

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

# TIMSS



## TIMSS 2007 International Mathematics Report

*Findings from IEA's Trends  
in International Mathematics  
and Science Study at the  
Fourth and Eighth Grades*

Ina V.S. Mullis

Michael O. Martin

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*In collaboration with*

John F. Olson

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Joseph Galia



**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



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# Contents



Foreword . . . . .	1
Executive Summary . . . . .	5
Introduction . . . . .	13
<b>What Is TIMSS?</b> . . . . .	14
<b>Which Countries Participated in TIMSS 2007?</b> . . . . .	15
Exhibit 1    Countries Participating in TIMSS 2007 . . . . .	16
Exhibit 2    Countries Participating in TIMSS 1995 Through 2007 . . . . .	20
Exhibit 3    Selected Characteristics of TIMSS 2007 Countries. . . . .	22
<b>What Was the Nature of the TIMSS 2007 Mathematics Test?</b> . . . . .	24
<b>How Was Information Collected About the Contexts for Learning Mathematics?</b> . . . . .	25
<b>Who Conducts TIMSS?</b> . . . . .	26
<b>Chapter 1 . . . . .</b>	<b>31</b>
<i><b>International Student Achievement in Mathematics</b></i>	
<b>How Do Countries Differ in Mathematics Achievement?</b> . . . . .	31
Exhibit 1.1    TIMSS 2007 Distribution of Mathematics Achievement . . . . .	34
Exhibit 1.2    TIMSS 2007 Multiple Comparisons of Average Mathematics Achievement. . . . .	36
<b>How Has Mathematics Achievement Changed Since 1995, 1999, and 2003?</b> . . . . .	43
Exhibit 1.3    Trends in Mathematics Achievement – 1995 Through 2007 . . . . .	44
<b>Trends Across Grades: Fourth to Eighth Grade Cohort Analysis</b> . . . . .	54
Exhibit 1.4    Cohort Comparison: 2003 Fourth Grade Students in Eighth Grade in 2007. . . . .	55
<b>What Are the Gender Differences in Mathematics Achievement?</b> . . . . .	56
Exhibit 1.5    TIMSS 2007 Average Mathematics Achievement by Gender . . . . .	58
Exhibit 1.6    Trends in Average Mathematics Achievement by Gender – 1995 Through 2007 . . . . .	60

Chapter 2 . . . . . 65  
*Performance at the TIMSS 2007 International Benchmarks  
 for Mathematics Achievement*

**How Do Countries Compare with the TIMSS 2007 International Benchmarks of Mathematics Achievement?** . . . . . 66

    Exhibit 2.1 TIMSS 2007 International Benchmarks of Mathematics Achievement . . . . . 68

    Exhibit 2.2 Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement . . . . . 70

    Exhibit 2.3 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement . . . . . 76

**Fourth Grade: Achievement at the Advanced International Benchmark** . . . . . 80

    Exhibit 2.4 Description of the TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement . . . . . 81

    Exhibit 2.5 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 1 . . . . . 83

    Exhibit 2.6 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 2 . . . . . 84

**Fourth Grade: Achievement at the High International Benchmark** . . . . . 85

    Exhibit 2.7 Description of the TIMSS 2007 High International Benchmark (550) of Mathematics Achievement . . . . . 86

    Exhibit 2.8 TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 3 . . . . . 87

    Exhibit 2.9 TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 4 . . . . . 88

**Fourth Grade: Achievement at the Intermediate International Benchmark** . . . . . 89

    Exhibit 2.10 Description of the TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement . . . . . 90

    Exhibit 2.11 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 5 . . . . . 91

    Exhibit 2.12 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 6 . . . . . 93

    Exhibit 2.13 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 7 . . . . . 94

**Fourth Grade: Achievement at the Low International Benchmark** . . . . . 95

    Exhibit 2.14 Description of the TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement . . . . . 96

    Exhibit 2.15 TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 8 . . . . . 97

**Eighth Grade: Achievement at the Advanced International Benchmark** . . . . . 98

    Exhibit 2.16 Description of the TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement . . . . . 100

    Exhibit 2.17 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 1 . . . . . 102

    Exhibit 2.18 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 2 . . . . . 103

<b>Eighth Grade: Achievement at the High International Benchmark</b> . . . . .	104
<b>Exhibit 2.19</b> Description of the TIMSS 2007 High International Benchmark (550) of Mathematics Achievement . . . . .	105
<b>Exhibit 2.20</b> TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 3. . . . .	106
<b>Exhibit 2.21</b> TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 4. . . . .	107
<b>Eighth Grade: Achievement at the Intermediate International Benchmark</b> . . . . .	108
<b>Exhibit 2.22</b> Description of the TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement . . . . .	109
<b>Exhibit 2.23</b> TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 5 . . . . .	110
<b>Exhibit 2.24</b> TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 6. . . . .	111
<b>Eighth Grade: Achievement at the Low International Benchmark</b> . . . . .	112
<b>Exhibit 2.25</b> Description of the TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement . . . . .	113
<b>Exhibit 2.26</b> TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 7. . . . .	114
<b>Exhibit 2.27</b> TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 8. . . . .	115

## Chapter 3 . . . . . 117

### *Average Achievement in the Mathematics Content and Cognitive Domains*

<b>How Does Achievement Differ Across the TIMSS 2007 Mathematics Content and Cognitive Domains?</b> . . . . .	118
<b>Exhibit 3.1</b> Average Achievement in the Mathematics Content and Cognitive Domains. . . . .	120
<b>In Which Mathematics Content and Cognitive Domains Are Countries Relatively Strong or Weak?</b> . . . . .	124
<b>Exhibit 3.2</b> Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains . . . . .	126
<b>What Are the Gender Differences in Achievement for the Mathematics Content and Cognitive Domains?</b> . . . . .	136
<b>Exhibit 3.3</b> Average Achievement in the Mathematics Content and Cognitive Domains by Gender. . . . .	138

## Chapter 4 . . . . . 143

### *Students' Backgrounds And Attitudes Toward Mathematics*

<b>What Educational Resources Do Students Have in Their Homes?</b> . . . . .	143
<b>Exhibit 4.1</b> Highest Level of Education of Either Parent. . . . .	146
<b>Exhibit 4.2</b> Students Speak the Language of the Test at Home with Trends . . . . .	148
<b>Exhibit 4.3</b> Students' Parents Born in the Country with Trends . . . . .	152
<b>Exhibit 4.4</b> Books in the Home with Trends . . . . .	156
<b>Exhibit 4.5</b> Computer and Internet Connection in the Home . . . . .	162
<b>Exhibit 4.6</b> Computer Use with Trends . . . . .	164

<b>How Much of Their Out-of-school Time Do Students Spend on Homework During the School Week?</b> . . . . .	169
Exhibit 4.7 Index of Time Students Spend Doing Mathematics Homework (TMH) in a Normal School Week . . . . .	170
<b>What Are Students' Attitudes Toward Mathematics?</b> . . . . .	173
Exhibit 4.8 Index of Students' Positive Affect Toward Mathematics (PATM) with Trends . . . . .	175
Exhibit 4.9 Index of Students' Valuing Mathematics (SVM) with Trends. . . . .	179
Exhibit 4.10 Index of Students' Self-Confidence in Learning Mathematics (SCM) with Trends . . . . .	182
Exhibit 4.11 Index of Students' Self-Confidence in Learning Mathematics (SCM) by Gender . . . . .	184

## Chapter 5 . . . . . 189

### *The Mathematics Curriculum*

<b>How Much Instructional Time Is Spent on Mathematics?</b> . . . . .	190
Exhibit 5.1 Weekly Intended and Implemented Instructional Time for Mathematics with Trends . . . . .	192
Exhibit 5.2 Yearly Hours of Implemented Instructional Time for Mathematics with Trends . . . . .	194
Exhibit 5.3 Percentage of Time in Mathematics Class Devoted to TIMSS Content Domains During the School Year . . . . .	196
<b>Are the TIMSS Mathematics Topics Included in the Intended Curriculum Taught in School?</b> . . . . .	198
Exhibit 5.4 Summary of TIMSS Mathematics Topics in the Intended Curriculum . . . . .	200
Exhibit 5.5 Summary of Students Taught the TIMSS Mathematics Topics . . . . .	204
<b>Fourth Grade: Which TIMSS Mathematics Topics Are in the Intended and Implemented Curriculum?</b> . . . . .	206
Exhibit 5.6 Intended and Taught TIMSS Number Topics . . . . .	208
Exhibit 5.7 Intended and Taught TIMSS Geometric Shapes and Measures Topics . . . . .	216
Exhibit 5.8 Intended and Taught TIMSS Data Display Topics . . . . .	220
<b>Eighth Grade: Which TIMSS Mathematics Topics Are in the Intended and Implemented Curriculum?</b> . . . . .	222
Exhibit 5.9 Intended and Taught TIMSS Number Topics . . . . .	224
Exhibit 5.10 Intended and Taught TIMSS Algebra Topics. . . . .	228
Exhibit 5.11 Intended and Taught TIMSS Geometry Topics . . . . .	232
Exhibit 5.12 Intended and Taught TIMSS Data and Chance Topics . . . . .	238

## Chapter 6 . . . . . 243

### *Teachers of Mathematics*

<b>What Are the Background Characteristics of Mathematics Teachers?</b> . . . . .	243
Exhibit 6.1 Mathematics Teachers' Gender, Age, and Number of Years Teaching with Trends . . . . .	244
<b>What Education and Training Do Teachers Have for Teaching Mathematics?</b> . . . . .	246
Exhibit 6.2 Highest Educational Level of Mathematics Teachers . . . . .	248
Exhibit 6.3 Teachers' Educational Emphasis on Mathematics and Teaching . . . . .	250
Exhibit 6.4 Teachers' Participation in Professional Development in Mathematics . . . . .	252
Exhibit 6.5 Frequency of Collaboration Among Mathematics Teachers with Trends. . . . .	255



<b>How Well Prepared Do Teachers Feel They Are to Teach Mathematics?</b> . . . . .	257
<b>Exhibit 6.6</b> Summary of Students Whose Teachers Feel "Very Well" Prepared to Teach the TIMSS Mathematics Topics . . . . .	258
<b>Exhibit 6.7</b> Students Whose Teachers Feel "Very Well" Prepared to Teach the TIMSS Mathematics Topics . . . . .	260

## Chapter 7 . . . . . 267

### *Classroom Characteristics and Instruction*

<b>How Do the Characteristics of Mathematics Classrooms Impact Instruction?</b> . . . . .	267
<b>Exhibit 7.1</b> Class Size for Mathematics Instruction with Trends . . . . .	268
<b>Exhibit 7.2</b> Achievement and Class Size for Mathematics Instruction . . . . .	274
<b>Exhibit 7.3</b> Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction Due to Student Factors (MCFL) . . . . .	276
<b>What Activities Do Students Do in Their Mathematics Lessons?</b> . . . . .	278
<b>Exhibit 7.4</b> Students' Reports on Mathematics Content-related Emphasis in Classroom Activities . . . . .	280
<b>Exhibit 7.5</b> Teachers' Reports on Mathematics Content-related Emphasis in Students' Classroom Activities . . . . .	282
<b>Exhibit 7.6</b> Students' Reports on Learning Activities in Mathematics Lessons . . . . .	284
<b>Exhibit 7.7</b> Teachers' Reports on Learning Activities in Mathematics Lessons . . . . .	286
<b>What Instructional Strategies Are Used in Mathematics Classes?</b> . . . . .	288
<b>Exhibit 7.8</b> Textbook Use in Teaching Mathematics with Trends . . . . .	290
<b>Exhibit 7.9</b> Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week . . . . .	292
<b>How Are Calculators and Computers Used?</b> . . . . .	296
<b>Exhibit 7.10</b> Calculator Use in Mathematics Class with Trends . . . . .	298
<b>Exhibit 7.11</b> Computer Use in Mathematics Class with Trends . . . . .	300
<b>What is the Role of Homework?</b> . . . . .	302
<b>Exhibit 7.12</b> Index of Teachers' Emphasis on Mathematics Homework (EMH) with Trends . . . . .	304
<b>Exhibit 7.13</b> Use of Mathematics Homework . . . . .	306
<b>Exhibit 7.14</b> Types of Mathematics Homework with Trends . . . . .	307
<b>What Types of Assessments Are Used in Mathematics Classes?</b> . . . . .	308
<b>Exhibit 7.15</b> Emphasis on Sources to Monitor Students' Progress in Mathematics . . . . .	309
<b>Exhibit 7.16</b> Frequency of Teachers Giving Mathematics Tests with Trends . . . . .	310
<b>Exhibit 7.17</b> Item Formats Used by Teachers in Mathematics Tests or Examinations with Trends . . . . .	312
<b>Exhibit 7.18</b> Types of Questions on Mathematics Tests . . . . .	314

## Chapter 8 . . . . . 317

### *School Contexts for Mathematics Learning and Instruction*

<b>What Are the Characteristics of the Schools' Student Population?</b> . . . . .	317
<b>Exhibit 8.1</b> Principals' Reports on the Percentages of Students in Their Schools Coming from Economically Disadvantaged Homes with Trends . . . . .	320
<b>Exhibit 8.2</b> Principals' Reports on the Percentages of Students Having the Language of the Test as Their Native Language with Trends . . . . .	324
<b>Exhibit 8.3</b> Index of Good Attendance at School (GAS) . . . . .	328
<b>Exhibit 8.4</b> High Index of Good Attendance at School (GAS) with Trends . . . . .	330

<b>What Is the Role of the School Principal?</b> . . . . .	332
Exhibit 8.5 Principals' Time Spent on Various School-related Activities with Trends . . . . .	334
<b>Do Schools Encourage Home Involvement?</b> . . . . .	338
Exhibit 8.6 Schools' Encouragement of Parental Involvement . . . . .	340
<b>What School Resources Are Available to Support School Learning?</b> . . . . .	342
Exhibit 8.7 Index of Availability of School Resources for Mathematics Instruction (ASRMI) . . . . .	344
Exhibit 8.8 High Index of Availability of School Resources for Mathematics Instruction (ASRMI) with Trends . . . . .	346
Exhibit 8.9 Index of Teachers' Adequate Working Conditions (TAWC). . . . .	350
Exhibit 8.10 Schools' Reports on Teachers' Mathematics and Science Professional Development in the Past 2 Years. . . . .	352
<b>What Are the Perceptions of School Climate?</b> . . . . .	355
Exhibit 8.11 Index of Principals' Perception of School Climate (PPSC) with Trends . . . . .	358
Exhibit 8.12 Index of Mathematics Teachers' Perception of School Climate (TPSC) with Trends . . . . .	360
<b>How Safe and Orderly Are Schools?</b> . . . . .	362
Exhibit 8.13 Index of Mathematics Teachers' Perception of Safety in School (TPSS) with Trends . . . . .	364
Exhibit 8.14 Index of Students' Perception of Being Safe in School (SPBSS) with Trends . . . . .	366
 <b>Appendix A</b> . . . . .	 371
<i>Supporting Documentation</i>	
<b>TIMSS 2007 Mathematics Framework</b> . . . . .	371
Exhibit A.1 Overview of TIMSS 2007 Mathematics Framework . . . . .	372
<b>Number of Items by Mathematics Content and Cognitive Domains</b> . . . . .	373
Exhibit A.2 Distribution of Mathematics Items by Content Domain and Cognitive Domain . . . . .	374
<b>Grades and Ages Assessed</b> . . . . .	376
Exhibit A.3 Information About the Grades and Ages of Students Tested in TIMSS 2007 . . . . .	378
<b>Sample Implementation and Participation Rates</b> . . . . .	382
Exhibit A.4 Coverage of TIMSS 2007 Target Population . . . . .	384
Exhibit A.5 School Sample Sizes . . . . .	388
Exhibit A.6 Student Sample Sizes . . . . .	390
Exhibit A.7 Participation Rates (Weighted). . . . .	392
Exhibit A.8 Trends in Student Populations . . . . .	395
<b>Translation and Layout Verification</b> . . . . .	398
<b>Survey Operations for Data Collection</b> . . . . .	399
<b>Scoring the Constructed-response Items</b> . . . . .	399
<b>Test Reliability</b> . . . . .	401
<b>Scaling the Achievement Data</b> . . . . .	401
Exhibit A.9 Average Percent Correct in the Mathematics Content and Cognitive Domains . . . . .	405
<b>Scale Anchoring Analysis</b> . . . . .	407
<b>Estimating Standard Errors</b> . . . . .	409

Appendix B. . . . . 411

*Multiple Comparisons of Average Achievement in Mathematics Content And Cognitive Domains*

Exhibit B.1 Multiple Comparisons of Average Achievement in Number . . . . . 412

Exhibit B.2 Multiple Comparisons of Average Achievement in Geometric Shapes and Measures . . . . . 414

Exhibit B.3 Multiple Comparisons of Average Achievement in Data Display . . . . . 416

Exhibit B.4 Multiple Comparisons of Average Achievement in Knowing. . . . . 418

Exhibit B.5 Multiple Comparisons of Average Achievement in Applying. . . . . 420

Exhibit B.6 Multiple Comparisons of Average Achievement in Reasoning. . . . . 422

Exhibit B.7 Multiple Comparisons of Average Achievement in Number . . . . . 424

Exhibit B.8 Multiple Comparisons of Average Achievement in Algebra . . . . . 426

Exhibit B.9 Multiple Comparisons of Average Achievement in Geometry . . . . . 428

Exhibit B.10 Multiple Comparisons of Average Achievement in Data and Chance . . . . . 430

Exhibit B.11 Multiple Comparisons of Average Achievement in Knowing. . . . . 432

Exhibit B.12 Multiple Comparisons of Average Achievement in Applying. . . . . 434

Exhibit B.13 Multiple Comparisons of Average Achievement in Reasoning. . . . . 436

Appendix C . . . . . 439

*The Test-Curriculum Matching Analysis: Mathematics*

Exhibit C.1 Average Percent Correct for Test–Curriculum Matching Analysis – Mathematics . . . 444

Exhibit C.2 Standard Errors for the Test–Curriculum Matching Analysis – Mathematics . . . . . 448

Appendix D . . . . . 453

*Percentiles and Standard Deviations of Mathematics Achievement*

Exhibit D.1 Percentiles of Achievement in Mathematics . . . . . 454

Exhibit D.2 Standard Deviations of Achievement in Mathematics . . . . . 456

Appendix E. . . . . 459

*Mongolia—Mathematics Achievement*

Exhibit E.1 Mongolia – Selected Mathematics Achievement Results . . . . . 460

Appendix F. . . . . 463

*Organizations and Individuals Responsible for TIMSS 2007*



# Foreword



There is almost universal recognition that the effectiveness of a country's educational system is a key element in establishing competitive advantage in what is an increasingly global economy. Education is fundamentally implicated not only in a country's economic and social development, but also in the personal development of its citizens. It is considered one of the primary means whereby inequities, social and economic, can be reduced. Attendant on this growing recognition of the importance and centrality of education has been the recognition, worldwide, of the importance of regular monitoring of educational performance and its antecedents.

How and on what basis policymakers, administrators, and teachers make decisions in the educational arena, and how and on what information educational systems are shaped lie at the heart of international comparative studies of education like TIMSS (Trends in International Mathematics and Science Study). As a pioneer in the field, the International Association for the Evaluation of Educational Achievement (IEA) has been conducting comparative studies of educational achievement in a number of curriculum areas, including mathematics and science, for nearly 50 years.

Conducted in 59 countries around the world, TIMSS 2007 represents the fourth cycle of IEA's study of the mathematics and science performance of fourth grade and eighth grade students. This report provides extensive information on the performance of students in mathematics and science as well as sub-domains in these curricular areas. It also provides information about students' competence in managing mathematics and science challenges

which have differing cognitive demands. For policymakers, the TIMSS 2007 report contains a wealth of information about key instructional, curricular, and resource related variables that are fundamental in understanding the teaching and learning process. This extensive information about trends in students' achievement and the contexts for teaching and learning mathematics and science should help ensure that TIMSS continues to be widely recognized as the most influential study of its type. The information should be of great value in guiding educational decision making and practice in the areas of mathematics and science around the world.

TIMSS is an enormous undertaking, well into its second decade of operation and involving activities spanning the globe. Clearly, projects of this magnitude are not possible without the dedication, skills, cooperation, and support of a large number of individuals, institutions, and organizations around the world. The trend data in this report represent years of technically demanding work involving many, many people, far too numerous to name here. IEA, however, is deeply grateful to each and every person who contributed to the possibility and creation of the TIMSS results reported herein.

IEA is particularly indebted to the remarkable group of professionals at the TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College who have been charged with the overall leadership of this project. The contributions from the staff of the IEA Data Processing and Research Center and the IEA Secretariat, as well as from IEA's consortium partners, Statistics Canada and Educational Testing Service, are also central to the success of this project and for their support I am extremely grateful. The TIMSS 2007 project coordinators, assessment designer/developers, psychometricians, sampling statisticians, statistical programmers, and production specialists are among the most expert and experienced in the world. Most important, however, has been the continued leadership and direction of the TIMSS Executive Directors, Drs. Ina Mullis and Michael Martin, whose contributions are central to the success of this project.

Projects of this size are also not possible without considerable financial support. I am particularly grateful for the financial support from IEA's major funding partners, including the U.S. National Center for Education Statistics, the World Bank, the United Nations Development Program, and the many self funding countries without which this project would not have been possible. I also wish to thank Boston College and the National Foundation for Educational Research for their continued support.

As always, critical to the success of this project has been the willingness of participating countries to commit to a common set of protocols. Also, TIMSS would not have been possible without the participation of the many teachers, students, and policymakers around the world who gave freely of their time in the interest of advancing our common understanding of mathematics and science achievement. On behalf of all who benefit from the use of the information provided by TIMSS, we remain thankful for this commitment.

Finally, TIMSS relies on the National Research Coordinators and their colleagues whose responsibility it was to manage and execute the study at the national level. These individuals and their national teams made this project a success and for this they deserve our thanks and appreciation.

Dr. Hans Wagemaker  
Executive Director, IEA





# Executive Summary



TIMSS 2007 is the fourth in a continuing cycle of international mathematics and science assessments conducted every four years. TIMSS assesses achievement in countries around the world and collects a rich array of information about the educational contexts for learning mathematics and science, with TIMSS 2007 involving more than 60 participants. This report contains the mathematics results for 37 countries and 7 benchmarking participants at the fourth grade and for 50 countries and 7 benchmarking participants at the eighth grade. Trend data are provided at the fourth and eighth grades for those countries that also participated in 1995, 1999, and 2003 (please see the Introduction for more information about TIMSS 2007).

## **Mathematics Achievement**

- ▶ At the fourth grade, Hong Kong SAR and Singapore were the top performing countries. They were followed by Chinese Taipei, that had higher average mathematics achievement than all countries except Hong Kong SAR and Singapore, and, in turn, by Japan, that had higher achievement than all of the remaining countries. Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands also performed very well. Several benchmarking participants also had high average mathematics achievement, including the U.S. state of Massachusetts, which performed similarly to Chinese Taipei and the state of Minnesota, which performed similarly to Kazakhstan, the Russian Federation, and England.

- ▶ At the eighth grade, Chinese Taipei, Korea, and Singapore had the highest average mathematics achievement. These three countries were followed by Hong Kong SAR and Japan, also performing similarly and having higher achievement than all the other countries except the top three performers. There was a substantial gap in average mathematics achievement between the five Asian countries and the next group of four similarly performing countries, including Hungary, England, the Russian Federation, and the United States. Among the benchmarking participants, the two U.S. states, Massachusetts and Minnesota, and the province of Quebec were outperformed by the five Asian countries but had higher average achievement than the group of four countries. The provinces of Ontario and British Columbia had average achievement similar to the group of four countries.
- ▶ Remarkable percentages of students in Asian countries reached the Advanced International Benchmark for mathematics, representing fluency on items involving the most complex topics and reasoning skills. In particular, at the fourth grade, Singapore and Hong Kong SAR had 41 and 40 percent of their students, respectively, achieving at or above the Advanced International Benchmark. At the eighth grade, Chinese Taipei, Korea, and Singapore had 40 to 45 percent of their students achieving at or above the Advanced International Benchmark. The median percentage of students reaching this Benchmark was 5 percent at the fourth grade and 2 percent at the eighth grade.
- ▶ Looking at trends across all of the participating countries, not taking into account whether countries have participated in two, three, or four cycles (eighth grade) of TIMSS, more countries showed improvement in average achievement between their first cycle of participation and TIMSS 2007 than declines at the fourth grade, although this was not the pattern at the eighth grade. At the fourth grade, 10 countries had higher average achievement in 2007 than in their first TIMSS assessment, 5 had lower average achievement, and 8 showed no significant change. At the eighth grade, 10 countries had higher average achievement in 2007 than in their initial assessment, 15 lower average achievement, and 11 showed no significant change.

- ▶ At the fourth grade, there was no difference in average mathematics achievement between boys and girls, on average across the TIMSS 2007 countries. In approximately half the countries, the difference in average achievement was negligible. Girls had higher mathematics achievement than boys in 8 countries and boys had higher achievement than girls in 12 countries. At the eighth grade, on average, girls had higher achievement than boys. Girls had higher average mathematics achievement than boys in 16 countries and boys had higher achievement than girls in 8 countries.

### **Factors Associated with Higher Achievement in Mathematics**

- ▶ At both fourth and eighth grades, on average across countries, a large majority of students reported always or almost always speaking the language of the test at home, and these students had higher average mathematics achievement than those who reported speaking it less frequently. Also, students from homes with more books had higher average mathematics achievement than those from homes with fewer books.
- ▶ At the eighth grade, higher levels of parents' education were associated with higher average mathematics achievement in almost all countries.
- ▶ On average across countries at the fourth and eighth grades, students from homes with a computer had higher mathematics achievement than those from homes without a computer, and those from homes with an Internet-connected computer had higher achievement than students from homes without such a facility. Average achievement was highest among those reporting using a computer at home and at school and at home only, perhaps reflecting an economic advantage for those with a computer at home, and lowest among those reporting that they do not use a computer at all or use one only at places other than the home and the school. At both grades, computer use increased in a number of countries between 2003 and 2007.
- ▶ Students generally had positive attitudes toward mathematics, on average across countries (72% at the high level at fourth grade and 54% at

eighth grade), and those with more positive attitudes had higher average mathematics achievement than students with less positive attitudes. There also was a positive association between level of self-confidence in learning mathematics and mathematics achievement at both grades. Further, eighth grade mathematics achievement was higher for students who reported placing a higher value on mathematics.

- ▶ At both grades, on average, there was a positive association between attending schools with fewer students from economically disadvantaged homes and mathematics achievement. Also, achievement was highest among students attending schools with more than 90 percent of students having the language of the test as their native language.
- ▶ Average mathematics achievement was highest among students attending schools with few attendance problems and lowest among students attending schools where there were serious problems with students arriving late, absenteeism, and missing class. Such problems appear to be more serious at the eighth grade.
- ▶ Principals were asked the degree to which shortages or inadequacies in resources affected their schools' general capacity to provide instruction. At both grades, average mathematics achievement was highest among students in schools where principals reported that resource shortages were not a problem. Also, there was an association between higher average achievement and more positive teachers' reports about the adequacy of their working conditions.
- ▶ At both fourth and eighth grades, mathematics achievement was highest, on average, where principals and teachers had a positive view of the school climate. At the eighth grade, teachers had a somewhat less positive outlook on climate than principals. There was a positive association between average mathematics achievement and students' perception of being safe in school at both fourth and eighth grades.

## Mathematics Curriculum and Instruction

- ▶ At the fourth grade, there was some variation, but countries' prescribed curricula averaged 23 hours of total instruction per week, with about one fifth of the time (18%) being for mathematics instruction. Generally, there was very close agreement between the curriculum and teachers' reports about its implementation. On average internationally, fourth grade teachers reported a total of 24 hours of weekly instruction, with 16 percent being devoted to mathematics. At the eighth grade, the prescribed instructional time per week averaged 27 hours, with 14 percent for mathematics instruction. Teachers' reports of 28 hours per week in total and 12 percent for mathematics instruction corresponded closely.
- ▶ At the fourth grade, on average across countries, teachers reported devoting half the mathematics instructional time to the content area of number, about one fourth (24%) to geometric shapes and measures, 16 percent to data display, and 10 percent to other areas. At the eighth grade, on average internationally, teachers reported devoting 24 percent of the mathematics instructional time to number, 29 percent to algebra, 27 percent to geometry, 13 percent to data and chance, and 7 percent to other areas.
- ▶ For most countries, much of the mathematics content assessed by TIMSS was included in their intended curriculum. On average across countries at the fourth grade, the majority of the assessment topics (22 out of 35) were intended for all or almost all students. At the eighth grade, on average across countries, most of the assessment topics (31 out of 39) were intended for all or almost all students.
- ▶ According to their teachers, 66 percent of fourth grade students and 72 percent of eighth grade students, on average across countries, had been taught the mathematics topics assessed.
- ▶ At both the fourth and eighth grades, the majority of students were taught mathematics by teachers in their 30s and 40s. Although about one fourth of the students internationally were taught by teachers 50 or older, relatively few students were taught by younger teachers. On

average, internationally, 70 percent of the fourth grade students and 78 percent of the eighth grade students had teachers with a university degree. However, there was some variation at the fourth grade.

- ▶ Most countries have a national or regional mathematics curriculum, and most countries reported that teachers received specific preparation in how to teach the mathematics curriculum as part of pre-service education. At the eighth grade, on average internationally, most students had teachers who had studied mathematics (70%) and/or mathematics education (54%). However, in a number of countries, the teachers of the fourth grade students reported little specific training or specialized education in mathematics.
- ▶ At the fourth grade, on average internationally, 72 percent of the students were taught by teachers who reported feeling very well prepared to teach the mathematics topics in the TIMSS assessment. At the eighth grade, 79 percent of the students had teachers who reported being very well prepared to teach the TIMSS mathematics topics.
- ▶ The textbook remains the primary basis of mathematics instruction at both the fourth and eighth grades. On average internationally, 65 percent of the students at fourth grade and 60 percent at eighth grade had teachers who reported using a textbook as the primary basis of their lessons. For another 30 percent of the fourth grade students and 34 percent of the eighth grade students, teachers reported using textbooks as a supplementary resource.
- ▶ At the fourth grade, internationally on average, most time in mathematics class was spent on having students work on problems with teacher guidance (21%) and having students work on solving problems independently (22%). According to teachers, considerable time also was spent on listening to lectures (16%) and clarifications of content and procedures (13%). Together, these four activities accounted for 69 to 72 percent of the class time at both the fourth and eighth grades. At the eighth grade, the distribution involved slightly more time listening to lectures (20%) and slightly less on independent problem solving (16%).
- ▶ Most countries do not permit calculators in mathematics classes at the fourth grade; however, even in the high use countries, teachers reported

asking only small percentages of students to do calculator activities on a regular basis. At the eighth grade, almost all countries permit calculator usage for the majority of eighth grade students. On average internationally, teachers asked the greatest percentages of students to use calculators in solving complex problems (31%), checking answers (26%), and doing routine computations (25%). Only 16 percent, on average, were asked to explore number concepts.

- ▶ At the fourth grade, mathematics homework was not very prevalent and there was little relationship between teachers' emphasis on homework and student achievement. At the eighth grade, there was a positive relationship between teachers assigning more homework and mathematics achievement. However, a number of countries were assigning less homework in 2007 than in 2003.
- ▶ At the eighth grade, teachers used classroom tests to some extent for nearly all of the students. According to teachers' reports, 85 percent of eighth grade students were given mathematics tests at least monthly, on average internationally. Nearly half were given a mathematics test or examination every two weeks (or more frequently). On average, 44 percent of the students were taught by teachers who reported testing them with only or mostly constructed-response items, another 41 percent by teachers who reported using about half constructed-response and half multiple-choice items, and only 15 percent by teachers who reported using only or mostly multiple-choice items.





# Introduction



This report contains the results from the TIMSS 2007 mathematics assessments at the fourth and eighth grades, including trends over time in achievement and the educational contexts for mathematics instruction. The science results are contained in a companion volume, the *TIMSS 2007 International Science Report*.<sup>1</sup> Intended as a companion to both the mathematics and science reports, the *TIMSS 2007 Encyclopedia*<sup>2</sup> describes the national contexts for mathematics and science education and the mathematics and science curricula in the participating countries. The *TIMSS 2007 Assessment Frameworks*<sup>3</sup> contains the mathematics and science frameworks underlying the assessments at the fourth and eighth grades, and the contextual framework for the questionnaires. The *TIMSS 2007 Technical Report*<sup>4</sup> provides technical documentation about the development and implementation of the assessment. This report and the four other publications can be found on the TIMSS website ([timssandpirls.bc.edu](http://timssandpirls.bc.edu)).

Also, achievement results for the TIMSS 2007 participants are influenced by a great many factors, and the international report typically is complemented by a national report prepared by each country. In a national report, the countries can explore their data in more detail, make comparisons with smaller sets of countries of interest, or examine aspects of particular contextual factors not examined in the international report.

- 1 Martin, M.O., Mullis, I.V.S., & Foy, P. (with Olson, J.F., Erberber, E., Preuschoff, C., & Galia, J.). (2008). *TIMSS 2007 international science report: Findings from IEA's Trends in International Mathematics and Science Study at the fourth and eighth grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.
- 2 Mullis, I.V.S., Martin, M.O., Olson, J.F., Berger, D.R., Milne, D., & Stanco, G.M. (Eds.). (2008). *TIMSS 2007 encyclopedia: A guide to mathematics and science education around the world*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.
- 3 Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O'Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.
- 4 Olson, J.F., Martin, M.O., & Mullis, I.V.S. (Eds.). (2008). *TIMSS 2007 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

## What Is TIMSS?

TIMSS 2007, involving approximately 425,000 students from 59 countries around the world, is the most recent in an ambitious series of international assessments. The goal is to provide comparative information about educational achievement across countries to improve teaching and learning in mathematics and science.

TIMSS (Trends in International Mathematics and Science Study) measures trends in mathematics and science achievement at the fourth and eighth grades, as well as monitoring curricular implementation and identifying promising instructional practices from around the world. TIMSS is a project of the IEA (International Association for the Evaluation of Educational Achievement), which is an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement in a wide range of subjects since 1959.

Conducted on a regular 4-year cycle, TIMSS has assessed mathematics and science in 1995, 1999, 2003, and 2007 with planning underway for 2011. In addition to monitoring trends in achievement at the fourth and eighth grades, TIMSS provides information about relative progress across grades as the cohort of students assessed at the fourth grade in one cycle moves to the eighth grade four years later (i.e., the fourth grade students of 2003 became the eighth grade students of 2007). Also, to provide comparative perspectives on trends in achievement in the context of different educational systems, school organizational approaches, and instructional practices, TIMSS collects a rich array of background information.

### **Which Countries Participated in TIMSS 2007?**

TIMSS 2007 involved widespread participation from around the world. Exhibit 1 shows a map of the world identifying the TIMSS 2007 countries and benchmarking participants (regional entities). In Exhibit 1, the 59 participating countries and 8 benchmarking participants are listed alphabetically and shown by their geographic location. The benchmarking participants are regional entities that follow all of the rigorous quality standards established by TIMSS. Their data are comparable to the countries' data, and they can use the TIMSS results as a benchmark. The decision to participate in any IEA study is coordinated through the IEA Secretariat in Amsterdam and made by each member country according to its data needs and resources.

For the sake of comparability across countries and across assessments, TIMSS 2007 testing was generally conducted at the end of the school year. The countries on a Southern Hemisphere school schedule tested during October through December of 2006, which was the end of the school year for them. The remaining countries tested towards the end of the 2006–2007 school year, most often in April, May, or June of 2007.

Exhibit 1 **Countries Participating in TIMSS 2007**

**TIMSS2007** 4<sup>th</sup> & 8<sup>th</sup>  
**Mathematics & Science** Grades

- |                        |                         |
|------------------------|-------------------------|
| Algeria                | Mongolia                |
| Armenia                | Morocco                 |
| Australia              | Netherlands             |
| Austria                | New Zealand             |
| Bahrain                | Norway                  |
| Bosnia and Herzegovina | Oman                    |
| Botswana               | Palestinian Nat'l Auth. |
| Bulgaria               | Qatar                   |
| Chinese Taipei         | Romania                 |
| Colombia               | Russian Federation      |
| Cyprus                 | Saudi Arabia            |
| Czech Republic         | Scotland                |
| Denmark                | Serbia                  |
| Egypt                  | Singapore               |
| El Salvador            | Slovak Republic         |
| England                | Slovenia                |
| Georgia                | Sweden                  |
| Germany                | Syrian Arab Republic    |
| Ghana                  | Thailand                |
| Hong Kong SAR          | Tunisia                 |
| Hungary                | Turkey                  |
| Indonesia              | Ukraine                 |
| Iran, Islamic Rep. of  | United States           |
| Israel                 | Yemen                   |
| Italy                  |                         |
| Japan                  |                         |
| Jordan                 |                         |
| Kazakhstan             |                         |
| Korea, Rep. of         |                         |
| Kuwait                 |                         |
| Latvia                 |                         |
| Lebanon                |                         |
| Lithuania              |                         |
| Malaysia               |                         |
| Malta                  |                         |

**Benchmarking Participants**

- Alberta, Canada
- Basque Country, Spain
- British Columbia, Canada
- Dubai, UAE
- Massachusetts, US
- Minnesota, US
- Ontario, Canada
- Quebec, Canada

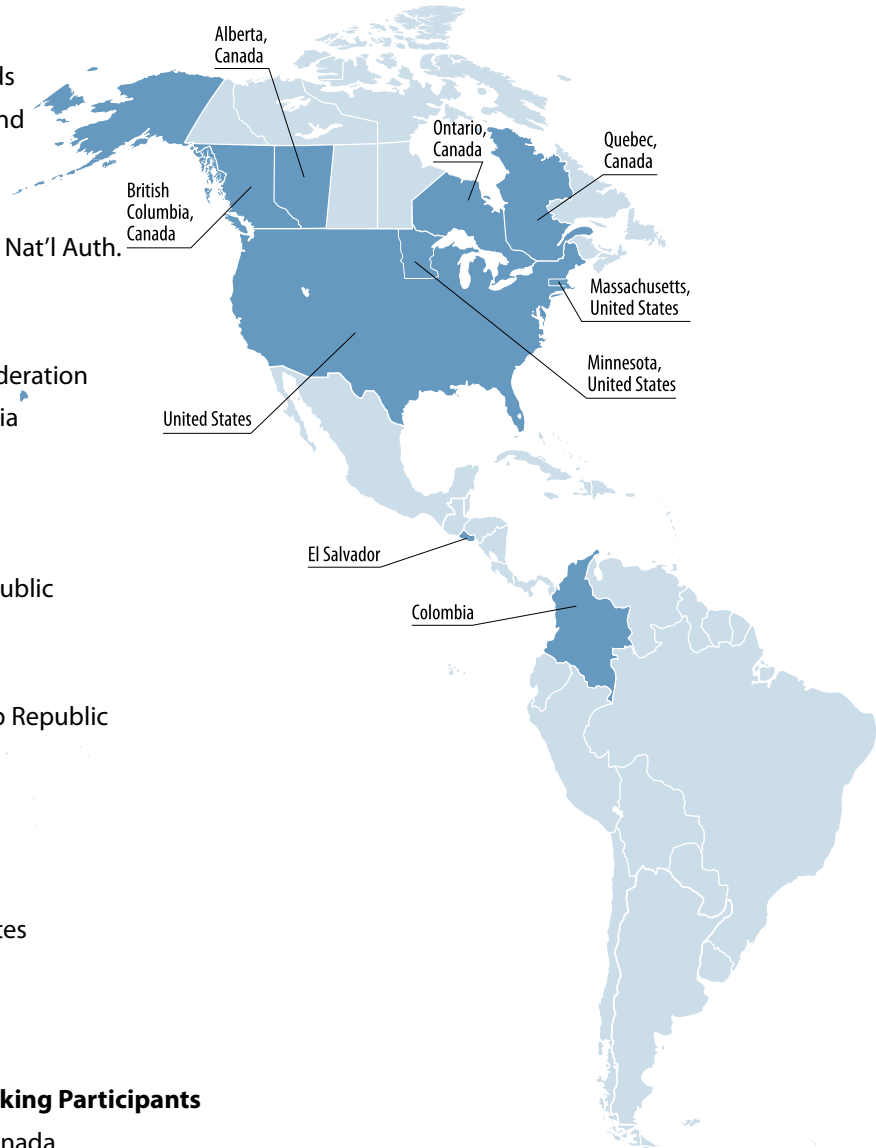


Exhibit 1 Countries Participating in TIMSS 2007 (Continued)

TIMSS2007  
Mathematics & Science  
4<sup>th</sup> & 8<sup>th</sup>  
Grades



Exhibit 2 lists the TIMSS 2007 participants, and indicates the grade(s) at which they participated and the previous cycles they participated in at that grade. It can be seen that many of the TIMSS 2007 participants have data for both the fourth and eighth grades. At the fourth grade, this report contains TIMSS 2007 data for 37 countries and 7 benchmarking participants, including 12 countries and 3 benchmarking entities that participated at the fourth grade for the first time. In all, 183,150 students participated at the fourth grade. At the eighth grade, the report contains data for 50 countries and 7 benchmarking participants, including 9 countries and 1 benchmarking entity participating at the eighth grade for the first time. In all, 241,613 students participated at the eighth grade. Because the quality of the Mongolian data is not well documented, the achievement results for Mongolia are presented in Appendix E.

Exhibit 2 also shows that most TIMSS 2007 participants have trend data and, for each participant, whether it is for two, three, or four points in time: 1995, 1999, 2003, and 2007. In several cases, countries participated in previous TIMSS assessments but some procedures were improved or changed for TIMSS 2007 and the earlier data are not comparable. The trend tables in this report include 23 countries and 4 benchmarking participants at the fourth grade and 36 countries and 6 benchmarking participants at the eighth grade.

Exhibit 3 presents selected information about the demographic and economic characteristics of the TIMSS 2007 countries, because such factors can influence educational policies and decision-making. As can be seen, the TIMSS 2007 countries vary widely in population size and geographic area, as well as in population density. The countries also vary widely on indicators of health, such as life expectancy and infant mortality rate. The majority of countries had life expectancies of 70 to 79 years, and infant mortality rates of between 3 and 20 out of 1,000 births. However, at one end of the continuum, 11 of the countries had a life expectancy of 80 years or more and a low infant mortality rate (5 or fewer infant deaths per 1,000 live births), while Ghana and Yemen had life expectancies of about 60 years and Botswana of 50 years,

and these three had the highest infant mortality rates (approximately 75 and 90 infant deaths per 1,000 live births, respectively).

The economic indicators in Exhibit 3, such as the data for gross national income per capita, reveal great disparity in the economic resources available, and also that different policies exist about the percentage of funds spent on education. Economically, the TIMSS 2007 countries ranged from Kuwait, Norway, Singapore, and the United States with relatively high gross national incomes per capita (in U.S. dollars adjusted for purchasing power parity) to Egypt, Georgia, Ghana, Indonesia, Jordan, Mongolia, Morocco, and Syria, with relatively low gross national incomes per capita. Although a number of countries had 95 percent or more of their primary and secondary students enrolled in school, there were differences in enrollments rates, especially at the secondary level. It should be noted that the enrollment data are for primary schools and secondary schools, not for the fourth and eighth grades *per se*.

## Exhibit 2 Countries Participating in TIMSS 1995 Through 2007

TIMSS2007  
Mathematics & Science  
4<sup>th</sup> & 8<sup>th</sup>  
Grades

Country	Grade 4			Grade 8			
	2007	2003	1995	2007	2003	1999	1995
Algeria	●			●			
Armenia	●	●			●		
Australia	●	●	●	●	●	●	●
Austria	●		●				●
Bahrain				●	●		
Bosnia and Herzegovina				●			
Botswana				●	●		
Bulgaria				●	●	●	●
Chinese Taipei	●	●		●	●	●	
Colombia	●			●			●
Cyprus		●	●	●	●	●	●
Czech Republic	●		●	●		●	●
Denmark	●						●
Egypt				●	●		
El Salvador	●			●			
England	●	●	●	●	●	●	●
Georgia	●			●			
Germany	●						●
Ghana				●	●		
Hong Kong SAR	●	●	●	●	●	●	●
Hungary	●	●	●	●	●	●	●
Indonesia				●	●	●	●
Iran, Islamic Rep. of	●	●	●	●	●	●	●
Israel			●	●	●	●	●
Italy	●	●	●	●	●	●	●
Japan	●	●	●	●	●	●	●
Jordan				●	●	●	
Kazakhstan	●						
Korea, Rep. of			●	●	●	●	●
Kuwait	●		●	●			●
Latvia	●	●	●		●	●	●
Lebanon				●	●		
Lithuania	●	●		●	●	●	●
Malaysia				●	●	●	
Malta				●			
Mongolia	●			●			
Morocco	●	●		●	●	●	
Netherlands	●	●	●		●	●	●
New Zealand	●	●	●		●	●	●
Norway	●	●	●	●	●		●
Oman				●			
Palestinian Nat'l Auth.				●	●		
Qatar	●			●			
Romania				●	●	●	●
Russian Federation	●	●		●	●	●	●
Saudi Arabia				●	●		

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



**Exhibit 2 Countries Participating in TIMSS 1995 Through 2007 (Continued)** **TIMSS2007**  
Mathematics & Science **4<sup>th</sup> & 8<sup>th</sup> Grades**

Country	Grade 4			Grade 8			
	2007	2003	1995	2007	2003	1999	1995
Scotland	●	●	●	●	●		●
Serbia				●	●		
Singapore	●	●	●	●	●	●	●
Slovak Republic	●				●	●	●
Slovenia	●	●	●	●	●	●	●
Sweden	●			●	●		●
Syrian Arab Republic				●	●		
Thailand			●	●		●	●
Tunisia	●	●		●	●	●	
Turkey				●		●	
Ukraine	●			●			
United States	●	●	●	●	●	●	●
Yemen	●	●					
<b>Benchmarking Participants</b>							
Alberta, Canada	●		●			●	●
Basque Country, Spain				●	●		
British Columbia, Canada	●			●		●	
Dubai, UAE	●			●			
Massachusetts, US	●			●		●	
Minnesota, US	●		●	●			●
Ontario, Canada	●	●	●	●	●	●	●
Quebec, Canada	●	●	●	●	●	●	●

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Exhibit 3 Selected Characteristics of TIMSS 2007 Countries

TIMSS2007  
Mathematics & Science 4<sup>th</sup> & 8<sup>th</sup> Grades

Country	Population Size (in Millions) <sup>1</sup>	Area of Country (Square Kilometers) <sup>2</sup>	Population Density (People per Square Kilometer) <sup>3</sup>	Urban Population (% of Total) <sup>4</sup>	Life Expectancy at Birth (Years) <sup>5</sup>	Infant Mortality Rate (per 1,000 Live Births) <sup>6</sup>	Gross National Income per Capita (in US Dollars) <sup>7</sup>	GNI per Capita (Purchasing Power Parity) <sup>8</sup>
Algeria	33.4	2381700	14	64	72	33	3030	5940
Armenia	3.0	28200	107	64	72	21	1920	4950
Australia	20.7	7682300	3	88	81	5	35860	33940
Austria	8.3	82500	100	66	80	4	39750	36040
Bahrain	0.7	700	1041	97	76	9	19350	34310
Bosnia and Herzegovina	3.9	51200	77	46	75	13	3230	6780
Botswana	1.9	566700	3	58	50	90	5570	11730
Bulgaria	7.7	108600	71	70	73	12	3990	10270
Chinese Taipei	23.0	36000	634	70	78	5	17294	–
Colombia	45.6	1109500	41	73	73	17	3120	6130
Cyprus	0.8	9300	84	70	79	3	23270	25060
Czech Republic	10.3	77300	133	74	77	3	12790	20920
Denmark	5.4	42400	128	86	78	4	52110	36190
Egypt	74.2	995500	75	43	71	29	1360	4940
El Salvador	6.8	20720	326	60	72	22	2680	5610
England	50.4	130000	390	90	79	5	40560	33650
Georgia	4.4	69500	64	52	71	28	1580	3880
Germany	82.4	348800	236	75	79	4	36810	32680
Ghana	23.0	227500	101	49	60	76	510	1240
Hong Kong SAR	6.9	1000	6581	100	82	–	29040	39200
Hungary	10.1	89600	112	67	73	6	10870	16970
Indonesia	223.0	1811600	123	49	68	26	1420	3310
Iran, Islamic Rep. of	70.1	1628600	43	67	71	30	2930	9800
Israel	7.1	21600	326	92	80	4	20170	23840
Italy	58.8	294100	200	68	81	4	31990	28970
Japan	127.8	364500	351	66	82	3	38630	32840
Jordan	5.5	88200	63	83	72	21	2650	4820
Kazakhstan	15.3	2699700	6	58	66	26	3870	8700
Korea, Rep. of	48.4	98700	490	81	79	5	17690	22990
Kuwait	2.6	17800	146	98	78	10	30630	48310
Latvia	2.3	62400	37	68	71	8	8100	14840
Lebanon	4.1	10200	396	87	72	26	5580	9600
Lithuania	3.4	62700	54	67	71	7	7930	14550
Malaysia	26.1	328600	80	68	74	10	5620	12160
Malta	0.4	300	1269	96	79	5	15310	20990
Mongolia	2.6	1566500	2	57	67	34	1000	2810
Morocco	30.5	446300	68	59	71	34	2160	3860
Netherlands	16.3	33900	482	81	80	4	43050	37940
New Zealand	4.2	267700	16	86	80	5	26750	25750
Norway	4.7	304300	15	78	80	3	68440	50070
Oman	2.5	309500	8	72	76	10	11120	19740
Palestinian Nat'l Auth.	3.9	6000	648	57	72	29	1374	–
Qatar	0.8	11000	75	96	76	18	–	–
Romania	21.6	230000	94	54	72	16	4830	10150
Russian Federation	142.5	16381400	9	73	66	14	5770	12740
Saudi Arabia	23.7	2000000	12	81	73	21	13980	22300
Scotland	5.1	78000	66	82	77	5	40560	33650
Serbia	7.4	102000	84	52	73	7	4030	9320
Singapore	4.5	700	6508	100	80	2	28730	43300
Slovak Republic	5.4	48100	112	56	74	7	9610	17060
Slovenia	2.0	20100	100	51	78	3	18660	23970
Sweden	9.1	410300	22	84	81	3	43530	34310
Syrian Arab Republic	19.4	183800	106	51	74	12	1560	4110
Thailand	63.4	510900	124	33	70	7	3050	7440
Tunisia	10.1	155400	65	66	74	19	2970	6490
Turkey	73.0	769600	95	68	72	24	5400	8410
Ukraine	46.8	579400	81	68	68	20	1940	6110
United States	299.4	9161900	33	81	78	7	44710	44070
Yemen	21.7	527900	41	28	62	75	760	2090

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



**Exhibit 3 Selected Characteristics of TIMSS 2007 Countries (Continued)**

**TIMSS2007** **4<sup>th</sup> & 8<sup>th</sup>**  
**Mathematics & Science** **Grades**

Public Expenditure on Education (% of GDP) <sup>9</sup>	Net Enrollment Ratio in Education (% of Relevant Group) <sup>10</sup>		Primary Pupil-Teacher Ratio <sup>11</sup>	Country
	Primary	Secondary		
–	95	66	25	Algeria
–	82	86	21	Armenia
5	96	86	–	Australia
5	97	–	12	Austria
–	96	90	–	Bahrain
–	–	–	–	Bosnia and Herzegovina
9	86	61	25	Botswana
3	93	89	16	Bulgaria
4	99	95	17	<sup>12</sup> Chinese Taipei
5	88	65	28	Colombia
6	100	94	18	Cyprus
4	93	–	16	Czech Republic
8	96	91	–	Denmark
–	94	83	26	Egypt
3	94	54	40	El Salvador
5	99	95	22	England
3	89	79	15	Georgia
5	–	–	14	Germany
5	66	38	32	Ghana
4	93	78	18	Hong Kong SAR
5	89	90	10	Hungary
1	95	57	20	Indonesia
5	94	77	19	Iran, Islamic Rep. of
7	97	89	13	Israel
5	99	92	10	Italy
4	100	100	19	Japan
–	91	79	20	Jordan
3	90	86	17	Kazakhstan
5	98	94	28	Korea, Rep. of
4	83	–	10	Kuwait
5	90	–	12	Latvia
3	82	73	14	Lebanon
5	88	94	14	Lithuania
6	99	72	17	Malaysia
–	86	84	11	Malta
5	91	82	33	Mongolia
7	88	35	27	Morocco
5	98	87	10	Netherlands
7	99	–	16	New Zealand
8	98	96	11	Norway
5	74	77	14	Oman
11	80	95	25	Palestinian Nat'l Auth.
2	96	90	11	Qatar
3	91	81	17	Romania
4	92	–	17	Russian Federation
7	93	60	15	Saudi Arabia
5	100	100	16	Scotland
–	96	–	–	Serbia
–	–	–	24	Singapore
4	92	–	18	Slovak Republic
6	96	91	15	Slovenia
7	97	99	10	Sweden
–	92	63	–	Syrian Arab Republic
4	94	71	18	Thailand
7	97	–	20	Tunisia
4	90	66	–	Turkey
6	90	84	17	Ukraine
6	92	88	14	United States
–	75	37	–	Yemen

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- All data taken from the 2008 World Development Indicators (World Bank, 2008) unless otherwise noted.
- Includes all residents regardless of legal status or citizenship except refugees not permanently settled in the country of asylum as they are generally considered to be part of their country of origin (pp. 40–43). Data for Palestinian National Authority, England, and Scotland provided by the National Research Coordinator (NRC).
  - Area is the total surface area in square kilometers, excluding the area under inland water bodies and national claims to the continental shelf and exclusive economic zones (pp. 130–133). Data for Palestinian National Authority, England, and Scotland provided by the NRC.
  - Mid-year population is divided by land area in square kilometers (pp. 14–17). Data for Palestinian National Authority, England, and Scotland provided by the NRC.
  - Urban population is the mid-year population of areas defined as urban in each country and reported to the United Nations. It is measured here as the percentage of the total population (pp. 170–173). Data for Palestinian National Authority, England, and Scotland provided by the NRC.
  - Number of years a newborn infant would live if prevailing patterns of mortality at its birth were to stay the same throughout its life (pp. 118–121). Data for Palestinian National Authority, England, and Scotland provided by the NRC.
  - Infant mortality rate is the number of deaths of infants under 1 year of age, per 1,000 live births in the same year (118–121). Data for Palestinian National Authority, England, and Scotland provided by the NRC.
  - GNI per capita in U.S. dollars is converted using the World Bank Atlas method (pp. 14–17). Data for Palestinian National Authority provided by the NRC. Figures for England and Scotland are for the whole region of the United Kingdom.
  - An international dollar has the same purchasing power over GNI as a U.S. dollar in the United States (pp. 14–17). Figures for England and Scotland are for the whole region of the United Kingdom.
  - Current and capital public expenditure on primary, secondary, and tertiary education expressed as a percentage of GDP (pp. 76–79). Data for Palestinian National Authority provided by the NRC. Figures for England and Scotland are for the whole region of the United Kingdom.
  - Ratio of the children of official school age who are enrolled in school to the population of the corresponding official school age, based on the International Standard Classification of Education 1997 (pp. 80–83). Data also provided by the Global Education Digest 2007, UNESCO Institute for Statistics (pp. 81–89, 101–109). Figures for England are for the whole region of the United Kingdom. Figures for Scotland provided by the NRC.
  - Primary pupil-teacher ratio is the number of pupils enrolled in primary school divided by the number of primary school teachers (regardless of their assignment (pp. 76–79)). Data for England and Scotland provided by the NRC.
  - Data for Chinese Taipei provided by the NRC.
- A dash (–) indicates comparable data are not available.

## What Was the Nature of the TIMSS 2007 Mathematics Test?

Chapters 1 through 3 of this report contain data about students' achievement on the mathematics assessment. At both fourth and eighth grades, the TIMSS 2007 mathematics assessment was organized around two dimensions, a content dimension specifying the subject matter domains to be assessed within mathematics and a cognitive dimension specifying the thinking processes or domains to be assessed.

The publication entitled *TIMSS 2007 Assessment Frameworks*<sup>5</sup> contains the mathematics framework for the fourth and eighth grades. The content domains differ for the fourth and eighth grades, reflecting the nature and difficulty of the mathematics widely taught at each grade.<sup>6</sup> At the fourth grade, the three content domains are number, geometric shapes and measures, and data display (with about half the assessment emphasis on the number domain including introductory algebra). At the eighth grade, the four content domains are number, algebra, geometry, and data and chance. At each grade, the mathematics framework describes each content domain in terms of the specific topic areas covered and the objectives within each topic.

The cognitive domains are the same for both grades—knowing, applying, and reasoning. Each cognitive domain is described according to the sets of processing behaviors expected of students as they engage with the mathematics content. The emphasis across the cognitive domains is such that the majority of the items assess the applying or reasoning domains.

TIMSS 2007 included an extensive test development effort to support the mathematics assessment framework. At the fourth grade, the test includes 179 items totaling 192 score points and at the eighth grade the test includes 215 items totaling 238 score points. At both grades, approximately half the items are constructed-response and half are multiple-choice. Chapter 2 contains more information about the content of the mathematics assessment, including example items. Appendix A contains further information about the numbers of items by type in each domain.

5 Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O'Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

6 With each cycle, TIMSS updates the assessment frameworks. For example, in 2003 the frameworks were expanded to provide specific objectives for assessing students at the fourth and eighth grades, and in 2007 the content domains were presented separately for the two grades. Also, there was an effort to consolidate the major content areas and, particularly at the fourth grade, to adjust the topic areas and objectives to make them better reflect fourth-grade curricula.

Developing the TIMSS tests for 2007 was a cooperative venture involving representatives from the participating countries throughout the entire process. The TIMSS & PIRLS International Study Center began the process with an item-writing workshop for the National Research Coordinators from the participating countries and their colleagues. Through a series of efforts, countries then submitted items that were reviewed by mathematics subject-matter specialists. Participating countries field-tested the items with representative samples of students, and all of the potential new items were reviewed by the TIMSS 2007 Science and Mathematics Item Review Committee of subject area experts. The National Research Coordinators had several opportunities to review the items and scoring criteria to ensure the items were measuring objectives in the frameworks, and were appropriate for students in their countries.

### **How Was Information Collected About the Contexts for Learning Mathematics?**

TIMSS uses the curriculum, broadly defined, as the major organizing concept in considering how educational opportunities are provided to students, and the factors that influence how students use these opportunities. IEA's curriculum model has three aspects, the intended curriculum specified by countries, the implemented curriculum actually taught, and the achieved curriculum—what students have learned. While Chapters 1 through 3 of this report present the data about students' mathematics learning, Chapters 4 through 8, together with the *TIMSS 2007 Encyclopedia* provide comprehensive information about the national contexts for mathematics education including information about the intended curriculum and the implemented curriculum.

To collect information about the intended curriculum, the TIMSS 2007 participants each completed a chapter for the *TIMSS 2007 Encyclopedia* published as a companion to the TIMSS 2007 international reports. For each TIMSS 2007 participant, the encyclopedia summarizes the major components of the curriculum in mathematics and science and describes what supports there are for curriculum implementation—for example, the types of teacher

education required, and any formal testing programs and/or assessments. Also, countries completed questionnaires about their national situations for education and aspects of their intended curricula, including identifying the TIMSS topics included (see Chapter 5).

Data about the instructional methods used to implement the curriculum were collected via questionnaires completed by the teachers and principals of the assessed students and by the students themselves. Corresponding to the information about the intended curriculum, teachers provided information about each of the TIMSS topics taught to the students (also in Chapter 5). The students that were assessed provided information about their home and classroom experiences, and their teachers and school principals provided information about instructional practices, school resources, and the school climate for learning.

To guide questionnaire development, the *TIMSS 2007 Assessment Frameworks* document includes a framework describing the contextual factors associated with students' learning in mathematics and science. Advice throughout the development process was provided by the TIMSS 2007 Questionnaire Item Review Committee.

### Who Conducts TIMSS?

TIMSS is a major undertaking of IEA, and together with PIRLS, comprises the core of IEA's regular cycle of studies. PIRLS (Progress in International Reading Literacy Study) has been assessing reading comprehension at the fourth grade since 2001 on a regular 5-year cycle. Forty countries participated in PIRLS 2006<sup>7</sup> and PIRLS 2011 is underway. IEA has delegated responsibility for the overall direction and management of these two projects to the TIMSS & PIRLS International Study Center at Boston College. Headed by Michael O. Martin and Ina V.S. Mullis, the study center is located in the Lynch School of Education.

In carrying out the projects, the TIMSS & PIRLS International Study Center works closely with the IEA Secretariat in Amsterdam, the IEA Data Processing and Research Center in Hamburg, Statistics Canada in Ottawa, and Educational Testing Service in Princeton, New Jersey. TIMSS expends

7 Kennedy, A.M., Mullis, I.V.S., Martin, M.O., & Trong, K.L. (Eds.). (2007). *PIRLS 2006 encyclopedia: A guide to reading education in the forty PIRLS 2006 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report: IEA's Progress in International Reading Literacy Study in primary schools in 40 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

enormous energy to ensure the reliability, validity, and comparability of the data through careful planning and documentation, cooperation among participating countries, standardized procedures, and rigorous attention to quality control throughout. The data are collected according to rigorous scientific standards detailed in manuals, and countries receive training every step of the way.

TIMSS 2007 was conducted in many different languages, involving a substantial effort in translating all of the assessment instruments. The translations underwent a complex verification procedure coordinated by the IEA Secretariat, while the test booklet layouts were verified by the TIMSS & PIRLS International Study Center.

The student sampling for TIMSS 2007 was conducted with careful attention to quality and comparability. The sampling was designed to ensure that the data provided accurate and economical estimates of the student population. To maintain high quality standards, a uniform approach was specified and staff from Statistics Canada worked with the participants on all phases of the sampling activities. If procedures did not satisfy the TIMSS standards, the data are annotated in the report (or not reported at all). Appendix A contains further information on target populations, sample implementation, and participation rates.

Adherence to the test administration procedures was monitored through the use of international quality control observers arranged by the IEA Secretariat, and within-country quality control procedures. The TIMSS & PIRLS International Study Center conducted several training sessions to ensure that the constructed-response scoring was done correctly. Reliability data were collected for within-country scoring and across assessment cycles using special procedures developed by the IEA Data Processing and Research Center (see Appendix A). The IEA Data Processing and Research Center checked each country's data files for internal consistency and accuracy, and interacted with countries to resolve data issues.

The TIMSS & PIRLS International Study Center reviewed achievement item statistics for every country and consulted with Educational Testing Service on the methods and results of the scaling process. The primary

approach to reporting the TIMSS 2007 achievement data was based on item response theory (IRT) scaling methods. In order to measure trends in mathematics achievement across assessments, the TIMSS achievement scales for mathematics were designed to provide reliable measures on a common metric established originally with the 1995 assessment, and now spanning the 1995, 1999, 2003, and 2007 assessments. More information about the TIMSS 2007 procedures for scaling and data analysis can be found in Appendix A.

To coordinate the TIMSS project nationally and to work with the international team, each participating country designated an individual (or two) to be its National Research Coordinator (NRC). The NRCs had the crucial and complex task of implementing the TIMSS 2007 study in their countries in accordance with TIMSS guidelines and procedures. The quality of the assessments depends on the work of the NRCs and their colleagues in carrying out the very detailed sampling, data collection, and scoring tasks involved. The TIMSS NRCs performed their many tasks with great dedication, competence, and energy, and are to be commended for their commitment to the project and high quality of their work.

Appendix F lists the names of many of those responsible for the management, coordination, and conduct of TIMSS 2007, including the NRCs from every country and benchmarking participant.







# Chapter 1



## *International Student Achievement in Mathematics*

Chapter 1 contains the TIMSS 2007 achievement results for fourth and eighth grade students in mathematics for each of the participating countries and benchmarking entities. It also presents trends in mathematics achievement over time for participants in previous TIMSS assessments in 1995, 1999, and 2003. Achievement differences by gender at both grades are also described.

### **How Do Countries Differ in Mathematics Achievement?**

Exhibit 1.1 shows the distribution of student achievement for the participants in TIMSS 2007, including the average (mean) scale score with its 95 percent confidence interval and the ranges in performance for the middle half of the students (25th to 75th percentiles) as well as the extremes (5th and 95th percentiles). The first page of Exhibit 1.1 presents the distribution for the achievement for the 36 countries and 7 benchmarking participants at the fourth grade and the second page presents the distribution of student achievement for the 49 countries and 7 benchmarking participants at the eighth grade.<sup>1</sup> For each grade in Exhibit 1.1, countries are shown in decreasing order of average (mean) scale score (with the exception of Morocco at the eighth grade<sup>2</sup>) followed by the benchmarking participants also ordered from highest to lowest average achievement. The benchmarking participants followed the same procedures and met the same standards as the countries, the difference being that they are regional entities (in some cases parts of

<sup>1</sup> Because characteristics of their samples and data are not completely known, selected achievement results for Mongolia at the fourth and eighth grades are presented in Appendix E.

<sup>2</sup> Morocco did not meet the school participation rates as specified in the TIMSS guidelines due to a procedural difficulty with some schools, and consequently, its results are shown below a line.

countries shown above). Because there often are relatively small differences between participants in average achievement, Exhibit 1.2 shows whether or not the differences in average achievement are statistically significant.

TIMSS used item response theory (IRT) methods to summarize the achievement for each grade on a scale with a mean of 500 and a standard deviation of 100.<sup>3</sup> The TIMSS mathematics scales for the fourth and eighth grades were established based on the 1995 assessments and the methodology enables comparable trend measures from assessment to assessment within each grade. It should be noted that the results for the fourth and eighth grades are not directly comparable. While the scales for the two grades are expressed in the same numerical units, they are not directly comparable in terms of being able to say how much achievement or learning at one grade equals how much achievement or learning at the other grade. That is, achievement on the TIMSS scales cannot be described in absolute terms (like all such scales developed using IRT technology). Comparisons can only be made in terms of relative performance (higher or lower), for example, among countries and population groups as well as between assessments.

In Exhibit 1.1, there is a symbol by a participant's average scale score indicating if the average achievement is significantly higher (up arrow) or lower (down arrow) than the **scale** average of 500. It should be noted that the scale average referenced in Exhibit 1.1 is different from the international average referenced in previous TIMSS reports. The TIMSS scale metric for the fourth grade and for the eighth grade was established in 1995 by setting the average of the mean scores of the countries that participated in TIMSS 1995 to 500 and the standard deviation to 100. To enable comparisons across TIMSS assessments, with each subsequent assessment the data from 1999, 2003, and 2007 also were placed on this metric so that scores are equivalent from assessment to assessment. Thus, the scale average has remained at 500 with each cycle of TIMSS and provides a fixed point of comparison through time. That is, a score of 500 in eighth or fourth grade mathematics in 2007 is equivalent to a score of 500 in eighth or fourth grade mathematics, respectively, in 2003, in 1999 (eighth grade only), and in 1995.

3 Given the matrix-sampling approach, the scaling process averages students' responses in a way that accounts for differences in the difficulty of different subsets of items. It allows students' performance to be summarized on a common metric even though individual students responded to different items in the mathematics test. For further information, see the "IRT Scaling and Data Analysis" section of Appendix A.

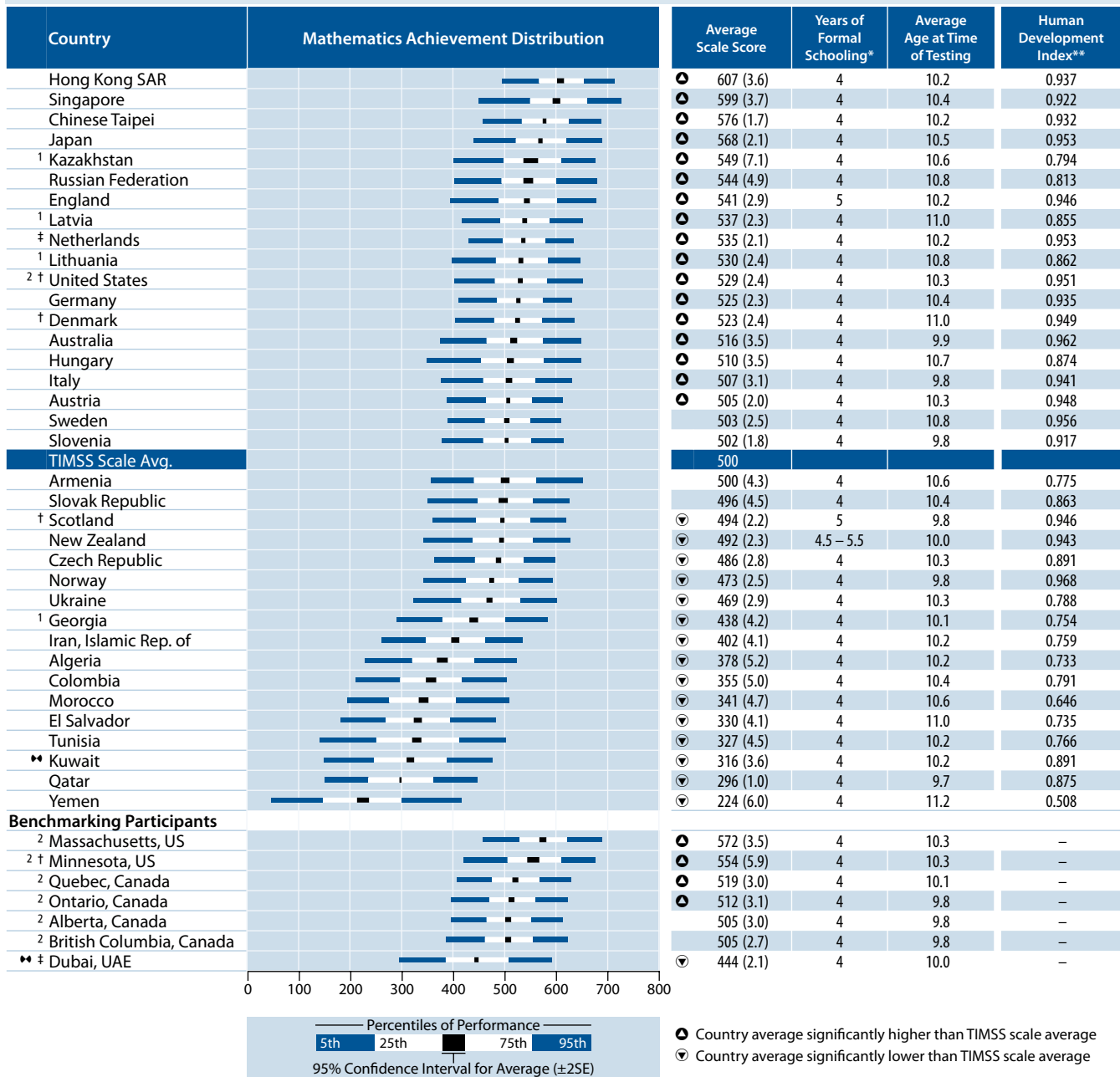
In contrast, the international average, obtained by averaging across the mean scores for each of the participating countries, needs to be recomputed for each new cycle based on the set of participating countries and has changed from cycle to cycle, becoming lower with each assessment, particularly at the eighth grade, depending on the set of countries taking part.<sup>4</sup> Using a point of reference that can change substantially from cycle to cycle depending on which countries participate creates the possibility for misinterpretations, particularly if countries gauge their progress in terms of how far they are above or below this point. For example, in 2003 using the international average may have given the erroneous impression that some countries at the eighth grade had improved, when actually it was only that the international average had become lower. Thus, to avoid misinterpretations based on movement of the international average between cycles, TIMSS 2007 adopted the fixed average approach by using the scale average as the point of reference, and this approach will be used for all future cycles of TIMSS (i.e., in 2011, 2016, and so on). It can be noted that the same approach is used in PIRLS. In PIRLS 2001, the average of the mean scale scores of the countries was set to 500 (the scale average) and the standard deviation to 100, and the fixed reference point approach (scale average instead of international average) was adopted for use from then on.

Similar to earlier TIMSS assessments, Asian countries top Exhibit 1.1 at both the fourth and eighth grades. At the fourth grade, Hong Kong SAR and Singapore were the top performing countries. Using Exhibit 1.2 to help interpret the typically small differences in achievement among countries, these two countries performed similarly and had higher achievement than all of the other countries. They were followed by Chinese Taipei, that had higher achievement than all countries except Hong Kong SAR and Singapore, and, in turn, by Japan that had higher achievement than all of the remaining countries. Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands also performed very well. These five countries performed similarly—not as well as the top four Asian countries, but with higher achievement than the other remaining countries participating

4 In 1995, the scale average for mathematics and the international average were both 500 at the fourth grade and at the eighth grade. In 1999, the scale average remained at 500; however, because different countries participated in 1999 than 1995, the international average at the eighth grade for TIMSS 1999 changed to 487, somewhat lower than the scale average. With yet a larger and different set of countries participating in TIMSS 2003, including some with low average achievement, the international average at grade 8 dropped to 467. At the fourth grade in 2003, the international average was 495 in mathematics.

Exhibit 1.1 TIMSS 2007 Distribution of Mathematics Achievement

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Represents years of schooling counting from the first year of ISCED Level 1.  
 \*\* Taken from United Nations Development Programme's *Human Development Report 2007/2008*, p.229–232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. *Statistical Yearbook 2007*. Data for England and Scotland are for the United Kingdom.  
 † Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (–) indicates comparable data are not available.  
 Note: See Exhibit D.1 for percentiles of achievement in mathematics.

Exhibit 1.1 TIMSS 2007 Distribution of Mathematics Achievement (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Mathematics Achievement Distribution	Average Scale Score	Years of Formal Schooling*	Average Age at Time of Testing	Human Development Index**
Chinese Taipei		598 (4.5)	8	14.2	0.932
Korea, Rep. of		597 (2.7)	8	14.3	0.921
Singapore		593 (3.8)	8	14.4	0.922
† Hong Kong SAR		572 (5.8)	8	14.4	0.937
Japan		570 (2.4)	8	14.5	0.953
Hungary		517 (3.5)	8	14.6	0.874
† England		513 (4.8)	9	14.2	0.946
Russian Federation		512 (4.1)	7 or 8	14.6	0.802
<sup>2</sup> † United States		508 (2.8)	8	14.3	0.951
<sup>1</sup> Lithuania		506 (2.3)	8	14.9	0.862
Czech Republic		504 (2.4)	8	14.4	0.891
Slovenia		501 (2.1)	7 or 8	13.8	0.917
<b>TIMSS Scale Avg.</b>		<b>500</b>			
Armenia		499 (3.5)	8	14.9	0.775
Australia		496 (3.9)	8	13.9	0.962
Sweden		491 (2.3)	8	14.8	0.956
Malta		488 (1.2)	9	14.0	0.878
† Scotland		487 (3.7)	9	13.7	0.946
<sup>1 2</sup> Serbia		486 (3.3)	8	14.9	0.810
Italy		480 (3.0)	8	13.9	0.941
Malaysia		474 (5.0)	8	14.3	0.811
Norway		469 (2.0)	8	13.8	0.968
Cyprus		465 (1.6)	8	13.8	0.903
Bulgaria		464 (5.0)	8	14.9	0.824
<sup>3</sup> Israel		463 (3.9)	8	14.0	0.932
Ukraine		462 (3.6)	8	14.2	0.788
Romania		461 (4.1)	8	15.0	0.813
Bosnia and Herzegovina		456 (2.7)	8 or 9	14.7	0.803
Lebanon		449 (4.0)	8	14.4	0.772
Thailand		441 (5.0)	8	14.3	0.781
Turkey		432 (4.8)	8	14.0	0.775
Jordan		427 (4.1)	8	14.0	0.773
Tunisia		420 (2.4)	8	14.5	0.766
<sup>1</sup> Georgia		410 (5.9)	8	14.2	0.754
Iran, Islamic Rep. of		403 (4.1)	8	14.2	0.759
Bahrain		398 (1.6)	8	14.1	0.866
Indonesia		397 (3.8)	8	14.3	0.728
Syrian Arab Republic		395 (3.8)	8	13.9	0.724
Egypt		391 (3.6)	8	14.1	0.708
Algeria		387 (2.1)	8	14.5	0.733
Colombia		380 (3.6)	8	14.5	0.791
Oman		372 (3.4)	8	14.3	0.814
Palestinian Nat'l Auth.		367 (3.5)	8	14.0	0.731
Botswana		364 (2.3)	8	14.9	0.654
♦♦ Kuwait		354 (2.3)	8	14.4	0.891
El Salvador		340 (2.8)	8	15.0	0.735
Saudi Arabia		329 (2.9)	8	14.4	0.812
Ghana		309 (4.4)	8	15.8	0.553
Qatar		307 (1.4)	8	13.9	0.875
‡ Morocco		381 (3.0)	8	14.8	0.646
<b>Benchmarking Participants</b>					
<sup>2</sup> Massachusetts, US		547 (4.6)	8	14.2	–
<sup>2</sup> † Minnesota, US		532 (4.4)	8	14.3	–
<sup>3</sup> Quebec, Canada		528 (3.5)	8	14.2	–
<sup>2</sup> Ontario, Canada		517 (3.5)	8	13.8	–
<sup>3</sup> British Columbia, Canada		509 (3.0)	8	13.9	–
Basque Country, Spain		499 (3.0)	8	14.1	–
♦† Dubai, UAE		461 (2.4)	8	14.2	–

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Represents years of schooling counting from the first year of ISCED Level 1.  
 \*\* Taken from United Nations Development Programme's *Human Development Report 2007/2008*, p.229–232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, *R.O.C. Statistical Yearbook 2007* and for Serbia taken from *Human Development Analyses of Serbia 2007*. Data for England and Scotland are for the United Kingdom.  
 † Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (–) indicates comparable data are not available.  
 Note: See Exhibit D.1 for percentiles of achievement in mathematics.

**Exhibit 1.2 TIMSS 2007 Multiple Comparisons of Average Mathematics Achievement**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup> Grade**

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Hong Kong SAR	Singapore	Chinese Taipei	Japan	Kazakhstan	Russian Federation	England	Latvia	Netherlands	Lithuania	United States	Germany	Denmark	Australia	Hungary	Italy	Austria	Sweden	Slovenia	Armenia	Slovak Republic	Scotland	New Zealand	Czech Republic	Norway	Ukraine	Georgia	Iran, Islamic Rep. of	Algeria
Hong Kong SAR	607 (3.6)			⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Singapore	599 (3.7)			⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Chinese Taipei	576 (1.7)	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Japan	568 (2.1)	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Kazakhstan	549 (7.1)	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Russian Federation	544 (4.9)	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
England	541 (2.9)	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Latvia	537 (2.3)	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Netherlands	535 (2.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Lithuania	530 (2.4)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
United States	529 (2.4)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Germany	525 (2.3)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Denmark	523 (2.4)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Australia	516 (3.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Hungary	510 (3.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Italy	507 (3.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Austria	505 (2.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Sweden	503 (2.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Slovenia	502 (1.8)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Armenia	500 (4.3)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Slovak Republic	496 (4.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Scotland	494 (2.2)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	⬆	
New Zealand	492 (2.3)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	⬆	
Czech Republic	486 (2.8)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	⬆	
Norway	473 (2.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	⬆	
Ukraine	469 (2.9)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	⬆	
Georgia	438 (4.2)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		⬆	
Iran, Islamic Rep. of	402 (4.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇		
Algeria	378 (5.2)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Colombia	355 (5.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Morocco	341 (4.7)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
El Salvador	330 (4.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Tunisia	327 (4.5)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Kuwait	316 (3.6)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Qatar	296 (1.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Yemen	224 (6.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
<b>Benchmarking Participants</b>																														
Massachusetts, US	572 (3.5)	⬇	⬇			⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Minnesota, US	554 (5.9)	⬇	⬇	⬇	⬇			⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	⬆	
Quebec, Canada	519 (3.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Ontario, Canada	512 (3.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Alberta, Canada	505 (3.0)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
British Columbia, Canada	505 (2.7)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	
Dubai, UAE	444 (2.1)	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.



**Exhibit 1.2 TIMSS 2007 Multiple Comparisons of Average Mathematics Achievement (Continued)**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	Morocco	El Salvador	Tunisia	Kuwait	Qatar	Yemen	Benchmarking Participants	Average Scale Score	Country
▲	▲	▲	▲	▲	▲	▲	Massachusetts, US	607 (3.6)	Hong Kong SAR
▲	▲	▲	▲	▲	▲	▲	Minnesota, US	599 (3.7)	Singapore
▲	▲	▲	▲	▲	▲	▲	Quebec, Canada	576 (1.7)	Chinese Taipei
▲	▲	▲	▲	▲	▲	▲	Ontario, Canada	568 (2.1)	Japan
▲	▲	▲	▲	▲	▲	▲	Alberta, Canada	549 (7.1)	Kazakhstan
▲	▲	▲	▲	▲	▲	▲	British Columbia, Canada	544 (4.9)	Russian Federation
▲	▲	▲	▲	▲	▲	▲	Dubai, UAE	541 (2.9)	England
▲	▲	▲	▲	▲	▲	▲		537 (2.3)	Latvia
▲	▲	▲	▲	▲	▲	▲		535 (2.1)	Netherlands
▲	▲	▲	▲	▲	▲	▲		530 (2.4)	Lithuania
▲	▲	▲	▲	▲	▲	▲		529 (2.4)	United States
▲	▲	▲	▲	▲	▲	▲		525 (2.3)	Germany
▲	▲	▲	▲	▲	▲	▲		523 (2.4)	Denmark
▲	▲	▲	▲	▲	▲	▲		516 (3.5)	Australia
▲	▲	▲	▲	▲	▲	▲		510 (3.5)	Hungary
▲	▲	▲	▲	▲	▲	▲		507 (3.1)	Italy
▲	▲	▲	▲	▲	▲	▲		505 (2.0)	Austria
▲	▲	▲	▲	▲	▲	▲		503 (2.5)	Sweden
▲	▲	▲	▲	▲	▲	▲		502 (1.8)	Slovenia
▲	▲	▲	▲	▲	▲	▲		500 (4.3)	Armenia
▲	▲	▲	▲	▲	▲	▲		496 (4.5)	Slovak Republic
▲	▲	▲	▲	▲	▲	▲		494 (2.2)	Scotland
▲	▲	▲	▲	▲	▲	▲		492 (2.3)	New Zealand
▲	▲	▲	▲	▲	▲	▲		486 (2.8)	Czech Republic
▲	▲	▲	▲	▲	▲	▲		473 (2.5)	Norway
▲	▲	▲	▲	▲	▲	▲		469 (2.9)	Ukraine
▲	▲	▲	▲	▲	▲	▲		438 (4.2)	Georgia
▲	▲	▲	▲	▲	▲	▲		402 (4.1)	Iran, Islamic Rep. of
▲	▲	▲	▲	▲	▲	▲		378 (5.2)	Algeria
▼	▲	▲	▲	▲	▲	▲		355 (5.0)	Colombia
▼	▼	▲	▲	▲	▲	▲		341 (4.7)	Morocco
▼	▼	▼	▲	▲	▲	▲		330 (4.1)	El Salvador
▼	▼	▼	▼	▲	▲	▲		327 (4.5)	Tunisia
▼	▼	▼	▼	▼	▲	▲		316 (3.6)	Kuwait
▼	▼	▼	▼	▼	▼	▲		296 (1.0)	Qatar
▼	▼	▼	▼	▼	▼	▼		224 (6.0)	Yemen
▲	▲	▲	▲	▲	▲	▲	Massachusetts, US	572 (3.5)	Massachusetts, US
▲	▲	▲	▲	▲	▲	▲	Minnesota, US	554 (5.9)	Minnesota, US
▲	▲	▲	▲	▲	▲	▲	Quebec, Canada	519 (3.0)	Quebec, Canada
▲	▲	▲	▲	▲	▲	▲	Ontario, Canada	512 (3.1)	Ontario, Canada
▲	▲	▲	▲	▲	▲	▲	Alberta, Canada	505 (3.0)	Alberta, Canada
▲	▲	▲	▲	▲	▲	▲	British Columbia, Canada	505 (2.7)	British Columbia, Canada
▲	▲	▲	▲	▲	▲	▲	Dubai, UAE	444 (2.1)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country





at the fourth grade. Among the benchmarking participants, the state of Massachusetts in the United States performed similarly to Chinese Taipei, and the state of Minnesota similarly to Kazakhstan, the Russian Federation, and England.

At the fourth grade, top-performing Hong Kong SAR and Singapore had averages approximately 100 points above the 500 scale average (607 and 599, respectively), and the other countries described above (Chinese Taipei, Japan, Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands) also performed above the scale average. In addition, eight more countries had average achievement higher than the scale average of 500, including Lithuania, the United States, Germany, Denmark, Australia, Hungary, Italy, and Austria. In addition to the benchmarking states of Massachusetts and Minnesota, two Canadian provinces, Quebec and Ontario, also performed above the scale average.

At the eighth grade, Exhibit 1.1 shows five Asian countries with the highest average achievement in mathematics. Using the information in Exhibit 1.2, Chinese Taipei, Korea, and Singapore had the highest average achievement, performing similarly and having substantially higher achievement than all the remaining countries (averages nearly 100 points above the scale average). These three countries were followed by Hong Kong SAR and Japan also performing similarly and having higher achievement than all the other countries except the top three performers.

It can be seen that there is a substantial gap in average achievement between the five Asian countries and the next group of four similarly performing countries including Hungary, England, the Russian Federation, and the United States—a 53-point difference between Japan (570) and Hungary (517). However, this group of four countries all had average achievement above the scale average (Exhibit 1.1). Next, although Lithuania and the Czech Republic performed similarly (506 and 504, respectively), as shown in Exhibit 1.1, achievement in Lithuania was above the scale average whereas achievement in the Czech Republic was not significantly different statistically from the scale average (500). At the eighth grade,

among the benchmarking participants, the two U.S. states, Massachusetts and Minnesota, and the three Canadian provinces, Quebec, Ontario, and British Columbia, performed above the scale average. The two U.S. states and the province of Quebec were outperformed by the five Asian countries, but had higher average achievement than the group of four countries including Hungary, England, the Russian Federation, and United States. The provinces of Ontario and British Columbia had average achievement similar to that group of four countries.

At the fourth grade, looking at the other end of the achievement continuum in Exhibit 1.2, beginning with Algeria (378) each country typically had higher average achievement than the next lower performing country, in turn, through Colombia (355), Morocco (341), El Salvador (330) and Tunisia (327), Kuwait (316), Qatar (296), and Yemen (224). At the eighth grade, there was a similar pattern beginning with Oman (372) having higher achievement than the Palestinian National Authority (367) and Botswana (364), and then Kuwait (354), El Salvador (340), Saudi Arabia (329), and concluding with Ghana (309) and Qatar (307).

At both grades, TIMSS 2007 involved countries from around the world and from a wide variety of circumstances. It might then be anticipated that the results would reveal substantial differences in average mathematics achievement between the highest- and lowest-performing countries and this proved to be the case (607 in Hong Kong SAR compared with 224 in Yemen at fourth grade and 598 in Chinese Taipei compared with 307 in Qatar at eighth grade). The percentiles shown in Exhibit 1.1 also show, however, the wide range of achievement within countries. The difference between the 95th and 5th percentiles within countries is often approximately 300 scale points, which is similar to the difference across countries.

TIMSS devoted considerable energy to maximizing comparability across the grades and ages tested, but this is difficult considering the variation internationally in many educational policies, primarily school entry ages and policies concerning retention and promotion from grade to grade. For the most part, TIMSS participants are to assess students in the fourth year

of schooling and the eighth year of schooling. However, to avoid testing very young children, the guidelines also specify that the average age of the students tested should not be below 9.5 years old for the fourth grade or 13.5 years old for the eighth grade. Thus, countries where students start school at a very young age must assess students at the next higher grade in accordance with the TIMSS guidelines.

Exhibit 1.1 includes the years of formal schooling and average age at time of testing of the students in each country. Every country tested the correct year of schooling in accordance with the TIMSS guidelines, which was the fourth grade and the eighth grade in most countries and why, for the matter of convenience in this report, the students will be referred to as fourth grade students or eighth grade students. It should be noted that five countries (England, Scotland, New Zealand, Malta, and Bosnia and Herzegovina) tested students in their fifth and/or ninth year of schooling in accordance with TIMSS guidelines, because their students start school at a very early age and otherwise would have been very young. Also, both the Russian Federation and Slovenia have been undergoing structural reforms requiring students to start school at a younger age so that students at the fourth and eighth grades would be the same age as students previously were in the third and seventh grades, but having had an additional year of schooling. To monitor this change, these two countries assessed students in the third and seventh years of schooling in previous assessments. The transition has been completed at the fourth grade, but not at the eighth grade where some of the students assessed in these two countries were in the seventh year of schooling.

Given that students typically are in their fourth or eighth year of schooling and the majority begins school at age 6 (see Appendix A), they are expected to be approximately 10 or 14 years old, on average, respectively. This was the case in most countries including the five countries testing students in their fifth and/or ninth years of schooling. In some countries, however, students do not start school until age 7 and, consequently, are expected to be approximately 11 or 15 years old, on average, respectively. Considering

the cultural and economic diversity of the TIMSS countries as well as variation in age of entry to school and retention policies, students with the same amount of schooling are of different ages.<sup>5</sup> The interaction among these various factors and achievement is complicated, differing country by country. For example, the TIMSS data show the countries performing above the scale average ranging in students' average age from 9.8 to 11.0 years old at the fourth grade and from 14.2 to 14.9 years at the eighth grade. Students in countries performing below the scale average also range in average age, from 9.7 to 11.2 years at the fourth grade and from 13.7 to 15.8 years at the eighth grade.

To provide some context about the economic and educational development of the TIMSS participants, Exhibit 1.1 also includes each one's value on the Human Development Index provided by the United Nations Development Programme. The index has a minimum value of 0.0 and a maximum of 1.0. Countries with high values on the index have a long life expectancy, high levels of school enrollment and adult literacy, and a good standard of living, as measured by per capita Gross Domestic Product. Nearly all the TIMSS participants had index values in the 0.7 to 0.9 range except Botswana and Morocco (0.6) and Ghana and Yemen (0.5). At both grades, the countries performing above the 500 scale average had index values in the 0.8 to 0.9 range (the lowest is Kazakhstan (0.794) at the fourth grade) and those countries with values below 0.8 typically had average achievement below 500. However, not all countries with average achievement below the scale average had low index values. The countries with average achievement significantly below 500 included 6 with index values 0.8 or higher at the fourth grade and 17 at the eighth grade.

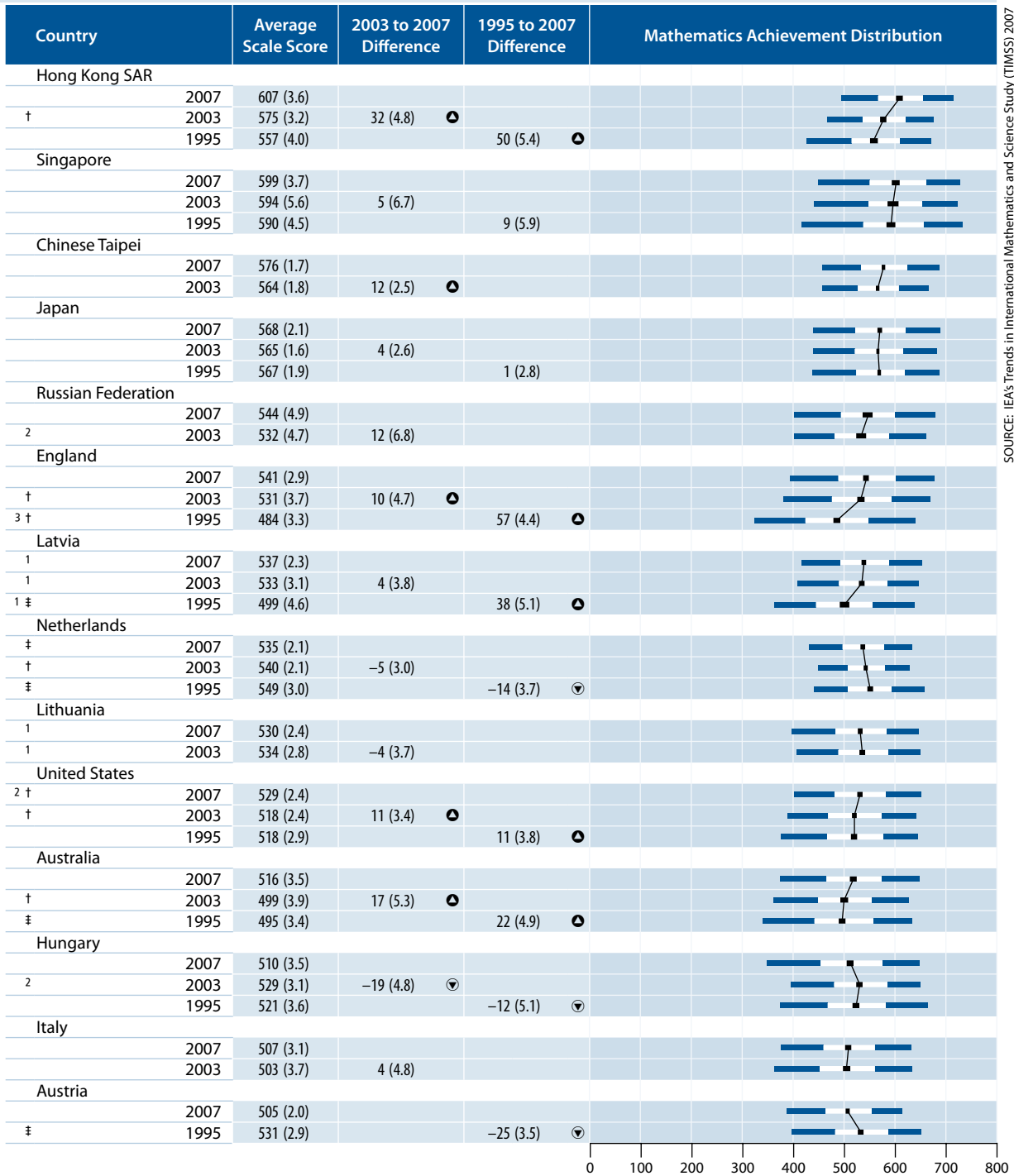
### **How Has Mathematics Achievement Changed Since 1995, 1999, and 2003?**

Exhibit 1.3 displays changes in average mathematics achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments at the fourth and eighth grades. The participants are shown in descending order of their average TIMSS 2007 achievement.

5 Martin, M.O., Mullis, I.V.S., & Foy, P. (2008). Interrelationships among reading achievement, grade level, and age in PIRLS 2006. In C. Papanastasiou (Ed.), *Proceedings of the IEA International Research Conference (IRC): PIRLS volume*. Nicosia, Cyprus: Cyprus University Press.

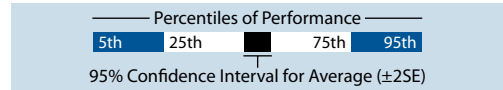
Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 average significantly higher  
▼ 2007 average significantly lower



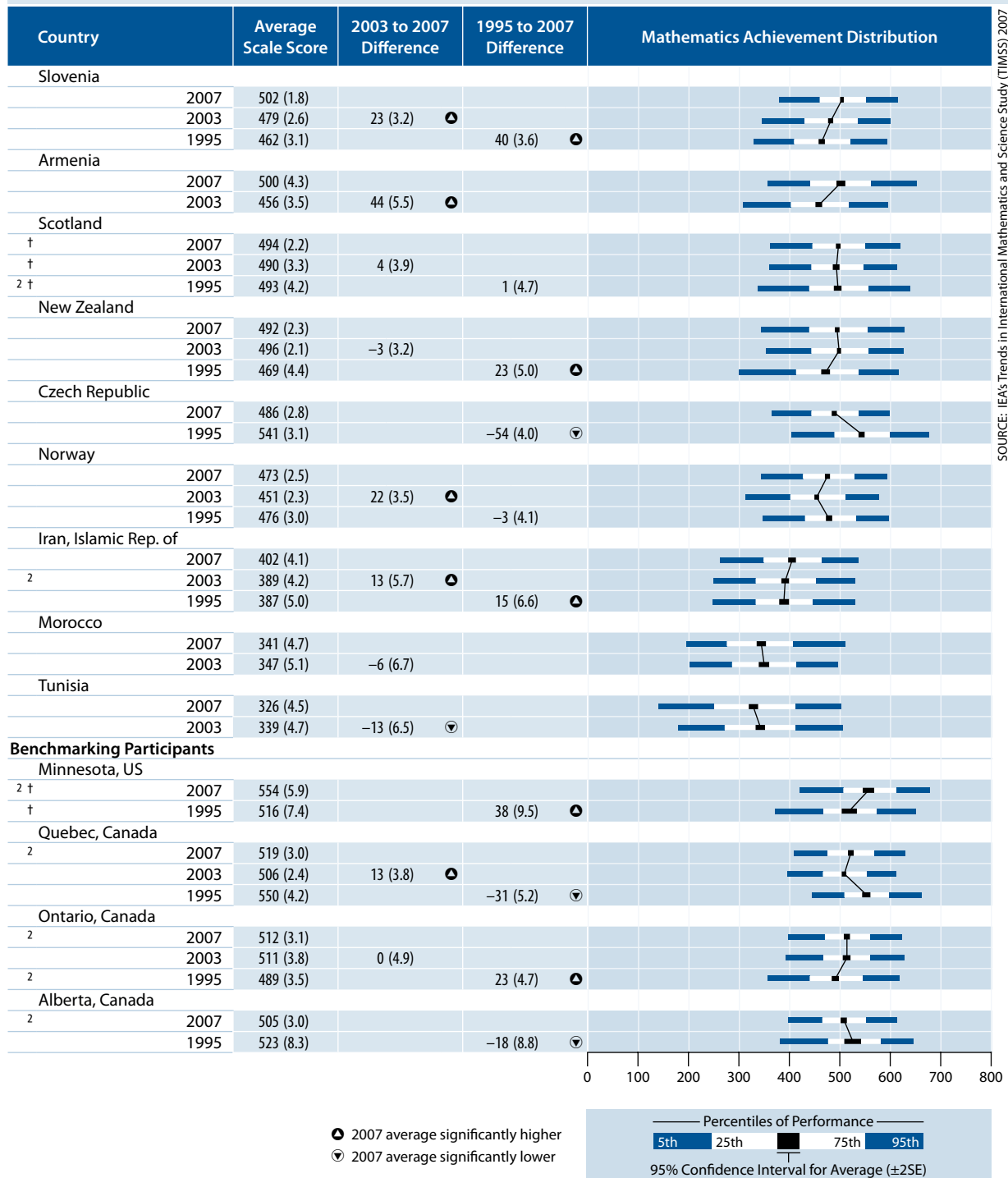
† Met guidelines for sample participation rates only after replacement schools were included.  
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.  
‡ Did not satisfy guidelines for sample participation rates.  
1 National Target Population does not include all of the International Target Population defined by TIMSS.  
2 National Defined Population covers 90% to 95% of National Target Population.

3 National Defined Population covers less than 90% of National Target Population (but at least 77%).  
Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007 (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

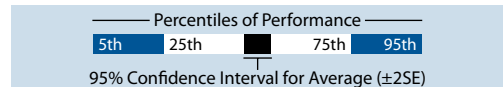
Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007 (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	Mathematics Achievement Distribution
Chinese Taipei					
	2007	598 (4.5)			
	2003	585 (4.6)	13 (6.4) ▲		
	1999	585 (4.0)		13 (5.9) ●	
Korea, Rep. of					
	2007	597 (2.7)			
	2003	589 (2.2)	8 (3.1) ▲		
	1999	587 (2.0)		10 (3.4) ▲	
	1995	581 (2.0)		17 (3.4) ●	
Singapore					
	2007	593 (3.8)			
	2003	605 (3.6)	-13 (5.2) ▼		
	1999	604 (6.3)		-12 (7.2)	
	1995	609 (4.0)		-16 (5.6) ▼	
Hong Kong SAR					
†	2007	572 (5.8)			
†	2003	586 (3.3)	-14 (6.6) ▼		
†	1999	582 (4.3)		-10 (7.2)	
	1995	569 (6.1)		4 (8.4)	
Japan					
	2007	570 (2.4)			
	2003	570 (2.1)	0 (3.1)		
	1999	579 (1.7)		-9 (2.9) ▼	
	1995	581 (1.6)		-11 (2.8) ▼	
Hungary					
2	2007	517 (3.5)			
	2003	529 (3.2)	-12 (4.7) ▼		
	1999	532 (3.7)		-15 (5.0) ▼	
	1995	527 (3.2)		-10 (4.7) ▼	
England					
†	2007	513 (4.8)			
‡	2003	498 (4.7)	15 (6.7) ▲		
†	1999	496 (4.1)		17 (6.4) ▲	
	1995	498 (3.0)		16 (5.6) ●	
Russian Federation					
	2007	512 (4.1)			
	2003	508 (3.7)	4 (5.5)		
	1999	526 (5.9)		-14 (7.2) ▼	
	1995	524 (5.3)		-12 (6.7)	
United States					
2 †	2007	508 (2.8)			
‡	2003	504 (3.3)	4 (4.4)		
†	1999	502 (4.0)		7 (4.8)	
	1995	492 (4.7)		16 (5.5) ●	
Lithuania					
1	2007	506 (2.3)			
1	2003	502 (2.5)	4 (3.4)		
1 ●	1999	482 (4.3)		24 (4.9) ●	
1 2	1995	472 (4.1)		34 (4.7) ●	
Czech Republic					
	2007	504 (2.4)			
	1999	520 (4.2)		-16 (4.8) ▼	
	1995	546 (4.5)		-42 (5.1) ▼	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● 2007 average significantly higher  
▼ 2007 average significantly lower



† Met guidelines for sample participation rates only after replacement schools were included.  
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.  
‡ Did not satisfy guidelines for sample participation rates.  
1 National Target Population does not include all of the International Target Population defined by TIMSS.  
2 National Defined Population covers 90% to 95% of National Target Population.

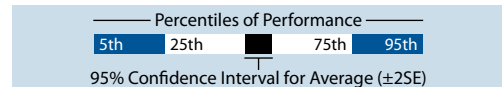
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).  
●● Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007 (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	Mathematics Achievement Distribution
Slovenia					
2007	501 (2.1)				
2003	493 (2.2)	9 (3.0) ▲			
1995	494 (2.9)			7 (3.6)	
Armenia					
2007	499 (3.5)				
2003	478 (3.0)	21 (4.6) ▲			
Australia					
2007	496 (3.9)				
2003	505 (4.6)	-8 (6.1)			
‡	1995	509 (3.7)		-13 (5.4) ▼	
Sweden					
2007	491 (2.3)				
2003	499 (2.6)	-8 (3.4) ▼			
1995	540 (4.3)		-48 (4.8) ▼		
Scotland					
†	2007	487 (3.7)			
†	2003	498 (3.7)	-10 (5.2) ▼		
‡	1995	493 (5.7)		-6 (6.8)	
Serbia					
1 2	2007	486 (3.3)			
1	2003	477 (2.6)	9 (4.1) ▲		
Italy					
2007	480 (3.0)				
2003	484 (3.2)	-4 (4.3)			
2	1999	479 (3.8)		0 (4.8)	
Malaysia					
2007	474 (5.0)				
2003	508 (4.1)	-34 (6.5) ▼			
1999	519 (4.4)		-45 (6.7) ▼		
Norway					
2007	469 (2.0)				
2003	461 (2.5)	8 (3.2) ▲			
1995	498 (2.2)			-29 (2.9) ▼	
Cyprus					
2007	465 (1.6)				
2003	459 (1.7)	6 (2.3) ▲			
1999	476 (1.8)		-11 (2.4) ▼		
1995	468 (2.2)			-2 (2.9)	
Bulgaria					
2007	464 (5.0)				
2003	476 (4.3)	-13 (6.5)			
1999	511 (5.8)		-47 (7.7) ▼		
‡	1995	527 (5.8)		-63 (7.6) ▼	
Israel					
3	2007	463 (3.9)			
3	2003	496 (3.4)	-32 (5.2) ▼		
3	1999	466 (3.9)		-3 (5.6)	
Romania					
2007	461 (4.1)				
2003	475 (4.8)	-14 (6.4) ▼			
1999	472 (5.8)		-11 (7.2)		
1995	474 (4.6)			-12 (6.2) ▼	

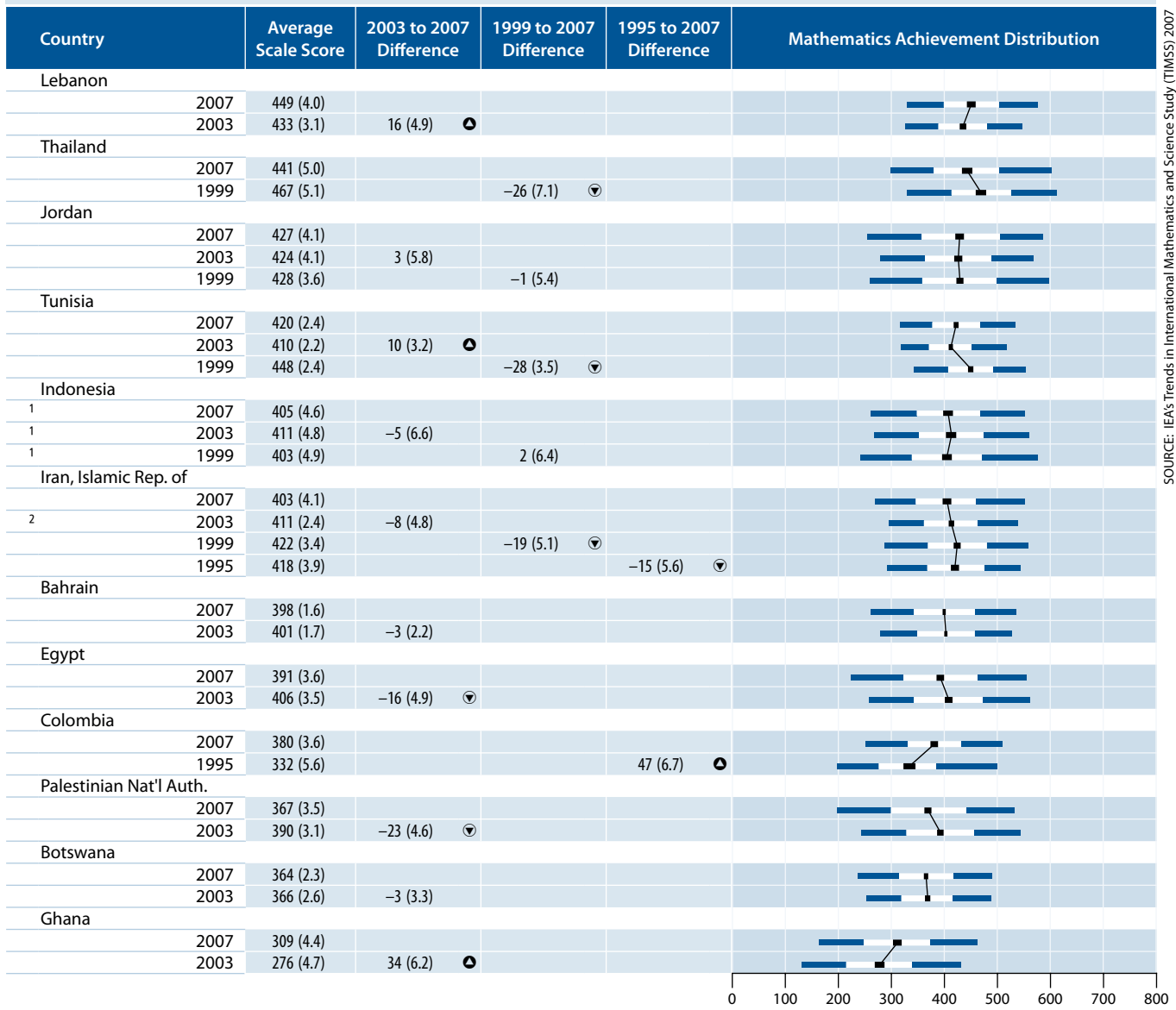
▲ 2007 average significantly higher  
▼ 2007 average significantly lower



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007 (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 average significantly higher  
▼ 2007 average significantly lower

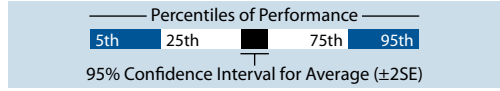
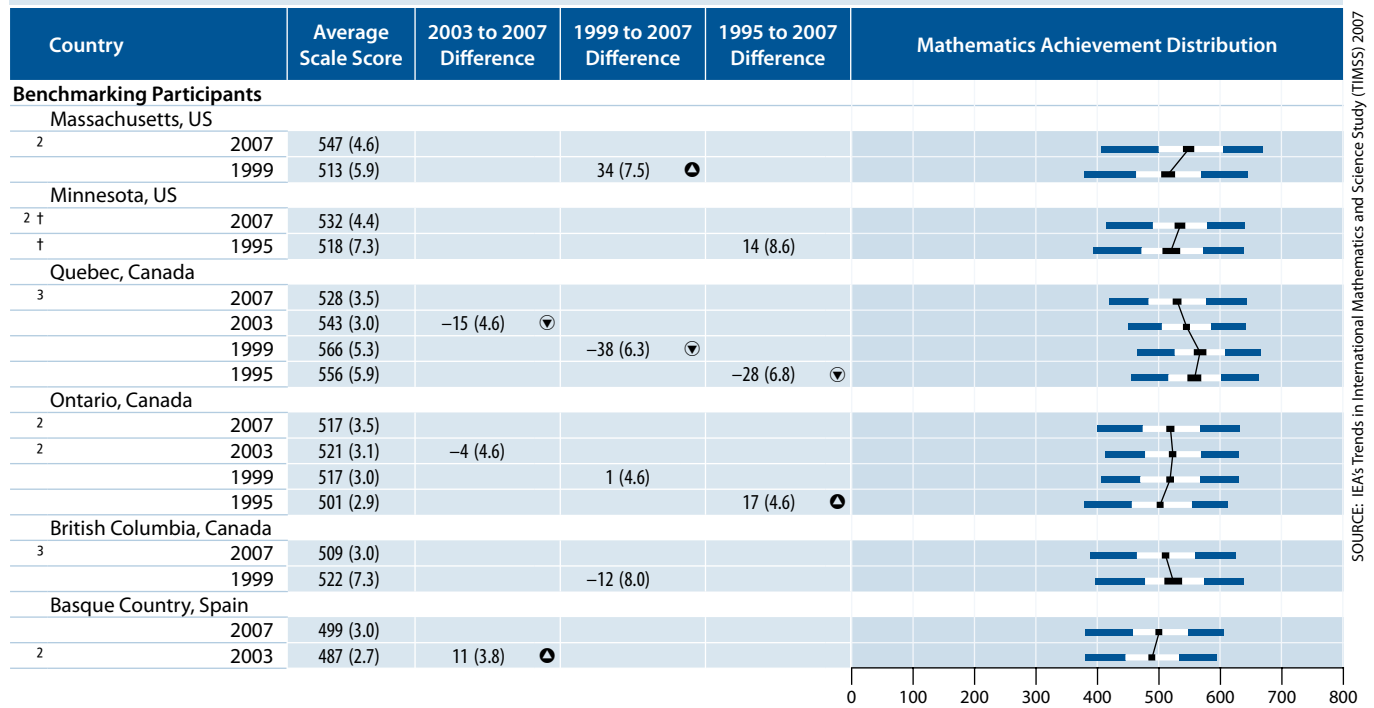


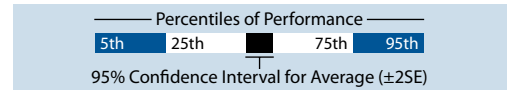
Exhibit 1.3 Trends in Mathematics Achievement – 1995 Through 2007 (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- ⬆ 2007 average significantly higher
- ⬇ 2007 average significantly lower



At the fourth grade, 23 countries and 4 benchmarking participants have data from 1995 and 2003 or from either 1995 or 2003 that can be compared to 2007. There was no fourth grade assessment in TIMSS 1999. Thus, participants at the fourth grade have data from two or three points in time. At the eighth grade, 36 countries and 6 benchmarking participants have data from at least one previous assessment that can be compared with 2007, with 26 countries and 2 benchmarking participants having comparable data from three or all four TIMSS assessments—1995, 1999, 2003, and 2007.

It is interesting to consider the TIMSS 2007 achievement results in light of the information countries provided in the *TIMSS 2007 Encyclopedia*. For example, the trend results illustrate how TIMSS data can be used to monitor the impact of major changes in education systems. Many countries are engaged in implementing important structural, curricular, and instructional reforms. For example, according to ongoing reforms described in the *TIMSS 2007 Encyclopedia*, improvement in the Russian Federation and Slovenia may have been anticipated. As described previously, these two countries have been undergoing structural changes in their educational system that involved adding one more year of schooling at the primary level, as well as associated curricular and instructional reforms. For trend participants, Exhibit A.8 in Appendix A documents the years of formal schooling, average ages, percentages of exclusions, and participation rates for each assessment. In general, these have been relatively stable across the participants from assessment to assessment. However, as mentioned, there have been some structural changes in educational systems.

Looking at trends across all of the participating countries, not taking into account whether countries have participated in two, three, or four cycles (eighth grade) of TIMSS, more showed improvement in average achievement between their first cycle of participation and TIMSS 2007 than declines at the fourth grade, but this was not the pattern at the eighth grade. At the fourth grade, 10 countries had higher average achievement in 2007 than in their first TIMSS assessment, 5 had lower average achievement, and 8 showed no significant change. At the eighth grade, 10 countries had higher

average achievement in 2007 than in their initial assessment, 15 lower average achievement, and 11 showed no significant change.

Comparing only across the past 12 years, at the fourth grade, 16 countries have comparison data between 1995 and 2007. Of those, 8 had increased average achievement in 2007 compared to 1995, 4 had similar achievement, and 4 had decreases. At the eighth grade, of the 20 countries with 1995 data, 5 had increased average achievement in 2007, 5 similar achievement, and 10 had decreases. Taking an even closer look at the 12 countries that have trend data between 1995 and 2007 at both grades, the pattern persists with more improvements at the fourth than the eighth grade. Only the Czech Republic and Hungary had lower achievement at the fourth grade, as well as at the eighth grade. Six of these countries had higher achievement at the fourth grade in 2007 than in 1995, with England and the United States also showing improvement at the eighth grade. Two of them had no significant change at the eighth grade (Hong SAR and Slovenia) and two had declines (Australia and Iran). Of the 12 countries, the remaining 4 had equivalent average achievement at the fourth grade between 1995 and 2007, with one also having equivalency at the eighth grade (Scotland) but three having decreases (Japan, Norway, and Singapore). Thus, generally, and even in the same countries, between 1995 and 2007 there has been a tendency toward more improvement than declines at the fourth grade accompanied by less improvement or even declines at the eighth grade.

There was more consistency between the fourth and eighth grades in changes between 2003 and 2007. Looking across countries with trend data between 2003 and 2007, average achievement at the fourth grade either increased (9 countries) or stayed the same (10 countries) in most countries, with only 2 countries having decreases. At the eighth grade one-third of the countries (11) showed improvements, one-third (12) stayed the same, and one-third (10) showed declines. Among the 17 countries that participated in both grades, there was considerable consistency between grades. Ten changed in the same direction at both grades between 2003 and 2007: 5 with increases, 4 with essentially no changes, and 1 with a decrease. Five countries had more

positive trends at the fourth than the eighth grade (2 with increases at fourth grade and stable performance at eighth grade, 2 with stability at fourth grade and decreases at eighth grade, and 1 with an increase at fourth grade and a decrease at eighth grade). Tunisia, however, had the reverse, with a decrease at the fourth grade accompanied by an improvement at the eighth grade.

At the fourth grade, 8 countries and 2 benchmarking participants showed higher average mathematics achievement in 2007 than in 1995. Three of these countries—Hong Kong SAR, England, and Slovenia—had significant improvement from 1995 together with significant improvement from 2003 to 2007 suggesting a sustained improvement over the 12-year period from 1995 to 2007. For the United States, Australia, and Iran, the improvement in 2007 compared to 1995 largely reflects recent gains between 2003 and 2007. Latvia, New Zealand, and the province of Ontario also had higher average achievement in 2007 than 1995, but not between the two most recent assessments, indicating that the gains were essentially between 1995 and 2003. The state of Minnesota showed significant gains between 1995 and 2007, but has no data for intervening assessments. Norway appears to have recovered from an early decline, such that significant improvement between 2003 and 2007 resulted in essentially no change from 1995. In the province of Quebec, the recent gains did not equal the earlier declines so that achievement in 2007 is still below that of 1995. Chinese Taipei and Armenia showed increased average achievement between 2003 and 2007, the two assessments they participated in.

At the fourth grade, 4 countries and the province of Alberta (in addition to the province of Quebec described above) had lower average mathematics achievement in 2007 than in 1995. Of these, Austria, the Czech Republic, and the province of Alberta have previous data only from 1995. In Hungary, the decrease reflects a recent decline between 2003 and 2007 that overshadowed an upward shift between 1995 and 2003, whereas the Netherlands has shown a relatively steady decline from assessment to assessment. Tunisia participated in 2003 and 2007 and declined between the two assessments. In Singapore, Japan, and Scotland, average mathematics achievement has remained



essentially the same since 1995. The Russian Federation, Lithuania, Italy, and Morocco do not have comparable data from 1995, but average mathematics achievement did not change significantly between 2003 and 2007.

At the eighth grade, 5 countries and the province of Ontario had higher average mathematics achievement in 2007 than in 1995. Korea, England, the United States and Lithuania participated in all four assessments without having any significant declines between assessments, showing generally upward progress over the 12-year period. Average achievement increased in Colombia between 1995 and 2007, but it did not participate in the intervening assessments. After no change between 1995 and 2003, Slovenia improved between 2003 and 2007. Chinese Taipei participated in the three most recent assessments, showing improvement between 1999 and 2007, although the improvement largely reflects recent gains between 2003 and 2007. The state of Massachusetts improved between its two assessments in 1999 and 2007. Armenia, Serbia, Lebanon, Ghana, and the Basque Country of Spain showed improvement between 2003 and 2007, the two assessments they participated in.

Average mathematics achievement at the eighth grade remained relatively constant across assessments in Italy, Jordan, Indonesia, Bahrain, Botswana, the state of Minnesota and the province of British Columbia. Also, several countries participating at the eighth grade have had compensating increases and decreases in average mathematics achievement from assessment to assessment. For example, Cyprus had higher achievement in 2007 than 2003 essentially recovering from a previous decline and returning back to the 1995 level of achievement. After an initial increase, Hong Kong SAR had lower average achievement in 2007 than 2003 so that achievement is essentially the same as in 1995. The Russian Federation had lower average achievement in 2007 than in 1999—the high point for the four assessments, but achievement was not significantly different from 1995. Israel had a decrease between 2003 and 2007 equivalent to the previous increase between 1999 and 2003, bringing achievement back to the 1999 level.

At the eighth grade, 10 countries and the province of Quebec had lower average mathematics achievement in 2007 than in 1995. The Czech Republic, Australia, Sweden, and Bulgaria have had declines of various magnitudes from assessment to assessment. In Iran and Quebec the decreases have occurred since 1999, while in Singapore, Hungary, and Romania the decreases primarily were more recent between 2003 and 2007. Not all countries with declines between 1995 and 2007 showed declines between 2003 and 2007. For example, Japan showed no change between 2003 and 2007 perhaps stemming the earlier downward trend and Norway had higher average achievement in 2007 than 2003 (but not enough to recover from its previous decline). Malaysia has had successively lower average achievement with each assessment since 1999. Tunisia declined between 1999 and 2003, but has increased since then, although not back to the level it was at in 1999. In the Palestinian National Authority and Egypt, average achievement declined between its two assessments in 2003 and 2007.

### **Trends Across Grades: Fourth to Eighth Grade Cohort Analysis**

Because TIMSS is conducted on a four-year cycle, the cohort of students that was assessed in the fourth grade in 2003 had reached the eighth grade by 2007, and thus was assessed as the eighth grade in 2007. This enables the 17 countries and 2 benchmarking participants that assessed both grades in both assessments to examine how their performance relative to each other changed as the fourth grade students of 2003 became the eighth grade students of 2007. The results are presented in Exhibit 1.4, which shows average mathematics achievement as a difference from the TIMSS scale average (500) for the fourth grade students in 2003 (upper-left panel) and in 2007 (top-right panel). The exhibit shows also achievement for the eighth grade students in 2003 (bottom-left panel) and in 2007 (bottom-right panel). The trends for fourth and eighth grade, however, were presented more fully in Exhibit 1.3. The purpose of Exhibit 1.4 is to provide information about relative progress across grades as the cohort of students assessed at the fourth grade in 2003 moved to the eighth grade four years later in 2007. That is, to compare relative performance at the fourth grade in 2003 (upper-left panel)

Exhibit 1.4 Cohort Comparison: 2003 Fourth Grade Students in Eighth Grade in 2007

TIMSS2007  
Mathematics 4<sup>th</sup> & 8<sup>th</sup>  
Grades

2003 – Fourth Grade		
Country	Difference From TIMSS Scale Avg.	
Singapore	94 (5.6)	▲
Hong Kong SAR	75 (3.2)	▲
Japan	65 (1.6)	▲
Chinese Taipei	64 (1.8)	▲
Lithuania	34 (2.8)	▲
Russian Federation	32 (4.7)	▲
England	31 (3.7)	▲
Hungary	29 (3.1)	▲
United States	18 (2.4)	▲
Italy	3 (3.7)	
Australia	-1 (3.9)	
Scotland	-10 (3.3)	▼
Slovenia	-21 (2.6)	▼
Armenia	-44 (3.5)	▼
Norway	-49 (2.3)	▼
Iran, Islamic Rep. of	-111 (4.2)	▼
Tunisia	-161 (4.7)	▼
<b>TIMSS Scale Avg.</b>	<b>500</b>	
<b>Benchmarking Participants</b>		
Ontario, Canada	11 (3.8)	▲
Quebec, Canada	6 (2.4)	▲

2007 – Fourth Grade		
Country	Difference From TIMSS Scale Avg.	
Hong Kong SAR	107 (3.6)	▲
Singapore	99 (3.7)	▲
Chinese Taipei	76 (1.7)	▲
Japan	68 (2.1)	▲
Russian Federation	44 (4.9)	▲
England	41 (2.9)	▲
Lithuania	30 (2.4)	▲
United States	29 (2.4)	▲
Australia	16 (3.5)	▲
Hungary	10 (3.5)	▲
Italy	7 (3.1)	▲
Slovenia	2 (1.8)	
Armenia	0 (4.3)	
Scotland	-6 (2.2)	▼
Norway	-27 (2.5)	▼
Iran, Islamic Rep. of	-98 (4.1)	▼
Tunisia	-173 (4.5)	▼
<b>TIMSS Scale Avg.</b>	<b>500</b>	
<b>Benchmarking Participants</b>		
Quebec, Canada	19 (3.0)	▲
Ontario, Canada	12 (3.1)	▲

2003 – Eighth Grade		
Country	Difference From TIMSS Scale Avg.	
Singapore	105 (3.6)	▲
Hong Kong SAR	86 (3.3)	▲
Chinese Taipei	85 (4.6)	▲
Japan	70 (2.1)	▲
Hungary	29 (3.2)	▲
Russian Federation	8 (3.7)	▲
Australia	5 (4.6)	
United States	4 (3.3)	
Lithuania	2 (2.5)	
England	-2 (4.7)	
Scotland	-2 (3.7)	
Slovenia	-7 (2.2)	▼
Italy	-16 (3.2)	▼
Armenia	-22 (3.0)	▼
Norway	-39 (2.5)	▼
Iran, Islamic Rep. of	-89 (2.4)	▼
Tunisia	-90 (2.2)	▼
<b>TIMSS Scale Avg.</b>	<b>500</b>	
<b>Benchmarking Participants</b>		
Quebec, Canada	43 (3.0)	▲
Ontario, Canada	21 (3.1)	▲

2007 – Eighth Grade		
Country	Difference From TIMSS Scale Avg.	
Chinese Taipei	98 (4.5)	▲
Singapore	93 (3.8)	▲
Hong Kong SAR	72 (5.8)	▲
Japan	70 (2.4)	▲
Hungary	17 (3.5)	▲
England	13 (4.8)	▲
Russian Federation	12 (4.1)	▲
United States	8 (2.8)	▲
Lithuania	6 (2.3)	▲
Slovenia	1 (2.1)	
Armenia	-1 (3.5)	
Australia	-4 (3.9)	
Scotland	-13 (3.7)	▼
Italy	-20 (3.0)	▼
Norway	-31 (2.0)	▼
Tunisia	-80 (2.4)	▼
Iran, Islamic Rep. of	-97 (4.1)	▼
<b>TIMSS Scale Avg.</b>	<b>500</b>	
<b>Benchmarking Participants</b>		
Quebec, Canada	28 (3.5)	▲
Ontario, Canada	17 (3.5)	▲

▲ Country average significantly higher than TIMSS scale average  
▼ Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

to relative performance at the eighth grade in 2007 (lower-right panel) as indicated by the arrow pointing diagonally downward.

Nine countries, including Singapore, Hong Kong SAR, Japan, Chinese Taipei, Lithuania, the Russian Federation, England, Hungary, and the United States as well as the two Canadian provinces of Ontario and Quebec performed above the scale average at the fourth grade in 2003 and again at the eighth grade in 2007 (although not in the same order of average achievement). Australia had achievement similar to the scale average in both 2003 and 2007. Scotland, Norway, Iran, and Tunisia also retained the same relative positions, performing below the scale average in the fourth grade in 2003 and again at the eighth grade in 2007. In comparison, Slovenia and Armenia moved from being below the scale average at the fourth grade in 2003 to having achievement similar to the scale average at the eighth grade in 2007. Italy had achievement at the fourth grade similar to the scale average in 2003, but below it at the eighth grade in 2007.

### **What Are the Gender Differences in Mathematics Achievement?**

Exhibit 1.5 shows gender differences in fourth- and eighth-grade mathematics achievement in 2007. It presents average achievement separately for girls and boys for the TIMSS 2007 countries and benchmarking participants, as well as the difference between the averages. The difference between the average achievement for girls and for boys is shown by a bar indicating the amount of the difference, whether the direction of the difference was positive for girls or boys, and whether the difference is statistically significant (indicated by a darkened bar). Countries are shown in increasing order of this difference in average achievement between girls and boys. International averages also are shown. These were obtained by averaging across the mean scores for girls in each of the countries and the mean scores for boys in each of the countries. Benchmarking participants were not included in the calculation on the international averages.

At the fourth grade, there was no difference in average achievement between boys and girls across the participating countries, on average,

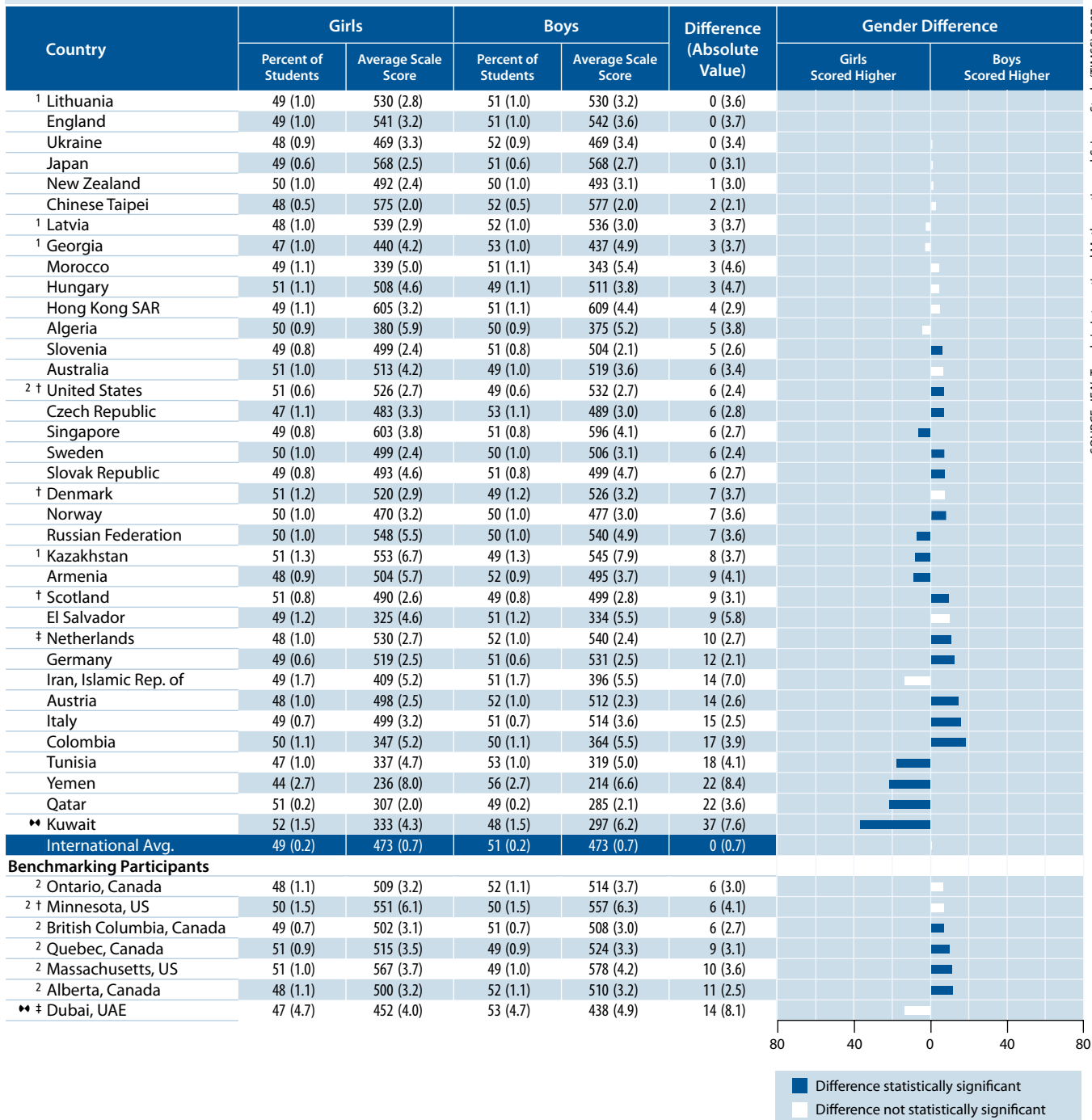
although the situation varied from country to country. In approximately half the countries, the difference in average achievement in mathematics between girls and boys was negligible at the fourth grade. Girls had higher average mathematics achievement than boys in 8 countries, including Singapore, the Russian Federation, Kazakhstan, Armenia, Tunisia, Yemen, Qatar, and Kuwait. Boys had higher average achievement than girls in 12 countries, including Slovenia, the United States, the Czech Republic, Sweden, the Slovak Republic, Norway, Scotland, Netherlands, Germany, Austria, Italy, and Colombia. Among the benchmarking participants, boys had higher achievement than girls in three Canadian provinces, British Columbia, Quebec, and Alberta, and in the U.S. state of Massachusetts.

At the eighth grade, on average across the TIMSS 2007 countries, girls had higher average achievement than boys. Girls had higher achievement than boys in 16 of the participating countries, including Lithuania, Malaysia, Egypt, Bulgaria, Singapore, Botswana, Romania, Cyprus, Jordan, Kuwait, Saudi Arabia, Thailand, Bahrain, the Palestinian National Authority, Qatar, and Oman. Girls had higher average achievement than boys in many, but not all, of the countries in the Middle East. Boys had higher achievement than girls in 8 countries, including Algeria, Lebanon, Australia, the Syrian Arab Republic, El Salvador, Tunisia, Ghana, and Colombia, as well as in 2 Canadian provinces, British Columbia and Ontario.

Exhibit 1.6 shows changes in average achievement separately for boys and girls. At the fourth grade, changes are shown between 2003 and 2007 and between 1995 and 2007 (fourth grade was not assessed in 1999). Across the TIMSS participants, fourth grade girls showed improvement in 8 countries compared to 1995. In five of these countries, there also was improvement from 2003 to 2007, including Australia, England, Hong Kong SAR, Slovenia, and the United States. Also, girls in Armenia, Chinese Taipei, Norway, and the Russian Federation had higher average mathematics achievement in 2007 than in 2003. Girls had decreased average achievement across the 12-year period in Austria and the Czech Republic. In the Netherlands, fourth grade

Exhibit 1.5 TIMSS 2007 Average Mathematics Achievement by Gender

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 1.5 TIMSS 2007 Average Mathematics Achievement by Gender (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Malta	51 (0.3)	488 (1.5)	49 (0.3)	488 (1.7)	0 (2.2)		
Turkey	47 (0.8)	432 (5.3)	53 (0.8)	432 (5.0)	1 (3.9)		
Hungary	50 (1.1)	517 (4.1)	50 (1.1)	517 (3.7)	1 (3.6)		
Chinese Taipei	48 (1.3)	599 (4.6)	52 (1.3)	598 (5.3)	1 (4.2)		
Bosnia and Herzegovina	49 (0.8)	456 (3.1)	51 (0.8)	455 (2.8)	1 (2.5)		
Slovenia	50 (0.8)	500 (2.7)	50 (0.8)	503 (2.6)	2 (3.2)		
Czech Republic	48 (0.8)	505 (2.5)	52 (0.8)	503 (2.8)	2 (2.4)		
<sup>3</sup> Israel	53 (1.6)	465 (4.6)	47 (1.6)	462 (4.9)	3 (5.4)		
<sup>†</sup> Scotland	51 (1.0)	486 (3.8)	49 (1.0)	489 (4.4)	3 (3.5)		
<sup>2</sup> <sup>†</sup> United States	51 (0.7)	507 (3.0)	49 (0.7)	510 (3.1)	4 (2.2)		
Sweden	48 (0.9)	493 (2.6)	52 (0.9)	490 (2.5)	4 (2.5)		
Norway	49 (0.7)	471 (2.1)	51 (0.7)	467 (2.6)	4 (2.5)		
Indonesia	51 (1.0)	399 (4.1)	49 (1.0)	395 (4.4)	4 (4.0)		
Korea, Rep. of	48 (2.7)	595 (3.3)	52 (2.7)	599 (3.1)	4 (3.4)		
Armenia	50 (0.9)	501 (4.4)	50 (0.9)	497 (3.5)	4 (3.7)		
Japan	50 (1.0)	568 (3.2)	50 (1.0)	572 (3.2)	4 (4.3)		
<sup>1</sup> Georgia	50 (1.0)	412 (5.9)	50 (1.0)	408 (6.7)	4 (4.3)		
Russian Federation	52 (0.9)	514 (4.3)	48 (0.9)	509 (4.7)	5 (3.7)		
Ukraine	52 (0.8)	465 (3.9)	48 (0.8)	459 (3.9)	5 (2.9)		
Algeria	49 (0.6)	384 (2.4)	51 (0.6)	389 (2.2)	5 (1.8)		
<sup>†</sup> England	51 (1.9)	511 (5.0)	49 (1.9)	516 (6.1)	6 (5.7)		
Italy	48 (0.7)	477 (3.3)	52 (0.7)	483 (3.5)	6 (3.2)		
<sup>1</sup> <sup>2</sup> Serbia	49 (0.7)	489 (3.6)	51 (0.7)	483 (4.0)	6 (3.9)		
<sup>1</sup> Lithuania	50 (1.1)	509 (3.0)	50 (1.1)	502 (2.3)	7 (2.6)		
Iran, Islamic Rep. of	46 (1.5)	407 (5.3)	54 (1.5)	400 (6.1)	7 (8.1)		
Malaysia	53 (1.5)	479 (5.6)	47 (1.5)	468 (5.3)	11 (4.4)		
<sup>†</sup> Hong Kong SAR	50 (1.3)	578 (5.0)	50 (1.3)	567 (8.0)	11 (6.7)		
Egypt	49 (2.7)	397 (5.0)	51 (2.7)	384 (4.6)	13 (6.4)		
Lebanon	54 (1.8)	443 (4.1)	46 (1.8)	456 (4.7)	13 (3.6)		
Bulgaria	50 (1.2)	471 (4.6)	50 (1.2)	456 (6.3)	15 (5.0)		
Singapore	49 (0.9)	600 (4.1)	51 (0.9)	586 (4.6)	15 (4.4)		
Australia	48 (1.9)	488 (5.5)	52 (1.9)	504 (5.4)	15 (7.7)		
Botswana	53 (0.8)	371 (2.4)	47 (0.8)	355 (3.2)	15 (3.3)		
Syrian Arab Republic	52 (1.9)	387 (4.3)	48 (1.9)	403 (5.1)	16 (5.6)		
Romania	49 (0.9)	470 (4.2)	51 (0.9)	452 (4.6)	18 (3.3)		
Cyprus	50 (0.6)	476 (2.2)	50 (0.6)	455 (2.4)	20 (3.2)		
Jordan	48 (2.0)	438 (6.4)	52 (2.0)	417 (5.6)	20 (8.8)		
El Salvador	52 (1.4)	331 (3.8)	48 (1.4)	351 (3.6)	21 (4.9)		
Tunisia	52 (0.8)	410 (2.8)	48 (0.8)	431 (2.7)	21 (2.4)		
Ghana	45 (0.8)	297 (5.0)	55 (0.8)	319 (4.4)	22 (3.6)		
<sup>**</sup> Kuwait	54 (2.1)	364 (2.7)	46 (2.1)	342 (4.0)	22 (4.8)		
Saudi Arabia	48 (1.6)	341 (3.6)	52 (1.6)	319 (4.0)	23 (5.0)		
Thailand	50 (1.3)	453 (5.3)	50 (1.3)	430 (5.5)	23 (4.7)		
Colombia	51 (1.6)	364 (4.2)	49 (1.6)	396 (4.1)	32 (4.3)		
Bahrain	49 (0.4)	414 (2.2)	51 (0.4)	382 (2.6)	32 (3.6)		
Palestinian Nat'l Auth.	51 (1.4)	385 (4.2)	49 (1.4)	349 (5.4)	36 (6.5)		
Qatar	50 (0.2)	325 (2.1)	50 (0.2)	288 (2.0)	38 (2.9)		
Oman	52 (2.0)	399 (3.6)	48 (2.0)	344 (5.0)	54 (5.6)		
<sup>‡</sup> Morocco	53 (1.3)	377 (3.7)	47 (1.3)	385 (3.9)	9 (4.8)		
International Avg.	50 (0.2)	453 (0.7)	50 (0.2)	448 (0.7)	5 (0.6)		
<b>Benchmarking Participants</b>							
<sup>**</sup> <sup>‡</sup> Dubai, UAE	49 (4.8)	461 (5.2)	51 (4.8)	461 (5.9)	0 (10.1)		
<sup>3</sup> Quebec, Canada	49 (1.5)	527 (3.5)	51 (1.5)	529 (4.6)	2 (4.2)		
<sup>2</sup> <sup>†</sup> Minnesota, US	52 (1.3)	531 (4.4)	48 (1.3)	535 (5.1)	4 (3.7)		
Basque Country, Spain	48 (1.7)	496 (3.9)	52 (1.7)	501 (3.9)	4 (5.0)		
<sup>2</sup> Massachusetts, US	50 (1.0)	544 (4.8)	50 (1.0)	550 (5.1)	5 (3.8)		
<sup>3</sup> British Columbia, Canada	51 (1.1)	507 (3.3)	49 (1.1)	512 (3.4)	6 (2.9)		
<sup>2</sup> Ontario, Canada	50 (1.1)	513 (4.1)	50 (1.1)	522 (4.0)	9 (4.1)		

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Did not satisfy guidelines for sample participation rates (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
<sup>\*\*</sup> Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
<sup>()</sup> Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

■ Difference statistically significant  
 □ Difference not statistically significant

Exhibit 1.6 Trends in Average Mathematics Achievement by Gender – 1995 Through 2007

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Girls			Boys		
	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Armenia	504 (5.7)	42 (6.8) ▲	◊ ◊	495 (3.7)	45 (5.3) ▲	◊ ◊
Australia	513 (4.2)	16 (6.1) ▲	20 (5.7) ▲	519 (3.6)	19 (5.6) ▲	23 (5.4) ▲
Austria	498 (2.5)	◊ ◊	-27 (4.3) ▼	512 (2.3)	◊ ◊	-24 (4.4) ▼
Chinese Taipei	575 (2.0)	11 (2.7) ▲	◊ ◊	577 (2.0)	13 (2.9) ▲	◊ ◊
Czech Republic	483 (3.3)	◊ ◊	-54 (4.6) ▼	489 (3.0)	◊ ◊	-54 (4.6) ▼
England	541 (3.2)	11 (5.0) ▲	62 (5.3) ▲	542 (3.6)	9 (5.8)	53 (5.2) ▲
Hong Kong SAR	605 (3.2)	30 (4.6) ▲	47 (5.0) ▲	609 (4.4)	34 (5.6) ▲	52 (6.3) ▲
Hungary	508 (4.6)	-19 (6.0) ▼	-11 (6.1)	511 (3.8)	-19 (5.1) ▼	-13 (5.5) ▼
Iran, Islamic Rep. of	409 (5.2)	15 (8.4)	30 (7.9) ▲	396 (5.5)	10 (7.8)	2 (9.7)
Italy	499 (3.2)	1 (5.2)	--	514 (3.6)	7 (5.2)	--
Japan	568 (2.5)	5 (3.1)	5 (3.2)	568 (2.7)	2 (3.4)	-3 (3.6)
Latvia	539 (2.9)	4 (4.3)	33 (5.9) ▲	536 (3.0)	5 (4.9)	43 (6.3) ▲
Lithuania	530 (2.8)	-5 (4.4)	◊ ◊	530 (3.2)	-6 (4.5)	◊ ◊
Morocco	339 (5.0)	-4 (7.9)	◊ ◊	343 (5.4)	-7 (7.4)	◊ ◊
Netherlands	530 (2.7)	-8 (3.8) ▼	-13 (4.2) ▼	540 (2.4)	-4 (3.2)	-17 (4.2) ▼
New Zealand	492 (2.4)	-3 (3.6)	19 (4.9) ▲	493 (3.1)	-3 (3.9)	28 (6.9) ▲
Norway	470 (3.2)	21 (4.2) ▲	-4 (5.4)	477 (3.0)	23 (4.0) ▲	-1 (4.7)
Russian Federation	548 (5.5)	18 (7.7) ▲	◊ ◊	540 (4.9)	7 (6.8)	◊ ◊
Scotland	490 (2.6)	5 (4.1)	-3 (4.9)	499 (2.8)	3 (5.2)	6 (5.4)
Singapore	603 (3.8)	4 (6.8)	8 (6.7)	596 (4.1)	6 (7.4)	10 (6.2)
Slovenia	499 (2.4)	23 (3.8) ▲	42 (4.5) ▲	504 (2.1)	23 (4.1) ▲	38 (4.1) ▲
Tunisia	336 (4.8)	-6 (6.9)	◊ ◊	317 (5.0)	-19 (7.0) ▼	◊ ◊
United States	526 (2.7)	12 (3.6) ▲	10 (4.1) ▲	532 (2.7)	10 (3.9) ▲	12 (4.1) ▲
<b>Benchmarking Participants</b>						
Alberta, Canada	500 (3.2)	◊ ◊	-23 (10.1) ▼	510 (3.2)	◊ ◊	-13 (8.4)
Minnesota, US	551 (6.1)	◊ ◊	34 (10.6) ▲	557 (6.3)	◊ ◊	42 (9.9) ▲
Ontario, Canada	509 (3.2)	3 (4.8)	22 (4.7) ▲	514 (3.7)	-2 (6.0)	24 (5.7) ▲
Quebec, Canada	515 (3.5)	12 (4.4) ▲	-34 (6.7) ▼	524 (3.3)	15 (4.4) ▲	-28 (5.7) ▼

▲ 2007 average significantly higher  
▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

A diamond (◊) indicates the country did not participate in the assessment.





**Exhibit 1.6 Trends in Average Mathematics Achievement by Gender – 1995 Through 2007 (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Girls				Boys			
	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Armenia	501 (4.4)	18 (5.5) ▲	0 0	0 0	497 (3.5)	24 (4.9) ▲	0 0	0 0
Australia	488 (5.5)	-10 (8.0)	--	-23 (6.9) ▼	504 (5.4)	-7 (7.9)	--	-4 (7.2)
Bahrain	414 (2.2)	-3 (3.2)	0 0	0 0	382 (2.6)	-2 (3.6)	0 0	0 0
Botswana	371 (2.4)	3 (3.5)	0 0	0 0	355 (3.2)	-9 (4.3) ▼	0 0	0 0
Bulgaria	471 (4.6)	-5 (7.2)	-39 (7.5) ▼	-62 (7.6) ▼	456 (6.3)	-20 (7.7) ▼	-54 (9.4) ▼	-65 (8.9) ▼
Chinese Taipei	599 (4.6)	10 (6.8)	15 (6.1) ▲	0 0	598 (5.3)	16 (7.4) ▲	11 (7.5)	0 0
Colombia	364 (4.2)	0 0	0 0	44 (8.3) ▲	396 (4.1)	0 0	0 0	52 (9.2) ▲
Cyprus	476 (2.2)	8 (2.9) ▲	-3 (3.0)	5 (3.4)	455 (2.4)	4 (3.3)	-19 (3.6) ▼	-9 (4.0) ▼
Czech Republic	505 (2.5)	0 0	-7 (4.7)	-34 (5.9) ▼	503 (2.8)	0 0	-26 (6.4) ▼	-50 (5.4) ▼
Egypt	397 (5.0)	-9 (6.6)	0 0	0 0	384 (4.6)	-22 (6.8) ▼	0 0	0 0
England	511 (5.0)	12 (7.3)	24 (7.4) ▲	16 (6.4) ▲	516 (6.1)	18 (8.5) ▲	11 (7.9)	16 (8.2)
Ghana	297 (5.0)	31 (7.1) ▲	0 0	0 0	319 (4.4)	36 (6.6) ▲	0 0	0 0
Hong Kong SAR	578 (5.0)	-9 (6.3)	-5 (6.9)	19 (8.6) ▲	567 (8.0)	-18 (9.2) ▼	-14 (10.0)	-10 (10.8)
Hungary	517 (4.1)	-9 (5.5)	-12 (5.7) ▼	-10 (5.5)	517 (3.7)	-16 (5.1) ▼	-18 (5.7) ▼	-9 (5.2)
Indonesia	406 (4.7)	-5 (6.8)	6 (7.1)	0 0	404 (5.3)	-6 (7.5)	-1 (7.3)	0 0
Iran, Islamic Rep. of	407 (5.3)	-10 (6.8)	-1 (6.8)	2 (8.1)	400 (6.1)	-7 (7.4)	-32 (7.7) ▼	-29 (7.7) ▼
Israel	465 (4.6)	-27 (5.7) ▼	6 (6.3)	--	462 (4.9)	-38 (6.7) ▼	-12 (6.9)	--
Italy	477 (3.3)	-4 (4.5)	2 (5.6)	--	483 (3.5)	-4 (5.3)	-2 (5.6)	--
Japan	568 (3.2)	-1 (5.2)	-7 (4.0)	-9 (3.8) ▼	572 (3.2)	1 (4.8)	-10 (4.0) ▼	-13 (3.9) ▼
Jordan	438 (6.4)	-1 (7.9)	6 (8.0)	0 0	417 (5.6)	6 (8.1)	-8 (8.2)	0 0
Korea, Rep. of	595 (3.3)	9 (4.3) ▲	11 (4.6) ▲	24 (4.4) ▲	599 (3.1)	7 (4.0)	9 (3.8) ▲	11 (4.1) ▲
Lebanon	443 (4.1)	14 (5.5) ▲	0 0	0 0	456 (4.7)	18 (6.1) ▲	0 0	0 0
Lithuania	509 (3.0)	6 (4.2)	29 (5.5) ▲	37 (5.5) ▲	502 (2.3)	4 (3.8)	20 (5.3) ▲	31 (5.1) ▲
Malaysia	479 (5.6)	-33 (7.3) ▼	-43 (7.3) ▼	0 0	468 (5.3)	-36 (7.0) ▼	-49 (8.0) ▼	0 0
Norway	471 (2.1)	8 (3.4) ▲	0 0	-26 (3.3) ▼	467 (2.6)	7 (4.0)	0 0	-32 (3.9) ▼
Palestinian Nat'l Auth.	385 (4.2)	-9 (5.7)	0 0	0 0	349 (5.4)	-37 (7.2) ▼	0 0	0 0
Romania	470 (4.2)	-7 (6.6)	-4 (7.5)	-2 (6.1)	452 (4.6)	-21 (6.8) ▼	-18 (7.7) ▼	-22 (7.0) ▼
Russian Federation	514 (4.3)	4 (5.6)	-12 (7.4)	-10 (6.6)	509 (4.7)	3 (6.4)	-17 (7.9) ▼	-14 (7.8)
Scotland	486 (3.8)	-14 (5.8) ▼	0 0	0 (6.6)	489 (4.4)	-7 (5.8)	0 0	-12 (8.3)
Serbia	489 (3.6)	9 (4.7)	0 0	0 0	483 (4.0)	9 (5.0)	0 0	0 0
Singapore	600 (4.1)	-10 (5.3) ▼	-3 (7.3)	-10 (6.3)	586 (4.6)	-15 (6.3) ▼	-20 (8.8) ▼	-22 (6.6) ▼
Slovenia	500 (2.7)	6 (3.8)	--	8 (4.0) ▲	503 (2.6)	11 (3.7) ▲	--	5 (4.4)
Sweden	493 (2.6)	-6 (4.0)	0 0	-48 (5.3) ▼	490 (2.5)	-10 (3.7) ▼	0 0	-49 (5.4) ▼
Thailand	453 (5.3)	0 0	-16 (7.8) ▼	--	430 (5.5)	0 0	-35 (7.8) ▼	--
Tunisia	410 (2.8)	11 (3.8) ▲	-25 (3.7) ▼	0 0	431 (2.7)	8 (3.4) ▲	-29 (4.0) ▼	0 0
United States	507 (3.0)	5 (4.5)	9 (4.9)	17 (5.6) ▲	510 (3.1)	3 (4.7)	5 (5.7)	15 (6.1) ▲
<b>Benchmarking Participants</b>								
Basque Country, Spain	496 (3.9)	6 (4.6)	0 0	0 0	501 (3.9)	16 (5.3) ▲	0 0	0 0
British Columbia, Canada	507 (3.3)	0 0	-18 (7.8) ▼	0 0	512 (3.4)	0 0	-7 (9.1)	0 0
Massachusetts, US	544 (4.8)	0 0	34 (8.0) ▲	0 0	550 (5.1)	0 0	33 (7.9) ▲	0 0
Minnesota, US	531 (4.4)	0 0	0 0	14 (8.8)	535 (5.1)	0 0	0 0	14 (9.4)
Ontario, Canada	513 (4.1)	-7 (5.3)	-1 (5.3)	13 (5.0) ▲	522 (4.0)	0 (5.3)	2 (5.1)	18 (5.3) ▲
Quebec, Canada	527 (3.5)	-13 (5.1) ▼	-39 (6.7) ▼	-33 (7.6) ▼	529 (4.6)	-17 (5.6) ▼	-36 (7.3) ▼	-24 (7.9) ▼

▲ 2007 average significantly higher  
▼ 2007 average significantly lower

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

A dash (–) indicates comparable data are not available.  
A diamond (◊) indicates the country did not participate in the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

girls showed increasing declines in average mathematics achievement across the assessments.

Fourth grade boys often showed increases or decreases in achievement in the same countries as girls, indicating overall trends typically were reflected in similar changes for both sexes. The notable exception to this pattern is in Iran, where girls showed a 30-point increase between 1995 and 2007 compared to essentially no change for boys. Also, between 2003 and 2007 the improvement in the Russian Federation was significant for girls and not for boys, whereas in the decline in Tunisia was significant for boys and not for girls.

Among the benchmarking participants at fourth grade, the decrease in average achievement in the Canadian province of Alberta between 1995 and 2007 was significant for girls and not for boys. In the U.S. state of Minnesota, both girls and boys had higher achievement in 2007 than in 1995. This also was the trend in the Canadian province of Ontario, although achievement was unchanged recently between 2003 and 2007. In Quebec, both sexes had higher average achievement in 2007 than in 2003, but these improvements did not equal previous declines still resulting in lower achievement over the 12-year period for both girls and boys.

At the eighth grade, looking at the changes by gender between 1995 and 2007, girls had increases in average achievement in 7 countries and declines in 6 countries. The increases were in Colombia, England, Hong Kong SAR, Korea, Lithuania, Slovenia, and the United States. The improvements were similar for boys in these countries, except in Hong Kong SAR where boys had decreased average achievement, particularly between 2003 and 2007. The Canadian province of Ontario showed improvement for both boys and girls between 1995 and 2007, and the Canadian province of Quebec had declines for both sexes during the same period.

Among the 6 countries with declines in average achievement for girls at the eighth grade, in Bulgaria, the Czech Republic, Japan, Norway, and Sweden the boys also had lower average achievement in 2007 than in 1995. In Australia, only the girls had lower achievement in 2007 and not the boys.

However, in Cyprus, Iran, Romania, and Singapore, boys had lower average achievement in 2007 than in 1995. For countries with trends dating only back to 1999 and showing changes by gender, Chinese Taipei had increases for girls but not boys and Malaysia, Thailand, and Tunisia had decreases for both. Among the benchmarking participants, the U.S. state of Massachusetts had increases for both boys and girls and the Canadian province of British Columbia had a decrease for girls. For countries joining TIMSS in 2003 and showing changes in achievement by gender, both boys and girls had higher achievement in 2007 in Armenia, Ghana, and Lebanon, and the boys had lower achievement in Botswana, Egypt, and the Palestinian National Authority. In the Basque Country of Spain, boys had higher achievement in 2007 than in 2003.



# Chapter 2



## *Performance at the TIMSS 2007 International Benchmarks for Mathematics Achievement*

The TIMSS mathematics achievement scale summarizes student performance on test items designed to measure breadth of content in number, algebra, geometry, and data as well as a range of cognitive processes within the knowing, applying, and reasoning domains. To interpret the achievement results in meaningful ways, it is important to understand the content of the assessment. As a way of interpreting the scaled results, TIMSS uses four points on the scale as international benchmarks and describes achievement at those benchmarks in relation to students' performance on the test questions. The benchmarks represent the range of performance shown by students internationally (and, at the fourth grade, complement the PIRLS International Benchmarks). The Advanced International Benchmark is 625, the High International Benchmark is 550, the Intermediate International Benchmark is 475, and the Low International Benchmark is 400.

The TIMSS & PIRLS International Study Center worked with the TIMSS 2007 Science and Mathematics Item Review Committee (SMIRC)<sup>1</sup> to conduct a detailed scale anchoring analysis to describe mathematics achievement at these benchmarks. Scale anchoring is a way of describing TIMSS 2007 performance at different points on the TIMSS mathematics scale in terms of the types of items students answered correctly. In addition to a data analysis component to identify items that discriminated between

1 The members of the Science and Mathematics Item Review Committee (SMIRC) are listed in Appendix F.

successive points on the scale,<sup>2</sup> the analysis also involved a judgmental component in which the SMIRC members examined the mathematics content and cognitive processing dimensions assessed by each item and generalized to describe students' knowledge and understandings.

This chapter presents the TIMSS 2007 mathematics achievement results for the International Benchmarks for the countries and benchmarking participants. Then, benchmark by benchmark for each grade, there is a detailed description of the understanding of mathematics content and types of cognitive processing skills and strategies demonstrated by students at each of the international benchmarks together with illustrative items. For each example item, the percent correct for each of the TIMSS 2007 participants is given as well as the international average across countries. The correct answer is circled for multiple-choice items. For open-ended items, the answers exemplify the types of student responses that were given full credit.<sup>3</sup> Of course, the items published herein were selected from the items released for public use.<sup>4</sup> Beyond illustrating the benchmark and being released, an effort was made across the benchmarks to include examples of different item formats and content area domains.

### **How Do Countries Compare with the TIMSS 2007 International Benchmarks of Mathematics Achievement?**

Exhibit 2.1 summarizes what fourth- and eighth-grade students scoring at the TIMSS International Benchmarks typically know and can do in mathematics. At each grade, there was a substantial variation in performance between students achieving at the high end of the scale and the low end of the scale. At the fourth grade, students at the Advanced International Benchmark applied mathematical understanding and knowledge in a variety of relatively complex problem situations and were able to explain their reasoning whereas those at the Low International Benchmark demonstrated some basic mathematical knowledge and were able to compute with whole numbers, recognize some geometric shapes, and read simple graphs and tables. At the

2 For example, in brief, a multiple-choice item anchored at the Advanced International Benchmark if at least 65 percent of students scoring at 625 answered the item correctly and fewer than 50 percent of students scoring at the High International Benchmark (550) answered correctly, and so on, for each successively lower benchmark. Since constructed-response questions nearly eliminate guessing, the criterion for the constructed-response items was simply 50 percent at the particular benchmark. For more information, see the "Scale Anchoring Analysis" section of Appendix A as well as the *TIMSS 2007 Technical Report*.

3 All of the constructed-response items were scored according to detailed scoring guides containing descriptions and examples of the types of responses that should receive credit. Although most constructed-response items were worth 1 point, some were worth 2 points (with 1 point awarded for partial credit). If the example item was worth 2 points, the data are for responses receiving 2 points (full credit).

4 After each TIMSS assessment, approximately one-third of the items are released into the public domain and the rest of the items are kept secure for use in measuring trends over time in subsequent assessments.

eighth grade, students at the Advanced International Benchmark organized and drew conclusions from information, made generalizations, and solved non-routine problems involving numeric, algebraic, and geometric concepts and relationships. In comparison, those at the Low International Benchmark demonstrated some knowledge of whole numbers and decimals, operations, and basic graphs.

Exhibit 2.2 displays the percentage of students in each country and benchmarking entity that reached each international benchmark. At each grade, the results are presented in descending order according to the percentage of students reaching the Advanced International Benchmark (indicated by the blue dots, and shown in the column labeled “Advanced”).

Generally, the TIMSS 2007 participants with the highest average achievement had greater percentages of students reaching each benchmark, and lower achieving countries had smaller percentages. Thus, consistent with the results in Exhibit 1.1, the Asian countries had the highest percentages of students reaching the advanced benchmark and appear at the top in Exhibit 2.2. Keeping in mind that the Advanced International Benchmark represents fluency on items involving the most complex topics and reasoning skills in the *TIMSS 2007 Mathematics Framework*, remarkable percentages of students in these countries reached the advanced benchmark. In particular, at the fourth grade, Singapore and Hong Kong SAR had 41 and 40 percent of their students, respectively, achieving at or above the Advanced International Benchmark. At the eighth grade, Chinese Taipei, Korea, and Singapore had 40 to 45 percent of their students achieving at or above the Advanced International Benchmark.

Exhibit 2.1 **TIMSS 2007 International Benchmarks of Mathematics Achievement**TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Advanced International Benchmark – 625**

*Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.* They can apply proportional reasoning in a variety of contexts. They demonstrate a developing understanding of fractions and decimals. They can select appropriate information to solve multi-step word problems. They can formulate or select a rule for a relationship. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can organize, interpret, and represent data to solve problems.

**High International Benchmark – 550**

*Students can apply their knowledge and understanding to solve problems.* Students can solve multi-step word problems involving operations with whole numbers. They can use division in a variety of problem situations. They demonstrate understanding of place value and simple fractions. Students can extend patterns to find a later specified term and identify the relationship between ordered pairs. Students show some basic geometric knowledge. They can interpret and use data in tables and graphs to solve problems.

**Intermediate International Benchmark – 475**

*Students can apply basic mathematical knowledge in straightforward situations.* Students at this level demonstrate an understanding of whole numbers. They can extend simple numeric and geometric patterns. They are familiar with a range of two-dimensional shapes. They can read and interpret different representations of the same data.

**Low International Benchmark – 400**

*Students have some basic mathematical knowledge.* Students demonstrate an understanding of adding and subtracting with whole numbers. They demonstrate familiarity with triangles and informal coordinate systems. They can read information from simple bar graphs and tables.





Exhibit 2.1 **TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)**TIMSS2007  
Mathematics **8**<sup>th</sup>  
Grade**Advanced International Benchmark – 625**

*Students can organize and draw conclusions from information, make generalizations, and solve non-routine problems. They can solve a variety of ratio, proportion, and percent problems. They can apply their knowledge of numeric and algebraic concepts and relationships. Students can express generalizations algebraically and model situations. They can apply their knowledge of geometry in complex problem situations. Students can derive and use data from several sources to solve multi-step problems.*

**High International Benchmark – 550**

*Students can apply their understanding and knowledge in a variety of relatively complex situations. They can relate and compute with fractions, decimals, and percents, operate with negative integers, and solve word problems involving proportions. Students can work with algebraic expressions and linear equations. Students use knowledge of geometric properties to solve problems, including area, volume, and angles. They can interpret data in a variety of graphs and table and solve simple problems involving probability.*

**Intermediate International Benchmark – 475**

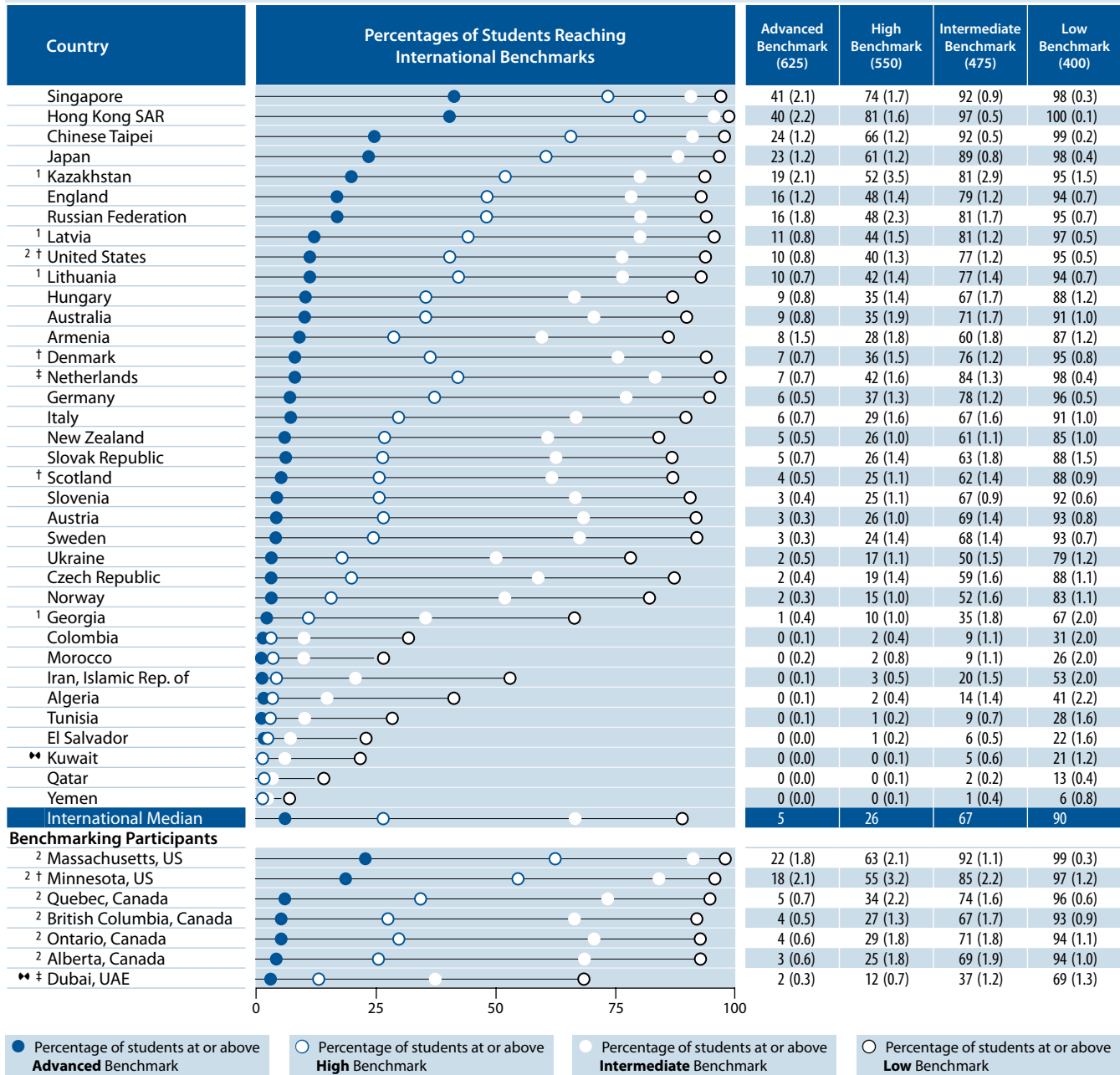
*Students can apply basic mathematical knowledge in straightforward situations. They can add and multiply to solve one-step word problems involving whole numbers and decimals. They can work with familiar fractions. They understand simple algebraic relationships. They demonstrate understanding of properties of triangles and basic geometric concepts. They can read and interpret graphs and tables. They recognize basic notions of likelihood.*

**Low International Benchmark – 400**

*Students have some knowledge of whole numbers and decimals, operations, and basic graphs.*

**Exhibit 2.2 Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade



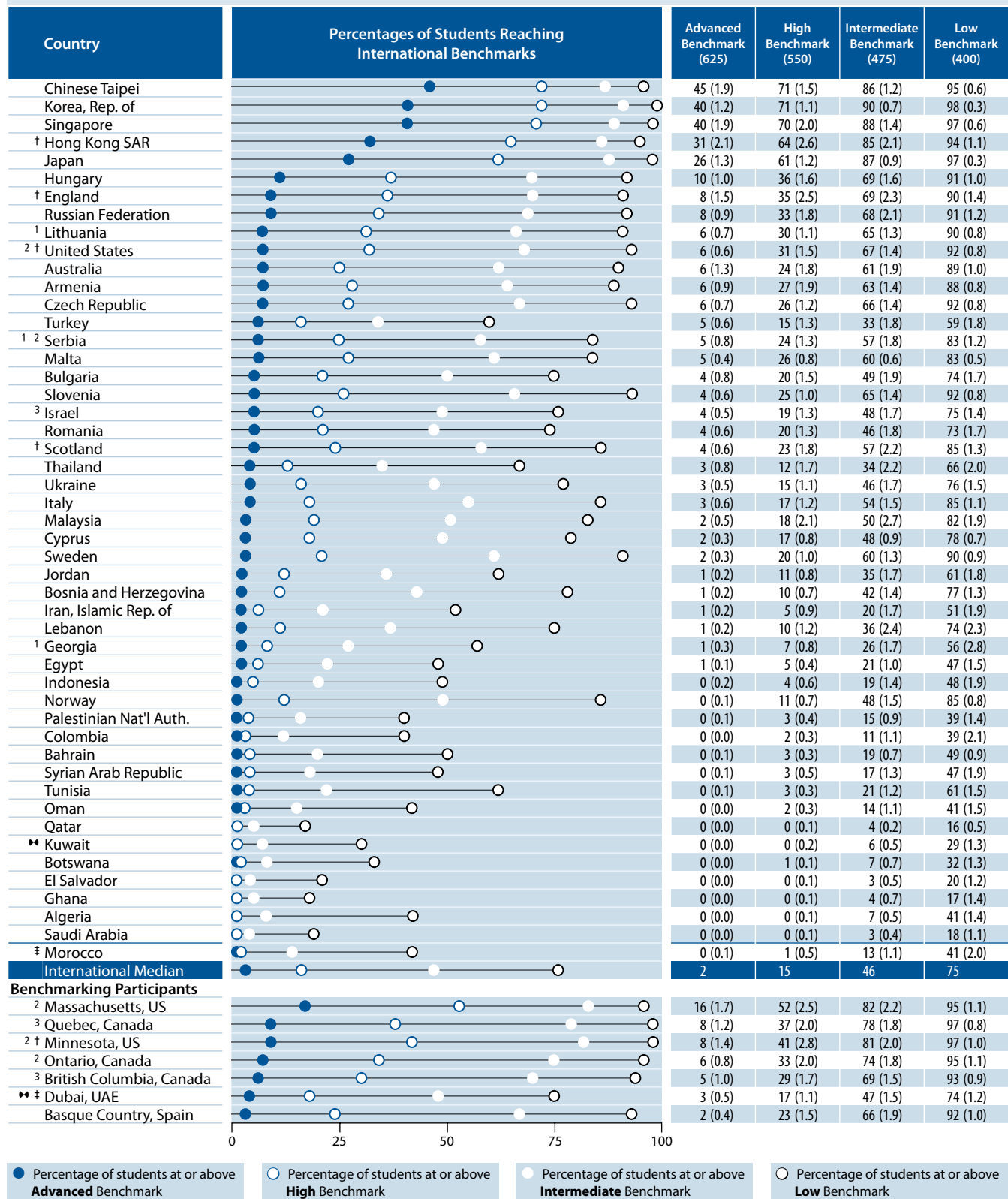
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

**Exhibit 2.2 Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 † Did not satisfy guidelines for sample participation rates (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

As a point of reference, Exhibit 2.2 provides the median in TIMSS 2007 for each of the international benchmarks. By definition, half the countries (not including the benchmarking participants) will have a percentage above the median and half below. The median percentage of students reaching the Advanced International Benchmark was 5 percent at the fourth grade and 2 percent at the eighth grade. Following Singapore and Hong Kong SAR at the fourth grade, Chinese Taipei and Japan had nearly one-fourth of their students (23 to 24 percent) reaching the advanced benchmark. Other countries with at least 10 percent of fourth grade students reaching the advanced benchmark included Kazakhstan (19%), England (16%), the Russian Federation (16%), Latvia (11%), the United States (10%), and Lithuania (10%). Among the benchmarking participants, about one-fifth of fourth-grade students in the U.S. states of Massachusetts and Minnesota reached the advanced benchmark (22 and 18 percent, respectively). At the eighth grade, following Chinese Taipei, Korea, and Singapore, nearly one-third (31%) of students in Hong Kong (SAR) and approximately one-fourth (26%) in Japan reached the advanced benchmark. After that there is a considerable gap to the next highest percent, with Hungary having 10% of students reaching the advanced benchmark and all other countries less than that.

Although Exhibit 2.2 is organized to draw particular attention to the percentage of high-achieving students in each country and benchmarking participant, it also conveys information about the distribution of middle and low performers. Since students reaching a particular benchmark also reached lower benchmarks, the percentages illustrated graphically, and shown in the table are cumulative. At the fourth grade, the median for the Low International Benchmark was an impressive 90 percent, indicating that in at least half the countries almost all of the fourth grade students had elementary knowledge and skills in mathematics. A number of countries had 95 percent or more of fourth grade students reaching this benchmark, including Singapore, Hong Kong SAR, Chinese Taipei, Japan, Kazakhstan, the Russian Federation, Latvia, the United States, Denmark, the Netherlands,

and Germany. The two U.S. states and Canadian province of Quebec also had 95 percent or more of their fourth grade students reaching this benchmark. At the other end of the achievement distribution, however, less than half the students reached the low benchmark in Algeria (41%), Colombia (31%), Tunisia (28%), Morocco (26%), El Salvador (22%), Kuwait (21%), Qatar (13%), and Yemen (6%).

At the fourth grade, the median for the intermediate benchmark was 67 percent and the high benchmark median was 26 percent, indicating that in half the countries two-thirds or more of students could apply mathematical knowledge in straightforward situations and one-fourth or more could solve multi-step word problems. Conversely, however, the percentages at the high level, for example, also were lower than 26 percent in half of the countries. Also, while many countries have patterns consistent with the median results, several appear to be concentrating on helping students reach basic levels. For example, the results for the Netherlands are near the median (7%) for the advanced benchmark, but well above the median at the high (42%) and, most notably, the intermediate (84%) and low (98%) benchmarks. In Iran, few students reached the two highest benchmarks but one-fifth (20%) could apply mathematical knowledge (intermediate benchmark) and more than half (53%) demonstrated a grasp of the basics (low benchmark).

At the eighth grade, the substantial variation in achievement at the Advanced International Benchmark was mirrored at each of the other benchmarks. For example, the gap between the Asian countries and the remaining countries observed at the advanced benchmark also was evident at the high benchmark. The High International Benchmark was reached by at least 70 percent in Chinese Taipei, Korea, and Singapore as well as by 60 percent in Hong Kong SAR and Japan, but only about half that percent (30 to 36%) in the next highest group of countries (Hungary, England, the Russian Federation, Lithuania, and the United States). The range at the Intermediate International Benchmark was from 90 percent in Korea to 3 percent in El Salvador and Saudi Arabia. At the Low International

Benchmark, 95 percent or more achieved that level in four countries (Chinese Taipei, Korea, Singapore, and Japan), the two U.S. states, and the Canadian provinces of Quebec and Ontario. However, many countries had fewer than half of students reaching the low benchmark and several had less than 20 percent, including Saudi Arabia (18%), Ghana (17%), and Qatar (16%).

Considering their percentages reaching the advanced benchmark (2 to 6%), several countries had relatively larger percentages reaching the intermediate and low benchmarks, including the Czech Republic (66 and 92%, respectively), Slovenia (65 and 92%, respectively), and Sweden (60 and 90%, respectively). Norway also displayed this pattern with essentially no students at the advanced benchmark but 48 percent reaching the intermediate benchmark and 85 percent reaching the low benchmark.

Exhibit 2.3 presents changes in the percentages of students reaching the benchmarks. Trends across the four benchmarks generally were consistent with the patterns of overall changes across the previous assessments. For example, at the fourth grade, Hong Kong SAR had increased percentages of students at each of the benchmarks in each assessment (except at the low benchmark already reached by 99 percent of the students in 2003). Among those with lower average achievement in 2007 compared to 1995, the Czech Republic had decreased percentages of students at each benchmark and Austria had decreased percentages at the three top benchmarks.

At the eighth grade, for example, Lithuania had increased percentages reaching all four benchmarks compared to 1995 and 1999 and Malaysia had decreased percentages at all four benchmarks compared to 1999 and 2003. Sometimes, however, the changes in average achievement were reflected in some parts of the distribution more than others. For example, between 2003 and 2007 the Basque Country in Spain had the most improvements in the middle of the distribution—at the high and intermediate benchmarks but not at the advanced and low benchmarks.



**Exhibit 2.3 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Advanced International Benchmark (625)			High International Benchmark (550)		
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students
Singapore	41 (2.1)	38 (2.9)	38 (2.2)	74 (1.7)	73 (2.4)	70 (1.6)
Hong Kong SAR	40 (2.2)	22 (1.7)	17 (1.7)	81 (1.6)	67 (2.0)	56 (2.2)
Chinese Taipei	24 (1.2)	16 (0.9)	0 0	66 (1.2)	61 (1.1)	0 0
Japan	23 (1.2)	21 (0.8)	22 (1.0)	61 (1.2)	60 (1.0)	61 (1.1)
England	16 (1.2)	14 (1.4)	7 (0.8)	48 (1.4)	43 (1.8)	24 (1.5)
Russian Federation	16 (1.8)	11 (1.6)	0 0	48 (2.3)	41 (2.6)	0 0
Latvia	11 (0.8)	9 (0.9)	6 (1.3)	44 (1.5)	43 (2.1)	27 (2.1)
United States	10 (0.8)	7 (0.7)	9 (0.9)	40 (1.3)	35 (1.3)	37 (1.6)
Lithuania	10 (0.7)	10 (1.1)	0 0	42 (1.4)	44 (1.7)	0 0
Hungary	9 (0.8)	10 (1.0)	11 (1.0)	35 (1.4)	41 (1.6)	38 (1.8)
Australia	9 (0.8)	5 (0.7)	6 (0.6)	35 (1.9)	26 (1.7)	27 (1.4)
Armenia	8 (1.5)	2 (0.3)	0 0	28 (1.8)	13 (1.2)	0 0
Netherlands	7 (0.7)	5 (0.8)	12 (1.1)	42 (1.6)	44 (1.5)	50 (1.9)
Italy	6 (0.7)	6 (1.0)	--	29 (1.6)	29 (1.8)	--
New Zealand	5 (0.5)	5 (0.5)	4 (0.6)	26 (1.0)	27 (1.2)	19 (1.4)
Scotland	4 (0.5)	3 (0.4)	7 (0.9)	25 (1.1)	22 (1.4)	27 (1.7)
Slovenia	3 (0.4)	2 (0.4)	2 (0.4)	25 (1.1)	18 (1.0)	14 (1.1)
Austria	3 (0.3)	0 0	10 (0.9)	26 (1.0)	0 0	42 (1.9)
Czech Republic	2 (0.4)	0 0	16 (1.2)	19 (1.4)	0 0	46 (1.6)
Norway	2 (0.3)	1 (0.2)	2 (0.4)	15 (1.0)	10 (1.0)	16 (1.2)
Morocco	0 (0.2)	0 (0.0)	0 0	2 (0.8)	1 (0.2)	0 0
Iran, Islamic Rep. of	0 (0.1)	0 (0.1)	0 (0.2)	3 (0.5)	2 (0.3)	3 (0.7)
Tunisia	0 (0.1)	0 (0.1)	0 0	1 (0.2)	1 (0.3)	0 0
<b>Benchmarking Participants</b>						
Minnesota, US	18 (2.1)	0 0	9 (1.9)	55 (3.2)	0 0	35 (3.0)
Quebec, Canada	5 (0.7)	3 (0.4)	13 (1.9)	34 (2.2)	25 (1.5)	50 (3.4)
Ontario, Canada	4 (0.6)	5 (1.1)	4 (0.5)	29 (1.8)	29 (2.2)	22 (1.5)
Alberta, Canada	3 (0.6)	0 0	9 (1.7)	25 (1.8)	0 0	39 (3.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- ▲ 2007 percent significantly higher  
 ▼ 2007 percent significantly lower

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

A diamond (0) indicates the country did not participate in the assessment.





**Exhibit 2.3 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Intermediate International Benchmark (475)			Low International Benchmark (400)						
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students				
Singapore	92 (0.9)	91 (1.3)	89 (1.0)	▲	98 (0.3)	97 (0.6)	96 (0.4)	▲		
Hong Kong SAR	97 (0.5)	94 (0.7)	▲	87 (1.3)	▲	100 (0.1)	99 (0.2)	97 (0.6)	▲	
Chinese Taipei	92 (0.5)	92 (0.7)	◇	◇	99 (0.2)	99 (0.2)	◇	◇		
Japan	89 (0.8)	89 (0.7)	◇	◇	98 (0.4)	98 (0.3)	98 (0.2)	◇		
England	79 (1.2)	75 (1.6)	▲	54 (1.6)	▲	94 (0.7)	93 (0.8)	82 (1.1)	▲	
Russian Federation	81 (1.7)	76 (2.0)	◇	◇	95 (0.7)	95 (0.8)	◇	◇		
Latvia	81 (1.2)	80 (1.4)	◇	◇	97 (0.5)	96 (0.8)	88 (1.1)	▲		
United States	77 (1.2)	72 (1.2)	▲	71 (1.3)	▲	95 (0.5)	93 (0.5)	▲	92 (0.7)	▲
Lithuania	77 (1.4)	79 (1.3)	◇	◇	94 (0.7)	96 (0.7)	◇	◇		
Hungary	67 (1.7)	76 (1.6)	▼	72 (1.5)	◇	88 (1.2)	94 (0.8)	▼	91 (0.9)	▼
Australia	71 (1.7)	64 (1.9)	▲	61 (1.6)	▲	91 (1.0)	88 (1.3)	▲	86 (1.1)	▲
Armenia	60 (1.8)	43 (1.7)	▲	◇	◇	87 (1.2)	75 (1.5)	▲	◇	◇
Netherlands	84 (1.3)	89 (1.2)	▼	87 (1.4)	◇	98 (0.4)	99 (0.4)	▼	99 (0.4)	▼
Italy	67 (1.6)	65 (1.7)	◇	◇	91 (1.0)	89 (1.1)	◇	◇		
New Zealand	61 (1.1)	62 (1.3)	◇	51 (1.9)	▲	85 (1.0)	86 (1.0)	◇	78 (1.7)	▲
Scotland	62 (1.4)	60 (1.6)	◇	60 (1.9)	◇	88 (0.9)	88 (1.2)	◇	85 (1.2)	◇
Slovenia	67 (0.9)	55 (1.5)	▲	45 (2.0)	▲	92 (0.6)	84 (1.0)	▲	77 (1.4)	▲
Austria	69 (1.4)	◇	◇	77 (1.4)	▼	93 (0.8)	◇	◇	94 (0.7)	▼
Czech Republic	59 (1.6)	◇	◇	79 (1.1)	▼	88 (1.1)	◇	◇	95 (0.5)	▼
Norway	52 (1.6)	41 (1.3)	▲	53 (2.0)	◇	83 (1.1)	75 (1.2)	▲	84 (1.2)	▲
Morocco	9 (1.1)	8 (0.8)	◇	◇	26 (2.0)	29 (2.2)	◇	◇		
Iran, Islamic Rep. of	20 (1.5)	17 (1.3)	◇	15 (1.9)	▲	53 (2.0)	45 (2.2)	▲	44 (2.5)	▲
Tunisia	9 (0.8)	9 (1.0)	◇	◇	28 (1.6)	28 (1.7)	◇	◇		
<b>Benchmarking Participants</b>										
Minnesota, US	85 (2.2)	◇	◇	70 (3.3)	▲	97 (1.2)	◇	◇	91 (2.2)	▲
Quebec, Canada	74 (1.6)	69 (1.4)	▲	87 (1.7)	▼	96 (0.6)	94 (0.8)	▲	98 (0.7)	▼
Ontario, Canada	71 (1.8)	70 (1.7)	◇	59 (1.9)	▲	94 (1.1)	94 (0.9)	◇	86 (1.3)	▲
Alberta, Canada	69 (1.9)	◇	◇	74 (3.9)	◇	94 (1.0)	◇	◇	93 (2.7)	◇

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



**Exhibit 2.3 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	Advanced International Benchmark (625)				High International Benchmark (550)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Chinese Taipei	45 (1.9)	38 (2.0) ▲	37 (1.6) ▲	◇ ◇	71 (1.5)	66 (1.8) ▲	67 (1.5)	◇ ◇
Korea, Rep. of	40 (1.2)	35 (1.3) ▲	32 (0.9) ▲	31 (1.1) ▲	71 (1.1)	70 (1.0)	70 (1.0)	67 (1.0) ▲
Singapore	40 (1.9)	44 (2.0)	42 (3.5)	40 (2.9)	70 (2.0)	77 (2.0) ▼	77 (2.6) ▼	84 (1.8) ▼
Hong Kong SAR	31 (2.1)	31 (1.6)	28 (2.1)	23 (2.4) ▲	64 (2.6)	73 (1.8) ▼	70 (2.3)	65 (3.2)
Japan	26 (1.3)	24 (1.0)	29 (0.9)	29 (1.0)	61 (1.2)	62 (1.2)	66 (1.0) ▼	67 (0.8) ▼
Hungary	10 (1.0)	11 (1.0)	13 (1.2) ▼	10 (0.8)	36 (1.6)	41 (1.9) ▼	43 (1.9) ▼	40 (1.6)
England	8 (1.5)	5 (1.0)	6 (0.8)	6 (1.0)	35 (2.5)	26 (2.8) ▲	25 (2.0) ▲	27 (1.5) ▲
Russian Federation	8 (0.9)	6 (0.8) ▲	12 (1.6) ▼	9 (1.2)	33 (1.8)	30 (1.8)	39 (2.8)	38 (3.1)
Lithuania	6 (0.7)	5 (0.6)	3 (0.6) ▲	2 (0.5) ▲	30 (1.1)	28 (1.2)	18 (2.0) ▲	17 (1.5) ▲
United States	6 (0.6)	7 (0.7)	7 (1.0)	4 (0.7)	31 (1.5)	29 (1.6)	30 (1.6)	26 (2.0)
Australia	6 (1.3)	7 (1.1)	--	7 (1.0)	24 (1.8)	29 (2.4)	--	33 (1.8) ▲
Armenia	6 (0.9)	2 (0.3) ▲	◇ ◇	◇ ◇	27 (1.9)	21 (1.3) ▲	◇ ◇	◇ ◇
Czech Republic	6 (0.7)	◇ ◇	9 (1.2) ▼	15 (2.0) ▼	26 (1.2)	◇ ◇	35 (2.1) ▼	47 (2.4) ▼
Serbia	5 (0.8)	4 (0.4)	◇ ◇	◇ ◇	24 (1.3)	21 (1.1)	◇ ◇	◇ ◇
Bulgaria	4 (0.8)	3 (0.7)	9 (2.1) ▼	17 (2.0) ▼	20 (1.5)	19 (1.8)	32 (3.0) ▼	40 (2.8) ▼
Slovenia	4 (0.6)	3 (0.5)	--	4 (0.7)	25 (1.0)	21 (1.0) ▲	--	22 (1.3)
Israel	4 (0.5)	6 (0.6) ▼	4 (0.5)	--	19 (1.3)	27 (1.5) ▼	19 (1.3)	--
Romania	4 (0.6)	4 (0.6)	4 (0.9)	4 (0.6)	20 (1.3)	21 (1.8)	20 (2.0)	21 (1.6)
Scotland	4 (0.6)	4 (0.6)	◇ ◇	5 (1.4)	23 (1.8)	25 (2.1)	◇ ◇	24 (2.7)
Thailand	3 (0.8)	◇ ◇	3 (0.7)	--	12 (1.7)	◇ ◇	17 (1.9)	--
Italy	3 (0.6)	3 (0.6)	4 (0.6)	--	17 (1.2)	19 (1.5)	21 (1.5) ▼	--
Malaysia	2 (0.5)	6 (1.0) ▼	10 (1.2) ▼	◇ ◇	18 (2.1)	30 (2.4) ▼	36 (2.4) ▼	◇ ◇
Cyprus	2 (0.3)	1 (0.2) ▲	2 (0.4)	3 (0.4)	17 (0.8)	13 (0.7) ▲	19 (0.9)	19 (1.0)
Sweden	2 (0.3)	3 (0.5)	◇ ◇	12 (1.1) ▼	20 (1.0)	24 (1.2) ▼	◇ ◇	46 (2.4) ▼
Jordan	1 (0.2)	1 (0.2) ▲	3 (0.5) ▼	◇ ◇	11 (0.8)	8 (1.0) ▲	12 (1.0)	◇ ◇
Iran, Islamic Rep. of	1 (0.2)	0 (0.2)	1 (0.2)	0 (0.2)	5 (0.9)	3 (0.4)	6 (0.9)	4 (0.6)
Lebanon	1 (0.2)	0 (0.1) ▲	◇ ◇	◇ ◇	10 (1.2)	4 (0.6) ▲	◇ ◇	◇ ◇
Indonesia	1 (0.2)	1 (0.2)	2 (0.3) ▼	◇ ◇	5 (0.8)	6 (0.7)	8 (0.9) ▼	◇ ◇
Egypt	1 (0.1)	1 (0.2)	◇ ◇	◇ ◇	5 (0.4)	6 (0.5)	◇ ◇	◇ ◇
Norway	0 (0.1)	0 (0.2)	◇ ◇	4 (0.4) ▼	11 (0.7)	10 (0.6)	◇ ◇	26 (1.3) ▼
Palestinian Nat'l Auth.	0 (0.1)	0 (0.1)	◇ ◇	◇ ◇	3 (0.4)	4 (0.4)	◇ ◇	◇ ◇
Colombia	0 (0.0)	◇ ◇	◇ ◇	0 (0.0) ▲	2 (0.3)	◇ ◇	◇ ◇	2 (0.7)
Bahrain	0 (0.1)	0 (0.0) ▲	◇ ◇	◇ ◇	3 (0.3)	2 (0.2)	◇ ◇	◇ ◇
Tunisia	0 (0.1)	0 (0.0)	0 (0.1)	◇ ◇	3 (0.3)	1 (0.3) ▲	5 (0.5) ▼	◇ ◇
Botswana	0 (0.0)	0 (0.0)	◇ ◇	◇ ◇	1 (0.1)	1 (0.2)	◇ ◇	◇ ◇
Ghana	0 (0.0)	0 (0.0)	◇ ◇	◇ ◇	0 (0.1)	0 (0.0)	◇ ◇	◇ ◇
<b>Benchmarking Participants</b>								
Massachusetts, US	16 (1.7)	◇ ◇	8 (1.3) ▲	◇ ◇	52 (2.5)	◇ ◇	33 (2.6) ▲	◇ ◇
Quebec, Canada	8 (1.2)	8 (1.4)	18 (4.4) ▼	14 (2.8) ▼	37 (2.0)	45 (2.2) ▼	60 (3.5) ▼	54 (4.2) ▼
Minnesota, US	8 (1.4)	◇ ◇	◇ ◇	7 (2.3)	41 (2.8)	◇ ◇	◇ ◇	36 (4.1)
Ontario, Canada	6 (0.8)	6 (0.7)	6 (0.8)	3 (0.4) ▲	33 (2.0)	34 (1.8)	32 (1.8)	26 (1.7) ▲
British Columbia, Canada	5 (1.0)	◇ ◇	7 (2.0)	◇ ◇	29 (1.7)	◇ ◇	35 (4.3)	◇ ◇
Basque Country, Spain	2 (0.4)	1 (0.3)	◇ ◇	◇ ◇	23 (1.5)	16 (1.5) ▲	◇ ◇	◇ ◇

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

A diamond (◇) indicates the country did not participate in the assessment.



**Exhibit 2.3 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Intermediate International Benchmark (475)				Low International Benchmark (400)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Chinese Taipei	86 (1.2)	85 (1.2)	85 (1.0)	∅ ∅	95 (0.6)	96 (0.6)	95 (0.5)	∅ ∅
Korea, Rep. of	90 (0.7)	90 (0.5)	91 (0.5)	89 (0.7)	98 (0.3)	98 (0.3)	99 (0.2) ▼	97 (0.4)
Singapore	88 (1.4)	93 (1.0) ▼	94 (1.2) ▼	98 (0.4) ▼	97 (0.6)	99 (0.2) ▼	99 (0.3) ▼	100 (0.0) ▼
Hong Kong SAR	85 (2.1)	93 (1.3) ▼	92 (1.3) ▼	88 (2.1)	94 (1.1)	98 (0.6) ▼	98 (0.6) ▼	96 (1.1)
Japan	87 (0.9)	88 (0.6)	90 (0.5)	91 (0.5) ▼	97 (0.3)	98 (0.2) ▼	98 (0.2) ▼	98 (0.2) ▼
Hungary	69 (1.6)	75 (1.6) ▼	75 (1.5) ▼	74 (1.6) ▼	91 (1.0)	95 (0.8) ▼	93 (1.0)	94 (0.9) ▼
England	69 (2.3)	61 (2.9) ▲	60 (2.2) ▲	61 (1.5) ▲	90 (1.4)	90 (1.5)	88 (1.2)	87 (1.0)
Russian Federation	68 (2.1)	66 (1.8)	73 (2.7)	73 (2.4)	91 (1.2)	92 (0.9)	93 (1.4)	93 (1.1)
Lithuania	65 (1.3)	63 (1.4)	53 (2.3) ▲	50 (2.3) ▲	90 (0.8)	90 (0.8)	85 (1.8) ▲	81 (1.7) ▲
United States	67 (1.4)	64 (1.6)	62 (1.8)	61 (2.4) ▲	92 (0.8)	90 (1.0)	87 (1.1) ▲	86 (1.5) ▲
Australia	61 (1.9)	65 (2.3)	--	68 (1.7) ▼	89 (1.0)	90 (1.4)	--	90 (1.0)
Armenia	63 (1.4)	54 (1.5) ▲	∅ ∅	∅ ∅	88 (0.8)	82 (1.0) ▲	∅ ∅	∅ ∅
Czech Republic	66 (1.4)	∅ ∅	71 (2.1) ▼	82 (1.4) ▼	92 (0.8)	∅ ∅	94 (1.1)	98 (0.5) ▼
Serbia	57 (1.8)	52 (1.4) ▲	∅ ∅	∅ ∅	83 (1.2)	80 (0.9)	∅ ∅	∅ ∅
Bulgaria	49 (1.9)	51 (2.1)	67 (2.5) ▼	69 (2.4) ▼	74 (1.7)	82 (1.6) ▼	90 (1.2) ▼	90 (1.1) ▼
Slovenia	65 (1.4)	60 (1.3) ▲	--	60 (1.8)	92 (0.8)	90 (0.9)	--	90 (0.9)
Israel	48 (1.7)	60 (1.8) ▼	49 (1.9)	--	75 (1.4)	86 (1.2) ▼	76 (2.0)	--
Romania	46 (1.8)	52 (2.2) ▼	51 (2.6)	52 (2.2) ▼	73 (1.7)	79 (1.7) ▼	79 (2.1)	79 (1.6) ▼
Scotland	57 (2.2)	63 (2.4) ▼	∅ ∅	60 (2.6)	85 (1.3)	90 (1.1) ▼	∅ ∅	87 (1.4)
Thailand	34 (2.2)	∅ ∅	45 (2.6) ▼	--	66 (2.0)	∅ ∅	79 (1.8) ▼	--
Italy	54 (1.5)	56 (1.7)	53 (2.1)	--	85 (1.1)	86 (1.2)	82 (1.6)	--
Malaysia	50 (2.7)	66 (2.1) ▼	70 (2.1) ▼	∅ ∅	82 (1.9)	93 (0.9) ▼	93 (0.9) ▼	∅ ∅
Cyprus	48 (0.9)	45 (1.0) ▲	53 (1.2) ▼	51 (1.3)	78 (0.7)	77 (1.0)	82 (0.9) ▼	77 (1.0)
Sweden	60 (1.3)	64 (1.5) ▼	∅ ∅	81 (1.8) ▼	90 (0.9)	91 (1.0)	∅ ∅	96 (0.8) ▼
Jordan	35 (1.7)	30 (1.9) ▲	33 (1.6)	∅ ∅	61 (1.8)	60 (1.9)	61 (1.4)	∅ ∅
Iran, Islamic Rep. of	20 (1.7)	20 (1.1)	26 (1.9) ▼	24 (1.9) ▼	51 (1.9)	55 (1.4)	61 (1.6) ▼	59 (1.8) ▼
Lebanon	36 (2.4)	27 (1.8) ▲	∅ ∅	∅ ∅	74 (2.3)	68 (1.9)	∅ ∅	∅ ∅
Indonesia	22 (1.8)	24 (1.7)	23 (1.4)	∅ ∅	52 (2.2)	55 (2.4)	50 (2.1)	∅ ∅
Egypt	21 (1.0)	24 (1.2)	∅ ∅	∅ ∅	47 (1.5)	52 (1.7) ▼	∅ ∅	∅ ∅
Norway	48 (1.5)	44 (1.6)	∅ ∅	64 (1.3) ▼	85 (0.8)	81 (1.2) ▲	∅ ∅	90 (0.9) ▼
Palestinian Nat'l Auth.	15 (0.9)	19 (1.2) ▼	∅ ∅	∅ ∅	39 (1.4)	46 (1.5) ▼	∅ ∅	∅ ∅
Colombia	11 (1.1)	∅ ∅	∅ ∅	7 (0.9) ▲	39 (2.1)	∅ ∅	∅ ∅	20 (1.9) ▲
Bahrain	19 (0.7)	17 (0.7)	∅ ∅	∅ ∅	49 (0.9)	51 (1.1)	∅ ∅	∅ ∅
Tunisia	21 (1.2)	15 (1.1) ▲	34 (1.5) ▼	∅ ∅	61 (1.5)	55 (1.6) ▲	78 (1.2) ▼	∅ ∅
Botswana	7 (0.7)	7 (0.7)	∅ ∅	∅ ∅	32 (1.3)	32 (1.5)	∅ ∅	∅ ∅
Ghana	4 (0.7)	2 (0.5) ▲	∅ ∅	∅ ∅	17 (1.4)	9 (1.3) ▲	∅ ∅	∅ ∅
<b>Benchmarking Participants</b>								
Massachusetts, US	82 (2.2)	∅ ∅	69 (3.0) ▲	∅ ∅	95 (1.1)	∅ ∅	92 (1.7)	∅ ∅
Quebec, Canada	78 (1.8)	88 (1.1) ▼	93 (1.1) ▼	90 (2.6) ▼	97 (0.8)	99 (0.2) ▼	99 (0.4) ▼	99 (0.5) ▼
Minnesota, US	81 (2.0)	∅ ∅	∅ ∅	73 (3.4) ▲	97 (1.0)	∅ ∅	∅ ∅	94 (1.6)
Ontario, Canada	74 (1.8)	75 (1.7)	72 (1.6)	65 (1.7) ▲	95 (1.1)	97 (0.5)	96 (0.6)	91 (1.0) ▲
British Columbia, Canada	69 (1.5)	∅ ∅	75 (3.0)	∅ ∅	93 (0.9)	∅ ∅	94 (1.4)	∅ ∅
Basque Country, Spain	66 (1.9)	58 (2.2) ▲	∅ ∅	∅ ∅	92 (1.0)	91 (1.0)	∅ ∅	∅ ∅

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

### **Fourth Grade: Achievement at the Advanced International Benchmark**

At the fourth grade, half (50%) of the assessment items were devoted to assessing the *number* content domain, including understanding of place value, ways of representing numbers, and the relationships between numbers. According to the *TIMSS 2007 Mathematics Framework*, students should have developed number sense and computational fluency, be able to use numbers and operations to solve problems, and be familiar with a range of number patterns. Within the *geometric shapes and measures* domain (35% of the assessment), students should be able to identify and analyze the properties and characteristics of lines, angles, and a variety of geometric figures, including two- and three-dimensional shapes, and to provide explanations based on geometric relationships. This domain also included understanding informal coordinate systems and using spatial visualization skills. The *data display* content domain (15%) included understanding how to organize data that have been collected and how to display it in graphs as well as reading and interpreting various data displays. Students at the fourth grade should be able to compare characteristics of data and to draw conclusions based on data displays. Within each of the content domains, students were expected to demonstrate knowledge as well as application and reasoning skills.

Exhibit 2.4 describes fourth-grade performance at the advanced international benchmark. Students achieving at or above this benchmark demonstrated fluency with many framework topics. They applied mathematical understanding and knowledge in a variety of relatively complex problem situations involving fractions and decimals, number sentences, linear relationships, a range of two- and three-dimensional geometric shapes, and various representations of data. They typically demonstrated success on the knowledge and skills represented by this benchmark, as well as those demonstrated at the high, intermediate, and low benchmarks.

At the fourth grade, pre-algebraic concepts and skills are part of the TIMSS 2007 assessment. The framework specifies that students should be exploring number patterns, investigating the relationships between their

## Exhibit 2.4 Description of the TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement

TIMSS2007  
Mathematics **4**<sup>th</sup>  
Grade

### Advanced International Benchmark – 625

#### Summary

*Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. They can apply proportional reasoning in a variety of contexts. They demonstrate a developing understanding of fractions and decimals. They can select appropriate information to solve multi-step word problems. They can formulate or select a rule for a relationship. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can organize, interpret, and represent data to solve problems.*

Students can solve a variety of multi-step word problems involving whole numbers. They can apply proportional reasoning in a variety of contexts. They show some understanding of divisibility and factors. Students at this level demonstrate a developing understanding of fractions and decimals. They can determine equivalent fractions represented in a variety of ways, including explaining why two representations show the same fraction. Given a fraction, they can identify a larger fraction with a different denominator. They can identify the smallest among a set of one- and two-place decimals and use their knowledge of decimals to solve two-step problems.

Students show understanding of missing numbers in number sentences. For example, they can identify the number that satisfies a number sentence involving addition with two terms on each side and the missing first number in a subtraction sentence. They can construct and use two-step rules for linear relationships between the first and second numbers in a set of ordered pairs.

Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can estimate the length of a

curved line in non-standard units. Students can use maps drawn to scale to solve problems, including locating a point between two specified points and estimating distance. They can draw a perpendicular line that meets given conditions. Students can use their knowledge of perimeter to solve a multi-step problem. Students can determine the areas of simple figures. For example, they can find the area of a figure composed of squares and half squares, determine the area of an isosceles triangle on a grid, and calculate the area of a rectangle. They can identify and use properties of rectangles. Students can relate two- and three-dimensional shapes, recognize properties of common solids, and determine the number of cubes that fill a given rectangular box. They show some understanding of rotation in a plane. For example, they can identify the position of a shape after a quarter-turn and a half-turn rotation in a plane.

Students can organize, interpret, and represent data to solve problems. They can organize data and complete a tally chart to represent the data. They can solve problems that involve relating and interpreting values from two different types of graphs. They can draw a conclusion from data in a table and justify their conclusion.

terms and finding or using the rules that generate them. Exhibit 2.5 presents a number pattern item likely to be answered correctly by students performing at the advanced benchmark. In Example Item 1, students were shown a linear relationship between pairs of numbers and asked to write the two-step rule that described how to get the second number from the first number. Internationally across countries, this was among the most difficult items in the TIMSS 2007 assessment. On average, 15 percent of the students received full credit for their responses. In Hong Kong SAR and Japan, 38 to 39 percent of fourth grade students wrote the correct rule, and in the benchmarking state of Massachusetts, 47 percent answered it correctly.

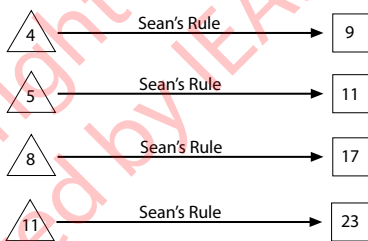
In the data display domain at the fourth grade, students are expected to use information from data displays to answer questions that go beyond directly reading the data displayed (e.g., combine data, perform computations based on the data, draw conclusions, and make predictions). One such item likely to be answered by students reaching the advanced level is shown in Exhibit 2.6. Example Item 2 is a multiple-choice item asking students to use data from two different data displays to solve a problem. On average internationally, 32 percent of the students answered this item correctly. In Singapore and Hong Kong SAR, 63 percent answered it correctly.

Exhibit 2.5 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 1

TIMSS2007 Mathematics 4<sup>th</sup> Grade

Content Domain: Number

Description: Writes two-step rule for a linear relationship between pairs of numbers.



Sean used the same rule to get the number in the □ from the number in the △. What was the rule?

Answer: *You double the number and add one*  
*Example: 2 × 4 = 8*  
*8 + 1 = 9*

The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit	
Hong Kong SAR	39 (2.7)	●
Japan	38 (2.1)	●
Singapore	36 (2.1)	●
Armenia	35 (2.9)	●
Chinese Taipei	33 (2.4)	●
England	28 (2.3)	●
<sup>1</sup> Kazakhstan	28 (4.2)	●
Hungary	28 (2.4)	●
Russian Federation	23 (3.1)	●
<sup>2 †</sup> United States	23 (1.4)	●
<sup>1</sup> Latvia	22 (2.3)	●
Italy	22 (1.7)	●
Australia	20 (3.1)	●
<sup>†</sup> Scotland	17 (1.7)	●
<sup>†</sup> Denmark	17 (2.1)	●
New Zealand	17 (1.6)	●
<b>International Avg.</b>	<b>15 (0.3)</b>	
Germany	13 (1.2)	●
<sup>‡</sup> Netherlands	13 (2.0)	●
<sup>1</sup> Lithuania	13 (1.7)	●
Slovak Republic	13 (2.0)	●
Austria	11 (1.6)	▼
Ukraine	11 (1.5)	▼
Norway	9 (1.4)	▼
<sup>1</sup> Georgia	8 (1.6)	▼
Slovenia	8 (0.8)	▼
Sweden	7 (1.3)	▼
Czech Republic	6 (1.0)	▼
Algeria	6 (1.2)	▼
Iran, Islamic Rep. of	5 (1.1)	▼
Morocco	4 (2.0)	▼
Tunisia	3 (0.5)	▼
♦♦ Kuwait	1 (0.4)	▼
Qatar	1 (0.2)	▼
Colombia	1 (0.4)	▼
Yemen	0 (0.2)	▼
El Salvador	0 (0.0)	▼
<b>Benchmarking Participants</b>		
<sup>2</sup> Massachusetts, US	47 (3.5)	●
<sup>2 †</sup> Minnesota, US	32 (4.1)	●
<sup>2</sup> Alberta, Canada	15 (1.8)	●
♦♦ <sup>‡</sup> Dubai, UAE	14 (1.7)	●
<sup>2</sup> British Columbia, Canada	13 (1.5)	●
<sup>2</sup> Ontario, Canada	12 (2.3)	●
<sup>2</sup> Quebec, Canada	8 (1.5)	▼

Percent significantly higher than international average ●  
 Percent significantly lower than international average ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

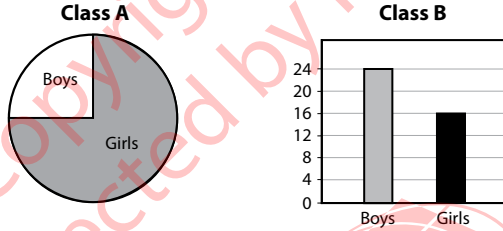
Exhibit 2.6 **TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 2**

TIMSS2007  
Mathematics **4<sup>th</sup>** Grade

Content Domain: Data Display

Description: Uses data from two different graph types to solve a problem.

Class A and B each have 40 students.



There are more girls in Class A than in Class B. How many more?

- 14
- (B) 16
- (C) 24
- (D) 30

Country	Percent Correct	
Singapore	63 (2.3)	▲
Hong Kong SAR	63 (2.3)	▲
<sup>1</sup> Kazakhstan	51 (3.7)	▲
Chinese Taipei	47 (2.5)	▲
<sup>1</sup> Lithuania	46 (2.1)	▲
‡ Netherlands	44 (2.6)	▲
Russian Federation	42 (3.0)	▲
Japan	41 (2.2)	▲
England	40 (2.5)	▲
Slovak Republic	39 (2.1)	▲
<sup>2</sup> † United States	38 (1.8)	▲
Hungary	37 (2.9)	▲
Sweden	37 (2.0)	▲
<sup>1</sup> Latvia	37 (2.5)	▲
Australia	36 (2.2)	▲
Slovenia	35 (2.1)	▲
Germany	35 (1.9)	▲
† Denmark	34 (2.6)	▲
† Scotland	34 (2.3)	▲
Austria	34 (2.1)	▲
Armenia	33 (2.7)	▲
<b>International Avg.</b>	<b>32 (0.4)</b>	
Ukraine	32 (2.1)	▲
New Zealand	32 (1.6)	▲
Norway	31 (2.3)	▲
Czech Republic	31 (2.6)	▲
<sup>1</sup> Georgia	26 (2.7)	▼
Italy	26 (2.2)	▼
Algeria	21 (1.9)	▼
Morocco	15 (2.0)	▼
Iran, Islamic Rep. of	15 (1.8)	▼
Tunisia	14 (1.7)	▼
Qatar	13 (1.1)	▼
♦♦ Kuwait	12 (1.5)	▼
Yemen	9 (1.3)	▼
El Salvador	9 (1.4)	▼
Colombia	9 (1.5)	▼
<b>Benchmarking Participants</b>		
<sup>2</sup> Massachusetts, US	51 (3.2)	▲
<sup>2</sup> † Minnesota, US	48 (2.8)	▲
<sup>2</sup> Ontario, Canada	39 (2.7)	▲
<sup>2</sup> Alberta, Canada	38 (2.4)	▲
<sup>2</sup> British Columbia, Canada	35 (2.1)	▲
<sup>2</sup> Quebec, Canada	30 (2.8)	▲
♦ ‡ Dubai, UAE	23 (2.5)	▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Percent significantly higher than international average ▲  
 Percent significantly lower than international average ▼

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



### **Fourth Grade: Achievement at the High International Benchmark**

Exhibit 2.7 describes performance at the high benchmark. Students reaching this level demonstrated some competency with many of the topics in the framework. For example, in the number domain they applied their knowledge and understanding to solve problems involving whole numbers, including division. They also demonstrated understanding of place value, simple fractions, and how to extend a pattern to find a later specified term. They had some geometric knowledge about angles and triangles as well as distances, perimeters, and areas, and displayed some spatial visualization skills. They could interpret and use data in tables and graphs to solve problems.

Exhibit 2.8 presents a constructed-response item assessing whole number computation. Example Item 3, involving subtraction with three digits, illustrates one type of item typically answered correctly by students reaching the high benchmark. Internationally, 42 percent of students, on average, were able to provide a correct response. Eighty percent or more of the students provided the correct answer in Chinese Taipei, Hong Kong SAR, Singapore, the Russian Federation, Kazakhstan, and Japan.

Example Item 4 shown in Exhibit 2.9 is an example of a data display problem likely to be answered by students reaching the high benchmark. In this constructed-response item, students were asked to use data interpretation and representation skills to complete a bar graph. Internationally on average, 38 percent of the students drew the bar that correctly completed the graph. At least half the students completed the bar graph correctly in 12 countries and the two U.S. states.

## Exhibit 2.7 Description of the TIMSS 2007 High International Benchmark (550) of Mathematics Achievement

TIMSS2007  
Mathematics **4**<sup>th</sup>  
Grade

### High International Benchmark – 550

#### Summary

*Students can apply their knowledge and understanding to solve problems.* Students can solve multi-step word problems involving operations with whole numbers. They can use division in a variety of problem situations. They demonstrate understanding of place value and simple fractions. Students can extend patterns to find a later specified term and identify the relationship between ordered pairs. Students show some basic geometric knowledge. They can interpret and use data in tables and graphs to solve problems.

Students at this level can solve multi-step word problems involving operations with whole numbers. They can use division in a variety of problem situations, including those that involve number sentences. They can solve word problems involving a range of measures (e.g., time, capacity, and temperature). They can use their understanding of place value to solve problems. For example, they can identify the missing digit in a number given its place value, the sum closest to a given value, and appropriately rounded numbers. They can read unlabelled gradations on a scale and solve a word problem involving measures and proportional reasoning.

Students at this level demonstrate understanding of simple fractions and two-place decimals. For example, they can add and subtract fractions with the same denominator, find a fractional part of a set of objects, recognize simple equivalent fractions, order unit fractions, write a number between two consecutive whole numbers, and identify the two-place decimal closest to a given whole number.

Students can extend patterns to find a later specified term and identify the relationship between ordered pairs. For example, they can identify and use two-step rules relating the first number to the second number in ordered pairs.

Students can apply knowledge of right angles to draw and identify them. They can find distances between points, perimeters of simple figures, and areas of right triangles on a grid. They can recognize a net of a cube and visualize hidden cubes in a stack. Students can state simple properties of triangles. They can compose shapes to make other simple shapes that meet specified conditions. Students have basic knowledge of reflections in a plane.

Students can interpret and use data in tables and graphs to solve problems. For example, they can compare data from two tables to draw conclusions. They can read a part symbol on a pictograph. They can complete and label a bar graph based on data in a tally chart, complete the scale of a bar graph, and complete a bar graph to show a specified comparison.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 2.8 **TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 3**

TIMSS 2007  
Mathematics **4<sup>th</sup>** Grade

**Content Domain: Number**

**Description: Determines the missing digit to give a specified difference in a three-digit subtraction problem.**

$$\begin{array}{r} 942 \\ -5\blacksquare7 \\ \hline 415 \end{array}$$

Mano did the subtraction problem above for homework but spilled some of his drink on it. One digit could not be read. His answer of 415 was correct. What is the missing digit?

Answer: 2

The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit	
Chinese Taipei	88 (1.6)	●
Hong Kong SAR	85 (1.9)	●
Singapore	85 (1.4)	●
Russian Federation	84 (1.8)	●
<sup>1</sup> Kazakhstan	83 (3.1)	●
Japan	80 (1.8)	●
<sup>1</sup> Lithuania	71 (2.3)	●
<sup>1</sup> Latvia	71 (2.6)	●
Ukraine	68 (2.3)	●
Armenia	66 (3.0)	●
<sup>1</sup> Georgia	60 (2.7)	●
Hungary	51 (2.8)	●
Slovak Republic	50 (2.3)	●
Italy	49 (2.1)	●
<b>International Avg.</b>	<b>42 (0.4)</b>	
Germany	41 (2.2)	
Czech Republic	41 (2.6)	
<sup>2</sup> † United States	41 (1.8)	
Austria	41 (2.4)	
Slovenia	31 (2.0)	▼
‡ Netherlands	31 (2.6)	▼
Iran, Islamic Rep. of	29 (2.2)	▼
† Denmark	28 (2.5)	▼
England	28 (2.1)	▼
Colombia	25 (2.1)	▼
† Scotland	25 (2.2)	▼
Australia	22 (2.6)	▼
Sweden	18 (1.7)	▼
New Zealand	18 (1.6)	▼
Norway	18 (1.9)	▼
Tunisia	18 (1.8)	▼
Algeria	16 (1.9)	▼
Morocco	14 (1.7)	▼
El Salvador	13 (1.6)	▼
♦♦ Kuwait	10 (1.4)	▼
Yemen	7 (1.3)	▼
Qatar	5 (0.8)	▼
<b>Benchmarking Participants</b>		
<sup>2</sup> Massachusetts, US	52 (3.8)	●
<sup>2</sup> † Minnesota, US	45 (3.9)	
<sup>2</sup> Quebec, Canada	42 (2.9)	
♦♦ ‡ Dubai, UAE	32 (2.9)	▼
<sup>2</sup> British Columbia, Canada	31 (2.2)	▼
<sup>2</sup> Alberta, Canada	26 (2.4)	▼
<sup>2</sup> Ontario, Canada	22 (2.8)	▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Percent significantly higher than international average ●  
Percent significantly lower than international average ▼

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

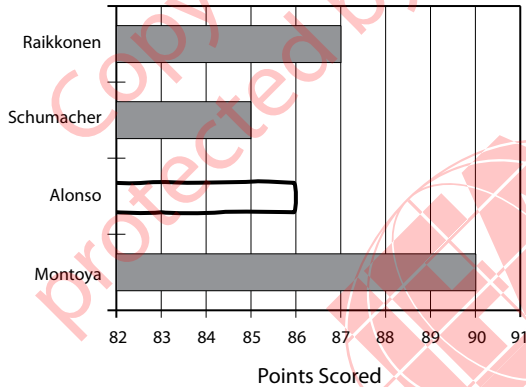
Exhibit 2.9 **TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 4**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

**Content Domain: Data Display**

**Description: Completes a bar graph to show a specified comparison.**

This graph shows the points obtained by 4 drivers in the car racing championship. Montoya is in first place. Alonso is in third place. Draw a bar which shows how many points Alonso has scored.



The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit
Hong Kong SAR	77 (1.9) ▲
Chinese Taipei	72 (1.8) ▲
Japan	71 (2.0) ▲
Singapore	70 (2.1) ▲
<sup>1</sup> Kazakhstan	63 (3.7) ▲
‡ Netherlands	55 (2.5) ▲
Sweden	54 (2.5) ▲
<sup>1</sup> Latvia	54 (2.8) ▲
Australia	52 (3.0) ▲
England	52 (2.5) ▲
<sup>2</sup> † United States	51 (1.7) ▲
Russian Federation	50 (3.2) ▲
† Denmark	48 (2.7) ▲
<sup>1</sup> Lithuania	47 (2.9) ▲
Austria	46 (2.4) ▲
Hungary	45 (3.0) ▲
† Scotland	44 (2.4) ▲
New Zealand	42 (1.9) ▲
Slovenia	41 (2.1) ▲
Germany	40 (2.3) ▲
Slovak Republic	38 (2.3) ▲
<b>International Avg.</b>	<b>38 (0.4)</b>
Italy	36 (2.0) ▲
Armenia	35 (2.5) ▲
Ukraine	32 (2.6) ▼
Czech Republic	30 (2.5) ▼
Norway	30 (2.1) ▼
<sup>1</sup> Georgia	23 (2.7) ▼
Algeria	12 (1.6) ▼
Morocco	10 (1.7) ▼
Iran, Islamic Rep. of	10 (1.5) ▼
♦♦ Kuwait	9 (1.4) ▼
Colombia	8 (1.4) ▼
El Salvador	6 (0.9) ▼
Tunisia	4 (1.0) ▼
Qatar	4 (0.6) ▼
Yemen	1 (0.4) ▼
<b>Benchmarking Participants</b>	
<sup>2</sup> Massachusetts, US	54 (2.8) ▲
<sup>2</sup> † Minnesota, US	53 (2.7) ▲
<sup>2</sup> Ontario, Canada	47 (2.6) ▲
<sup>2</sup> Alberta, Canada	45 (2.7) ▲
<sup>2</sup> British Columbia, Canada	44 (2.1) ▲
<sup>2</sup> Quebec, Canada	42 (3.3) ▲
♦ ‡ Dubai, UAE	31 (2.2) ▼

Percent significantly higher than international average ▲  
Percent significantly lower than international average ▼

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

### **Fourth Grade: Achievement at the Intermediate International Benchmark**

Exhibit 2.10 shows the description of performance at the intermediate benchmark. Students reaching this benchmark applied basic mathematics knowledge to straightforward situations. For example, they were able to order, add, subtract, and multiply whole numbers. They also identified basic fractions and extended patterns from the first several terms to the next terms. They demonstrated familiarity with a range of two-dimensional shapes and could read and interpret different representations of the same data.

Example Item 5 at the intermediate benchmark is from the domain of geometric shapes and measures. Among the topics in this domain, students were expected to be able to draw angles, know and use elementary properties of geometric figures, and use coordinate systems. For example, as shown in Exhibit 2.11, students were given two adjacent sides of a rectangle on a grid and asked to draw the other two sides. On average across countries, more than half the students (54%) completed the rectangle correctly. The fourth graders in Hong Kong SAR outperformed the other participants, with 90 percent providing correct drawings. However, students in Japan, Chinese Taipei, the Russian Federation, the Czech Republic, and the Canadian province of Quebec also did well (more than 70% correct completions).

## Exhibit 2.10 Description of the TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

### Intermediate International Benchmark – 475

#### Summary

*Students can apply basic mathematical knowledge in straightforward situations.* Students at this level demonstrate an understanding of whole numbers. They can extend simple numeric and geometric patterns. They are familiar with a range of two-dimensional shapes. They can read and interpret different representations of the same data.

Students at this level demonstrate an understanding of whole numbers. For example, they can order, add, subtract, and multiply whole numbers. They can identify the appropriate operations to solve multiplication and subtraction problems. Students can add and subtract one-place decimals and can identify an expression that represents a situation involving multiplication. They can identify the fraction that represents a given part-whole situation and select information to solve a simple proportion problem.

Students show understanding of patterns. They can extend patterns from the first several terms of numeric or geometric sequences to determine the next terms. They recognize multiples of single-digit numbers.

Students can order a set of angles by size and recognize that the area does not change when parts of a figure are rearranged. Students are familiar with

a range of two-dimensional shapes. For example, they can name common geometrical shapes in a picture and draw shapes satisfying given conditions. They can identify a three-dimensional object given the pictorial representation of its faces as well as recognize and draw a line of symmetry. They can describe the movement from one position on a grid to another and identify a pattern generated by a quarter-turn clockwise.

Students can interpret information in bar charts and tables to solve simple problems. They can read and interpret different representations of the same data. For example, they can match data in pie charts to tables and bar graphs. Given verbal descriptions of data or problem situations, they can use that information to complete bar graphs and a two-by-two table. They can also use information to identify the number of symbols needed to complete a pictograph when the symbol represents more than one unit.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



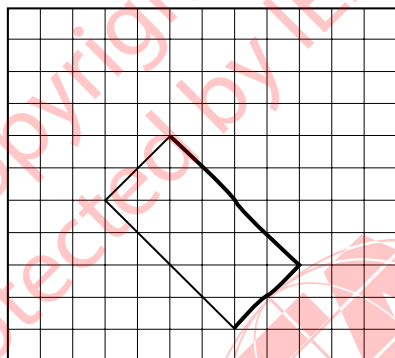
**Exhibit 2.11 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 5**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

**Content Domain: Geometric Shapes and Measures**

**Description: Draws a rectangle given two adjacent sides.**

Here are two sides of a rectangle. Draw the other two sides.



The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit	
Hong Kong SAR	90 (1.4)	⬆
Japan	78 (1.8)	⬆
Chinese Taipei	77 (1.9)	⬆
Russian Federation	75 (2.8)	⬆
Czech Republic	72 (2.2)	⬆
England	70 (1.9)	⬆
Singapore	69 (2.3)	⬆
Australia	68 (3.3)	⬆
Slovak Republic	67 (2.5)	⬆
Sweden	66 (2.0)	⬆
<sup>†</sup> Denmark	66 (2.6)	⬆
<sup>1</sup> Kazakhstan	65 (4.6)	⬆
Germany	62 (2.1)	⬆
Hungary	62 (2.5)	⬆
New Zealand	61 (1.8)	⬆
<sup>‡</sup> Netherlands	60 (2.6)	⬆
Austria	60 (2.2)	⬆
Armenia	58 (2.5)	⬆
Lithuania	57 (2.6)	⬆
Slovenia	57 (2.1)	⬆
<sup>2 †</sup> United States	55 (1.7)	⬆
<sup>†</sup> Scotland	55 (2.4)	⬆
<b>International Avg.</b>	<b>54 (0.4)</b>	
Italy	54 (2.2)	⬆
Iran, Islamic Rep. of	52 (2.9)	⬆
Ukraine	50 (2.3)	⬆
<sup>1</sup> Georgia	46 (3.3)	⬇
Norway	45 (2.7)	⬇
Morocco	40 (2.9)	⬇
Tunisia	31 (2.3)	⬇
Colombia	27 (3.1)	⬇
<sup>••</sup> Kuwait	24 (2.0)	⬇
Algeria	24 (2.1)	⬇
Qatar	16 (1.2)	⬇
El Salvador	13 (1.5)	⬇
Yemen	5 (1.0)	⬇
<sup>1</sup> Latvia	--	
<b>Benchmarking Participants</b>		
<sup>2</sup> Quebec, Canada	71 (2.5)	⬆
<sup>2</sup> Massachusetts, US	67 (2.9)	⬆
<sup>2</sup> Ontario, Canada	67 (2.4)	⬆
<sup>2 †</sup> Minnesota, US	64 (3.4)	⬆
<sup>2</sup> British Columbia, Canada	58 (2.3)	⬆
<sup>2</sup> Alberta, Canada	50 (2.6)	⬆
<sup>•• ‡</sup> Dubai, UAE	37 (2.5)	⬇

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Percent significantly higher than international average ⬆  
Percent significantly lower than international average ⬇

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
<sup>••</sup> Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
A dash (–) indicates comparable data are not available.

Example Item 6 presented in Exhibit 2.12 is a word problem involving subtraction of two-digit whole numbers in a measurement context. It represents the type of item in the number domain likely to be answered correctly by students reaching the intermediate benchmark. Presented in a constructed-response format, 60 percent of the students, internationally on average, were able to provide the correct answer for the cat's weight. Students in Chinese Taipei outperformed all other participants, with 95 percent providing the correct response.

To illustrate the range of achievement at each benchmark, Exhibit 2.13 presents Example Item 7 concerning place value. This was an easier item for students at the intermediate benchmark and for students overall. On average internationally, 71 percent of students identified a three-digit number based on its description in units, tens, and hundreds. Fourteen countries and 3 benchmarking participants had at least 80 percent of their students selecting the correct answer.



**Exhibit 2.12 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 6**

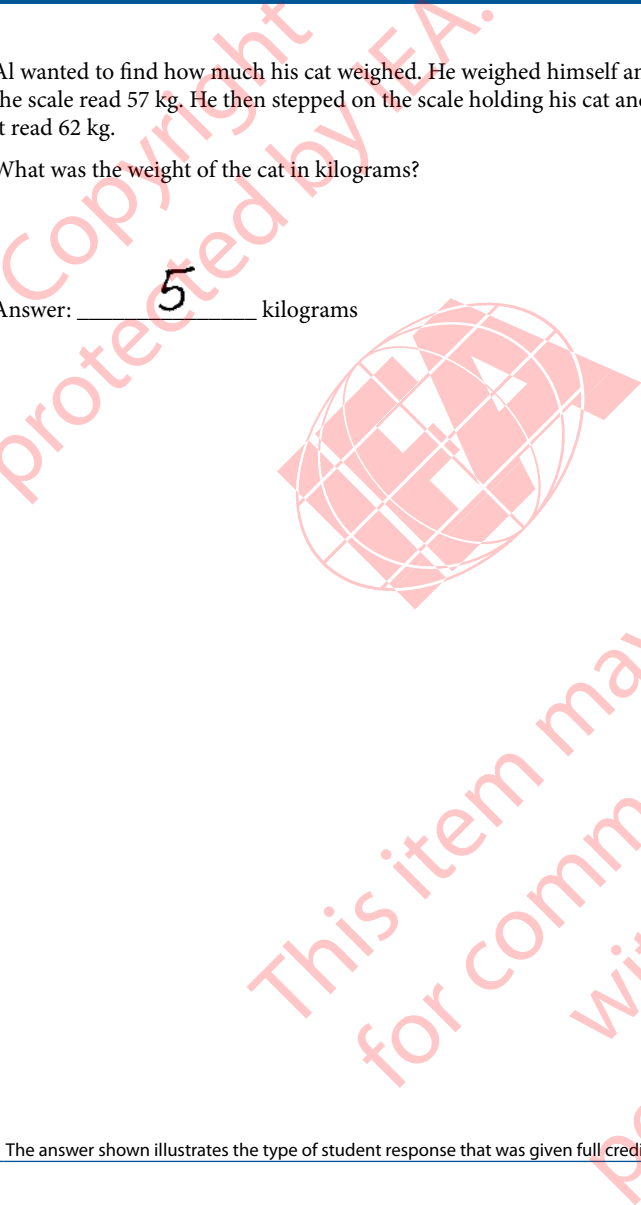
**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

**Content Domain: Number**  
**Description: Solves a measurement word problem involving subtraction of two-digit numbers.**

Al wanted to find how much his cat weighed. He weighed himself and noted that the scale read 57 kg. He then stepped on the scale holding his cat and found that it read 62 kg.

What was the weight of the cat in kilograms?

Answer: 5 kilograms



The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit	
Chinese Taipei	95 (1.2)	⬆
Singapore	87 (1.3)	⬆
Russian Federation	86 (1.8)	⬆
Hong Kong SAR	86 (1.7)	⬆
<sup>1</sup> Kazakhstan	85 (2.6)	⬆
<sup>‡</sup> Netherlands	85 (1.9)	⬆
Japan	83 (2.0)	⬆
<sup>1</sup> Lithuania	81 (1.8)	⬆
Austria	80 (2.1)	⬆
Germany	80 (1.6)	⬆
<sup>1</sup> Latvia	80 (2.2)	⬆
Czech Republic	76 (2.1)	⬆
<sup>†</sup> Denmark	75 (2.2)	⬆
Hungary	73 (2.4)	⬆
Slovenia	69 (2.2)	⬆
Italy	68 (2.0)	⬆
Ukraine	68 (2.4)	⬆
Norway	67 (2.4)	⬆
Sweden	66 (2.4)	⬆
Armenia	65 (2.5)	⬆
<sup>†</sup> Scotland	64 (2.7)	⬆
England	63 (2.2)	⬆
Australia	61 (2.4)	⬆
Slovak Republic	60 (2.3)	⬆
<b>International Avg.</b>	<b>60 (0.3)</b>	
<sup>2 †</sup> United States	60 (1.7)	⬆
<sup>1</sup> Georgia	59 (2.7)	⬆
New Zealand	53 (2.1)	⬇
Iran, Islamic Rep. of	43 (2.7)	⬇
Tunisia	28 (2.3)	⬇
Algeria	23 (2.3)	⬇
El Salvador	21 (1.7)	⬇
Morocco	19 (2.1)	⬇
Colombia	18 (2.1)	⬇
<sup>⚡</sup> Kuwait	12 (1.5)	⬇
Qatar	9 (1.0)	⬇
Yemen	5 (1.1)	⬇
<b>Benchmarking Participants</b>		
<sup>2</sup> Massachusetts, US	76 (2.9)	⬆
<sup>2</sup> Quebec, Canada	70 (2.9)	⬆
<sup>2 †</sup> Minnesota, US	68 (2.6)	⬆
<sup>2</sup> British Columbia, Canada	63 (2.5)	⬆
<sup>2</sup> Alberta, Canada	60 (2.4)	⬆
<sup>2</sup> Ontario, Canada	58 (3.1)	⬆
<sup>⚡ ‡</sup> Dubai, UAE	44 (1.7)	⬇

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Percent significantly higher than international average ⬆  
Percent significantly lower than international average ⬇

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
<sup>⚡</sup> Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

**Exhibit 2.13 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 7**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Content Domain: Number	Country	Percent Correct		
<p>Description: Identifies a three-digit number described in units, tens, and hundreds.</p> <p>Which number equals 3 ones + 2 tens + 4 hundreds?</p> <p>Ⓐ 432</p> <p>● 423</p> <p>Ⓒ 324</p> <p>Ⓓ 234</p>	Chinese Taipei	89 (1.4)	▲	
	‡ Netherlands	88 (1.8)	▲	
	Singapore	86 (1.5)	▲	
	Germany	84 (1.5)	▲	
	England	84 (1.8)	▲	
	Japan	83 (1.6)	▲	
	Hungary	82 (2.2)	▲	
	Russian Federation	82 (1.8)	▲	
	Hong Kong SAR	81 (2.0)	▲	
	<sup>1</sup> Latvia	81 (2.2)	▲	
	Slovak Republic	81 (1.7)	▲	
	† Denmark	80 (2.0)	▲	
	Austria	80 (1.7)	▲	
	Sweden	80 (1.6)	▲	
	<sup>2</sup> † United States	79 (1.4)	▲	
	♦♦ Kuwait	76 (1.8)	▲	
	Algeria	75 (2.2)	▲	
	<sup>1</sup> Lithuania	73 (2.1)	▲	
	† Scotland	73 (2.3)	▲	
	Slovenia	73 (2.0)	▲	
	<sup>1</sup> Kazakhstan	73 (3.3)	▲	
	Czech Republic	71 (2.3)	▲	
	International Avg.	71 (0.4)		
	New Zealand	70 (2.0)	▲	
	Italy	69 (2.2)	▲	
	Norway	68 (2.4)	▲	
	Ukraine	67 (2.4)	▲	
	Australia	67 (2.5)	▲	
	Iran, Islamic Rep. of	67 (2.4)	▲	
	Morocco	65 (2.8)	▼	
	Qatar	60 (1.3)	▼	
	Tunisia	59 (2.6)	▼	
Armenia	53 (2.5)	▼		
<sup>1</sup> Georgia	50 (3.0)	▼		
Yemen	48 (2.4)	▼		
El Salvador	20 (2.0)	▼		
Colombia	20 (2.0)	▼		
<b>Benchmarking Participants</b>				
<sup>2</sup> Massachusetts, US	88 (2.1)	▲		
<sup>2</sup> † Minnesota, US	87 (3.0)	▲		
<sup>2</sup> Quebec, Canada	86 (1.6)	▲		
<sup>2</sup> Alberta, Canada	76 (2.0)	▲		
<sup>2</sup> Ontario, Canada	73 (2.6)	▲		
<sup>2</sup> British Columbia, Canada	73 (2.1)	▲		
♦♦ ‡ Dubai, UAE	67 (2.4)	▲		

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Percent significantly higher than international average  
 ▼ Percent significantly lower than international average

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

### **Fourth Grade: Achievement at the Low International Benchmark**

Exhibit 2.14 presents the description of student achievement at the low benchmark. At this benchmark students demonstrated some basic mathematical knowledge, including adding and subtracting with whole numbers. They were familiar with simple number sentences. Within the domain of geometric shapes and measures, they knew about triangles and informal coordinate systems. They could read information from simple bar graphs and tables.

Example Item 8 presented in Exhibit 2.15 assesses a topic within the geometric shapes and measures domain that includes assessing students' ability to classify and compare geometric figures (e.g., by shape, size, or properties). This constructed-response item involving triangles was likely to be answered correctly by students reaching the low level. With an international average of 72 percent, it was relatively easy for students in many countries. In 24 countries, the two U.S. states, and the four Canadian provinces, at least three-fourths (75% or more) of the students indicated the correct triangles in the figure.

**Exhibit 2.14 Description of the TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement**TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade**Low International Benchmark – 400****Summary**

*Students have some basic mathematical knowledge.* Students demonstrate an understanding of adding and subtracting with whole numbers. They demonstrate familiarity with triangles and informal coordinate systems. They can read information from simple bar graphs and tables.

Students at this level demonstrate an understanding of adding and subtracting with whole numbers. For example, they can add a four-digit and a three-digit whole number. They are familiar with numbers into the thousands. Students are familiar with simple number sentences. For example, they can find the missing number in a number sentence involving multiplication by a one-digit whole number.

Students can recognize a pair of parallel lines. They can identify two triangles with the same size and shape in a complex figure. They recognize the inverse relationship between size of a unit and the number of units needed to cover an area. They can locate positions using informal coordinates (e.g., A3 on a map or game board). Students can read information from simple bar graphs and tables.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



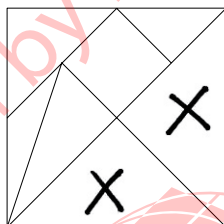
**Exhibit 2.15 TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 8**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

**Content Domain: Geometric Shapes and Measures**

**Description: Identifies two triangles with the same size and shape in a complex figure.**

The square is cut into 7 pieces. Put an X on each of the 2 triangles that are the same size and shape.



The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit	
Hong Kong SAR	91 (1.2)	⬆
Slovenia	91 (1.3)	⬆
<sup>1</sup> Lithuania	89 (1.3)	⬆
<sup>†</sup> Denmark	88 (1.8)	⬆
<sup>†</sup> Scotland	88 (1.4)	⬆
England	88 (1.4)	⬆
Singapore	88 (1.4)	⬆
Japan	87 (1.4)	⬆
Italy	87 (1.5)	⬆
Sweden	86 (1.6)	⬆
Australia	85 (1.9)	⬆
<sup>2</sup> <sup>†</sup> United States	85 (1.0)	⬆
Slovak Republic	84 (1.9)	⬆
Norway	84 (1.9)	⬆
Czech Republic	83 (1.8)	⬆
Austria	82 (2.1)	⬆
Chinese Taipei	81 (1.9)	⬆
Hungary	81 (2.1)	⬆
<sup>1</sup> Latvia	81 (2.1)	⬆
Russian Federation	81 (2.6)	⬆
New Zealand	81 (1.4)	⬆
<sup>‡</sup> Netherlands	79 (2.0)	⬆
<sup>1</sup> Kazakhstan	77 (2.2)	⬆
Germany	76 (1.8)	⬆
Armenia	74 (2.2)	⬆
<b>International Avg.</b>	<b>72 (0.3)</b>	
Ukraine	67 (2.3)	⬇
Colombia	59 (2.8)	⬇
<sup>1</sup> Georgia	59 (2.9)	⬇
Iran, Islamic Rep. of	58 (2.7)	⬇
El Salvador	50 (2.6)	⬇
Algeria	44 (2.3)	⬇
<sup>⚡</sup> Kuwait	40 (2.5)	⬇
Morocco	39 (2.3)	⬇
Tunisia	38 (2.2)	⬇
Qatar	32 (1.5)	⬇
Yemen	13 (1.5)	⬇
<b>Benchmarking Participants</b>		
<sup>2</sup> <sup>†</sup> Minnesota, US	90 (2.6)	⬆
<sup>2</sup> Ontario, Canada	90 (1.7)	⬆
<sup>2</sup> British Columbia, Canada	86 (1.7)	⬆
<sup>2</sup> Massachusetts, US	85 (2.6)	⬆
<sup>2</sup> Alberta, Canada	83 (1.9)	⬆
<sup>2</sup> Quebec, Canada	80 (2.3)	⬆
<sup>⚡</sup> <sup>‡</sup> Dubai, UAE	67 (2.6)	⬇

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Percent significantly higher than international average ⬆  
Percent significantly lower than international average ⬇

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
<sup>⚡</sup> Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

### **Eighth Grade: Achievement at the Advanced International Benchmark**

At the eighth grade, TIMSS 2007 assessed four content domains with each given similar weight—number (30%), algebra (30%), geometry (20%), and data and chance (20%). According to the *TIMSS 2007 Mathematics Framework*, within the *number* domain, students should have developed computational fluency with fractions and decimals. They also should have developed an understanding of how operations relate to one another, and extended their understanding to operations with integers. By the eighth grade students, should be able to move flexibly among equivalent fractions, decimals, and percents and use proportional reasoning to solve problems. In *algebra*, students should have developed an understanding of linear relationships and the concept of variable. They are expected to use and simplify algebraic formulas, solve linear equations, inequalities, pairs of simultaneous equations involving two variables, and use a range of functions. They should be able to solve problems using algebraic models and to explain relationships involving algebraic concepts. In *geometry*, the focus is on using geometric properties and their relationships to solve problems. It also includes understanding coordinate representations and using spatial visualization skills to move between two- and three-dimensional shapes and their representations. The *data and chance* domain includes describing and comparing characteristics of data (shape, spread, and central tendency). Students should be able to use data to draw conclusions and make predications, and understand issues related to misinterpretation of data. Eighth grade students should understand elementary probability in terms of the likelihood of familiar events and use data from experiments to predict the chance of a given outcome.

Within each content domain, students needed to draw on a range of cognitive skills and go beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multi-step problems. At the eighth grade, calculator use was permitted but not required. Because the availability of calculators varies widely, it would not be equitable to require calculator use when students in some countries may never have used them.

Similarly, however, it is not equitable to deprive students of the use of a familiar tool. The TIMSS 2007 guidelines emphasized giving students the best opportunity to operate in settings that mirrored their classroom experience. If students were used to having calculators for their classroom activities, then countries were encouraged to have students use them during the assessment. On the other hand, if students were not used to having calculators or not permitted to use them, then countries need not have permitted their use. Every effort was made to ensure that the test questions did not advantage or disadvantage students either way—with or without calculators.

Exhibit 2.16 describes performance at the Advanced International Benchmark. Students achieving at or above the advanced benchmark demonstrated fluency with many of the most complex topics in the mathematics framework. For example, they could organize and draw conclusions from information, make generalizations, and solve non-routine problems involving numeric, algebraic, and geometric concepts. They could use data from several sources to solve multi-step problems.

## Exhibit 2.16 Description of the TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement

TIMSS2007  
Mathematics **8**<sup>th</sup>  
Grade

### Advanced International Benchmark – 625

#### Summary

*Students can organize and draw conclusions from information, make generalizations, and solve non-routine problems. They can solve a variety of ratio, proportion, and percent problems. They can apply their knowledge of numeric and algebraic concepts and relationships. Students can express generalizations algebraically and model situations. They can apply their knowledge of geometry in complex problem situations. Students can derive and use data from several sources to solve multi-step problems.*

Students can solve a variety of ratio, proportion, and percent problems. For example, they can identify equivalent ratios and determine the ratio of two parts of a whole. Given a number and the ratio of two of its parts, students can find the values of the parts. Given the dimensions of two rectangles, they can express the ratio of their areas. They can determine the percent reduction. They can apply their understanding of fractions in abstract situations. For example, given two points on a number line representing unspecified fractions, students can identify the point that represents their product.

Students demonstrate facility with algebraic representations. They can express generalizations either algebraically or in words. For example, they can express the  $n$ th term in number patterns. They can identify algebraic expressions that model situations in word problems and diagrams. They can add three simple algebraic expressions with different numerical denominators, subtract expressions, and identify the sum of three consecutive whole numbers given the middle number in general terms.

They can solve a variety of problems involving equations, formulas, and functions. For example, they can solve a linear inequality involving fractions, evaluate formulas, solve linear equations with negative terms, and write an equation to model a situation. They can identify the linear equation that is satisfied by two ordered pairs.

Students can combine knowledge of geometric figures to solve problems that involve more than one step. This knowledge involves parallel lines, similar triangles, the sum of angles in a triangle, interior and exterior angles, and angle bisectors. Students can describe figures in different orientations.

Students also can use their knowledge of geometric figures to solve a wide range of problems about length and area. For example, they can find the area of a triangle inscribed in a square and the area of a trapezoid inscribed in a rectangle. They can use the Pythagorean theorem to find the area of a triangle and the perimeter of a trapezoid. They can draw a new rectangle based on a given rectangle and find its area. They can use their knowledge of the area of a circle and of average rate to solve a problem. Students can combine information about lengths of segments on a line to solve a distance problem.

Students can derive and use information from several sources to solve multi-step problems. They can predict outcomes from data. They demonstrate understanding of the meaning of averages and can determine the median. Students can interpolate and extrapolate data from tables and graphs.



Exhibit 2.17 shows the type of item likely to be answered correctly by students reaching the Advanced International Benchmark. Example Item 1 is a word problem that can be expressed as two linear equations with two variables. Students were asked to show their work. Although the example student response illustrates an algebraic approach to solving the problem, using algebra was not required to receive full credit. Still, this was among one of the most difficult items in the eighth grade assessment. On average, 18 percent of the students across countries received full credit for their responses. The country-by-country results, however, give an indication of why the Asian countries outperformed the other participating countries at the eighth grade. Two-thirds (68%) of the students in Chinese Taipei and Korea solved this problem as did more than half the students in Singapore (59%) and Hong Kong SAR (53%).

Example Item 2 in Exhibit 2.18 is from the geometry domain. It required students to use the properties of isosceles and right triangles to find the measure of an angle. Internationally on average, 32 percent of the eighth grade students selected the correct answer. Once again, the Asian countries had higher achievement by a considerable margin, with 69 to 75 correct. The next best result was 50 percent correct for Armenia. The remaining countries with above average performance included England, Malta, Lebanon, Hungary, and the Canadian province of Quebec.

Exhibit 2.17 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 1

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Content Domain: Algebra

Description: Solves a word problem that can be expressed as two linear equations with two variables.

Joe knows that a pen costs 1 zed more than a pencil.  
His friend bought 2 pens and 3 pencils for 17 zeds.  
How many zeds will Joe need to buy 1 pen and 2 pencils?

Show your work.

*Pencil: x zeds  
Pen: y = x + 1 zeds  
2y + 3x = 17  
2(x + 1) + 3x = 17  
2x + 2 + 3x = 17 / -2  
5x = 15 / :5  
x = 3  
One pencil costs 3 zeds.  
y = x + 1  
y = 3 + 1 = 4  
One pen costs 4 zeds.  
x + 2y = 4 + 2 · 3 = 4 + 6 = 10  
One pen and two pencils cost 10 zeds.*

The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit
Chinese Taipei	68 (2.3) ▲
Korea, Rep. of	68 (2.1) ▲
Singapore	59 (1.9) ▲
† Hong Kong SAR	53 (2.8) ▲
Japan	42 (1.9) ▲
<sup>2</sup> † United States	37 (2.0) ▲
Australia	36 (2.6) ▲
† England	34 (2.5) ▲
Sweden	34 (1.8) ▲
Slovenia	30 (2.0) ▲
† Scotland	29 (1.9) ▲
Czech Republic	25 (2.1) ▲
Hungary	24 (2.2) ▲
<sup>3</sup> Israel	24 (2.5) ▲
Malta	21 (1.6) ▲
Armenia	21 (2.6) ▲
Italy	19 (1.9) ▲
Russian Federation	19 (1.6) ▲
Norway	18 (1.7) ▲
Turkey	18 (2.0) ▲
International Avg.	18 (0.2)
Bulgaria	17 (1.8) ▲
<sup>1</sup> Lithuania	15 (1.7) ▲
<sup>1 2</sup> Serbia	15 (1.7) ▲
Romania	14 (1.8) ▲
Malaysia	14 (1.7) ▼
Thailand	13 (1.4) ▼
Cyprus	11 (1.4) ▼
Ukraine	11 (1.2) ▼
Colombia	9 (1.0) ▼
<sup>1</sup> Georgia	8 (1.8) ▼
Indonesia	8 (1.3) ▼
Bosnia and Herzegovina	8 (1.4) ▼
Tunisia	6 (0.9) ▼
Lebanon	5 (1.1) ▼
Jordan	5 (1.0) ▼
Oman	4 (0.8) ▼
Bahrain	4 (0.8) ▼
Iran, Islamic Rep. of	3 (0.8) ▼
Saudi Arabia	3 (0.8) ▼
Syrian Arab Republic	3 (0.7) ▼
El Salvador	2 (0.4) ▼
Algeria	2 (0.6) ▼
Egypt	2 (0.5) ▼
♦♦ Kuwait	2 (0.6) ▼
Botswana	2 (0.5) ▼
Qatar	2 (0.4) ▼
Ghana	1 (0.5) ▼
Palestinian Nat'l Auth.	1 (0.7) ▼
‡ Morocco	2 (1.3) ▼
<b>Benchmarking Participants</b>	
<sup>2</sup> Massachusetts, US	48 (2.6) ▲
<sup>2</sup> † Minnesota, US	47 (3.5) ▲
<sup>3</sup> British Columbia, Canada	39 (2.3) ▲
<sup>2</sup> Ontario, Canada	38 (3.1) ▲
<sup>3</sup> Quebec, Canada	32 (2.2) ▲
Basque Country, Spain	22 (2.4) ▲
♦ ‡ Dubai, UAE	16 (2.0) ▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

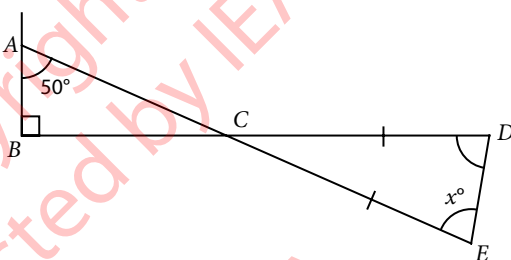
Percent significantly higher than international average ▲  
Percent significantly lower than international average ▼

Exhibit 2.18 TIMSS 2007 Advanced International Benchmark (625) of Mathematics Achievement – Example Item 2

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Content Domain: Geometry

Description: Uses properties of isosceles and right triangles to find the measure of an angle.



In this diagram,  $CD = CE$ .  
What is the value of  $x$ ?

- (A) 40
- (B) 50
- (C) 60
- 70

Country	Percent Correct	
Singapore	75 (1.7)	●
Chinese Taipei	73 (2.2)	●
Korea, Rep. of	73 (1.8)	●
Japan	71 (1.9)	●
† Hong Kong SAR	69 (2.8)	●
Armenia	50 (2.7)	●
† England	42 (2.8)	●
Malta	40 (1.7)	●
Lebanon	40 (3.0)	●
Hungary	38 (2.6)	●
Bulgaria	36 (2.6)	
Thailand	36 (2.1)	
Malaysia	36 (2.7)	
<sup>1</sup> Lithuania	35 (2.1)	
Norway	34 (2.3)	
Russian Federation	34 (2.3)	
<sup>3</sup> Israel	33 (2.4)	
Turkey	32 (2.1)	
<b>International Avg.</b>	<b>32 (0.3)</b>	
Australia	32 (2.8)	
Italy	31 (2.3)	
Sweden	31 (2.0)	
† Scotland	31 (2.0)	
<sup>1 2</sup> Serbia	30 (2.2)	
Jordan	29 (2.0)	
Tunisia	28 (2.2)	
Egypt	28 (2.2)	
Ukraine	28 (2.0)	▼
Cyprus	28 (2.0)	▼
Czech Republic	27 (1.7)	▼
<sup>2</sup> † United States	26 (1.4)	▼
Slovenia	25 (2.4)	▼
<sup>1</sup> Georgia	25 (2.9)	▼
Romania	24 (2.4)	▼
Algeria	23 (1.7)	▼
Bosnia and Herzegovina	22 (1.8)	▼
Iran, Islamic Rep. of	21 (2.1)	▼
Indonesia	19 (2.0)	▼
Oman	19 (1.7)	▼
Saudi Arabia	18 (1.9)	▼
Palestinian Nat'l Auth.	18 (1.6)	▼
♦♦ Kuwait	17 (1.5)	▼
Bahrain	17 (1.4)	▼
Qatar	17 (1.2)	▼
Colombia	17 (1.4)	▼
El Salvador	16 (1.5)	▼
Syrian Arab Republic	16 (1.8)	▼
Botswana	15 (1.5)	▼
Ghana	14 (1.5)	▼
‡ Morocco	19 (1.7)	▼
<b>Benchmarking Participants</b>		
<sup>3</sup> Quebec, Canada	49 (3.0)	●
<sup>2</sup> Ontario, Canada	37 (2.7)	
<sup>2</sup> Massachusetts, US	35 (4.2)	
<sup>2</sup> † Minnesota, US	34 (2.9)	
<sup>3</sup> British Columbia, Canada	34 (2.1)	
Basque Country, Spain	30 (2.9)	
♦♦ ‡ Dubai, UAE	22 (2.4)	▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Percent significantly higher than international average ●  
Percent significantly lower than international average ▼

### **Eighth Grade: Achievement at the High International Benchmark**

Exhibit 2.19 describes performance at the High International Benchmark. Students reaching this level applied their understanding and knowledge in a variety of relatively complex situations. They were able to relate fractions, decimals, and percents and operate with negative integers. They demonstrated the ability to work with algebraic expressions and linear equations, and used their knowledge of geometric properties to solve problems. They were able to compare and integrate several sets of data, and to solve simple problems involving outcomes and probabilities.

Example Item 3 in Exhibit 2.20 shows the type of algebra problem likely to be solved by students reaching the high benchmark. This word problem involving the solving of a linear equation was answered correctly, on average, by 34 percent of the students across countries. At least half the students solved the problem correctly in Chinese Taipei (75%), Korea (71%), Hong Kong SAR (67%), Japan (65%), Armenia (63%), Serbia (57%), the United States (57%), Singapore (56%), the Russian Federation (53%), Lithuania (50%), and the two U.S. states of Massachusetts and Minnesota (69 and 62%, respectively).

Exhibit 2.21 presents an item from the data and chance domain exemplifying the high benchmark. More specifically, Example Item 4 assesses students' ability to read, organize, and display data using various types of graphs, in this case a bar graph and a pie chart. Students needed to draw the bar graph in its entirety to receive full credit, a task completed by 27 percent of students, on average internationally. Students in Korea (76%) and Singapore (75%) responded correctly to this constructed-response item.

## Exhibit 2.19 Description of the TIMSS 2007 High International Benchmark (550) of Mathematics Achievement

TIMSS2007  
Mathematics 8<sup>th</sup>  
Grade

### High International Benchmark – 550

#### Summary

*Students can apply their understanding and knowledge in a variety of relatively complex situations. They can relate and compute with fractions, decimals, and percents, operate with negative integers, and solve word problems involving proportions. Students can work with algebraic expressions and linear equations. Students use knowledge of geometric properties to solve problems, including area, volume, and angles. They can interpret data in a variety of graphs and table and solve simple problems involving probability.*

Students can solve relatively complex problems, including those involving proportions and percents. Students can relate fractions, decimals, and percents to each other. They can compute with fractions and negative integers. Students show understanding of scales, number lines, and exponents. They can identify the prime factorization of a given number.

Students can solve simple algebraic problems. Students can extend sequences given in numeric and geometric forms, and find later specified terms. They also can simplify an algebraic expression by combining like terms, identify equivalent expressions, and evaluate an expression involving parentheses and negative terms. Students can identify an algebraic expression that corresponds to a simple situation, add algebraic expressions, and recognize the product of two algebraic expressions in one variable that involves exponents.

Students can solve a linear equation in one variable, identify the solution to a pair of simultaneous linear equations, and identify the quantity that satisfies two inequalities represented on a balance. They can identify the linear equation that describes the relationship between ordered pairs given in a table or shown on a graph. They can use a formula to determine the value of one variable given the value of the other.

Students can solve problems involving perimeter, area, and volume. For example, they can find the perimeter of a square given its area and find the area of an irregular figure formed by rectangles. Students can find the number of cubes needed to fill a hole in a given shape, identify a net of a cube, and calculate the volume of a rectangular prism given its net.

Students can use properties of lines, angles, and triangles to solve problems involving measures of angles. Students can produce a drawing that meets given angle specifications. They can recognize rotations and reflections, visualize a figure cut from a folded piece of paper, and draw the missing half of a symmetrical figure.

Students can solve simple problems involving outcomes and probabilities. They can calculate means. They can read and interpret data in pie graphs, line graphs, and bar graphs to solve problems. They can construct pie charts representing given data. They can compare and integrate several sets of data to determine which meet given conditions.

**Exhibit 2.20 TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 3**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**
**Content Domain: Algebra**
**Description: Solves a linear equation given in a word problem.**

In Zedland, total shipping charges to ship an item are given by the equation  $y = 4x + 30$ , where  $x$  is the weight in grams and  $y$  is the cost in zeds. If you have 150 zeds, how many grams can you ship?

- (A) 630  
 (B) 150  
 (C) 120  
 ● 30

Country	Percent Correct	
Chinese Taipei	75 (2.0)	▲
Korea, Rep. of	71 (1.8)	▲
† Hong Kong SAR	67 (2.9)	▲
Japan	65 (2.1)	▲
Armenia	63 (2.7)	▲
<sup>1 2</sup> Serbia	57 (2.9)	▲
<sup>2 †</sup> United States	57 (2.2)	▲
Singapore	56 (1.7)	▲
Russian Federation	53 (3.1)	▲
<sup>1</sup> Lithuania	50 (2.5)	▲
Bulgaria	47 (2.4)	▲
Romania	44 (2.8)	▲
Malta	41 (1.7)	▲
Ukraine	39 (2.5)	▲
Hungary	39 (2.2)	▲
Czech Republic	39 (2.5)	▲
† England	39 (2.8)	▲
Bosnia and Herzegovina	37 (2.6)	▲
Slovenia	36 (2.2)	▲
Jordan	35 (2.5)	▲
Turkey	35 (2.1)	▲
Cyprus	35 (1.9)	▲
Lebanon	34 (2.6)	▲
<b>International Avg.</b>	<b>34 (0.3)</b>	
<sup>3</sup> Israel	32 (2.5)	▼
Ghana	26 (1.9)	▼
† Scotland	26 (2.4)	▼
Australia	26 (2.0)	▼
Indonesia	26 (1.9)	▼
Thailand	26 (2.3)	▼
Bahrain	25 (2.0)	▼
<sup>1</sup> Georgia	25 (2.7)	▼
Italy	24 (2.0)	▼
Malaysia	24 (2.1)	▼
Egypt	24 (1.9)	▼
Botswana	23 (1.7)	▼
Sweden	23 (1.5)	▼
Oman	23 (2.1)	▼
Iran, Islamic Rep. of	21 (2.2)	▼
Syrian Arab Republic	19 (1.9)	▼
Colombia	19 (1.5)	▼
Tunisia	19 (1.8)	▼
El Salvador	17 (1.7)	▼
Palestinian Nat'l Auth.	16 (1.8)	▼
Algeria	16 (1.4)	▼
♦♦ Kuwait	15 (1.5)	▼
Saudi Arabia	14 (1.9)	▼
Qatar	12 (1.1)	▼
Norway	10 (1.1)	▼
‡ Morocco	15 (2.9)	▼
<b>Benchmarking Participants</b>		
<sup>2</sup> Massachusetts, US	69 (2.8)	▲
<sup>2 †</sup> Minnesota, US	62 (3.3)	▲
<sup>3</sup> Quebec, Canada	44 (2.9)	▲
<sup>2</sup> Ontario, Canada	42 (2.5)	▲
<sup>3</sup> British Columbia, Canada	42 (2.7)	▲
♦♦ ‡ Dubai, UAE	39 (2.5)	▲
Basque Country, Spain	36 (3.1)	▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

 Percent significantly higher than international average ▲  
 Percent significantly lower than international average ▼


**Exhibit 2.21 TIMSS 2007 High International Benchmark (550) of Mathematics Achievement – Example Item 4**

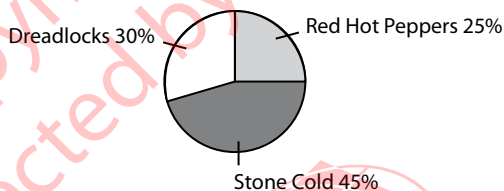
**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

**Content Domain: Data and Chance**

**Description: Uses the information in a pie chart showing percentages to draw a bar chart.**

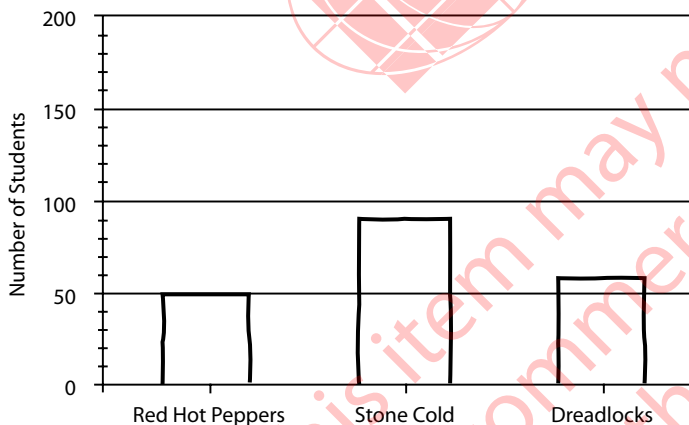
The results of a survey of 200 students are shown in the pie chart.

**Popularity of Rock Bands**



Make a bar chart showing the number of students in each category in the pie chart.

**Popularity of Rock Bands**



The answer shown illustrates the type of student response that was given full credit

Country	Percent Full Credit
Korea, Rep. of	76 (2.0)
Singapore	75 (1.7)
Chinese Taipei	70 (2.1)
Japan	68 (1.8)
† Hong Kong SAR	66 (2.6)
Sweden	56 (2.2)
<sup>1</sup> Lithuania	51 (2.4)
Hungary	48 (2.6)
Czech Republic	45 (2.4)
† England	45 (2.7)
Slovenia	44 (2.5)
Norway	41 (2.1)
<sup>2</sup> † United States	40 (1.9)
Malta	40 (1.9)
Australia	38 (2.7)
† Scotland	38 (2.3)
Russian Federation	35 (2.5)
Malaysia	35 (2.4)
Cyprus	33 (2.3)
<sup>3</sup> Israel	31 (2.4)
Romania	29 (2.7)
<b>International Avg.</b>	<b>27 (0.3)</b>
<sup>1</sup> <sup>2</sup> Serbia	27 (2.8)
Italy	27 (1.9)
Thailand	26 (2.2)
Ukraine	24 (2.2)
Bulgaria	23 (2.5)
Jordan	22 (2.0)
Turkey	17 (1.7)
Lebanon	15 (2.0)
<sup>1</sup> Georgia	15 (2.6)
Indonesia	14 (1.3)
Bosnia and Herzegovina	13 (2.0)
Armenia	12 (1.8)
Iran, Islamic Rep. of	11 (1.5)
Colombia	10 (1.8)
Egypt	10 (1.3)
Bahrain	9 (1.2)
Tunisia	8 (1.1)
Palestinian Nat'l Auth.	8 (1.3)
Botswana	7 (0.9)
Syrian Arab Republic	7 (1.1)
Oman	6 (1.0)
El Salvador	4 (0.8)
Qatar	4 (0.6)
Saudi Arabia	3 (0.9)
Algeria	3 (0.8)
♣ Kuwait	3 (0.8)
Ghana	2 (0.6)
‡ Morocco	9 (1.9)
<b>Benchmarking Participants</b>	
<sup>2</sup> † Minnesota, US	61 (4.2)
<sup>3</sup> Quebec, Canada	61 (2.9)
<sup>2</sup> Massachusetts, US	59 (3.7)
<sup>3</sup> British Columbia, Canada	50 (2.3)
<sup>2</sup> Ontario, Canada	48 (3.3)
Basque Country, Spain	45 (2.7)
♣ † Dubai, UAE	21 (3.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 † Did not satisfy guidelines for sample participation rates (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
 ♣ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Percent significantly higher than international average ●  
 Percent significantly lower than international average ▼

### **Eighth Grade: Achievement at the Intermediate International Benchmark**

Exhibit 2.22 describes students' performance at the Intermediate International Benchmark. Students reaching this benchmark were able to apply basic mathematical knowledge in relatively straightforward situations. For example, they solved one-step word problems involving addition and multiplication of decimals, and worked with familiar fractions. They demonstrated understanding of simple algebraic relationships, properties of triangles, and basic geometric concepts. They read and interpreted graphs and tables, and recognized basic notions of likelihood.

Exhibit 2.23 presents Example Item 5 from the number domain. This item about representations of fractions was typically answered correctly by students at the intermediate benchmark. Students needed to recognize that of the circular models presented, the only one showing less than  $\frac{1}{2}$  best represents the fractional part shown in a rectangle as  $\frac{5}{12}$ . On average internationally, 63 percent of the eighth-grade students answered correctly. The Korean students were the top-performers with 89 percent answering correctly.

Example Item 6 presented in Exhibit 2.24 also illustrates the type of item likely to be answered correctly by students reaching the intermediate benchmark. Students were asked to use the properties of an isosceles triangle to identify the point on the grid that completes the triangle. More than half (57%) did so, on average internationally. Slovenia joined Chinese Taipei, Korea, Japan, and Hong Kong SAR in having at least 80 percent of their students answer correctly.



**Exhibit 2.22 Description of the TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**
**Intermediate International Benchmark – 475**
**Summary**

*Students can apply basic mathematical knowledge in straightforward situations. They can add and multiply to solve one-step word problems involving whole numbers and decimals. They can work with familiar fractions. They understand simple algebraic relationships. They demonstrate understanding of properties of triangles and basic geometric concepts. They can read and interpret graphs and tables. They recognize basic notions of likelihood.*

Students can apply basic mathematical knowledge in straightforward situations. For example, they can solve word problems involving addition and multiplication of decimals. They can find equivalent ratios and proportions. Students understand that the whole is 100 percent and can approximate the quantity remaining after an amount is reduced by a given percent. They have basic understanding of simple exponential notation and negative integers.

Students show some understanding of decimals and fractions. For example, they can solve word problems involving decimals. They can round two-place decimals to whole numbers. They can select the smallest fraction from a set of commonly used fractions. They can identify a circular model of a fraction that best approximates a given rectangular model of the same fraction.

Students at this level know the meaning of simple algebraic expressions and have some knowledge of linear equations. They can extend number patterns to the next few terms.

Students can use knowledge of basic geometric properties to solve problems involving triangles. For example, they can draw a triangle with an area twice that of a given rectangle. They can locate points on grids and complete a two-dimensional drawing of a three-dimensional object.

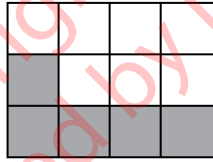
Students can locate and interpret data presented in tables, bar graphs, pie graphs, and line graphs. For example, they can select the pie graph that represents data in a table of percentages. Given two straight line graphs, they can select the one that models a situation described in words as well as interpret the graphs and use their intersection to solve a problem. They have some understanding of the likelihood of an event.

**Exhibit 2.23 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 5**

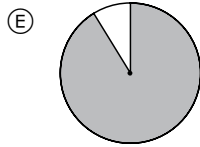
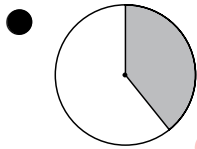
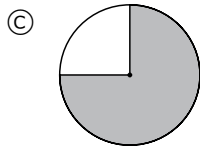
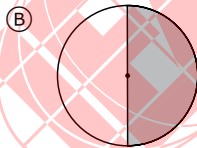
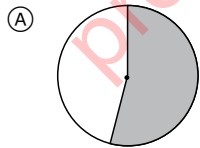
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

**Content Domain: Number**

**Description: Identifies a circular model of a fraction that best approximates a given rectangular model of the same fraction.**



Which circle has approximately the same fraction of its area shaded as the rectangle above?



Country	Percent Correct
Korea, Rep. of	89 (1.3)
Japan	85 (1.8)
† Hong Kong SAR	82 (2.3)
Chinese Taipei	81 (1.7)
<sup>2</sup> † United States	81 (1.3)
Singapore	81 (1.7)
Sweden	77 (1.8)
† England	77 (2.2)
Hungary	77 (2.2)
Australia	75 (2.3)
Czech Republic	74 (1.9)
<sup>1</sup> Lithuania	74 (2.3)
Malaysia	74 (2.0)
† Scotland	74 (2.0)
Norway	73 (2.2)
Russian Federation	73 (2.2)
Slovenia	72 (2.2)
Malta	72 (1.6)
Italy	70 (2.3)
Cyprus	70 (2.0)
Thailand	68 (1.9)
<sup>3</sup> Israel	66 (2.6)
Turkey	64 (2.4)
Ukraine	63 (2.4)
<b>International Avg.</b>	<b>63 (0.3)</b>
Romania	62 (2.8)
Bahrain	61 (2.0)
Tunisia	61 (2.3)
<sup>1 2</sup> Serbia	60 (2.7)
Bulgaria	59 (3.0)
♦♦ Kuwait	56 (2.0)
Iran, Islamic Rep. of	55 (2.2)
Lebanon	55 (3.0)
Colombia	54 (2.9)
Algeria	54 (1.8)
Bosnia and Herzegovina	53 (2.6)
Indonesia	52 (2.3)
Syrian Arab Republic	51 (2.3)
<sup>1</sup> Georgia	51 (3.7)
Jordan	48 (2.2)
El Salvador	47 (2.2)
Oman	46 (2.1)
Armenia	46 (2.8)
Qatar	44 (1.8)
Egypt	44 (2.3)
Saudi Arabia	41 (2.3)
Botswana	41 (1.7)
Palestinian Nat'l Auth.	41 (2.4)
Ghana	34 (2.3)
‡ Morocco	56 (3.0)
<b>Benchmarking Participants</b>	
<sup>2</sup> † Minnesota, US	84 (1.9)
<sup>2</sup> Massachusetts, US	80 (2.7)
<sup>3</sup> British Columbia, Canada	80 (1.6)
<sup>3</sup> Quebec, Canada	79 (2.2)
Basque Country, Spain	77 (2.9)
<sup>2</sup> Ontario, Canada	75 (2.1)
♦♦ ‡ Dubai, UAE	60 (2.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Percent significantly higher than international average ▲  
Percent significantly lower than international average ▼

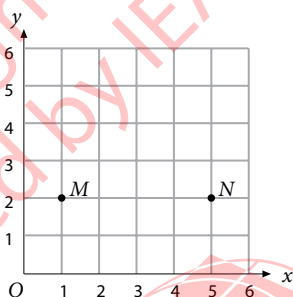


Exhibit 2.24 TIMSS 2007 Intermediate International Benchmark (475) of Mathematics Achievement – Example Item 6

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Content Domain: Geometry

Description: Uses properties of an isosceles triangle to identify the coordinates of a point on a grid.



Two points *M* and *N* are shown in the figure above. John is looking for a point *P* such that *MNP* is an isosceles triangle. Which of these points could be point *P*?

- (3,5)
- Ⓑ (3,2)
- Ⓒ (1,5)
- Ⓓ (5,1)

Country	Percent Correct
Chinese Taipei	86 (1.5) ●
Korea, Rep. of	82 (1.6) ●
Japan	81 (1.6) ●
† Hong Kong SAR	80 (2.6) ●
Slovenia	80 (2.2) ●
<sup>1</sup> Lithuania	78 (1.9) ●
Singapore	77 (2.0) ●
Russian Federation	77 (2.3) ●
Hungary	74 (2.1) ●
Malaysia	73 (1.8) ●
† Scotland	68 (2.1) ●
Ukraine	68 (2.4) ●
<sup>1 2</sup> Serbia	67 (2.8) ●
Malta	65 (1.5) ●
Lebanon	65 (2.9) ●
<sup>3</sup> Israel	64 (2.9) ●
† England	63 (2.2) ●
Czech Republic	63 (2.3) ●
♣ Kuwait	63 (2.6) ●
Romania	62 (2.6) ●
Italy	61 (2.1) ●
Bahrain	59 (2.1) ●
Indonesia	59 (2.5) ●
Oman	59 (2.0) ●
Bulgaria	58 (2.8) ●
Syrian Arab Republic	58 (2.4) ●
Egypt	58 (2.0) ●
<b>International Avg.</b>	<b>57 (0.3)</b>
Norway	56 (2.3) ●
Bosnia and Herzegovina	55 (2.5) ●
Thailand	55 (2.2) ●
Jordan	54 (2.5) ●
Armenia	53 (2.9) ●
Australia	51 (2.3) ●
Cyprus	51 (2.1) ●
Algeria	50 (2.0) ●
Iran, Islamic Rep. of	49 (2.5) ●
Sweden	48 (2.0) ●
Saudi Arabia	46 (2.3) ●
<sup>2 †</sup> United States	45 (1.6) ●
<sup>1</sup> Georgia	41 (3.0) ●
Palestinian Nat'l Auth.	41 (2.1) ●
Turkey	38 (2.0) ●
Qatar	38 (1.5) ●
El Salvador	33 (1.9) ●
Colombia	30 (2.1) ●
Botswana	30 (1.7) ●
Tunisia	26 (1.9) ●
Ghana	26 (1.6) ●
‡ Morocco	45 (3.1) ●
<b>Benchmarking Participants</b>	
<sup>3</sup> Quebec, Canada	60 (2.7) ●
<sup>2</sup> Ontario, Canada	50 (3.2) ●
♣ † Dubai, UAE	50 (2.6) ●
<sup>3</sup> British Columbia, Canada	50 (2.3) ●
<sup>2</sup> Massachusetts, US	49 (3.5) ●
Basque Country, Spain	49 (2.7) ●
<sup>2 †</sup> Minnesota, US	46 (3.6) ●

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♣ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Percent significantly higher than international average ●  
Percent significantly lower than international average ●



### **Eighth Grade: Achievement at the Low International Benchmark**

Exhibit 2.25 describes performance at the low benchmark. The few items that anchored at this level provided some evidence that students have an elementary knowledge of whole numbers and decimals, operations, and basic graphs.

Example Items 7 and 8 are presented in Exhibits 2.26 and 2.27, respectively. They illustrate the types of items likely to be answered correctly by students reaching the low benchmark. Example Item 7 is a word problem that can be solved through proportional reasoning with whole numbers. On average internationally, this multiple-choice item was answered correctly by 79 percent of the students. Example Item 8 in the data and chance domain asked students to match the data in a line graph with the data in a table. The temperatures in the table rise and fall from day to day, and students needed to recognize that only one line graph has this up and down pattern. Seventy-two percent answered correctly, on average internationally.

On Example Item 8, Slovenia and Lithuania joined Korea, Japan, Singapore, and Chinese Taipei in having 90 percent or more of students answer correctly, along with the two U.S. states, the Canadian provinces of Quebec and Ontario, and the Basque Country of Spain. Seven more countries and the Canadian province of British Columbia followed closely with 87 to 89 percent correct.

**Exhibit 2.25 Description of the TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement**TIMSS2007  
Mathematics **8**<sup>th</sup>  
Grade**Low International Benchmark – 400****Summary**

*Students have some knowledge of whole numbers and decimals, operations, and basic graphs.*

The few items at this level provide some evidence that students have an elementary understanding of whole numbers and decimals and can do basic

computations. They can select a bar graph or line graph that displays a given set of data and can complete a simple bar graph.



Exhibit 2.26 TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 7

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

**Content Domain: Number**

**Description: Solves a word problem involving a proportion with unit ratio.**

On a school trip there was 1 teacher for every 12 students. If 108 students went on the trip, how many teachers were on the trip?

Ⓐ 7  
Ⓑ 8  
● 9  
Ⓓ 10

Country	Percent Correct	
Korea, Rep. of	97 (0.6)	▲
Singapore	95 (1.0)	▲
<sup>1</sup> Lithuania	95 (0.9)	▲
Chinese Taipei	95 (1.0)	▲
Japan	94 (1.0)	▲
<sup>†</sup> Hong Kong SAR	94 (1.4)	▲
Hungary	93 (1.1)	▲
Czech Republic	93 (1.5)	▲
Russian Federation	92 (1.5)	▲
<sup>2 †</sup> United States	91 (1.0)	▲
Malaysia	90 (1.4)	▲
<sup>1 2</sup> Serbia	89 (1.5)	▲
Italy	89 (1.2)	▲
Slovenia	89 (1.2)	▲
Australia	88 (1.6)	▲
Sweden	87 (1.2)	▲
Lebanon	86 (1.8)	▲
Malta	86 (1.4)	▲
Bosnia and Herzegovina	85 (1.6)	▲
Ukraine	85 (1.5)	▲
Norway	84 (1.9)	▲
<sup>†</sup> England	83 (1.8)	▲
Cyprus	82 (1.6)	▲
Thailand	81 (1.7)	▲
<sup>3</sup> Israel	81 (2.1)	▲
Armenia	80 (1.8)	▲
<sup>†</sup> Scotland	80 (1.9)	▲
Romania	80 (2.3)	▲
Bulgaria	79 (2.3)	▲
<b>International Avg.</b>	<b>79 (0.3)</b>	
Algeria	79 (1.6)	▲
Indonesia	78 (2.0)	▲
Tunisia	78 (2.0)	▲
Iran, Islamic Rep. of	77 (2.0)	▲
Turkey	77 (2.0)	▲
<sup>1</sup> Georgia	77 (3.6)	▲
Jordan	76 (2.1)	▲
Egypt	72 (2.1)	▼
Palestinian Nat'l Auth.	65 (2.2)	▼
Syrian Arab Republic	64 (2.5)	▼
Oman	64 (2.1)	▼
Colombia	62 (1.7)	▼
El Salvador	61 (2.3)	▼
Bahrain	61 (2.0)	▼
Botswana	56 (2.1)	▼
Qatar	53 (1.7)	▼
Ghana	51 (1.8)	▼
Saudi Arabia	48 (2.6)	▼
♦♦ Kuwait	41 (2.0)	▼
‡ Morocco	69 (2.5)	▼
<b>Benchmarking Participants</b>		
<sup>2 †</sup> Minnesota, US	94 (1.6)	▲
<sup>3</sup> Quebec, Canada	94 (1.1)	▲
<sup>2</sup> Massachusetts, US	92 (1.8)	▲
Basque Country, Spain	91 (1.8)	▲
<sup>2</sup> Ontario, Canada	91 (1.7)	▲
<sup>3</sup> British Columbia, Canada	90 (1.5)	▲
♦‡ Dubai, UAE	78 (1.5)	▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
<sup>‡</sup> Did not satisfy guidelines for sample participation rates (see Appendix A).  
<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

▲ Percent significantly higher than international average  
 ▼ Percent significantly lower than international average  
<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).  
 ♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 2.27 TIMSS 2007 Low International Benchmark (400) of Mathematics Achievement – Example Item 8

TIMSS 2007 Mathematics 8<sup>th</sup> Grade

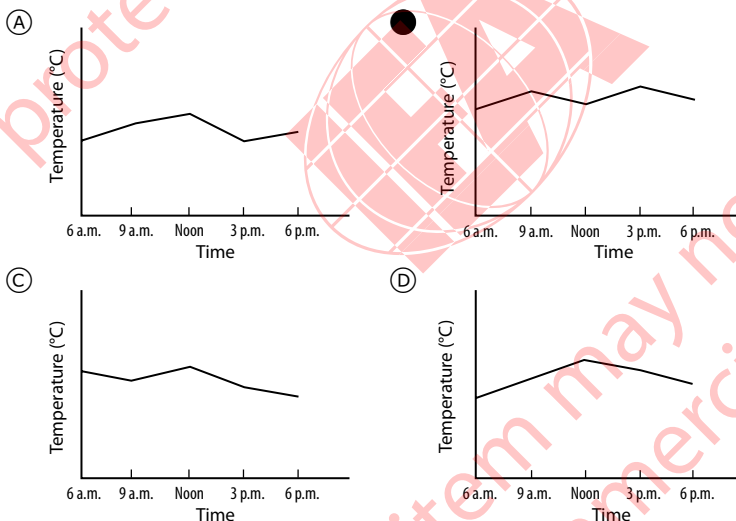
Content Domain: Data and Chance

Description: Given a table of values for two variables, selects the line graph that could represent the given data.

The table shows the temperatures at various times on a certain day.

Time	6 a.m.	9 a.m.	Noon	3 p.m.	6 p.m.
Temperature °C	12	17	14	18	15

A graph, without a temperature scale, is drawn. Of the following, which could be the graph that shows the information given in the table?



Country	Percent Correct
Korea, Rep. of	97 (0.7)
Japan	96 (0.8)
Singapore	93 (1.1)
Chinese Taipei	92 (1.1)
<sup>1</sup> Lithuania	90 (1.4)
Slovenia	90 (1.4)
<sup>2 †</sup> United States	89 (1.0)
Malaysia	89 (1.3)
Sweden	89 (1.2)
Czech Republic	88 (1.3)
Hungary	88 (1.6)
<sup>†</sup> Hong Kong SAR	87 (1.6)
Australia	87 (1.7)
Russian Federation	85 (1.8)
Italy	84 (1.4)
<sup>†</sup> Scotland	83 (1.6)
Malta	82 (1.4)
<sup>†</sup> England	81 (2.1)
<sup>1, 2</sup> Serbia	81 (1.9)
Lebanon	79 (2.3)
Norway	77 (1.8)
Ukraine	77 (2.2)
Cyprus	74 (1.8)
Thailand	73 (1.9)
Colombia	73 (2.2)
Bulgaria	72 (2.3)
<b>International Avg.</b>	<b>72 (0.3)</b>
<sup>3</sup> Israel	71 (2.3)
Bosnia and Herzegovina	70 (2.3)
Iran, Islamic Rep. of	66 (2.2)
Romania	66 (2.5)
Armenia	66 (2.7)
Indonesia	66 (2.2)
Botswana	65 (1.8)
<sup>1</sup> Georgia	65 (3.4)
Tunisia	63 (2.4)
Bahrain	62 (2.2)
Turkey	61 (2.3)
Jordan	61 (2.2)
Oman	57 (2.1)
El Salvador	55 (2.5)
Egypt	52 (2.4)
Algeria	51 (1.9)
Palestinian Nat'l Auth.	50 (2.8)
<sup>♦♦</sup> Kuwait	47 (2.2)
Syrian Arab Republic	47 (2.1)
Saudi Arabia	45 (2.3)
Ghana	43 (2.1)
Qatar	40 (1.6)
<sup>‡</sup> Morocco	56 (3.6)
<b>Benchmarking Participants</b>	
<sup>2 †</sup> Minnesota, US	94 (1.5)
<sup>3</sup> Quebec, Canada	91 (1.5)
<sup>2</sup> Ontario, Canada	91 (2.0)
<sup>2</sup> Massachusetts, US	90 (1.6)
Basque Country, Spain	90 (1.8)
<sup>3</sup> British Columbia, Canada	89 (1.3)
<sup>♦♦ ‡</sup> Dubai, UAE	72 (2.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

<sup>‡</sup> Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

<sup>♦♦</sup> Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Percent significantly higher than international average

Percent significantly lower than international average





# Chapter 3



## *Average Achievement in the Mathematics Content and Cognitive Domains*

As described in the *TIMSS 2007 Assessment Frameworks*,<sup>1</sup> the mathematics assessment is organized around two dimensions, a content dimension specifying the subject matter or content domains to be assessed in mathematics and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. Each item in the mathematics assessment is associated with one content domain and one cognitive domain, providing for both content-based and cognitive-oriented perspectives on student achievement in mathematics.

Chapter 3 presents average student performance in three content domains at the fourth grade: number, geometric shapes and measures, and data display, and four domains at the eighth grade: number, algebra, geometry, and data and chance. Average performance also is presented for each of three cognitive domains—knowing, applying, and reasoning—at both grades. The same three cognitive domains were used at both fourth and eighth grades. Knowing refers to the student’s knowledge base of mathematics facts, concepts, tools, and procedures. Applying focuses on the student’s ability to apply knowledge and conceptual understanding in a problem situation. Reasoning goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multi-step problems. To describe each country’s relative strengths in the content and cognitive domains, relative performance in each content and cognitive

<sup>1</sup> Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O’Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

domain are depicted graphically. Gender differences in the content and cognitive domains also are shown. Trend results are not presented separately for the content and cognitive domains, because there are too few items in common with the previous assessments.

To simplify comparisons of student achievement across domains, the content and cognitive achievement scales at each grade were constructed to have the same average difficulty.<sup>2</sup> As a point of reference, however, Exhibit A.9 in Appendix A shows the average percentage of students correctly answering the items within each of the content and cognitive domains for each country and benchmarking participant. It can be seen that across participants the difficulty of the mathematics items was similar from domain to domain but varied somewhat. At the fourth grade, the data display content domain was considerably easier, but only for students in some countries (Appendix C contains the results of the Test-Curriculum Matching Analysis). At both grades, the items in the reasoning cognitive domain were more difficult for students, on average, than those in the applying domain, which were in turn more difficult than the items in the knowing domain. In Yemen, the items were very difficult in all of the domains, making it difficult to obtain accurate domain scale estimates. Therefore, the content and cognitive domain scale results were not reported for Yemen in the exhibits in this chapter. Similarly, students at the fourth grade in Kuwait, Morocco, Qatar, and Tunisia, and at the eighth grade in Algeria, Botswana, El Salvador, Ghana, Kuwait, Qatar, and Saudi Arabia had particular difficulty with the mathematics reasoning items, and because of concerns about reliability, results for the reasoning domain scale were not reported in this chapter for these countries.

### **How Does Achievement Differ Across the TIMSS 2007 Mathematics Content and Cognitive Domains?**

Exhibit 3.1 presents average achievement in each of the content and cognitive domains for fourth and eighth grades. Countries and benchmarking participants are displayed in alphabetical order, and to provide a basis for comparison, symbols indicate whether a country's performance is statistically significantly above or below the TIMSS scale average of 500. Please note that

<sup>2</sup> At both fourth and eighth grades, student achievement in each of the content and cognitive domains was placed on the same scale by aligning its achievement distribution with the achievement distribution of the overall mathematics scale.

this refers to the mid-point of the TIMSS achievement scale, and not the average of the country means presented in the exhibit.

At both grades, the countries scoring highest on the overall mathematics assessment tended also to be the highest-scoring countries in each of the content and cognitive domains and the lowest-scoring countries overall tended to be those with lowest scores in the content and cognitive domains. In Appendix B, Exhibits B.1 through B.6 for fourth grade and B.7 through B.13 for eighth grade compare average achievement among individual countries and benchmarking participants for each of the content and cognitive domains. The exhibits show whether or not the differences in average achievement between pairs of countries are statistically significant.

At the fourth grade, Hong Kong SAR was a top performer in all three content areas. Hong Kong SAR had the highest achievement in geometric shapes and measures, was joined by Singapore in having the highest achievement in number, and they were joined by Japan in the data display content area. Chinese Taipei, Japan, Kazakhstan, and the Russian Federation also did very well in number as did the benchmarking states of Massachusetts and Minnesota. In geometric shapes and measures, other high performers included Singapore, Japan, Chinese Taipei, England, Denmark, Kazakhstan, and the Russian Federation as well as the benchmarking states of Massachusetts and Minnesota. In data display, Chinese Taipei, England, the United States, and the Netherlands also were among those with the highest average achievement as were the benchmarking states of Massachusetts and Minnesota and the province of Ontario.

At the fourth grade, Hong Kong SAR also had the highest average achievement in each of the cognitive domains, being joined by Singapore in the knowing domain. In this domain, each country typically had higher achievement than the next one or two countries. However, in addition to Singapore and Hong Kong SAR, other high performers included Chinese Taipei, Japan, Kazakhstan, England, the United States, and the Russian Federation as well as the benchmarking states of Massachusetts and Minnesota. In the applying domain, in addition to Hong Kong SAR, the other

Exhibit 3.1 Average Achievement in the Mathematics Content and Cognitive Domains

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Average Scale Scores for Mathematics Content Domains			Average Scale Scores for Mathematics Cognitive Domains		
	Number	Geometric Shapes and Measures	Data Display	Knowing	Applying	Reasoning
Algeria	391 (5.0) ▼	383 (4.5) ▼	361 (5.2) ▼	384 (5.4) ▼	376 (5.2) ▼	387 (4.7) ▼
Armenia	522 (4.0) ▲	483 (4.7) ▼	458 (4.3) ▼	518 (4.8) ▲	493 (4.1) ▼	489 (4.7) ▼
Australia	496 (3.7) ▼	536 (3.1) ▲	534 (3.1) ▲	509 (4.2) ▲	523 (3.5) ▲	516 (3.4) ▲
Austria	502 (2.2) ▼	509 (2.4) ▲	508 (2.6) ▲	505 (2.0) ▲	507 (1.8) ▲	506 (2.1) ▲
Chinese Taipei	581 (1.9) ▲	556 (2.2) ▲	567 (2.0) ▲	584 (1.7) ▲	569 (1.7) ▲	566 (1.9) ▲
Colombia	360 (4.3) ▼	361 (4.8) ▼	363 (5.9) ▼	360 (5.2) ▼	357 (5.1) ▼	372 (4.9) ▼
Czech Republic	482 (2.8) ▼	494 (2.8) ▼	493 (3.3) ▼	473 (2.4) ▼	496 (2.7) ▼	493 (3.4) ▼
† Denmark	509 (2.9) ▲	544 (2.6) ▲	529 (3.4) ▲	513 (2.7) ▼	528 (2.5) ▲	524 (2.1) ▲
El Salvador	317 (3.9) ▼	333 (4.3) ▼	367 (3.5) ▼	312 (4.1) ▼	339 (3.7) ▼	356 (4.0) ▼
England	531 (3.2) ▲	548 (2.7) ▲	547 (2.5) ▲	544 (3.6) ▲	540 (3.1) ▲	537 (3.1) ▲
<sup>1</sup> Georgia	464 (3.8) ▼	415 (4.8) ▼	414 (4.6) ▼	450 (4.0) ▼	433 (4.5) ▼	437 (4.2) ▼
Germany	521 (2.2) ▲	528 (2.0) ▲	534 (3.1) ▲	514 (2.0) ▲	531 (2.2) ▲	528 (2.5) ▲
Hong Kong SAR	606 (3.8) ▲	599 (3.1) ▲	585 (2.7) ▲	617 (3.5) ▲	599 (3.4) ▲	589 (3.5) ▲
Hungary	510 (3.7) ▲	510 (3.3) ▲	504 (3.5) ▲	511 (3.4) ▲	507 (3.5) ▲	509 (3.8) ▲
Iran, Islamic Rep. of	398 (3.6) ▼	429 (3.3) ▼	400 (4.0) ▼	410 (3.6) ▼	405 (3.7) ▼	410 (3.8) ▼
Italy	505 (3.2) ▼	509 (3.0) ▲	506 (3.4) ▲	514 (3.2) ▲	501 (2.9) ▼	509 (3.1) ▲
Japan	561 (2.2) ▲	566 (2.2) ▲	578 (2.8) ▲	565 (2.1) ▲	566 (2.0) ▲	563 (2.1) ▲
<sup>1</sup> Kazakhstan	556 (6.6) ▲	542 (7.4) ▲	522 (5.8) ▲	559 (7.3) ▲	547 (7.2) ▲	539 (6.1) ▲
♦♦ Kuwait	321 (3.5) ▼	316 (3.6) ▼	318 (4.7) ▼	326 (4.6) ▼	305 (4.1) ▼	++
<sup>1</sup> Latvia	536 (2.1) ▲	532 (2.6) ▲	536 (3.0) ▲	530 (2.2) ▲	540 (2.5) ▲	537 (2.5) ▲
<sup>1</sup> Lithuania	533 (2.3) ▲	518 (2.4) ▲	530 (2.9) ▲	520 (2.8) ▲	539 (2.4) ▲	526 (2.5) ▲
Morocco	353 (4.7) ▼	365 (4.3) ▼	316 (6.1) ▼	354 (4.8) ▼	346 (4.7) ▼	++
‡ Netherlands	535 (2.2) ▲	522 (2.3) ▲	543 (2.3) ▲	525 (2.2) ▲	540 (2.0) ▲	534 (2.4) ▲
New Zealand	478 (2.7) ▼	502 (2.3) ▼	513 (2.6) ▲	482 (2.5) ▼	495 (2.3) ▼	503 (2.8) ▼
Norway	461 (2.8) ▼	490 (3.0) ▼	487 (2.6) ▼	461 (2.9) ▼	479 (2.8) ▼	489 (2.7) ▼
Qatar	292 (1.2) ▼	296 (1.4) ▼	326 (1.6) ▼	293 (1.3) ▼	296 (1.2) ▼	++
Russian Federation	546 (4.4) ▲	538 (5.1) ▲	530 (4.9) ▲	538 (4.5) ▲	547 (4.8) ▲	540 (4.8) ▲
† Scotland	481 (2.6) ▼	503 (2.6) ▼	516 (2.2) ▲	489 (2.6) ▼	500 (2.4) ▼	497 (2.2) ▼
Singapore	611 (4.3) ▲	570 (3.6) ▲	583 (3.2) ▲	620 (4.0) ▲	590 (3.7) ▲	578 (3.8) ▲
Slovak Republic	495 (3.9) ▼	499 (4.3) ▼	492 (4.2) ▼	492 (3.9) ▼	498 (4.0) ▼	499 (4.0) ▼
Slovenia	485 (1.9) ▼	522 (1.8) ▲	518 (2.5) ▲	497 (1.8) ▼	504 (1.9) ▲	505 (2.1) ▲
Sweden	490 (2.5) ▼	508 (2.3) ▲	529 (2.7) ▼	482 (2.5) ▼	508 (2.2) ▲	519 (2.5) ▲
Tunisia	352 (4.5) ▼	334 (4.5) ▼	307 (4.8) ▼	343 (4.9) ▼	329 (4.8) ▼	++
Ukraine	480 (2.9) ▼	457 (2.8) ▼	462 (3.2) ▼	472 (3.0) ▼	466 (3.1) ▼	474 (3.2) ▼
<sup>2</sup> † United States	524 (2.7) ▲	522 (2.5) ▲	543 (2.4) ▲	541 (2.6) ▲	524 (2.6) ▲	523 (2.2) ▲
Yemen	++	++	++	++	++	++
TIMSS Scale Avg.	500	500	500	500	500	500
<b>Benchmarking Participants</b>						
<sup>2</sup> Alberta, Canada	489 (3.3) ▼	512 (2.9) ▲	537 (3.7) ▲	494 (3.1) ▼	505 (2.9) ▼	519 (3.1) ▲
<sup>2</sup> British Columbia, Canada	493 (2.8) ▼	510 (2.9) ▲	531 (2.8) ▲	498 (2.5) ▼	505 (2.6) ▲	516 (2.3) ▲
♦♦ ‡ Dubai, UAE	444 (2.0) ▼	440 (2.8) ▼	461 (2.7) ▼	457 (2.1) ▼	441 (1.7) ▼	446 (2.9) ▼
<sup>2</sup> Massachusetts, US	571 (4.0) ▲	564 (4.1) ▲	571 (4.0) ▲	581 (4.1) ▲	566 (3.5) ▲	565 (3.2) ▲
<sup>2</sup> † Minnesota, US	546 (6.2) ▲	556 (5.3) ▲	557 (4.8) ▲	565 (6.2) ▲	548 (5.5) ▲	543 (5.1) ▲
<sup>2</sup> Ontario, Canada	489 (3.6) ▼	530 (3.0) ▲	544 (3.4) ▲	498 (3.2) ▼	515 (3.1) ▲	526 (2.6) ▲
<sup>2</sup> Quebec, Canada	511 (3.0) ▲	525 (3.2) ▲	527 (3.6) ▲	517 (3.2) ▲	517 (2.8) ▲	523 (3.0) ▲

▲ Country average significantly higher than TIMSS scale average    ▼ Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit 3.1 Average Achievement in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Average Scale Scores for Mathematics Content Domains				Average Scale Scores for Mathematics Cognitive Domains		
	Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Algeria	403 (1.7) ▼	349 (2.4) ▼	432 (2.1) ▼	371 (1.7) ▼	371 (1.9) ▼	412 (2.0) ▼	++
Armenia	492 (3.1) ▼	532 (2.5) ▲	493 (4.1) ▼	427 (3.9) ▼	507 (3.1) ▲	493 (3.8) ▼	489 (3.8) ▼
Australia	503 (3.7)	471 (3.7)	487 (3.6) ▼	525 (3.2) ▲	487 (3.3) ▼	500 (3.4)	502 (3.3)
Bahrain	388 (2.0) ▼	403 (1.8) ▼	412 (2.1) ▼	418 (2.1) ▼	395 (1.7) ▼	403 (1.9) ▼	413 (2.1) ▼
Bosnia and Herzegovina	451 (3.0) ▼	475 (3.2) ▼	451 (3.5) ▼	437 (2.3) ▼	478 (2.9) ▼	440 (2.6) ▼	452 (2.9) ▼
Botswana	366 (2.9) ▼	394 (2.2) ▼	325 (3.2) ▼	384 (2.6) ▼	376 (2.1) ▼	351 (2.6) ▼	++
Bulgaria	458 (4.7) ▼	476 (5.1) ▼	468 (5.0) ▼	440 (4.7) ▼	477 (4.7) ▼	458 (4.8) ▼	455 (4.7) ▼
Chinese Taipei	577 (4.2) ▲	617 (5.4) ▲	592 (4.6) ▲	566 (3.6) ▲	594 (4.5) ▲	592 (4.2) ▲	591 (4.1) ▲
Colombia	369 (3.5) ▼	390 (3.1) ▼	371 (3.3) ▼	405 (3.8) ▼	364 (3.4) ▼	384 (3.7) ▼	416 (3.3) ▼
Cyprus	464 (1.6) ▼	468 (2.0) ▼	458 (2.7) ▼	464 (1.6) ▼	468 (1.6) ▼	465 (1.8) ▼	461 (2.1) ▼
Czech Republic	511 (2.5) ▲	484 (2.4) ▼	498 (2.7)	512 (2.8) ▲	502 (2.5)	504 (2.7)	500 (2.6)
Egypt	393 (3.1) ▼	409 (3.3) ▼	406 (3.4) ▼	384 (3.1) ▼	392 (3.6) ▼	393 (3.6) ▼	396 (3.4) ▼
El Salvador	355 (3.0) ▼	331 (3.7) ▼	318 (3.7) ▼	362 (3.0) ▼	336 (3.1) ▼	347 (3.3) ▼	++
† England	510 (5.0)	492 (4.6)	510 (4.4) ▲	547 (5.0) ▲	503 (4.0)	514 (4.9) ▲	518 (4.3) ▲
<sup>1</sup> Georgia	421 (5.6) ▼	421 (6.6) ▼	409 (6.7) ▼	373 (4.3) ▼	427 (5.8) ▼	401 (5.5) ▼	389 (5.8) ▼
Ghana	310 (3.9) ▼	358 (3.6) ▼	275 (4.9) ▼	321 (3.6) ▼	313 (4.6) ▼	297 (4.2) ▼	++
† Hong Kong SAR	567 (5.6) ▲	565 (5.6) ▲	570 (5.5) ▲	549 (4.7) ▲	574 (5.4) ▲	569 (5.9) ▼	557 (5.6) ▲
Hungary	517 (3.6) ▲	503 (3.6) ▼	508 (3.6) ▲	524 (3.3) ▲	518 (3.3) ▲	513 (3.1) ▲	513 (3.2) ▲
Indonesia	399 (3.7) ▼	405 (3.5) ▼	395 (4.5) ▼	402 (3.6) ▼	397 (4.0) ▼	398 (3.7) ▼	405 (3.3) ▼
Iran, Islamic Rep. of	395 (3.9) ▼	408 (3.9) ▼	423 (4.4) ▼	415 (3.5) ▼	403 (4.1) ▼	402 (4.2) ▼	427 (3.5) ▼
<sup>3</sup> Israel	469 (3.2) ▼	470 (3.9) ▼	436 (4.3) ▼	465 (4.4) ▼	473 (3.7) ▼	456 (4.1) ▼	462 (4.1) ▼
Italy	478 (2.8) ▼	460 (3.2) ▼	490 (3.1) ▼	491 (3.1) ▼	476 (3.0) ▼	483 (2.9) ▼	483 (2.8) ▼
Japan	551 (2.3) ▲	559 (2.5) ▲	573 (2.2) ▲	573 (2.2) ▲	560 (2.2) ▲	565 (2.2) ▲	568 (2.4) ▲
Jordan	416 (4.3) ▼	448 (4.1) ▼	436 (3.9) ▼	425 (3.8) ▼	432 (4.2) ▼	422 (4.1) ▼	440 (3.6) ▼
Korea, Rep. of	583 (2.4) ▲	596 (3.0) ▲	587 (2.3) ▲	580 (2.0) ▲	596 (2.5) ▲	595 (2.8) ▲	579 (2.3) ▲
♦ Kuwait	347 (3.1) ▼	354 (3.0) ▼	385 (2.8) ▼	366 (3.5) ▼	347 (3.1) ▼	361 (2.7) ▼	++
Lebanon	454 (3.4) ▼	465 (3.2) ▼	462 (4.0) ▼	407 (4.4) ▼	464 (3.9) ▼	448 (4.6) ▼	429 (4.0) ▼
<sup>1</sup> Lithuania	506 (2.7) ▲	483 (2.7) ▼	507 (2.6) ▲	523 (2.3) ▲	508 (2.5) ▲	511 (2.4) ▲	486 (2.5) ▼
Malaysia	491 (5.1)	454 (4.3) ▼	477 (5.6) ▼	469 (4.1) ▼	477 (4.8) ▼	478 (4.9) ▼	468 (3.8) ▼
Malta	496 (1.3) ▼	473 (1.4) ▼	495 (1.1) ▼	487 (1.4) ▼	490 (1.6) ▼	492 (1.0) ▼	475 (1.3) ▼
Norway	488 (2.0) ▼	425 (2.8) ▼	459 (2.3) ▼	505 (2.5) ▲	458 (1.8) ▼	477 (2.2) ▼	475 (2.3) ▼
Oman	363 (2.7) ▼	391 (3.2) ▼	387 (3.0) ▼	389 (3.0) ▼	372 (3.5) ▼	368 (3.0) ▼	397 (3.3) ▼
Palestinian Nat'l Auth.	366 (3.2) ▼	382 (3.4) ▼	388 (3.8) ▼	371 (2.9) ▼	365 (3.8) ▼	371 (3.4) ▼	381 (3.5) ▼
Qatar	334 (1.6) ▼	312 (1.5) ▼	301 (1.8) ▼	305 (1.6) ▼	307 (1.4) ▼	305 (1.4) ▼	++
Romania	457 (3.5) ▼	478 (4.6) ▼	466 (4.0) ▼	429 (3.7) ▼	470 (4.2) ▼	462 (4.0) ▼	449 (4.6) ▼
Russian Federation	507 (3.8)	518 (4.5) ▲	510 (4.1) ▲	487 (3.8) ▼	521 (3.9) ▲	510 (3.7) ▲	497 (3.6) ▼
Saudi Arabia	309 (3.3) ▼	344 (2.8) ▼	359 (2.6) ▼	348 (2.2) ▼	308 (2.6) ▼	335 (2.3) ▼	++
† Scotland	489 (3.7) ▼	467 (3.7) ▼	485 (3.9) ▼	517 (3.5) ▲	481 (3.3) ▼	489 (3.7) ▼	495 (3.3) ▼
<sup>1 2</sup> Serbia	478 (2.9) ▼	500 (3.2)	486 (3.6) ▼	458 (3.0) ▼	500 (3.2)	478 (3.3) ▼	474 (3.3) ▼
Singapore	597 (3.5) ▲	579 (3.7) ▲	578 (3.4) ▲	574 (3.9) ▲	581 (3.4) ▲	593 (3.6) ▲	579 (4.1) ▲
Slovenia	502 (2.3) ▼	488 (2.4) ▼	499 (2.4) ▼	511 (2.3) ▲	500 (2.2)	503 (2.0)	496 (2.5) ▼
Sweden	507 (1.8) ▲	456 (2.4) ▼	472 (2.5) ▼	526 (3.0) ▲	478 (2.0) ▼	497 (2.0)	490 (2.6) ▼
Syrian Arab Republic	393 (3.4) ▼	406 (3.7) ▼	417 (3.4) ▼	387 (2.7) ▼	393 (4.2) ▼	401 (3.4) ▼	396 (3.4) ▼
Thailand	444 (4.8) ▼	433 (5.0) ▼	442 (5.3) ▼	453 (4.1) ▼	436 (4.8) ▼	446 (4.7) ▼	456 (4.4) ▼
Tunisia	425 (2.6) ▼	423 (2.6) ▼	437 (2.6) ▼	411 (2.3) ▼	421 (2.6) ▼	423 (2.4) ▼	425 (2.3) ▼
Turkey	429 (4.0) ▼	440 (5.1) ▼	411 (5.1) ▼	445 (4.4) ▼	439 (4.8) ▼	425 (4.5) ▼	441 (4.2) ▼
Ukraine	460 (3.7) ▼	464 (3.9) ▼	467 (3.6) ▼	458 (3.5) ▼	471 (3.5) ▼	464 (3.5) ▼	445 (3.8) ▼
<sup>2</sup> † United States	510 (2.7) ▲	501 (2.7) ▼	480 (2.5) ▼	531 (2.8) ▲	514 (2.6) ▲	503 (2.9) ▼	505 (2.4) ▲
‡ Morocco	389 (3.4) ▼	362 (4.0) ▼	396 (3.6) ▼	371 (3.4) ▼	365 (4.4) ▼	389 (3.3) ▼	383 (3.5) ▼
<b>TIMSS Scale Avg.</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>	<b>500</b>
<b>Benchmarking Participants</b>							
Basque Country, Spain	509 (2.9) ▲	485 (3.1) ▼	476 (3.7) ▼	504 (3.7) ▼	501 (2.9) ▼	495 (3.0) ▼	496 (3.5) ▼
<sup>3</sup> British Columbia, Canada	520 (3.2) ▲	489 (3.1) ▼	487 (3.7) ▼	529 (3.2) ▲	504 (2.9) ▼	509 (3.1) ▲	510 (3.3) ▲
♦ † Dubai, UAE	458 (3.2) ▼	475 (2.4) ▼	451 (3.4) ▼	457 (3.2) ▼	469 (2.3) ▼	456 (2.9) ▼	465 (2.8) ▼
<sup>2</sup> Massachusetts, US	548 (5.2) ▲	538 (4.8) ▲	519 (4.3) ▲	569 (5.2) ▲	546 (4.5) ▲	542 (4.4) ▲	543 (4.1) ▲
<sup>2</sup> † Minnesota, US	537 (4.3) ▲	515 (4.7) ▲	505 (4.4) ▼	560 (5.4) ▲	532 (4.6) ▲	530 (4.8) ▲	523 (4.2) ▲
<sup>2</sup> Ontario, Canada	525 (4.0) ▲	490 (3.7) ▼	508 (4.2) ▼	543 (4.2) ▲	505 (3.2) ▼	518 (3.7) ▲	521 (3.2) ▲
<sup>3</sup> Quebec, Canada	534 (3.4) ▲	505 (3.3) ▼	523 (3.3) ▲	533 (3.0) ▲	520 (2.7) ▲	529 (3.1) ▲	524 (3.0) ▲

▲ Country average significantly higher than TIMSS scale average ▼ Country average significantly lower than TIMSS scale average

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

♦ Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

(.) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A plus (+) sign indicates average achievement could not be accurately estimated.

three Asian countries also had high performance as did the benchmarking state of Massachusetts, followed by a group of countries with similar average achievement—Kazakhstan, the Russian Federation, England, Latvia, the Netherlands, and Lithuania, as well as the benchmarking state of Minnesota. In the reasoning domain, after the four Asian countries, there were five countries with similar achievement—the Russian Federation, Kazakhstan, England, Latvia, and the Netherlands. The state of Massachusetts in the United States had average achievement similar to Chinese Taipei and Japan, and the state of Minnesota had average achievement similar to the five countries with the next highest achievement.

At the eighth grade, Singapore had the highest average achievement in the content area of number, closely followed by Korea and Chinese Taipei, and then Hong Kong SAR. Next, Japan, Hungary, the Czech Republic, the United States, and England performed similarly followed by Sweden, the Russian Federation, Lithuania, and Australia. Also, the two benchmarking states, the four benchmarking provinces, and the Basque Country in Spain had achievement similar to that of Japan, Hungary, the Czech Republic, the United States, and England. In algebra, Chinese Taipei had the highest achievement followed closely by Korea, Singapore, and, then, Hong Kong SAR and Japan. Armenia had the next highest average achievement, followed by the Russian Federation, and, then, Hungary, the United States, and Serbia with about the same achievement. Among the benchmarking participants, the state of Massachusetts performed similarly to Armenia, the state of Minnesota similarly to the Russian Federation, and the province of Quebec like the three-country group with Hungary, the United States, and Serbia. In geometry, Chinese Taipei and Korea had the highest average achievement followed by Singapore, Japan, and Hong Kong SAR all with similar achievement. Next was a group of four countries also with similar average achievement—England, the Russian Federation, Hungary, and Lithuania, and also four of the benchmarking participants—the two provinces of Quebec and Ontario and the two states of Massachusetts and Minnesota. In data and chance, top-performing Korea and Singapore were followed closely by

Japan and Chinese Taipei. Next, Hong Kong SAR and England had similar achievement, followed by the four-country group of the United States, Sweden, Australia, and Hungary. The benchmarking state of Massachusetts performed the same as Japan and Chinese Taipei, the state of Minnesota and the province of Ontario performed similarly to Hong Kong SAR and England, and the provinces of Quebec and British Columbia performed similarly to the four-country group of the United States, Sweden, Australia, and Hungary.

At the eighth grade, Chinese Taipei was a top-performer across the cognitive domains—knowing, applying, and reasoning. Achievement in the knowing domain was led by Korea and Chinese Taipei followed by Singapore and Hong Kong SAR and, then, Japan followed by the Russian Federation, Hungary, and the United States. Among the benchmarking participants, the two states of Massachusetts and Minnesota and the province of Quebec performed as well as the latter group of countries. In the applying domain, the three highest achieving countries were Korea, Singapore, and Chinese Taipei. They were followed by Hong Kong SAR and Japan. Next, was a group of four countries with similar achievement—England, Hungary, Lithuania, and the Russian Federation, and five benchmarking participants—the two states, Massachusetts and Minnesota, and the three provinces, Quebec, Ontario, and British Columbia. As mentioned earlier, Chinese Taipei had the highest average achievement in the reasoning domain, with Korea and Singapore having the next highest achievement. These three countries were followed by similarly performing Japan and Hong Kong SAR, and then, after a gap, England and Hungary with similar achievement. Five of the benchmarking participants also had performance aligned with England and Hungary—the two states, Massachusetts and Minnesota, and the three provinces, Quebec, Ontario, and British Columbia.

### **In Which Mathematics Content and Cognitive Domains Are Countries Relatively Strong or Weak?**

To highlight relative strengths and weaknesses in the mathematics content and cognitive domains within each country, Exhibit 3.2 profiles average achievement in these domains relative to the overall level of performance in the country. For each TIMSS 2007 participant, Exhibit 3.2 displays the difference between average performance in each mathematics content domain and the average across all the mathematics items for that participant, and similarly the difference between average performance in each mathematics cognitive domain and the average across all items. This relative performance is presented in two panels for each country, one for content domains and one for cognitive domains. Average relative performance is represented by a small circle, with a bar extending above and below the circle to denote a 95 percent confidence interval for this average.

The profiles reveal that many countries performed relatively better in one content domain or in one cognitive domain than on average. At fourth grade, countries performing relatively better in number than in mathematics overall included Armenia, Chinese Taipei, Georgia, Singapore, Tunisia, and the Ukraine, while those performing relatively less well included Australia, Denmark, El Salvador, England, New Zealand, Norway, Qatar, Scotland, Slovenia, and Sweden as well as the four Canadian Provinces. In geometric shapes and measures, Australia, Denmark, Iran, Morocco, Norway, Slovenia, as well as the Canadian province of Ontario performed relatively better, while Chinese Taipei, Georgia, Lithuania, the Netherlands, Singapore, the Ukraine, and the United States performed relatively less well. In data display, those performing relatively better included Australia, El Salvador, Japan, the Netherlands, New Zealand, Qatar, Scotland, Slovenia, Sweden, the United States as well as the three Canadian provinces of Alberta, British Columbia, and Ontario as well as Dubai, while those performing less well included Algeria, Armenia, Georgia, Hong Kong SAR, Kazakhstan, Morocco, and Tunisia.

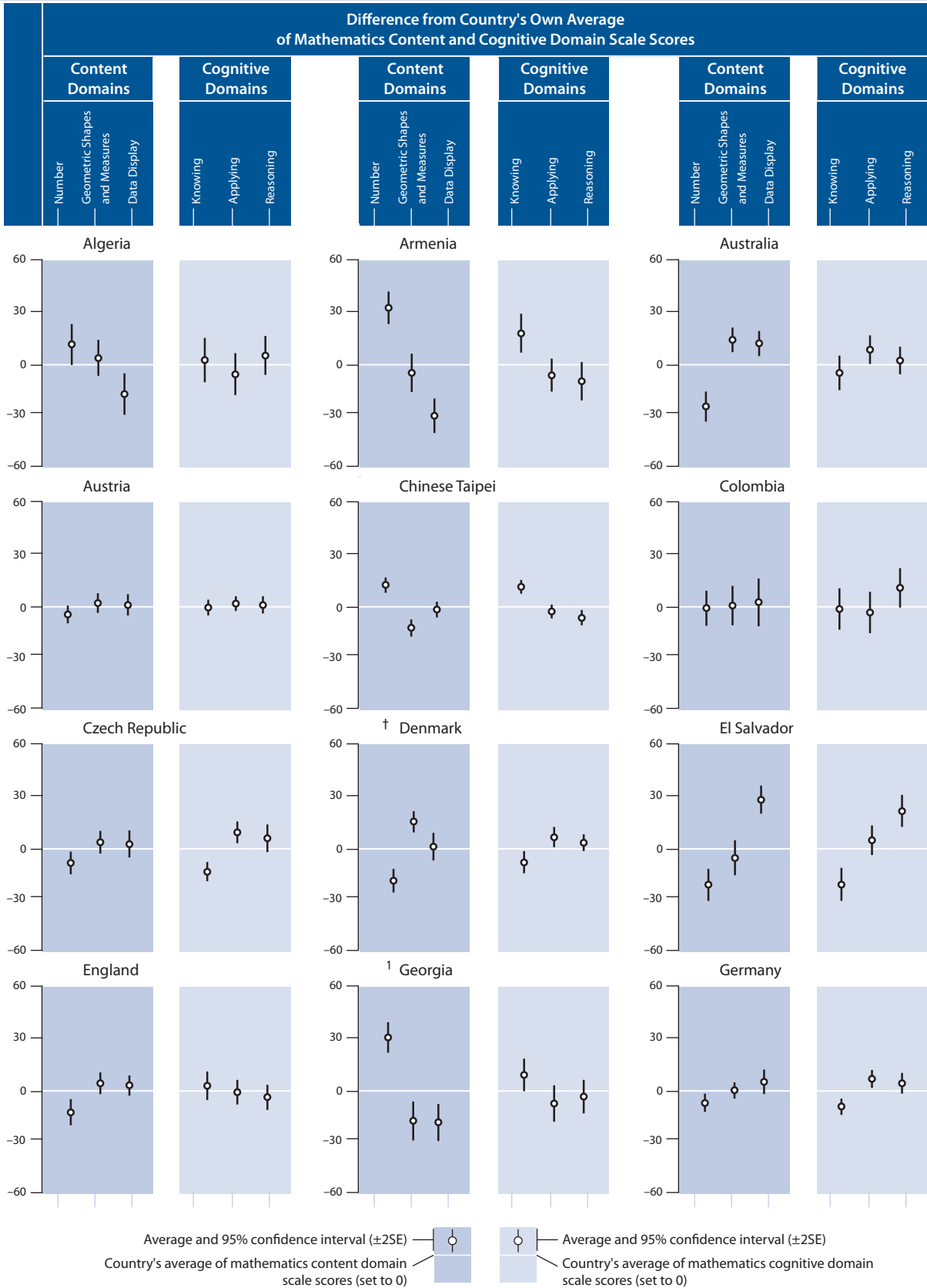


At the fourth grade, with the exceptions of the Czech republic, Germany, and Lithuania performing relatively better in the applying domain than in mathematics overall and Dubai performing relatively less well, differences in relative performance among the cognitive domains were mainly in the areas of knowing and reasoning. Armenia, Chinese Taipei, Georgia, Hong Kong SAR, Kuwait, Singapore, and the United States as well as the state of Massachusetts and Dubai in the United Arab Emirates performed relatively better in the knowing domain than in mathematics overall. In contrast, the Czech Republic, Denmark, El Salvador, Germany, the Netherlands, New Zealand, Norway, and Sweden performed relatively less well in the knowing domain, as did three of the Canadian provinces (Alberta, British Columbia, and Ontario). El Salvador, New Zealand, Norway, and Sweden, as well as the Canadian provinces of Alberta, British Columbia, and Ontario, performed relatively better in the reasoning domain while Hong Kong SAR and Singapore performed relatively less well.

At eighth grade, many participants showed a relative strength or weakness in one or other of the content domains. Those performing relatively better in number than in mathematics overall included Algeria, the Czech Republic, El Salvador, Malaysia, Malta, Norway, Qatar, Singapore, Sweden, the Basque Country in Spain and the Canadian province of British Columbia, while Bahrain, Colombia, Iran, Japan, Jordan, Kuwait, Oman, and Saudi Arabia performed relatively less well. In algebra, countries that performed relatively better included Armenia, Bosnia and Herzegovina, Botswana, Chinese Taipei, Egypt, Ghana, Jordan, Lebanon, Romania, Serbia, and Dubai in the United Arab Emirates, while participants that performed relatively less well included Algeria, Australia, the Czech Republic, El Salvador, England, Italy, Lithuania, Malaysia, Malta, Norway, Scotland, Slovenia, Sweden, Morocco, the Basque Country in Spain, and British Columbia, Ontario, and Quebec in Canada. In geometry, Algeria, Bahrain, Japan, Kuwait, Lebanon, Malta, the Palestinian National Authority, Saudi Arabia, the Syrian Arab Republic, Tunisia, and Morocco performed relatively better, while those performing less well included Botswana, Colombia, El Salvador,

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



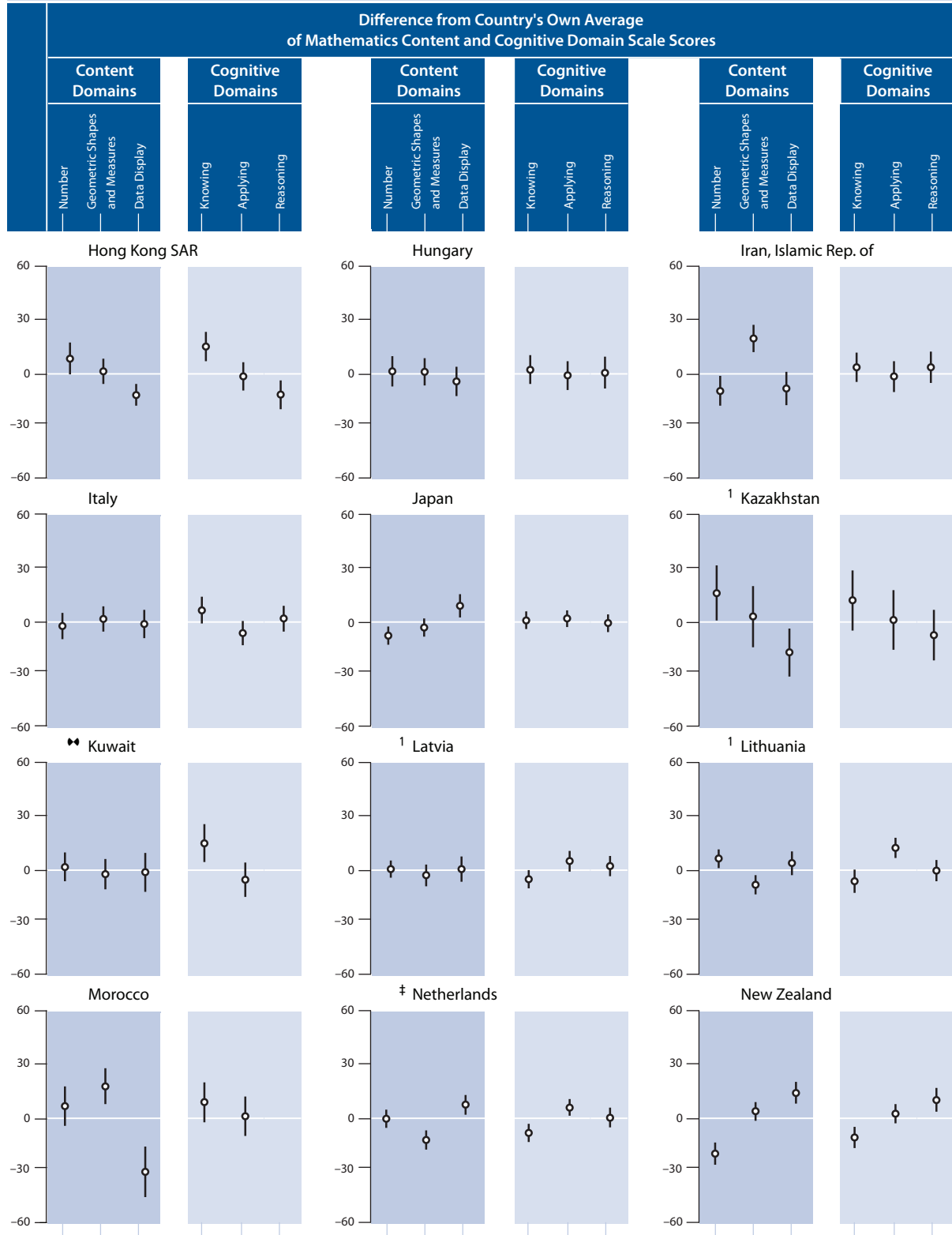
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 \*\* Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.  
 Note: Average achievement could not be accurately estimated on the reasoning scale for Kuwait, Morocco, Qatar, and Tunisia and on all subscales for Yemen.

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

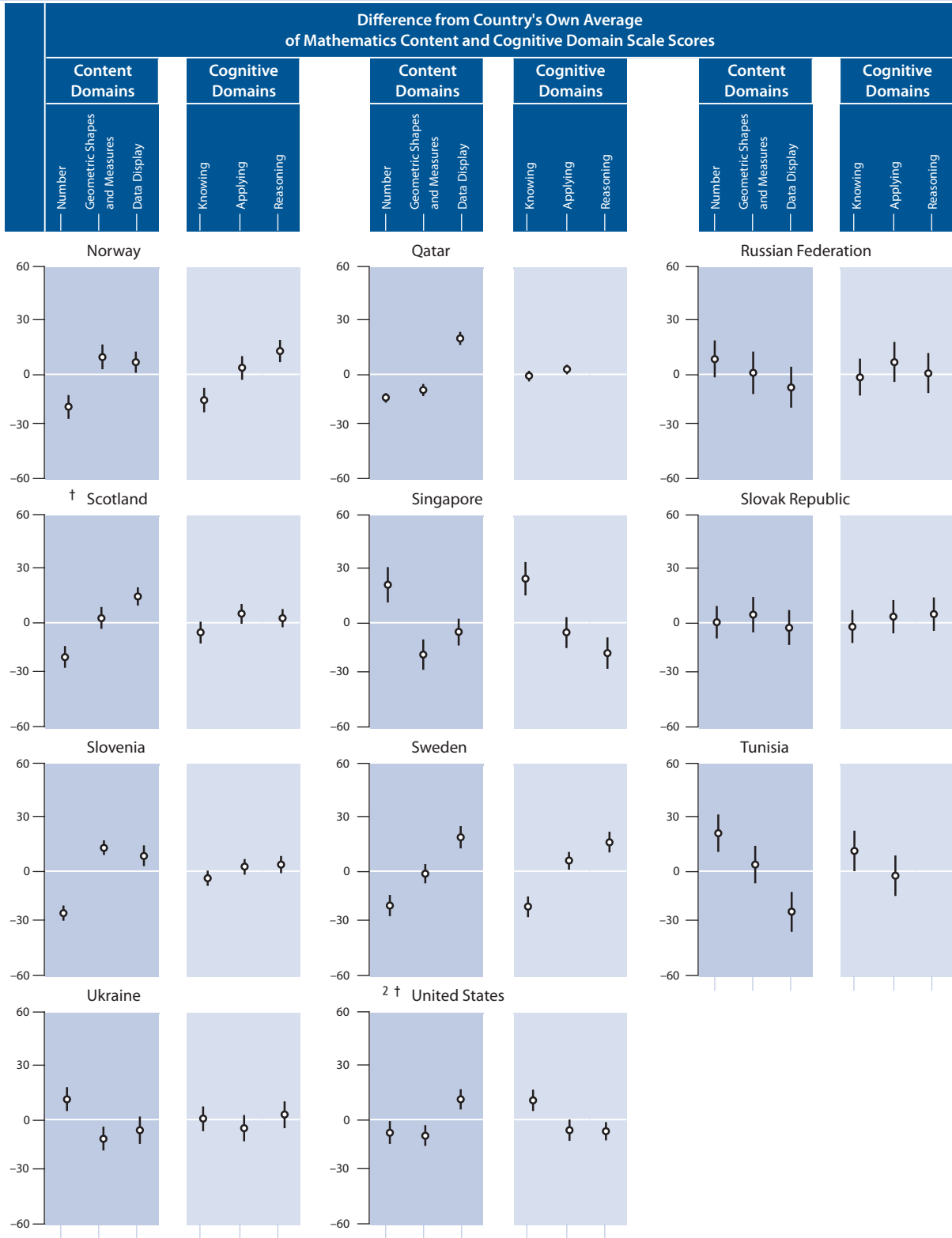
TIMSS2007  
Mathematics 4<sup>th</sup> Grade



Average and 95% confidence interval ( $\pm 2SE$ )  
 Country's average of mathematics content domain scale scores (set to 0)

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade



Average and 95% confidence interval ( $\pm 2SE$ )  
 Country's average of mathematics content domain scale scores (set to 0)

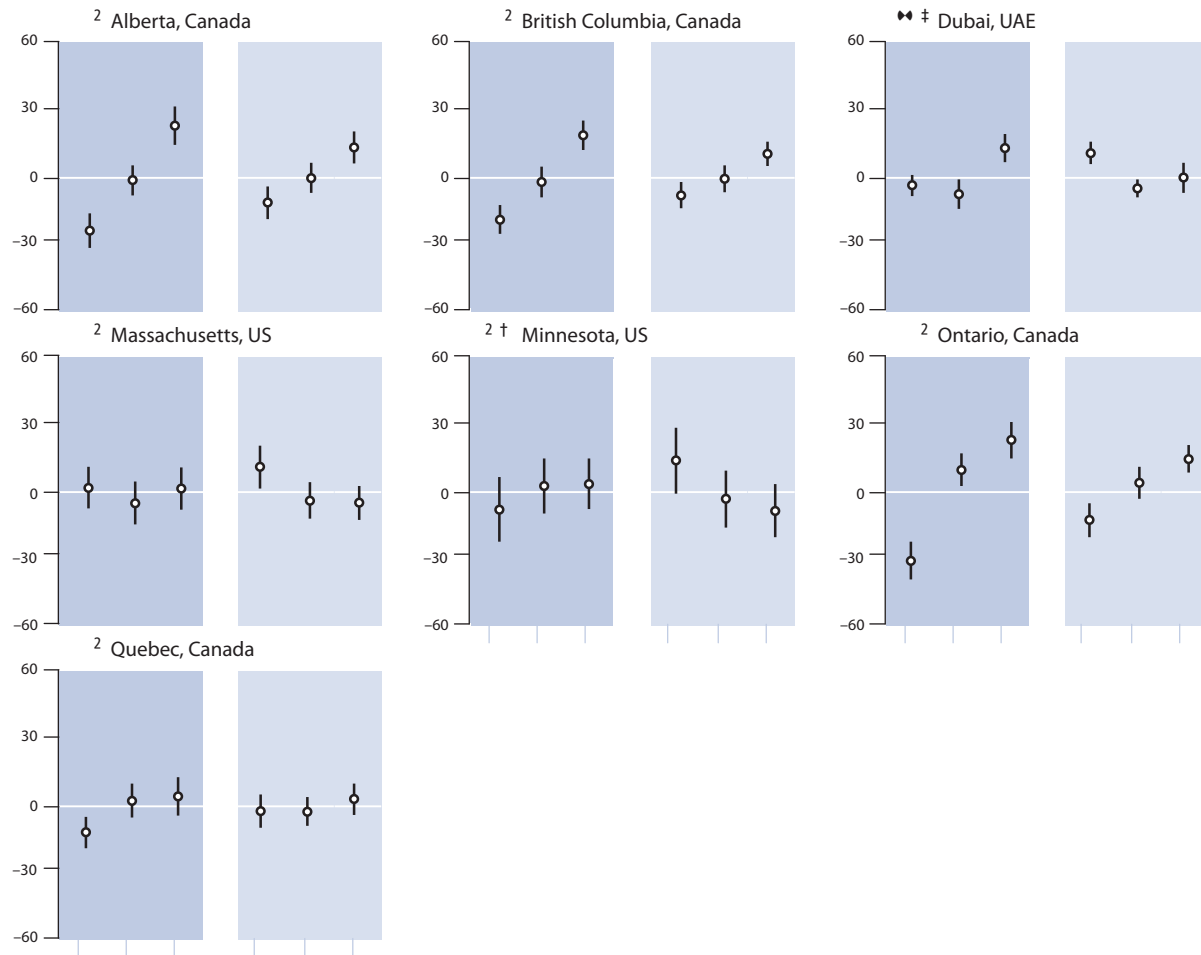
Average and 95% confidence interval ( $\pm 2SE$ )  
 Country's average of mathematics cognitive domain scale scores (set to 0)

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores					
Content Domains		Cognitive Domains		Cognitive Domains	
Number	Geometric Shapes and Measures	Knowing	Applying	Reasoning	Reasoning

Benchmarking Participants

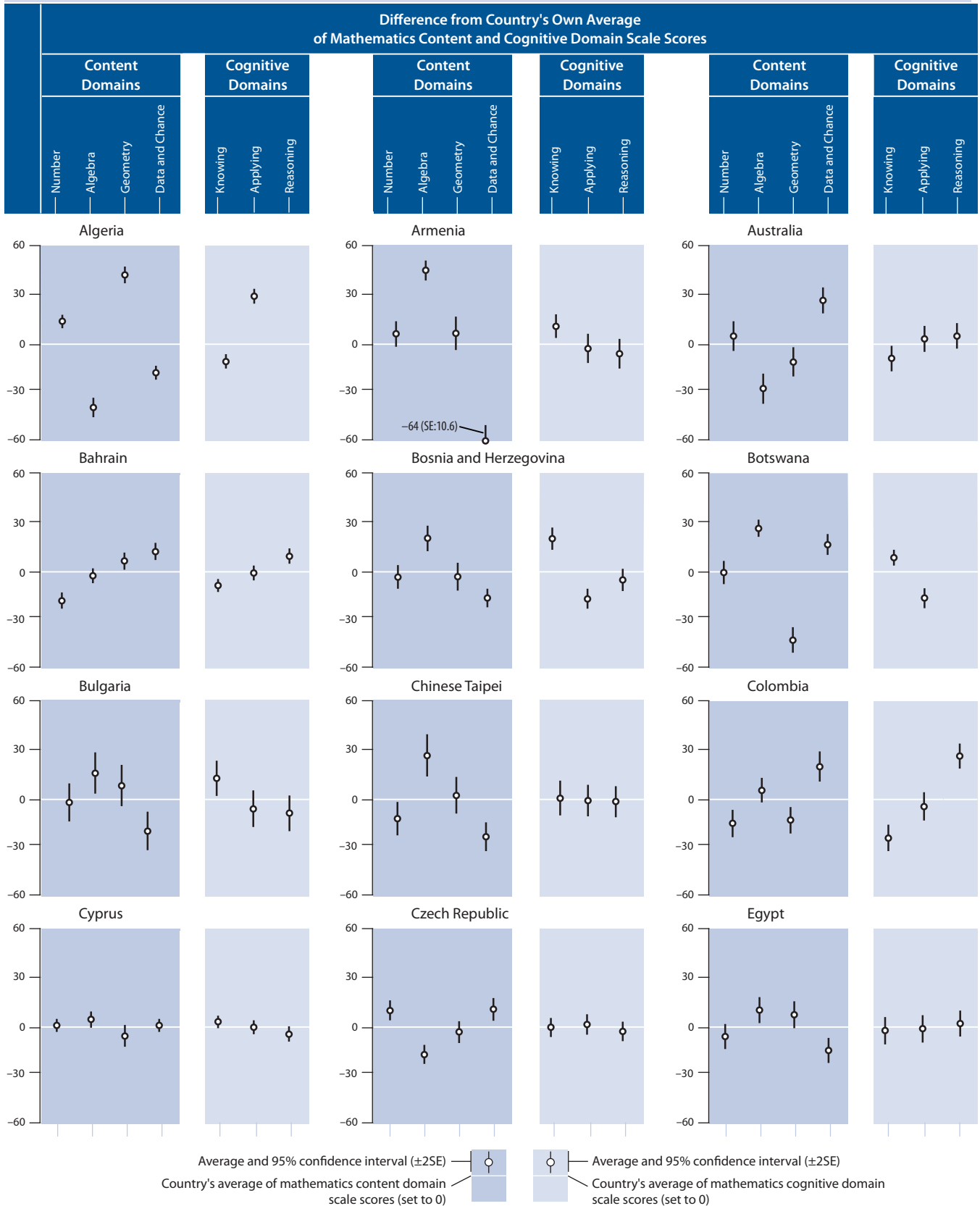


SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Average and 95% confidence interval ( $\pm 2SE$ )  
 Country's average of mathematics content domain scale scores (set to 0)

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

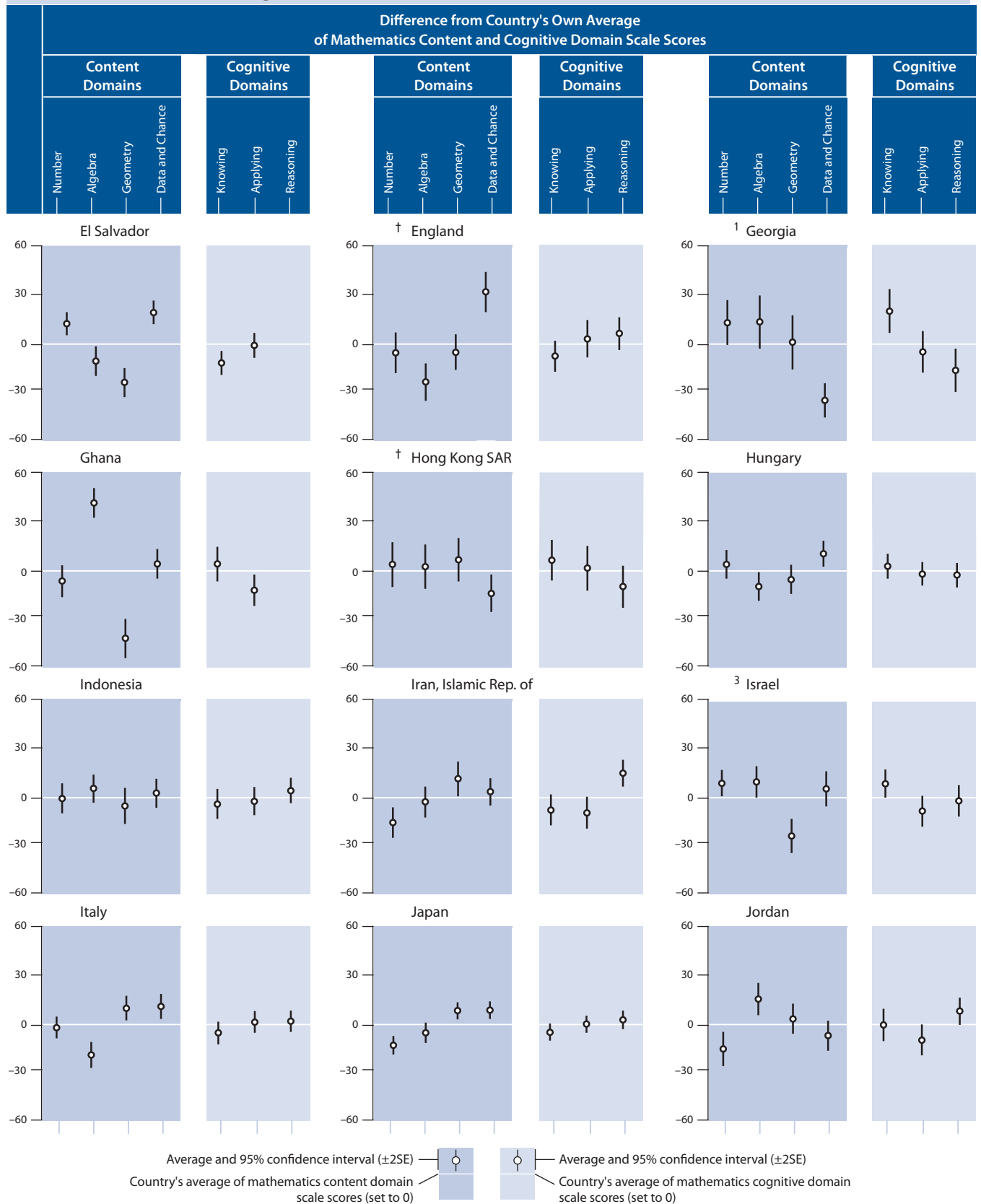


† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).  
 † Did not satisfy guidelines for sample participation rates (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).  
 2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).  
 3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade



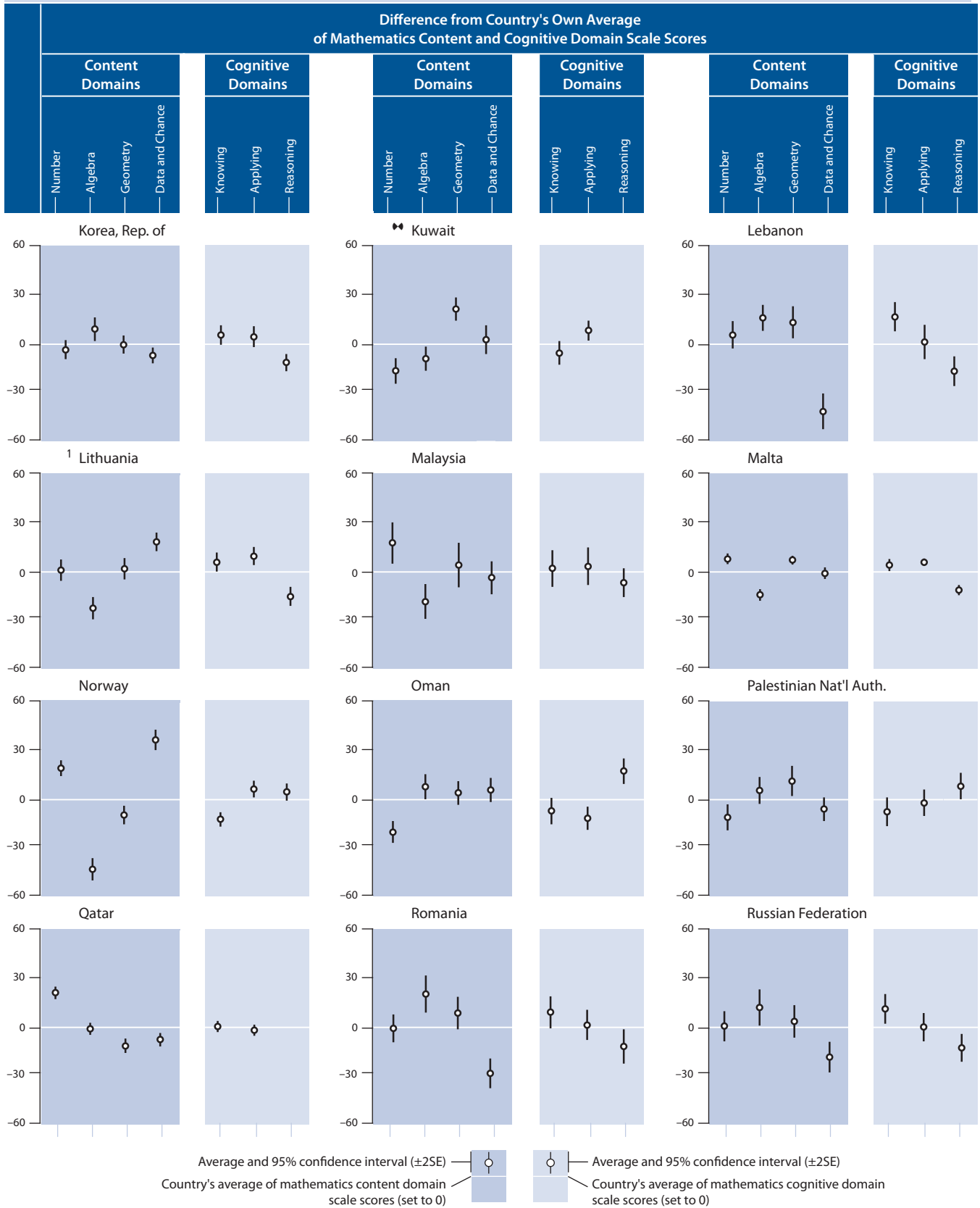
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

Note: Average achievement could not be accurately estimated on the reasoning scale for Algeria, Botswana, El Salvador, Ghana, Kuwait, Qatar, and Saudi Arabia.

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

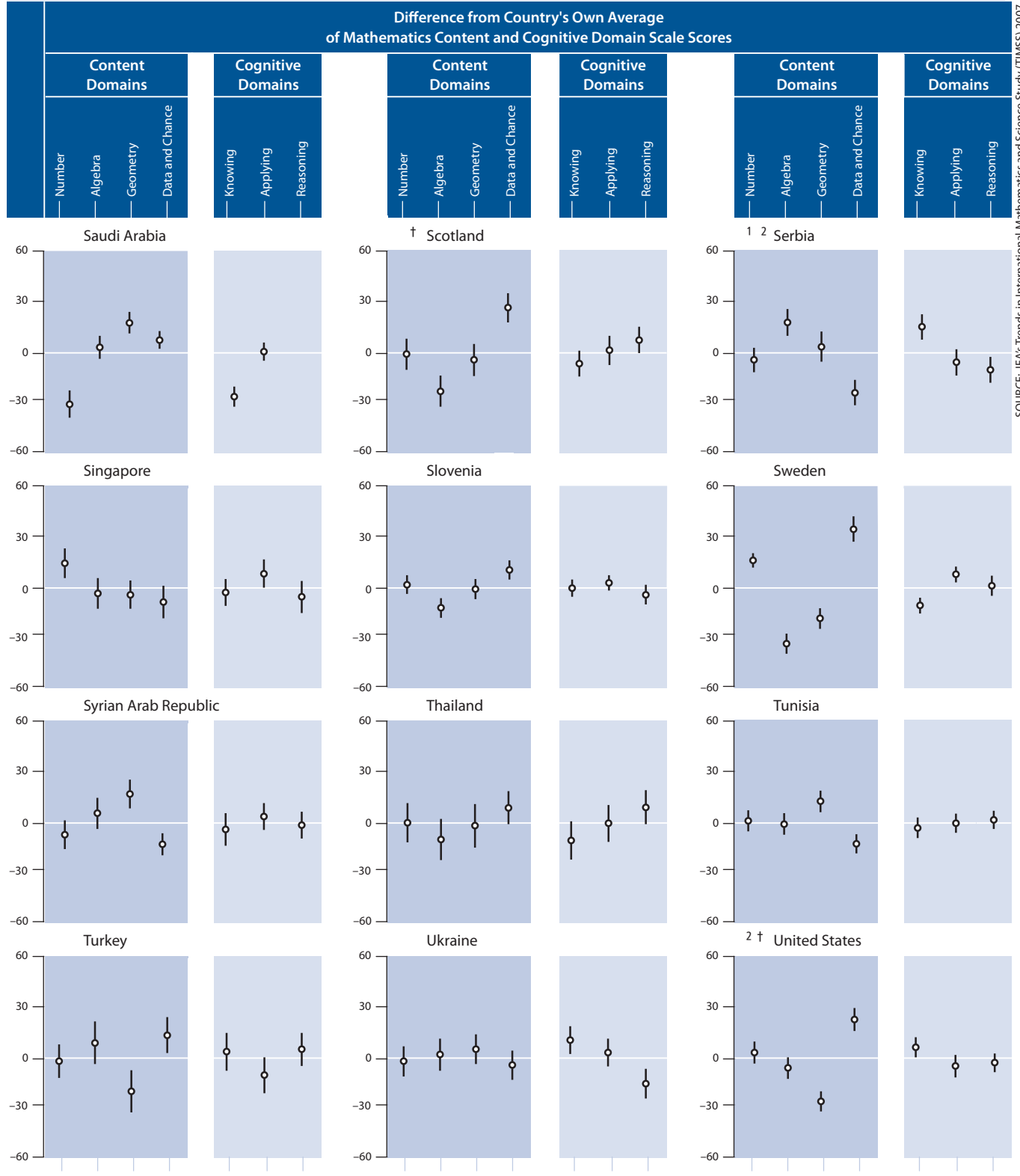


SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade



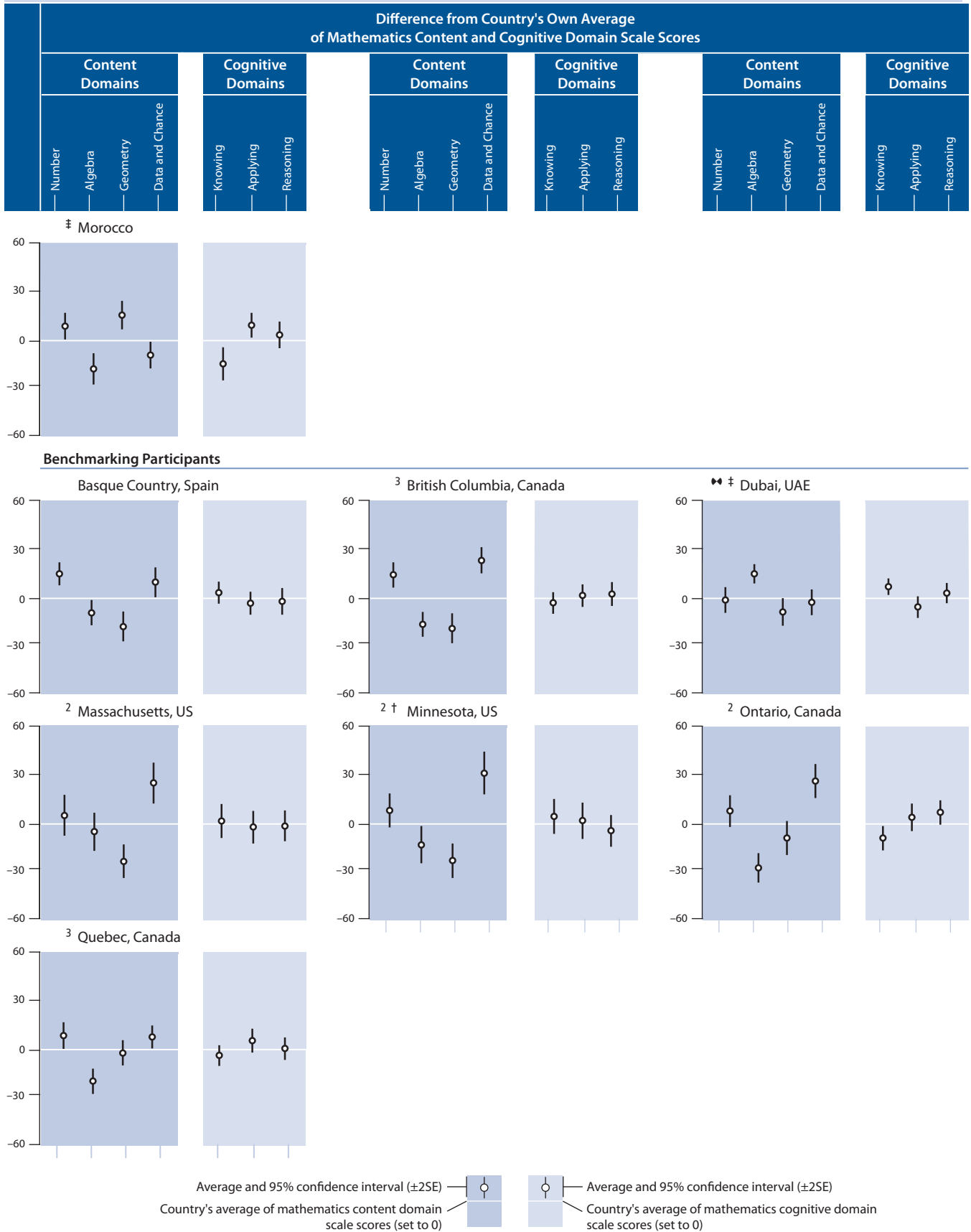
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Average and 95% confidence interval ( $\pm 2SE$ ) Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval ( $\pm 2SE$ ) Country's average of mathematics cognitive domain scale scores (set to 0)

Exhibit 3.2 Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Ghana, Israel, Norway, Qatar, Sweden, Turkey, the United States, the Basque Country in Spain, the states of Massachusetts and Minnesota in the United States, and the Canadian province of British Columbia. Participants with relatively better performance in data and chance included Australia, Bahrain, Botswana, Colombia, the Czech Republic, El Salvador, England, Italy, Japan, Lithuania, Norway, Saudi Arabia, Scotland, Slovenia, Sweden, Turkey, the United States, the states of Massachusetts and Minnesota in the United States, and the Canadian provinces of British Columbia and Ontario. Those performing less well included Algeria, Armenia, Bosnia and Herzegovina, Bulgaria, Chinese Taipei, Egypt, Georgia, Hong Kong SAR, Korea, Lebanon, Qatar, Romania, the Russian Federation, Serbia, the Syrian Arab Republic, and Tunisia.

At eighth grade, participants performing relatively better in the knowing domain than in mathematics overall included Armenia, Bosnia and Herzegovina, Botswana, Bulgaria, Georgia, Lebanon, the Russian Federation, Serbia, Ukraine, and Dubai in the United Arab Emirates, while those performing relatively less well included Algeria, Bahrain, Colombia, Kuwait, Norway, Saudi Arabia, Sweden, and Morocco. Participants with relatively better performance in applying included Algeria, Lithuania, and Malta, while Bosnia and Herzegovina, Botswana, Ghana, and Oman performed less well. Those participants performing better in the reasoning domain than in mathematics overall included Bahrain, Colombia, Iran, and Oman, while Georgia, Korea, Lebanon, Lithuania, Malta, the Russian Federation, and the Ukraine performed relatively less well.

### **What Are the Gender Differences in Achievement for the Mathematics Content and Cognitive Domains?**

To elaborate on the gender differences in overall mathematics achievement presented earlier in Exhibit 1.5, Exhibit 3.3 presents average achievement for boys and girls in each of the content and cognitive domains for fourth and eighth grades. As an additional basis for comparison, the international average for boys and girls (the average across all of the TIMSS 2007 countries) also is shown.

At the fourth grade, boys had higher achievement than girls in the number content domain in 19 countries and 5 benchmarking entities. In comparison, girls had higher achievement in the number domain in just 3 countries. The pattern was reversed for the other two content areas. In both geometric shapes and measures and data display at the fourth grade, girls had significantly higher achievement than boys on average across countries. In geometric shapes and measures, girls performed better in 11 countries and 1 benchmarking entity, whereas boys performed better in 2 countries. In data display, girls performed better in 15 countries and boys performed better in 3 countries and 1 benchmarking entity.

Among cognitive domains at the fourth grade, there were no gender differences, on average internationally, across the participating countries in the knowing and reasoning domains. Although the gender difference was statistically different in the applying domain, it was not substantively different. There were gender differences in many countries, however, especially in favor of boys in the knowing and applying domains. In the knowing domain, boys performed better than girls in 9 countries and 5 benchmarking entities, and girls performed better in 5 countries. In applying, boys performed better in 14 countries and 3 benchmarking entities and girls performed better in 5 countries. In the reasoning domain, girls performed better on the reasoning scale in 3 countries and boys performed better in 5 countries.

At eighth grade, the results in the content domains mirrored those at the fourth grade. In number, boys had higher achievement on average across countries, and performed better than girls in 21 countries and 3 benchmarking entities, while girls performed better than boys in

7 countries. Girls had higher achievement, on average across countries, in the remaining three content domains—algebra (13 points), geometry (6 points), and data and chance (4 points). Girls performed better than boys in 31 countries in algebra, whereas boys performed better in just 4 countries. In geometry, girls had higher achievement in 15 countries, and boys in 6 countries and 1 benchmarking entity. In data and chance, girls performed better than boys in 14 countries, whereas boys performed better than girls in 9 countries and 2 benchmarking entities.

In the cognitive domains at the eighth grade, girls had higher achievement than boys, on average internationally, in all three mathematics cognitive domains—knowing, applying, and reasoning. In the applying cognitive domain, however, the average difference across countries was small (2 points) and the boys had better achievement in about as many countries as did the girls. Girls had higher achievement in 13 countries and the boys had higher achievement in 12 countries and 4 benchmarking entities. In the knowing and reasoning domains, better performance by the girls was more consistent. They had higher average achievement than the boys (6–7 points), and outperformed the boys in 23 countries in knowing and in 15 countries in reasoning. In comparison, the boys had higher achievement in 6 countries and 1 benchmarking entity in knowing and in 4 countries and 1 benchmarking entity in the reasoning domain.

**Exhibit 3.3 Average Achievement in the Mathematics Content and Cognitive Domains by Gender**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Average Scale Scores for Mathematics Content Domains					
	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	391 (5.5)	390 (5.1)	388 (4.2) ▲	378 (5.3)	364 (5.1)	359 (6.6)
Armenia	524 (5.1)	520 (3.9)	489 (5.9) ▲	478 (5.0)	468 (5.1) ▲	449 (4.5)
Australia	491 (3.9)	503 (4.3)	▲ 535 (3.8)	536 (3.3)	536 (3.7) ▲	531 (3.1)
Austria	493 (2.4)	511 (2.7)	▲ 507 (2.8)	511 (3.2)	503 (3.8)	513 (2.5) ▲
Chinese Taipei	578 (2.2)	584 (2.2)	▲ 558 (2.5)	553 (2.6)	571 (2.0) ▲	562 (2.3)
Colombia	348 (4.6)	371 (4.7)	▲ 354 (4.8)	369 (5.8) ▲	359 (6.7)	368 (6.4)
Czech Republic	477 (3.3)	486 (3.2)	▲ 493 (3.6)	495 (3.1)	491 (4.2)	495 (4.1)
† Denmark	503 (3.0)	514 (4.1)	▲ 546 (3.3)	540 (2.9)	527 (3.9)	531 (4.0)
El Salvador	308 (4.4)	325 (5.0)	▲ 330 (5.4)	336 (5.2)	365 (4.2)	369 (4.8)
England	529 (3.6)	533 (4.0)	553 (3.0) ▲	543 (3.5)	548 (2.9)	545 (3.1)
<sup>1</sup> Georgia	464 (4.0)	465 (4.3)	418 (4.9)	413 (5.8)	420 (4.9)	▲ 409 (5.6)
Germany	513 (2.5)	529 (2.7)	▲ 527 (2.6)	530 (2.6)	529 (3.6)	538 (3.4) ▲
Hong Kong SAR	602 (3.3)	610 (4.8)	▲ 599 (3.0)	598 (4.0)	590 (2.9)	▲ 581 (3.4)
Hungary	505 (5.0)	514 (3.7)	509 (4.8)	510 (3.4)	508 (4.6)	500 (3.8)
Iran, Islamic Rep. of	404 (4.3)	393 (5.3)	437 (3.9) ▲	421 (5.0)	409 (5.7)	▲ 391 (6.1)
Italy	497 (3.4)	514 (3.5)	▲ 505 (3.1)	513 (3.5) ▲	500 (4.1)	513 (4.2) ▲
Japan	558 (2.7)	564 (2.6)	▲ 571 (3.1) ▲	561 (2.5)	583 (3.2)	▲ 574 (3.2)
<sup>1</sup> Kazakhstan	559 (5.9)	553 (7.9)	548 (7.3) ▲	537 (8.2)	526 (5.7)	517 (7.3)
♦♦ Kuwait	333 (4.5) ▲	307 (5.3)	335 (3.9) ▲	297 (5.8)	335 (5.7)	▲ 299 (6.7)
<sup>1</sup> Latvia	534 (2.7)	537 (2.9)	534 (3.6)	531 (3.3)	543 (3.6)	▲ 529 (4.4)
<sup>1</sup> Lithuania	530 (2.7)	536 (3.0)	522 (2.6) ▲	514 (2.9)	534 (3.0)	527 (4.1)
Morocco	349 (5.0)	357 (5.8)	365 (4.3)	365 (5.2)	314 (5.8)	317 (7.3)
‡ Netherlands	527 (3.4)	542 (2.2)	▲ 520 (3.7)	525 (2.2)	544 (3.6)	541 (2.6)
New Zealand	474 (2.9)	482 (3.3)	▲ 504 (2.7)	500 (2.8)	517 (3.1)	▲ 509 (3.1)
Norway	454 (3.8)	467 (3.3)	▲ 491 (3.5)	488 (3.7)	485 (3.2)	489 (3.5)
Qatar	300 (1.7) ▲	283 (1.9)	309 (2.2) ▲	283 (2.6)	337 (1.9)	▲ 314 (2.4)
Russian Federation	548 (5.0)	545 (4.4)	542 (6.0)	535 (5.0)	537 (5.7)	▲ 524 (5.2)
† Scotland	473 (2.8)	489 (3.4)	▲ 504 (3.1)	502 (2.9)	513 (2.6)	518 (2.8)
Singapore	611 (4.4)	610 (4.8)	574 (3.6) ▲	567 (4.1)	589 (3.6)	▲ 578 (4.0)
Slovak Republic	489 (4.4)	501 (4.0)	▲ 498 (4.6)	501 (4.4)	491 (4.7)	493 (4.3)
Slovenia	477 (2.5)	492 (2.2)	▲ 524 (2.5)	521 (2.3)	519 (2.6)	516 (3.1)
Sweden	484 (2.7)	496 (3.3)	▲ 509 (2.3)	507 (3.0)	530 (2.9)	528 (3.6)
Tunisia	360 (5.0) ▲	346 (5.2)	343 (4.9) ▲	327 (5.1)	322 (5.3)	▲ 295 (5.3)
Ukraine	478 (3.6)	482 (3.1)	457 (3.9)	457 (3.3)	470 (3.8)	▲ 455 (3.8)
<sup>2</sup> † United States	520 (2.8)	528 (3.1)	▲ 522 (2.6)	523 (2.7)	543 (2.6)	544 (2.9)
Yemen	++	++	++	++	++	++
<b>International Avg.</b>	<b>477 (0.6)</b>	<b>482 (0.7)</b>	<b>483 (0.6) ▲</b>	<b>479 (0.7)</b>	<b>483 (0.6) ▲</b>	<b>478 (0.7)</b>
<b>Benchmarking Participants</b>						
<sup>2</sup> Alberta, Canada	481 (4.0)	497 (3.3)	▲ 511 (2.8)	514 (3.4)	534 (4.1)	540 (3.6) ▲
<sup>2</sup> British Columbia, Canada	486 (3.4)	499 (3.1)	▲ 509 (3.6)	510 (3.4)	532 (3.1)	530 (3.0)
♦♦ ‡ Dubai, UAE	448 (3.8)	441 (4.8)	452 (5.4) ▲	430 (4.9)	471 (5.2)	452 (5.9)
<sup>2</sup> ‡ Massachusetts, US	565 (4.0)	578 (4.9)	▲ 564 (4.6)	565 (4.9)	566 (6.2)	576 (6.1)
<sup>2</sup> † Minnesota, US	541 (6.3)	550 (7.1)	558 (5.8)	554 (6.7)	557 (4.7)	557 (6.3)
<sup>2</sup> Ontario, Canada	483 (4.0)	495 (4.2)	▲ 533 (3.6)	528 (4.0)	544 (4.0)	544 (4.1)
<sup>2</sup> Quebec, Canada	504 (3.3)	518 (3.7)	▲ 524 (3.4)	526 (4.1)	526 (4.8)	528 (3.9)

▲ Average significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A plus (+) sign indicates average achievement could not be accurately estimated.

**Exhibit 3.3 Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	387 (5.7)	381 (5.9)	378 (5.7)	373 (5.3)	390 (5.8)	384 (4.8)
Armenia	523 (5.9) ▲	513 (4.7)	498 (4.8) ▲	488 (4.5)	492 (6.3)	486 (4.5)
Australia	506 (5.0)	512 (4.1)	518 (4.0)	528 (3.7) ▲	515 (3.8)	517 (3.4)
Austria	501 (2.8)	509 (2.3) ▲	499 (2.3)	515 (2.2) ▲	501 (2.9)	511 (3.2) ▲
Chinese Taipei	583 (3.2)	585 (2.2)	568 (1.9)	570 (2.3)	564 (2.3)	568 (2.2)
Colombia	353 (6.0)	365 (5.1) ▲	346 (5.6)	369 (5.3) ▲	363 (5.6)	381 (5.0) ▲
Czech Republic	471 (2.6)	475 (2.9)	492 (3.3)	500 (3.0) ▲	489 (4.2)	496 (3.8)
† Denmark	509 (3.0)	516 (3.7)	524 (3.1)	531 (3.1)	522 (2.5)	527 (3.4)
El Salvador	311 (4.8)	314 (5.6)	332 (4.8)	345 (4.6) ▲	349 (4.8)	363 (5.6) ▲
England	544 (3.8)	544 (4.5)	540 (3.4)	541 (3.5)	538 (4.0)	537 (3.5)
<sup>1</sup> Georgia	453 (4.1)	447 (4.6)	435 (4.8)	432 (5.2)	438 (4.1)	437 (4.8)
Germany	509 (2.6)	520 (2.4) ▲	526 (2.6)	536 (2.4) ▲	525 (2.8)	531 (3.1) ▲
Hong Kong SAR	614 (3.6)	619 (4.2)	597 (3.7)	602 (4.0)	588 (3.6)	589 (4.4)
Hungary	509 (4.7)	513 (3.7)	506 (4.6)	509 (3.8)	507 (5.5)	511 (3.6)
Iran, Islamic Rep. of	418 (4.5) ▲	402 (5.1)	410 (4.1)	399 (6.1)	419 (4.2) ▲	401 (5.4)
Italy	507 (3.2)	521 (3.8) ▲	493 (3.7)	508 (3.5) ▲	504 (3.6)	515 (3.3) ▲
Japan	564 (2.6)	566 (2.4)	566 (2.4)	566 (2.4)	562 (2.7)	564 (2.7)
<sup>1</sup> Kazakhstan	562 (6.5)	555 (8.4)	551 (6.6)	544 (8.4)	542 (5.8)	535 (6.9)
♦♦ Kuwait	346 (5.3) ▲	305 (6.6)	320 (5.2) ▲	289 (7.2)	++	++
<sup>1</sup> Latvia	531 (2.7)	528 (3.0)	540 (2.6)	540 (3.7)	538 (3.0)	537 (3.4)
<sup>1</sup> Lithuania	520 (3.8)	520 (3.0)	539 (3.2)	539 (2.9)	528 (3.8)	524 (2.9)
Morocco	352 (6.1)	355 (5.3)	343 (5.1)	348 (6.0)	++	++
‡ Netherlands	520 (2.6)	530 (2.5) ▲	535 (2.6)	544 (2.2) ▲	531 (3.5)	537 (2.6)
New Zealand	482 (2.8)	482 (3.1)	494 (2.7)	497 (2.7)	503 (3.2)	503 (3.2)
Norway	457 (3.3)	464 (3.4)	474 (3.5)	484 (3.0) ▲	490 (3.6)	488 (3.2)
Qatar	306 (1.6) ▲	279 (2.2)	306 (1.7) ▲	286 (1.6)	++	++
Russian Federation	541 (5.2)	535 (4.2)	549 (5.8)	545 (4.8)	546 (5.3) ▲	535 (5.2)
† Scotland	485 (2.9)	492 (3.1) ▲	495 (2.5)	504 (2.9) ▲	494 (3.2)	500 (3.3)
Singapore	622 (4.5)	619 (4.5)	593 (3.8) ▲	586 (4.1)	581 (3.9) ▲	575 (4.1)
Slovak Republic	490 (4.1)	495 (4.3)	495 (4.2)	501 (4.4) ▲	498 (4.7)	501 (4.3)
Slovenia	493 (2.0)	501 (2.9) ▲	500 (2.0)	507 (2.8) ▲	505 (2.0)	505 (3.5)
Sweden	478 (2.5)	486 (3.4) ▲	506 (2.1)	511 (2.9) ▲	517 (2.9)	521 (3.2)
Tunisia	353 (5.5) ▲	335 (5.2)	338 (5.0) ▲	321 (5.4)	++	++
Ukraine	472 (3.7)	472 (3.5)	466 (3.2)	467 (4.1)	475 (3.5)	473 (3.6)
<sup>2</sup> † United States	537 (2.8)	545 (2.9) ▲	521 (2.7)	527 (3.0) ▲	523 (2.4)	524 (2.6)
Yemen	++	++	++	++	++	++
International Avg.	480 (0.7)	480 (0.7)	480 (0.7)	481 (0.7) ▲	501 (0.7)	502 (0.7)
<b>Benchmarking Participants</b>						
<sup>2</sup> Alberta, Canada	488 (3.6)	500 (3.2) ▲	497 (3.5)	513 (3.1) ▲	518 (3.7)	521 (3.1)
<sup>2</sup> British Columbia, Canada	493 (3.0)	502 (3.0) ▲	501 (2.9)	509 (3.0) ▲	515 (2.9)	518 (3.2)
♦♦ ‡ Dubai, UAE	464 (4.9)	450 (5.1)	448 (4.4)	435 (4.5)	453 (5.2)	439 (5.3)
<sup>2</sup> Massachusetts, US	575 (4.2)	587 (5.1) ▲	562 (4.2)	570 (4.6)	563 (4.3)	567 (4.6)
<sup>2</sup> † Minnesota, US	560 (6.2)	570 (6.9) ▲	544 (6.3)	551 (5.7)	543 (5.0)	542 (5.6)
<sup>2</sup> Ontario, Canada	493 (3.5)	502 (3.9) ▲	512 (3.6)	518 (3.5)	527 (3.3)	525 (3.6)
<sup>2</sup> Quebec, Canada	514 (3.9)	521 (3.6)	512 (3.1)	523 (3.2) ▲	520 (3.7)	526 (3.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

**Exhibit 3.3 Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	Average Scale Scores for Mathematics Content Domains								
	Number		Algebra		Geometry		Data and Chance		
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	
Algeria	398 (2.2)	408 (2.3)	▲ 350 (2.8)	349 (3.8)	429 (2.5)	435 (2.5)	▲ 369 (2.0)	373 (1.9)	▲
Armenia	492 (4.1)	492 (3.5)	538 (3.4)	▲ 525 (2.8)	490 (5.1)	495 (4.6)	427 (5.4)	427 (4.1)	
Australia	492 (5.3)	514 (5.6)	▲ 466 (5.6)	475 (5.2)	481 (4.8)	493 (5.3)	516 (4.8)	534 (4.8)	▲
Bahrain	392 (2.4)	▲ 384 (3.2)	427 (2.9)	▲ 380 (3.4)	429 (2.7)	▲ 396 (3.1)	429 (3.1)	▲ 408 (2.5)	
Bosnia and Herzegovina	447 (3.0)	454 (3.5)	▲ 483 (3.5)	▲ 467 (3.6)	452 (4.6)	450 (3.4)	435 (3.1)	440 (2.6)	
Botswana	372 (3.4)	▲ 361 (4.0)	404 (2.7)	▲ 383 (2.7)	325 (4.3)	324 (4.1)	390 (3.3)	▲ 376 (4.0)	
Bulgaria	459 (4.4)	457 (6.0)	488 (5.0)	▲ 464 (6.3)	476 (5.0)	▲ 460 (6.1)	445 (4.6)	436 (6.4)	
Chinese Taipei	574 (4.6)	579 (4.9)	622 (5.8)	613 (6.3)	593 (4.9)	591 (5.3)	567 (4.5)	564 (4.1)	
Colombia	348 (4.0)	391 (4.1)	▲ 381 (3.6)	400 (3.8)	▲ 358 (4.2)	385 (4.5)	▲ 391 (4.7)	420 (4.0)	▲
Cyprus	468 (2.2)	▲ 461 (2.4)	481 (2.5)	▲ 455 (2.9)	470 (4.0)	▲ 445 (2.9)	474 (2.4)	▲ 454 (2.5)	
Czech Republic	507 (2.8)	515 (2.7)	▲ 492 (2.6)	▲ 476 (2.7)	497 (2.7)	498 (3.4)	512 (3.6)	511 (3.0)	
Egypt	393 (4.3)	392 (4.5)	418 (5.1)	▲ 401 (4.6)	411 (5.0)	402 (4.8)	391 (3.9)	▲ 377 (4.2)	
El Salvador	345 (4.0)	366 (4.0)	▲ 326 (4.4)	337 (5.1)	▲ 310 (4.9)	326 (4.4)	▲ 348 (4.3)	377 (4.0)	▲
† England	502 (5.2)	518 (6.2)	▲ 493 (4.8)	491 (6.0)	508 (4.5)	512 (5.7)	545 (5.2)	549 (6.2)	
<sup>1</sup> Georgia	417 (5.4)	424 (6.4)	429 (6.6)	▲ 413 (7.1)	409 (6.8)	408 (7.3)	378 (4.7)	▲ 367 (5.0)	
Ghana	298 (4.6)	319 (4.1)	▲ 345 (4.5)	369 (3.5)	▲ 265 (5.8)	283 (5.4)	▲ 311 (6.2)	328 (3.7)	▲
† Hong Kong SAR	570 (5.1)	564 (7.7)	573 (5.1)	▲ 558 (7.5)	573 (4.6)	567 (7.5)	554 (4.2)	544 (6.7)	
Hungary	511 (4.4)	523 (3.7)	▲ 509 (4.0)	▲ 498 (4.2)	508 (4.1)	507 (4.0)	523 (3.6)	525 (3.9)	
Indonesia	398 (4.3)	401 (4.3)	410 (3.8)	▲ 400 (4.6)	396 (4.9)	393 (5.1)	405 (4.4)	400 (3.8)	
Iran, Islamic Rep. of	392 (5.2)	397 (5.8)	417 (5.2)	▲ 401 (5.8)	429 (6.1)	418 (6.6)	417 (4.7)	413 (5.2)	
<sup>3</sup> Israel	464 (4.0)	474 (4.3)	▲ 476 (4.3)	▲ 463 (5.3)	439 (5.5)	433 (5.9)	465 (4.8)	466 (6.0)	
Italy	469 (3.5)	485 (3.0)	▲ 462 (3.6)	459 (3.6)	488 (3.5)	491 (3.6)	488 (3.4)	493 (3.7)	
Japan	545 (3.3)	558 (3.1)	▲ 560 (4.0)	559 (3.3)	573 (2.9)	572 (3.2)	573 (2.5)	573 (3.1)	
Jordan	419 (6.3)	414 (5.7)	461 (6.5)	▲ 436 (5.6)	447 (6.1)	▲ 425 (5.1)	434 (5.3)	▲ 417 (5.4)	
Korea, Rep. of	575 (3.4)	591 (2.8)	▲ 596 (4.1)	596 (3.9)	585 (2.7)	588 (3.3)	580 (2.5)	579 (2.5)	
♣ Kuwait	346 (4.3)	347 (3.9)	367 (3.8)	▲ 339 (5.5)	396 (3.6)	▲ 371 (4.4)	378 (4.7)	▲ 352 (3.8)	
Lebanon	446 (3.8)	465 (4.1)	▲ 461 (3.9)	469 (3.7)	459 (4.5)	465 (4.8)	402 (4.8)	414 (5.3)	▲
<sup>1</sup> Lithuania	505 (3.0)	507 (3.5)	491 (3.6)	▲ 474 (2.9)	510 (3.0)	503 (3.8)	525 (2.6)	521 (2.6)	
Malaysia	495 (5.6)	485 (5.7)	461 (4.7)	▲ 446 (4.6)	480 (6.4)	473 (6.6)	469 (4.5)	468 (4.6)	
Malta	495 (2.1)	497 (2.0)	476 (1.5)	471 (2.6)	493 (2.1)	497 (2.9)	487 (2.3)	486 (1.9)	
Norway	487 (2.5)	488 (2.5)	428 (3.0)	423 (3.4)	464 (2.5)	▲ 453 (3.2)	510 (3.1)	▲ 500 (3.4)	
Oman	380 (3.1)	▲ 344 (4.1)	421 (3.8)	▲ 360 (4.8)	412 (3.7)	▲ 362 (4.8)	411 (4.1)	▲ 367 (4.3)	
Palestinian Nat'l Auth.	376 (4.2)	▲ 355 (4.8)	403 (4.0)	▲ 362 (5.5)	403 (4.7)	▲ 373 (5.2)	388 (3.6)	▲ 352 (4.4)	
Qatar	342 (2.1)	▲ 327 (2.1)	331 (2.4)	▲ 293 (2.8)	323 (2.8)	▲ 280 (3.7)	329 (2.3)	▲ 281 (2.5)	
Romania	461 (4.0)	454 (4.1)	493 (4.7)	▲ 464 (5.3)	475 (4.4)	▲ 459 (4.9)	431 (4.3)	426 (4.5)	
Russian Federation	504 (4.1)	509 (4.2)	527 (5.2)	▲ 509 (4.9)	510 (4.4)	509 (4.7)	486 (4.4)	489 (4.2)	
Saudi Arabia	314 (4.6)	305 (4.3)	350 (3.8)	▲ 338 (3.8)	375 (4.2)	▲ 344 (4.0)	362 (3.3)	▲ 336 (3.1)	
† Scotland	483 (3.7)	495 (4.6)	▲ 470 (3.9)	464 (4.4)	485 (3.6)	486 (4.8)	515 (3.7)	518 (4.3)	
<sup>1 2</sup> Serbia	474 (3.4)	481 (3.8)	510 (3.8)	▲ 491 (3.9)	491 (4.3)	▲ 480 (4.4)	455 (3.9)	461 (3.6)	
Singapore	601 (3.9)	593 (4.3)	589 (3.9)	▲ 569 (4.5)	586 (3.7)	▲ 571 (4.2)	581 (4.5)	▲ 568 (4.3)	
Slovenia	496 (2.8)	508 (2.6)	▲ 493 (2.9)	▲ 483 (2.8)	498 (3.1)	501 (2.5)	507 (2.5)	515 (3.4)	▲
Sweden	506 (2.3)	508 (1.9)	462 (2.8)	▲ 452 (2.7)	475 (3.5)	469 (2.9)	526 (3.7)	525 (3.6)	
Syrian Arab Republic	380 (4.3)	407 (4.6)	▲ 403 (4.2)	408 (5.3)	413 (3.5)	422 (5.4)	383 (2.9)	392 (4.5)	
Thailand	452 (5.5)	▲ 435 (5.1)	446 (5.5)	▲ 420 (5.4)	451 (6.0)	▲ 433 (5.6)	464 (4.3)	▲ 442 (4.4)	
Tunisia	411 (3.0)	440 (2.7)	▲ 420 (2.8)	427 (3.1)	▲ 429 (3.0)	446 (3.2)	▲ 400 (3.0)	423 (3.0)	▲
Turkey	423 (4.3)	435 (4.5)	▲ 447 (5.8)	▲ 434 (5.6)	415 (5.5)	▲ 407 (5.4)	448 (4.7)	442 (4.9)	
Ukraine	459 (4.1)	461 (3.8)	472 (4.4)	▲ 455 (4.3)	468 (4.1)	466 (3.9)	459 (3.7)	456 (4.3)	
<sup>2</sup> † United States	506 (3.1)	515 (3.1)	▲ 503 (2.9)	498 (3.2)	477 (2.7)	483 (2.8)	▲ 527 (3.1)	535 (3.0)	▲
‡ Morocco	382 (4.0)	398 (5.0)	▲ 364 (5.2)	361 (5.6)	391 (4.7)	403 (5.1)	373 (4.7)	369 (4.6)	
International Avg.	448 (0.6)	453 (0.6)	▲ 457 (0.6)	▲ 444 (0.6)	454 (0.6)	▲ 448 (0.6)	453 (0.5)	▲ 449 (0.6)	
<b>Benchmarking Participants</b>									
Basque Country, Spain	503 (3.2)	515 (3.5)	▲ 487 (3.4)	483 (4.0)	476 (4.1)	477 (4.9)	500 (4.6)	507 (5.5)	
<sup>3</sup> British Columbia, Canada	514 (3.7)	526 (3.7)	▲ 488 (3.2)	490 (3.6)	483 (4.2)	491 (3.8)	▲ 527 (4.0)	532 (4.0)	
♣ † Dubai, UAE	453 (5.3)	463 (6.8)	475 (5.1)	474 (5.8)	455 (5.7)	447 (5.6)	457 (6.3)	457 (5.7)	
<sup>2</sup> Massachusetts, US	544 (6.0)	553 (5.5)	539 (5.1)	537 (5.6)	516 (4.9)	522 (5.2)	563 (5.2)	575 (6.1)	▲
<sup>2</sup> † Minnesota, US	533 (5.6)	541 (4.7)	515 (5.0)	515 (4.9)	501 (5.7)	510 (5.9)	556 (6.3)	565 (5.8)	
<sup>2</sup> Ontario, Canada	517 (4.6)	532 (4.3)	▲ 489 (4.1)	491 (4.4)	504 (4.5)	512 (5.3)	540 (4.6)	547 (4.8)	
<sup>3</sup> Quebec, Canada	531 (3.5)	537 (4.7)	507 (3.4)	502 (4.6)	520 (3.6)	526 (4.4)	529 (3.1)	537 (4.1)	▲

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

† Did not satisfy guidelines for sample participation rates (see Appendix A).

<sup>1</sup> National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

<sup>2</sup> National Defined Population covers 90% to 95% of National Target Population (see Appendix A).



**Exhibit 3.3 Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	369 (2.2)	373 (2.2)	409 (2.0)	415 (2.5) ▲	++	++
Armenia	512 (4.1) ▲	502 (3.2)	492 (4.5)	493 (4.0)	493 (4.9)	486 (3.9)
Australia	481 (4.9)	493 (4.9)	491 (4.9)	508 (5.2) ▲	495 (4.8)	508 (4.9)
Bahrain	414 (3.6) ▲	377 (2.7)	415 (2.3) ▲	391 (2.7)	426 (3.9) ▲	401 (4.2)
Bosnia and Herzegovina	483 (3.3) ▲	474 (2.9)	439 (3.3)	442 (2.8)	454 (3.8)	451 (2.9)
Botswana	385 (2.7) ▲	367 (2.8)	356 (3.3)	346 (3.1)	++	++
Bulgaria	485 (4.3) ▲	468 (6.0)	463 (4.4) ▲	452 (6.3)	465 (4.4) ▲	445 (6.1)
Chinese Taipei	596 (4.5)	592 (5.6)	592 (4.3)	593 (4.9)	591 (4.4)	592 (5.1)
Colombia	349 (3.9)	379 (4.3) ▲	366 (4.7)	402 (4.2) ▲	405 (3.6)	427 (4.3) ▲
Cyprus	478 (2.2) ▲	458 (2.2)	474 (2.6) ▲	456 (2.5)	472 (3.1) ▲	450 (2.9)
Czech Republic	506 (2.7) ▲	499 (2.7)	502 (2.8)	507 (3.0) ▲	505 (2.9) ▲	495 (2.8)
Egypt	403 (5.4) ▲	382 (4.8)	398 (5.0)	389 (4.7)	401 (4.6)	392 (4.7)
El Salvador	323 (4.5)	349 (4.0) ▲	336 (4.0)	358 (4.3) ▲	++	++
† England	501 (4.2)	506 (5.3)	510 (5.1)	519 (6.1)	519 (4.5)	516 (5.6)
<sup>1</sup> Georgia	429 (6.0)	424 (6.5)	401 (5.4)	401 (6.5)	393 (6.1)	385 (6.8)
Ghana	298 (5.6)	326 (4.8) ▲	287 (5.0)	305 (4.3) ▲	++	++
† Hong Kong SAR	580 (4.8) ▲	567 (7.3)	573 (4.9)	564 (8.1)	563 (5.0)	551 (7.9)
Hungary	521 (3.8)	516 (3.7)	511 (4.0)	516 (3.4)	514 (3.8)	511 (3.7)
Indonesia	400 (4.4)	393 (4.8)	401 (4.6)	396 (4.2)	406 (3.8)	404 (4.0)
Iran, Islamic Rep. of	409 (5.4)	399 (5.9)	404 (5.3)	400 (6.2)	430 (4.7)	424 (5.4)
<sup>3</sup> Israel	475 (4.1)	471 (4.7)	457 (4.5)	455 (5.5)	467 (4.7)	458 (5.0)
Italy	475 (3.4)	477 (3.5)	477 (3.1)	488 (3.2) ▲	484 (3.4)	483 (3.4)
Japan	560 (2.8)	560 (3.3)	562 (3.2)	569 (2.9)	568 (3.4)	567 (3.5)
Jordan	444 (6.5) ▲	421 (5.8)	431 (6.2) ▲	414 (5.6)	450 (5.6) ▲	432 (4.7)
Korea, Rep. of	597 (3.7)	596 (2.8)	592 (3.7)	598 (3.4)	577 (3.1)	580 (2.7)
♦♦ Kuwait	355 (4.0) ▲	338 (4.3)	370 (3.0) ▲	351 (4.3)	++	++
Lebanon	458 (4.1)	471 (4.6) ▲	444 (4.6)	453 (5.4) ▲	423 (4.4)	437 (5.5) ▲
<sup>1</sup> Lithuania	514 (3.2) ▲	501 (2.4)	513 (2.9)	510 (2.6)	489 (3.2) ▲	482 (2.7)
Malaysia	485 (5.5) ▲	468 (5.0)	481 (5.6)	475 (5.2)	470 (4.4)	465 (4.2)
Malta	492 (1.8)	489 (2.2)	491 (1.5)	494 (1.9)	473 (1.6)	476 (2.2)
Norway	460 (2.3)	457 (2.4)	480 (2.3)	475 (2.7)	479 (2.5) ▲	472 (2.8)
Oman	401 (4.2) ▲	341 (5.6)	391 (3.6) ▲	342 (5.3)	420 (4.4) ▲	372 (5.0)
Palestinian Nat'l Auth.	386 (4.8) ▲	344 (5.5)	386 (4.0) ▲	355 (5.2)	396 (4.5) ▲	366 (5.6)
Qatar	322 (2.1) ▲	292 (1.9)	324 (2.5) ▲	285 (2.5)	++	++
Romania	480 (4.8) ▲	461 (4.5)	469 (4.5) ▲	455 (4.5)	458 (4.9) ▲	440 (5.4)
Russian Federation	525 (4.4)	517 (4.4)	509 (4.1)	510 (4.2)	501 (4.2)	493 (4.2)
Saudi Arabia	316 (4.0) ▲	300 (3.4)	352 (3.2) ▲	320 (3.5)	++	++
† Scotland	480 (3.4)	482 (3.9)	487 (3.8)	491 (4.3)	496 (3.5)	494 (3.9)
<sup>1 2</sup> Serbia	507 (4.1) ▲	493 (3.5)	480 (3.7)	477 (4.0)	478 (3.7) ▲	469 (4.2)
Singapore	590 (3.8) ▲	573 (4.2)	600 (3.9) ▲	586 (4.4)	586 (4.6) ▲	571 (4.9)
Slovenia	500 (2.5)	499 (2.6)	498 (2.3)	508 (2.4) ▲	499 (3.1)	493 (2.9)
Sweden	478 (2.2)	478 (2.6)	499 (2.7)	495 (2.7)	494 (2.9) ▲	487 (2.9) ▲
Syrian Arab Republic	387 (4.7)	400 (5.5) ▲	393 (3.8)	410 (4.7) ▲	389 (3.5)	403 (4.7) ▲
Thailand	448 (5.3) ▲	424 (5.1)	456 (5.2) ▲	437 (5.0)	466 (4.9) ▲	447 (4.7) ▲
Tunisia	411 (2.8)	431 (3.8) ▲	413 (2.8)	435 (2.7) ▲	417 (3.2)	434 (2.2) ▲
Turkey	441 (5.1)	438 (5.3)	425 (4.9)	425 (4.9)	441 (4.7)	440 (4.7)
Ukraine	477 (4.2) ▲	465 (3.7)	464 (4.0)	464 (4.0)	449 (4.2) ▲	440 (4.2)
<sup>2 †</sup> United States	514 (2.8)	514 (2.8)	499 (3.2)	506 (3.1) ▲	504 (2.7)	505 (2.6)
‡ Morocco	361 (5.9)	369 (5.1)	385 (4.1)	394 (4.4)	381 (5.4)	386 (4.5)
International Avg.	454 (0.6) ▲	447 (0.6)	452 (0.6) ▲	450 (0.6)	471 (0.6) ▲	465 (0.7)
<b>Benchmarking Participants</b>						
Basque Country, Spain	502 (3.4)	501 (3.7)	490 (3.6)	499 (3.7) ▲	495 (4.2)	497 (4.4)
<sup>3</sup> British Columbia, Canada	502 (3.2)	507 (3.1) ▲	505 (3.3)	514 (3.4) ▲	508 (3.7)	513 (3.4)
♦♦ † Dubai, UAE	469 (5.6)	469 (5.2)	458 (5.4)	453 (5.7)	462 (5.7)	467 (5.9)
<sup>2</sup> Massachusetts, US	545 (5.0)	548 (5.2)	539 (5.0)	546 (5.1)	541 (4.8)	545 (4.5)
<sup>2 †</sup> Minnesota, US	532 (4.7)	532 (4.9)	525 (5.2)	534 (5.2) ▲	525 (4.0)	522 (5.2)
<sup>2</sup> Ontario, Canada	504 (3.6)	506 (3.9)	513 (4.3)	524 (4.0) ▲	517 (3.6)	526 (3.5) ▲
<sup>3</sup> Quebec, Canada	523 (3.0)	516 (3.9)	525 (3.3)	533 (4.3)	522 (3.5)	526 (4.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

<sup>3</sup> National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

♦♦ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A plus (+) sign indicates average achievement could not be accurately estimated.



# Chapter 4



## *Students' Backgrounds And Attitudes Toward Mathematics*

In describing the educational context in which learning takes place, TIMSS focuses primarily on curricular, instructional, and school resource factors that are expected to have an impact on mathematics and science learning and that may be modified through policy initiatives. However, there is ample evidence from previous IEA studies of mathematics achievement<sup>1</sup> and other studies that student achievement is related to home background factors, and to student activities and attitudes. Since information on such factors is very important in interpreting the achievement results, this chapter presents detailed information about students' home backgrounds and resources for learning, homework, their attitude toward mathematics, the value they place on mathematics, and their self-confidence in learning mathematics. As a matter of interest, an average across the participating countries (not including the benchmarking participants) is provided at the bottom of the table for each of the response categories for each background factor and attitude index (labeled the international average (avg.)).

### **What Educational Resources Do Students Have in Their Homes?**

For the 2007 data presented in this report, TIMSS has focused on just a few central variables: level of parents' education; speaking the language of the test at home; students having their parents born in the country; having books, computers, and Internet connections at home; and computer use at home and elsewhere.

1 For example, for results from TIMSS 2003, see Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., & Chrostowski, S.J. (2004). *TIMSS 2003 international mathematics report: Findings from IEA's Trends in International Mathematics and Science Study at the fourth and eighth grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Exhibit 4.1 summarizes eighth grade students' reports of the highest level of education attained by their parents. Ordered alphabetically by country, this two-page display shows the percentage of students in each of five categories of parents' educational level, together with the average mathematics achievement of students in each category. Because students sometimes were in doubt as to their parents' educational attainment, a sixth category for students reporting "I do not know" also was included. Standard errors for percentages and averages are shown. The education level of the parent with more education was used in assigning students to categories.

As shown in the exhibit, and in line with the diversity in economic development described in the introduction, the level of parents' education varied widely both across and within the TIMSS 2007 countries and benchmarking participants. On average across countries,<sup>2</sup> 24 percent of students had at least one parent with a university degree, 14 percent had a parent who had completed post-secondary education but not university, 25 percent a parent who completed upper-secondary school, 15 percent a parent who completed lower-secondary school, 9 percent had neither parent completing secondary school, and 13 percent did not know. Countries with the highest percentages of students (40% or more) with university-educated parents included Armenia, Georgia, Korea, Kuwait, Qatar, the Ukraine, and the United States, as well as Dubai, Massachusetts, and Minnesota among benchmarking participants. In contrast, countries where students reported the greatest percentages (30% or more) of parents with less than lower secondary education included Iran, Oman, and Morocco.

Differences in educational approaches, organizations, and structures across the TIMSS participants make comparisons of educational levels difficult, and this is exacerbated by high levels of "Do Not Know" responses in some countries. Ten countries had 20 percent or more of students in this response category, most notably Norway (46%) and Sweden (50%) but also including Australia (28%), Botswana (20%), Israel (26%), Japan (21%), Lithuania (24%), Malta (27%), Singapore (21%), and Slovenia (22%), as well as four benchmarking participants: British Columbia, Dubai, Minnesota, and

2 The international average is based on all participating countries, but does not include the benchmarking participants.

Ontario. Nonetheless, Exhibit 4.1 makes it clear that higher levels of parents' education are associated with higher average mathematics achievement in almost all countries. At 485 score points, the average mathematics achievement of eighth grade students with university-educated parents was 89 points greater than the average of students whose parents had less than lower secondary schooling. It can be noted, however, that in some high performing countries, students whose parents have little education have relatively high achievement (higher than students with university educated parents in many countries).

TIMSS has shown previously that, with some exceptions, countries with large proportions of students from homes where the language of the test (and consequently the language of instruction) is not often spoken at home had lower average mathematics achievement than those who spoke it more often. Exhibit 4.2, which presents students' reports of how frequently they spoke the language of the TIMSS test at home, together with average mathematics achievement and changes since TIMSS 2003, shows that this pattern continued in 2007. At both fourth and eighth grades, on average across countries, a large majority of students reported always or almost always speaking the language of the test at home (84% at fourth grade and 78% at eighth grade), and these students had higher average mathematics achievement than those who reported speaking it less frequently—478 points on average compared with 445 for those fourth grade students who sometimes speak the language of the test at home and 395 for those who never do so; and, at the eighth grade, 454 compared to 427 and 394, respectively.

The overall pattern notwithstanding, there were several countries where the students who only sometimes or never speak the language of the test at home did have the highest average mathematics achievement. At the fourth grade, these included Morocco and the Ukraine and at the eighth grade, Bahrain, Malaysia, Tunisia, Morocco, and British Columbia among benchmarking participants. Compared with 2003, a number of countries had increased percentages of students reporting that they frequently spoke the language of the test at home, including, at the fourth grade, Chinese Taipei,

Exhibit 4.1 Highest Level of Education of Either Parent\*

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	University Degree**		Completed Post-secondary Education but Not University		Completed Upper-secondary School	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	15 (0.9)	391 (3.6)	12 (0.6)	395 (3.7)	22 (0.7)	391 (2.9)
Armenia	52 (1.7)	505 (4.0)	23 (0.9)	499 (3.8)	16 (1.0)	483 (5.7)
Australia	19 (1.1)	546 (6.1)	23 (0.9)	503 (5.4)	16 (0.7)	484 (3.7)
Bahrain	21 (0.6)	429 (3.1)	8 (0.5)	415 (6.6)	33 (0.9)	402 (2.9)
Bosnia and Herzegovina	15 (1.0)	494 (4.4)	16 (0.6)	471 (4.2)	54 (1.1)	455 (2.6)
Botswana	15 (0.6)	381 (4.1)	17 (0.8)	355 (4.0)	17 (0.7)	358 (3.9)
Bulgaria	29 (1.4)	509 (6.7)	30 (1.3)	469 (4.5)	24 (1.2)	429 (8.6)
Chinese Taipei	20 (1.4)	647 (5.2)	12 (0.7)	633 (5.2)	42 (1.0)	594 (4.1)
Colombia	20 (1.1)	416 (5.4)	9 (0.6)	409 (6.6)	20 (0.7)	380 (4.6)
Cyprus	30 (0.8)	493 (2.7)	12 (0.5)	488 (3.8)	37 (0.7)	461 (2.5)
Czech Republic	17 (0.9)	547 (3.8)	11 (0.5)	512 (3.9)	57 (0.9)	499 (2.5)
Egypt	15 (0.7)	394 (4.6)	19 (1.0)	432 (5.4)	14 (0.6)	408 (6.0)
El Salvador	13 (1.1)	386 (6.4)	9 (0.7)	365 (5.5)	19 (0.9)	350 (3.6)
England	--	--	--	--	--	--
Georgia	47 (2.1)	429 (5.7)	0 (0.0)	~ ~	33 (2.1)	405 (7.0)
Ghana	11 (0.8)	341 (9.9)	20 (0.9)	321 (5.8)	24 (0.9)	314 (4.8)
Hong Kong SAR	13 (1.0)	609 (7.8)	12 (0.6)	587 (7.2)	28 (0.8)	575 (5.6)
Hungary	29 (1.3)	563 (4.6)	13 (0.7)	526 (4.9)	45 (1.2)	505 (3.2)
Indonesia	9 (0.8)	460 (7.7)	6 (0.5)	439 (8.2)	25 (1.2)	412 (5.1)
Iran, Islamic Rep. of	10 (1.0)	469 (9.5)	10 (1.0)	444 (7.7)	18 (1.0)	422 (6.1)
Israel	38 (1.2)	499 (4.3)	10 (0.6)	464 (7.1)	17 (0.8)	441 (6.9)
Italy	21 (1.2)	505 (3.6)	5 (0.4)	491 (6.1)	37 (1.1)	492 (2.8)
Japan	34 (1.0)	606 (3.4)	16 (0.6)	569 (3.7)	27 (1.0)	544 (3.1)
Jordan	29 (1.1)	461 (4.7)	18 (0.9)	455 (4.7)	28 (0.9)	415 (4.5)
Korea, Rep. of	44 (1.4)	627 (3.2)	3 (0.3)	610 (7.1)	39 (1.2)	582 (2.9)
Kuwait	43 (1.4)	370 (3.2)	15 (0.8)	365 (3.8)	26 (0.9)	336 (3.4)
Lebanon	20 (1.3)	490 (5.8)	19 (1.2)	464 (5.6)	16 (1.1)	446 (4.8)
Lithuania	14 (0.8)	549 (4.6)	34 (0.9)	517 (2.9)	23 (1.1)	495 (3.2)
Malaysia	13 (1.0)	510 (7.3)	17 (0.8)	493 (5.4)	34 (0.9)	478 (4.7)
Malta	11 (0.4)	525 (3.6)	11 (0.4)	514 (4.3)	13 (0.5)	513 (3.7)
Norway	39 (1.0)	490 (1.9)	6 (0.4)	469 (5.5)	6 (0.5)	455 (5.8)
Oman	16 (0.9)	388 (5.7)	4 (0.4)	382 (10.6)	18 (0.8)	387 (4.5)
Palestinian Nat'l Auth.	24 (0.9)	398 (5.4)	13 (0.6)	386 (5.8)	35 (0.9)	369 (4.4)
Qatar	48 (0.6)	332 (2.2)	4 (0.2)	310 (8.0)	19 (0.5)	289 (2.7)
Romania	13 (1.0)	524 (5.8)	14 (0.9)	493 (5.8)	44 (1.4)	460 (4.6)
Russian Federation	38 (1.3)	540 (4.4)	34 (1.3)	511 (5.1)	12 (1.0)	471 (6.2)
Saudi Arabia	31 (1.2)	354 (3.6)	5 (0.5)	343 (9.4)	20 (0.9)	325 (3.9)
Scotland	--	--	--	--	--	--
Serbia	20 (1.2)	533 (4.6)	16 (0.8)	496 (5.0)	51 (1.3)	477 (3.8)
Singapore	20 (0.7)	646 (3.9)	19 (0.6)	603 (4.7)	28 (0.7)	587 (4.3)
Slovenia	24 (0.9)	532 (3.3)	35 (1.0)	503 (2.6)	15 (0.7)	486 (4.6)
Sweden	19 (0.8)	515 (3.3)	13 (0.6)	510 (3.2)	13 (0.6)	487 (3.4)
Syrian Arab Republic	15 (0.9)	419 (4.7)	22 (0.9)	414 (4.8)	23 (0.8)	385 (4.3)
Thailand	12 (1.1)	522 (11.7)	5 (0.3)	481 (9.7)	14 (0.6)	455 (6.5)
Tunisia	13 (1.1)	459 (4.6)	17 (0.9)	437 (3.9)	25 (1.0)	414 (2.9)
Turkey	7 (0.8)	558 (8.7)	3 (0.3)	497 (8.8)	20 (1.2)	470 (5.2)
Ukraine	40 (1.4)	494 (4.3)	34 (0.9)	465 (3.6)	12 (0.8)	417 (6.6)
United States	44 (1.2)	531 (3.3)	7 (0.4)	503 (4.1)	21 (0.6)	495 (2.3)
‡ Morocco	20 (1.3)	407 (4.9)	0 (0.0)	~ ~	18 (1.0)	394 (5.8)
International Avg.	24 (0.2)	485 (0.9)	14 (0.1)	467 (1.0)	25 (0.1)	444 (0.9)
<b>Benchmarking Participants</b>						
Basque Country, Spain	--	--	--	--	--	--
British Columbia, Canada	39 (1.6)	532 (3.4)	15 (0.7)	499 (4.3)	15 (0.8)	499 (5.2)
Dubai, UAE	41 (1.0)	498 (2.4)	15 (0.9)	464 (3.7)	14 (0.6)	419 (5.6)
Massachusetts, US	56 (1.6)	571 (4.2)	6 (0.6)	524 (9.5)	16 (1.2)	512 (6.8)
Minnesota, US	46 (1.7)	552 (5.5)	9 (0.7)	527 (4.1)	18 (1.3)	516 (3.8)
Ontario, Canada	37 (1.9)	542 (3.6)	19 (0.9)	516 (4.5)	11 (0.8)	512 (5.5)
Quebec, Canada	39 (1.4)	549 (5.2)	18 (0.9)	526 (4.0)	21 (1.1)	510 (4.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

\* Based on countries' categorizations to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

\*\* Includes postgraduate degrees (e.g., doctorate, master's, other postgraduate degree or diploma).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

Note: The distribution of students' reports on parents' educational levels may not match the distribution from national population statistics, particularly where large percentages of students report that they "Do not know" (e.g., Sweden).



Exhibit 4.1 Highest Level of Education of Either Parent\* (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Completed Lower-secondary School		Less than Lower-secondary School		Do Not Know	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	26 (0.8)	379 (2.0)	19 (1.2)	385 (3.3)	6 (0.3)	386 (4.6)
Armenia	2 (0.4)	~ ~	1 (0.2)	~ ~	6 (0.5)	482 (5.8)
Australia	14 (0.9)	474 (4.5)	1 (0.2)	~ ~	28 (0.9)	487 (5.0)
Bahrain	15 (0.6)	367 (4.2)	6 (0.5)	383 (6.9)	18 (0.6)	388 (3.1)
Bosnia and Herzegovina	12 (0.9)	411 (5.6)	1 (0.3)	~ ~	3 (0.3)	421 (9.0)
Botswana	18 (0.6)	359 (3.5)	14 (0.7)	368 (3.9)	20 (0.8)	381 (3.9)
Bulgaria	8 (1.1)	418 (12.3)	1 (0.2)	~ ~	9 (0.7)	451 (8.1)
Chinese Taipei	14 (0.9)	554 (6.2)	3 (0.4)	543 (11.9)	9 (0.5)	554 (9.9)
Colombia	23 (0.9)	365 (5.0)	23 (1.2)	355 (3.8)	6 (0.5)	365 (7.5)
Cyprus	9 (0.4)	437 (4.6)	4 (0.3)	413 (6.5)	7 (0.6)	418 (6.4)
Czech Republic	2 (0.2)	~ ~	0 (0.0)	~ ~	13 (0.6)	466 (3.7)
Egypt	29 (1.1)	381 (4.6)	14 (0.8)	363 (6.3)	10 (0.7)	370 (6.2)
El Salvador	39 (1.3)	326 (3.4)	16 (1.1)	323 (3.5)	4 (0.4)	323 (7.9)
England	--	--	--	--	--	--
Georgia	2 (0.3)	~ ~	0 (0.1)	~ ~	18 (1.2)	383 (10.6)
Ghana	27 (1.2)	298 (5.1)	12 (0.8)	305 (7.6)	6 (0.6)	297 (8.5)
Hong Kong SAR	29 (0.9)	563 (7.3)	3 (0.3)	567 (11.1)	16 (0.8)	547 (7.6)
Hungary	7 (0.9)	434 (7.7)	1 (0.2)	~ ~	5 (0.6)	499 (7.6)
Indonesia	24 (0.9)	380 (4.2)	28 (1.4)	380 (4.9)	9 (0.6)	369 (6.7)
Iran, Islamic Rep. of	28 (1.0)	392 (4.4)	31 (1.5)	376 (4.3)	3 (0.3)	356 (9.5)
Israel	7 (0.6)	409 (9.5)	3 (0.4)	404 (12.3)	26 (1.0)	458 (5.7)
Italy	24 (1.1)	457 (4.7)	3 (0.3)	420 (9.8)	10 (0.7)	443 (5.6)
Japan	2 (0.2)	~ ~	0 (0.1)	~ ~	21 (0.8)	553 (3.4)
Jordan	9 (0.5)	389 (8.7)	9 (0.8)	390 (8.6)	7 (0.6)	388 (11.4)
Korea, Rep. of	3 (0.3)	548 (9.9)	1 (0.1)	~ ~	10 (0.6)	545 (5.0)
Kuwait	0 (0.0)	~ ~	16 (0.9)	334 (4.3)	0 (0.0)	~ ~
Lebanon	13 (1.0)	425 (5.6)	19 (1.6)	425 (6.0)	13 (0.9)	446 (5.3)
Lithuania	4 (0.5)	436 (6.3)	0 (0.1)	~ ~	24 (1.0)	492 (4.0)
Malaysia	19 (0.9)	454 (4.8)	7 (0.6)	450 (8.5)	11 (1.0)	441 (9.1)
Malta	34 (0.7)	477 (2.2)	3 (0.3)	460 (9.7)	27 (0.6)	470 (3.1)
Norway	2 (0.2)	~ ~	1 (0.1)	~ ~	46 (0.9)	460 (2.3)
Oman	17 (0.7)	381 (4.3)	31 (1.1)	370 (3.4)	14 (0.9)	345 (6.8)
Palestinian Nat'l Auth.	11 (0.6)	347 (5.7)	9 (0.7)	340 (5.7)	8 (0.6)	323 (8.9)
Qatar	13 (0.4)	270 (3.5)	7 (0.3)	284 (3.8)	9 (0.4)	295 (4.1)
Romania	9 (1.0)	424 (8.0)	2 (0.4)	~ ~	17 (1.0)	436 (5.0)
Russian Federation	5 (0.5)	462 (8.7)	0 (0.1)	~ ~	10 (0.8)	487 (6.3)
Saudi Arabia	17 (0.9)	315 (5.0)	23 (1.2)	310 (4.5)	5 (0.5)	335 (7.8)
Scotland	--	--	--	--	--	--
Serbia	7 (0.9)	421 (10.5)	0 (0.1)	~ ~	5 (0.4)	456 (7.6)
Singapore	6 (0.4)	567 (7.8)	6 (0.4)	553 (7.2)	21 (0.7)	564 (6.2)
Slovenia	4 (0.4)	465 (7.7)	1 (0.1)	~ ~	22 (0.9)	497 (2.7)
Sweden	4 (0.3)	473 (5.1)	1 (0.2)	~ ~	50 (1.1)	484 (2.9)
Syrian Arab Republic	25 (1.0)	386 (4.8)	11 (0.8)	384 (7.2)	4 (0.4)	378 (9.7)
Thailand	26 (0.9)	421 (4.6)	26 (1.6)	429 (7.3)	18 (1.1)	417 (4.8)
Tunisia	25 (1.0)	402 (3.3)	12 (0.9)	411 (3.5)	8 (0.5)	423 (4.7)
Turkey	52 (1.3)	412 (4.8)	16 (1.0)	389 (4.7)	1 (0.2)	~ ~
Ukraine	5 (0.4)	401 (7.0)	0 (0.1)	~ ~	8 (0.6)	432 (7.0)
United States	7 (0.5)	467 (4.1)	2 (0.2)	~ ~	18 (0.5)	496 (3.3)
‡ Morocco	16 (1.0)	369 (4.5)	36 (1.7)	368 (3.3)	10 (0.9)	367 (7.9)
<b>International Avg.</b>	<b>15 (0.1)</b>	<b>418 (1.0)</b>	<b>9 (0.1)</b>	<b>396 (1.4)</b>	<b>13 (0.1)</b>	<b>431 (1.1)</b>
<b>Benchmarking Participants</b>						
Basque Country, Spain	--	--	--	--	--	--
British Columbia, Canada	3 (0.3)	468 (10.5)	0 (0.1)	~ ~	28 (0.9)	497 (3.9)
Dubai, UAE	6 (0.4)	373 (5.8)	3 (0.4)	370 (10.8)	21 (1.1)	463 (5.1)
Massachusetts, US	3 (0.4)	487 (11.1)	1 (0.2)	~ ~	18 (0.9)	531 (9.4)
Minnesota, US	3 (0.6)	468 (11.6)	1 (0.3)	~ ~	23 (1.4)	517 (5.0)
Ontario, Canada	2 (0.3)	~ ~	0 (0.1)	~ ~	31 (1.6)	497 (4.9)
Quebec, Canada	3 (0.3)	507 (6.6)	0 (0.1)	~ ~	19 (0.9)	518 (3.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 4.2 Students Speak the Language of the Test at Home with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	56 (2.4)	382 (5.4)	0 (0)	32 (1.9)	382 (8.4)	0 (0)	12 (1.0)	368 (8.4)	0 (0)
Armenia	95 (0.6)	501 (4.5)	0 (0.8)	4 (0.4)	470 (6.9)	0 (0.6)	1 (0.4)	~ ~	1 (0.4)
Australia	90 (1.0)	519 (3.2)	-1 (1.5)	8 (1.0)	498 (11.5)	1 (1.4)	1 (0.2)	~ ~	0 (0.3)
Austria	88 (0.7)	510 (1.8)	0 (0)	10 (0.6)	465 (3.9)	0 (0)	2 (0.3)	~ ~	0 (0)
Chinese Taipei	84 (0.8)	582 (1.7)	12 (1.4) ▲	15 (0.8)	550 (3.4)	-11 (1.4) ▼	1 (0.2)	~ ~	0 (0.2)
Colombia	89 (0.9)	363 (4.9)	0 (0)	8 (0.8)	323 (8.9)	0 (0)	3 (0.3)	298 (9.7)	0 (0)
Czech Republic	97 (0.3)	487 (2.8)	0 (0)	2 (0.3)	~ ~	0 (0)	0 (0.1)	~ ~	0 (0)
Denmark	94 (0.9)	527 (2.3)	0 (0)	6 (0.9)	473 (11.4)	0 (0)	1 (0.2)	~ ~	0 (0)
El Salvador	93 (0.8)	336 (3.7)	0 (0)	5 (0.6)	287 (13.4)	0 (0)	2 (0.3)	~ ~	0 (0)
England	93 (0.6)	545 (3.0)	-2 (1.0)	6 (0.6)	493 (7.8)	2 (0.9) ▲	1 (0.1)	~ ~	0 (0.2)
Georgia	92 (0.7)	442 (4.1)	0 (0)	8 (0.6)	421 (9.5)	0 (0)	0 (0.1)	~ ~	0 (0)
Germany	92 (0.6)	532 (2.3)	0 (0)	7 (0.6)	483 (4.7)	0 (0)	1 (0.1)	~ ~	0 (0)
Hong Kong SAR	82 (0.9)	614 (3.4)	7 (1.5) ▲	15 (0.9)	582 (4.9)	-5 (1.3) ▼	3 (0.3)	542 (8.6)	-2 (0.5) ▼
Hungary	98 (0.4)	512 (3.4)	-1 (0.5)	2 (0.4)	~ ~	1 (0.5)	0 (0.1)	~ ~	0 (0.1)
Iran, Islamic Rep. of	62 (2.1)	421 (4.6)	4 (4.0)	21 (1.9)	381 (5.4)	0 (2.7)	16 (1.6)	365 (6.1)	-4 (3.0)
Italy	96 (0.2)	508 (3.2)	5 (0.6) ▲	3 (0.2)	477 (8.2)	-3 (0.5) ▼	0 (0.1)	~ ~	-2 (0.3) ▼
Japan	99 (0.2)	570 (2.1)	0 (0.3)	1 (0.1)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Kazakhstan	93 (1.3)	548 (7.3)	0 (0)	7 (1.3)	561 (10.1)	0 (0)	0 (0.1)	~ ~	0 (0)
Kuwait	74 (1.8)	322 (4.4)	0 (0)	18 (1.3)	328 (4.9)	0 (0)	8 (1.2)	305 (8.9)	0 (0)
Latvia	88 (1.5)	540 (2.1)	-2 (2.1)	9 (1.1)	511 (6.8)	2 (1.5)	3 (0.6)	532 (13.6)	0 (0.8)
Lithuania	98 (0.4)	531 (2.3)	1 (0.8)	2 (0.3)	~ ~	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Morocco	50 (2.6)	334 (5.7)	4 (3.5)	29 (2.1)	369 (8.0)	1 (2.7)	21 (2.4)	335 (12.8)	-6 (3.4)
Netherlands	89 (1.2)	538 (2.3)	-3 (1.4) ▼	8 (0.8)	507 (5.2)	1 (1.2)	3 (0.6)	523 (10.9)	2 (0.6) ▲
New Zealand	87 (0.8)	498 (2.1)	-2 (1.1) ▼	12 (0.7)	458 (5.9)	2 (1.0) ▲	1 (0.2)	~ ~	0 (0.2)
Norway	94 (0.5)	476 (2.5)	1 (0.7)	5 (0.4)	435 (7.2)	-1 (0.6)	1 (0.2)	~ ~	0 (0.3)
Qatar	71 (0.6)	307 (1.5)	0 (0)	20 (0.6)	286 (3.2)	0 (0)	9 (0.3)	264 (3.4)	0 (0)
Russian Federation	92 (1.4)	547 (5.0)	2 (2.5)	7 (1.2)	524 (16.7)	-2 (2.1)	2 (0.6)	~ ~	0 (0.8)
Scotland	91 (0.8)	498 (2.3)	4 (1.2) ▲	6 (0.5)	466 (5.3)	-3 (0.9) ▼	3 (0.6)	437 (9.5)	0 (0.7)
Singapore	50 (0.9)	623 (3.9)	4 (2.0) ▲	45 (0.9)	580 (4.0)	-2 (1.8)	5 (0.4)	539 (8.2)	-2 (0.7) ▼
Slovak Republic	87 (1.5)	505 (3.2)	0 (0)	11 (1.3)	451 (11.9)	0 (0)	3 (0.7)	438 (22.2)	0 (0)
Slovenia	90 (0.8)	506 (2.1)	0 (1.3)	8 (0.7)	471 (5.5)	0 (1.2)	2 (0.4)	~ ~	0 (0.5)
Sweden	92 (1.0)	506 (2.4)	0 (0)	8 (1.0)	467 (4.9)	0 (0)	1 (0.1)	~ ~	0 (0)
Tunisia	26 (1.7)	327 (7.0)	--	49 (2.0)	343 (5.0)	--	25 (1.8)	320 (6.5)	--
Ukraine	74 (2.1)	466 (3.3)	0 (0)	21 (1.7)	483 (5.9)	0 (0)	5 (0.6)	476 (8.6)	0 (0)
United States	87 (0.8)	535 (2.3)	0 (1.2)	12 (0.8)	493 (4.4)	0 (1.1)	2 (0.1)	~ ~	0 (0.2)
Yemen	85 (1.7)	233 (6.2)	0 (0)	11 (1.3)	212 (10.6)	0 (0)	4 (0.9)	175 (14.5)	0 (0)
International Avg.	84 (0.2)	478 (0.6)		12 (0.2)	445 (1.4)		4 (0.1)	395 (2.8)	
<b>Benchmarking Participants</b>									
Alberta, Canada	87 (1.4)	507 (3.0)	0 (0)	11 (1.2)	497 (4.9)	0 (0)	2 (0.3)	~ ~	0 (0)
British Columbia, Canada	87 (1.2)	507 (2.7)	0 (0)	12 (1.1)	502 (6.4)	0 (0)	1 (0.3)	~ ~	0 (0)
Dubai, UAE	55 (2.4)	463 (3.3)	0 (0)	39 (2.1)	438 (5.5)	0 (0)	6 (0.8)	405 (9.5)	0 (0)
Massachusetts, US	93 (1.0)	576 (3.2)	0 (0)	6 (1.0)	533 (12.8)	0 (0)	1 (0.2)	~ ~	0 (0)
Minnesota, US	89 (2.5)	561 (5.0)	0 (0)	10 (2.3)	493 (15.2)	0 (0)	1 (0.4)	~ ~	0 (0)
Ontario, Canada	85 (1.0)	514 (2.7)	-1 (1.5)	13 (0.9)	508 (5.5)	0 (1.4)	2 (0.4)	~ ~	1 (0.5)
Quebec, Canada	90 (0.9)	521 (3.1)	-1 (1.3)	8 (0.8)	508 (6.4)	1 (1.1)	1 (0.2)	~ ~	0 (0.3)

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (0) indicates the country did not participate in the assessment.



Exhibit 4.2 Students Speak the Language of the Test at Home with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	57 (1.7)	388 (2.5)	◊ ◊	31 (1.2)	389 (2.5)	◊ ◊	11 (1.1)	378 (3.5)	◊ ◊
Armenia	97 (0.5)	499 (3.5)	1 (0.8)	3 (0.4)	479 (9.0)	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Australia	96 (0.5)	498 (3.9)	4 (1.6) ▲	4 (0.5)	480 (13.4)	-3 (1.4) ▼	1 (0.1)	~ ~	-1 (0.4)
Bahrain	81 (0.8)	397 (1.8)	0 (1.3)	14 (0.6)	408 (4.5)	-1 (0.9)	5 (0.5)	397 (7.1)	1 (0.7)
Bosnia and Herzegovina	98 (0.4)	456 (2.7)	◊ ◊	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Botswana	34 (1.0)	371 (3.3)	23 (1.2) ▲	62 (1.0)	365 (2.3)	-18 (1.2) ▼	5 (0.4)	316 (6.7)	-4 (0.7) ▼
Bulgaria	89 (1.7)	472 (4.6)	-2 (2.4)	10 (1.6)	401 (12.8)	2 (2.2)	1 (0.3)	~ ~	0 (0.4)
Chinese Taipei	83 (1.2)	609 (4.2)	3 (1.8)	16 (1.1)	546 (7.8)	-3 (1.7)	1 (0.2)	~ ~	0 (0.3)
Colombia	96 (0.3)	382 (3.7)	◊ ◊	4 (0.3)	337 (7.4)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Cyprus	91 (0.5)	469 (1.7)	-1 (0.8)	6 (0.4)	440 (5.8)	0 (0.6)	2 (0.3)	~ ~	0 (0.4)
Czech Republic	98 (0.3)	504 (2.4)	◊ ◊	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Egypt	82 (1.2)	391 (3.7)	7 (1.6) ▲	15 (1.0)	402 (6.4)	-7 (1.4) ▼	3 (0.4)	384 (12.2)	0 (0.5)
El Salvador	97 (0.3)	342 (2.7)	◊ ◊	2 (0.3)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
England	97 (0.4)	514 (4.9)	0 (0.7)	2 (0.3)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.2)
Georgia	95 (0.9)	411 (5.9)	◊ ◊	5 (0.9)	402 (18.1)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Ghana	31 (1.2)	309 (5.8)	-2 (1.8)	66 (1.3)	314 (4.3)	3 (1.8)	3 (0.5)	259 (12.6)	-2 (1.0)
Hong Kong SAR	91 (1.0)	580 (5.2)	-2 (1.2)	8 (0.7)	513 (12.7)	1 (0.9)	2 (0.4)	~ ~	0 (0.4)
Hungary	99 (0.3)	518 (3.4)	-1 (0.4)	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.2)
Indonesia	35 (2.8)	397 (6.1)	2 (3.6)	58 (2.5)	397 (4.7)	0 (3.2)	7 (0.6)	402 (7.9)	-3 (1.0) ▼
Iran, Islamic Rep. of	63 (2.2)	423 (4.9)	-2 (3.9)	22 (1.7)	373 (4.9)	1 (2.5)	15 (1.3)	367 (6.0)	0 (2.3)
Israel	92 (0.7)	467 (4.0)	-1 (0.9)	6 (0.6)	444 (10.7)	1 (0.8)	1 (0.3)	~ ~	0 (0.3)
Italy	99 (0.1)	480 (3.1)	3 (0.4) ▲	1 (0.1)	~ ~	-2 (0.3) ▼	0 (0.1)	~ ~	-1 (0.2)
Japan	98 (0.2)	571 (2.4)	0 (0.3)	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.1)
Jordan	89 (0.9)	429 (4.1)	4 (1.4) ▲	8 (0.7)	418 (10.0)	-3 (1.0) ▼	3 (0.4)	414 (12.7)	-1 (0.7)
Korea, Rep. of	95 (0.4)	600 (2.7)	-4 (0.5) ▼	5 (0.4)	549 (7.5)	4 (0.4) ▲	0 (0.1)	~ ~	0 (0.1)
Kuwait	67 (1.2)	355 (2.4)	◊ ◊	19 (0.8)	359 (4.4)	◊ ◊	14 (0.9)	344 (6.2)	◊ ◊
Lebanon	20 (1.2)	456 (7.4)	4 (1.5) ▲	64 (1.7)	450 (3.8)	-5 (2.0) ▼	16 (1.2)	443 (5.9)	1 (1.5)
Lithuania	98 (0.4)	506 (2.3)	0 (0.8)	2 (0.4)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.3)
Malaysia	64 (2.1)	465 (5.6)	-2 (3.2)	28 (1.6)	486 (6.9)	0 (2.5)	9 (0.9)	504 (11.0)	2 (1.2)
Malta	17 (0.4)	505 (3.1)	◊ ◊	46 (0.7)	488 (1.9)	◊ ◊	38 (0.7)	481 (2.2)	◊ ◊
Norway	96 (0.4)	472 (2.0)	0 (0.6)	3 (0.3)	434 (6.4)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Oman	76 (1.9)	373 (3.5)	◊ ◊	19 (1.6)	377 (5.4)	◊ ◊	5 (0.6)	378 (8.9)	◊ ◊
Palestinian Nat'l Auth.	87 (1.4)	369 (3.7)	3 (1.8)	10 (1.1)	369 (9.8)	-3 (1.4) ▼	3 (0.5)	355 (12.7)	1 (0.6)
Qatar	72 (0.4)	312 (1.5)	◊ ◊	20 (0.4)	307 (3.9)	◊ ◊	8 (0.3)	266 (5.5)	◊ ◊
Romania	98 (0.3)	463 (4.1)	5 (1.7) ▲	1 (0.3)	~ ~	-3 (1.0) ▼	0 (0.0)	~ ~	-2 (1.0) ▼
Russian Federation	93 (1.8)	513 (4.0)	-2 (2.2)	6 (1.6)	497 (11.2)	2 (1.9)	1 (0.3)	~ ~	0 (0.4)
Saudi Arabia	72 (2.2)	328 (3.1)	--	18 (1.5)	338 (4.7)	--	11 (1.1)	325 (7.5)	--
Scotland	96 (0.5)	490 (3.6)	-1 (0.6)	3 (0.4)	463 (10.5)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Serbia	97 (0.8)	487 (3.2)	-1 (0.9)	2 (0.6)	~ ~	0 (0.7)	1 (0.2)	~ ~	0 (0.2)
Singapore	47 (0.9)	616 (3.7)	4 (1.3) ▲	46 (0.8)	576 (4.6)	-3 (1.1) ▼	7 (0.4)	553 (9.0)	-1 (0.6)
Slovenia	90 (1.1)	506 (2.0)	-1 (1.5)	7 (0.7)	465 (6.5)	0 (1.0)	3 (0.6)	455 (8.4)	1 (0.8)
Sweden	94 (0.6)	494 (2.1)	1 (1.0)	4 (0.5)	455 (7.9)	-1 (0.8)	1 (0.2)	~ ~	0 (0.3)
Syrian Arab Republic	86 (1.0)	397 (3.8)	◊ ◊	11 (0.8)	388 (7.6)	◊ ◊	3 (0.4)	378 (11.5)	◊ ◊
Thailand	67 (1.9)	456 (6.0)	◊ ◊	30 (1.6)	414 (7.1)	◊ ◊	3 (0.6)	395 (16.8)	◊ ◊
Tunisia	22 (0.9)	406 (3.6)	--	49 (1.0)	423 (2.7)	--	29 (1.1)	426 (2.8)	--
Turkey	89 (1.2)	440 (5.0)	◊ ◊	10 (1.2)	370 (5.5)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ukraine	69 (2.6)	460 (4.3)	◊ ◊	23 (1.9)	470 (4.6)	◊ ◊	8 (1.0)	459 (7.5)	◊ ◊
United States	91 (0.7)	512 (2.8)	-3 (0.9) ▼	8 (0.7)	474 (5.3)	3 (0.8) ▲	1 (0.1)	~ ~	0 (0.2)
‡ Morocco	52 (1.7)	374 (3.3)	--	37 (1.5)	387 (5.0)	--	11 (0.8)	392 (6.3)	--
International Avg.	78 (0.2)	454 (0.6)		17 (0.1)	427 (1.2)		5 (0.1)	394 (1.9)	
<b>Benchmarking Participants</b>									
Basque Country, Spain	93 (0.5)	501 (3.0)	4 (1.2) ▲	6 (0.5)	504 (5.8)	-2 (0.9) ▼	1 (0.3)	~ ~	-1 (0.6)
British Columbia, Canada	85 (1.8)	506 (3.0)	◊ ◊	10 (0.9)	533 (7.5)	◊ ◊	5 (1.2)	517 (6.6)	◊ ◊
Dubai, UAE	58 (1.2)	463 (3.3)	◊ ◊	37 (1.1)	466 (3.9)	◊ ◊	5 (0.7)	471 (11.8)	◊ ◊
Massachusetts, US	92 (0.9)	552 (4.3)	◊ ◊	7 (0.8)	490 (11.5)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Minnesota, US	95 (1.2)	535 (4.2)	◊ ◊	4 (1.1)	488 (15.7)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ontario, Canada	90 (1.3)	518 (3.2)	1 (1.7)	9 (1.1)	515 (14.3)	0 (1.4)	1 (0.3)	~ ~	-1 (0.4)
Quebec, Canada	91 (1.2)	529 (3.3)	0 (1.7)	7 (0.9)	522 (10.7)	0 (1.3)	2 (0.4)	~ ~	0 (0.6)

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

Hong Kong SAR, Italy, Scotland, and Singapore, and at the eighth grade, Australia, Botswana, Egypt, Italy, Jordan, Lebanon, Romania, Singapore, and, among benchmarking participants, the Basque Country.

A contributing factor in some countries to not all students speaking the language of the test at home may be the presence of an immigrant population. Exhibit 4.3 presents students' reports on whether their parents were born in the country. The exhibit presents for each participant the percentage of students with both parents, one parent, or neither parent born in the country, together with average mathematics achievement and changes in percentages since 2003. (For clarification, as denoted by the data label, the benchmarking participants, except Dubai, asked about the entire country, that is, Spain, Canada, and the United States, respectively.)

Although response rates to questions in the TIMSS questionnaires generally were high, students in some countries had difficulties in answering specific questions. Therefore, some exhibits in this chapter, including Exhibit 4.3, have special notation on this point. For a country where responses were available for at least 70 but less than 85 percent of the students, an "r" is included next to its data. Where responses were available for at least 50 but less than 70 percent of the students, an "s" is included. Where responses were available for less than 50 percent, an "x" replaces the data.

At fourth grade, more than three-quarters (77%) of students, on average internationally, reported that both parents were born in the country, whereas 13 percent reported that only one parent and 10 percent that neither parent was born in the country. In the Czech Republic, Hungary, Iran, Japan, and Lithuania, 90 percent or more of students reported that both parents were born in the country, as well as 80 percent or more (but less than 90%) in Chinese Taipei, Denmark, Georgia, Italy, Kazakhstan, Latvia, Norway, the Russian Federation, Scotland, and the Slovak Republic. Countries with an increase since 2003 included Hungary, Iran, Japan, and Lithuania, as well as the Canadian province of Quebec. The largest percentages of students (20% or more) reporting that neither parent was born in the country were in Australia, Hong Kong SAR, New Zealand, Qatar, and among the

benchmarking participants the Canadian provinces of Alberta, British Columbia, and Ontario as well as Dubai. The high percentage of students in Dubai (72%) is a result of high immigration, but also because Dubai did not ask about the country, the United Arab Emirates, but only Dubai in particular. Australia, Hong Kong SAR, New Zealand, and Qatar also had relatively large percentages of students (20% or more) with only one parent born in the country, as did Algeria, Kuwait, Singapore, and Yemen. Countries with a decrease since 2003 in the percentage of students with neither parent born in the country included Armenia, Chinese Taipei, Hong Kong SAR, Hungary, Iran, and Scotland, while two countries, Slovenia and Tunisia, showed an increase.

Although on average across countries, fourth grade mathematics achievement was highest among students with both parents born in the country (478 points, on average), next highest among students with one parent born in the country (458 points), and lowest among those with neither parent born in the country (452 points), this was not the case in all countries. In a number of countries (for example, Australia, Kuwait, Qatar, and Dubai among benchmarking participants), students with neither parent born in the country had average mathematics achievement higher than those with both parents born in the country.

At the eighth grade, the situation was similar, although a greater percentage of students (85% on average internationally) reported that both parents were born in the country, and a smaller percentage that one parent (9%) or neither parent (7%) was born in the country. Eighteen countries had 90 percent or more of students with both parents born in the country. Countries showing an increase in percentage of students in this category included Australia, Ghana, Indonesia, Jordan, and Lithuania, and those showing a decrease included Botswana, Cyprus, Hungary, Italy, Lebanon, Malaysia, Scotland, Tunisia, and the United States. The Basque Country of Spain also showed a decrease. More than 20 percent of students reported that neither parent was born in the country in Hong Kong SAR, Israel, Qatar, and the provinces of British Columbia and Ontario as well as Dubai

Exhibit 4.3 Students' Parents Born in the Country with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Both Parents Born in Country			Only One Parent Born in Country			Neither Parent Born in Country			
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	
Algeria	67 (1.9)	385 (5.9)	◇ ◇	20 (1.1)	358 (6.9)	◇ ◇	13 (1.1)	381 (7.0)	◇ ◇	
Armenia	77 (1.5)	501 (3.3)	1 (1.9)	19 (1.3)	511 (16.4)	9 (1.4) ▲	5 (0.4)	476 (10.5)	-10 (1.1) ▼	
Australia	57 (1.7)	512 (2.9)	0 (2.7)	21 (0.9)	513 (5.2)	1 (1.3)	21 (1.4)	535 (6.2)	-1 (2.3)	
Austria	73 (1.0)	515 (1.9)	◇ ◇	11 (0.6)	498 (3.8)	◇ ◇	16 (0.8)	470 (3.5)	◇ ◇	
Chinese Taipei	88 (0.6)	582 (1.6)	0 (0.9)	7 (0.5)	542 (5.1)	2 (0.6) ▲	5 (0.4)	523 (6.3)	-3 (0.6) ▼	
Colombia	73 (1.3)	365 (4.8)	◇ ◇	13 (0.8)	333 (7.9)	◇ ◇	14 (0.8)	352 (5.8)	◇ ◇	
Czech Republic	90 (0.6)	488 (2.8)	◇ ◇	7 (0.5)	481 (5.5)	◇ ◇	3 (0.3)	458 (10.2)	◇ ◇	
Denmark	82 (1.3)	529 (2.5)	◇ ◇	8 (0.6)	516 (5.5)	◇ ◇	10 (1.2)	482 (7.5)	◇ ◇	
El Salvador	78 (0.9)	339 (4.6)	◇ ◇	14 (0.7)	302 (6.0)	◇ ◇	8 (0.6)	316 (8.7)	◇ ◇	
England	74 (1.5)	547 (3.1)	-4 (2.4)	16 (0.9)	540 (4.9)	4 (1.2) ▲	11 (1.0)	514 (6.0)	0 (1.8)	
Georgia	84 (1.1)	449 (4.1)	◇ ◇	8 (0.6)	402 (8.0)	◇ ◇	8 (0.7)	401 (7.7)	◇ ◇	
Germany	70 (1.4)	540 (2.1)	◇ ◇	12 (0.7)	509 (4.0)	◇ ◇	17 (1.0)	494 (3.6)	◇ ◇	
Hong Kong SAR	48 (1.8)	606 (4.1)	1 (2.6)	24 (0.9)	599 (4.1)	4 (1.1) ▲	28 (1.4)	615 (4.5)	-5 (2.3) ▼	
Hungary	91 (0.6)	515 (3.4)	2 (0.9) ▲	6 (0.5)	473 (13.0)	1 (0.8)	3 (0.3)	485 (10.9)	-2 (0.5) ▼	
Iran, Islamic Rep. of	92 (1.0)	404 (4.1)	4 (1.6) ▲	4 (0.5)	380 (7.8)	-1 (0.7)	4 (0.8)	391 (8.3)	-3 (1.3) ▼	
Italy	87 (0.6)	510 (3.3)	0 (0.9)	8 (0.5)	488 (5.8)	0 (0.7)	5 (0.4)	490 (6.7)	0 (0.6)	
Japan	96 (0.4)	571 (2.1)	2 (0.5) ▲	3 (0.3)	530 (9.1)	-2 (0.4) ▼	1 (0.2)	~ ~	0 (0.2)	
Kazakhstan	84 (1.4)	550 (8.0)	◇ ◇	8 (0.6)	541 (9.3)	◇ ◇	9 (1.3)	552 (12.4)	◇ ◇	
Kuwait	65 (1.6)	325 (3.7)	◇ ◇	22 (1.1)	291 (4.9)	◇ ◇	13 (1.0)	348 (9.6)	◇ ◇	
Latvia	85 (0.9)	541 (2.2)	1 (1.5)	12 (0.7)	523 (5.4)	-1 (1.2)	3 (0.4)	510 (11.6)	0 (0.7)	
Lithuania	91 (0.7)	532 (2.3)	2 (1.0) ▲	7 (0.6)	510 (7.8)	-1 (0.8)	1 (0.3)	~ ~	-1 (0.4)	
Morocco	76 (1.6)	349 (5.7)	4 (2.6)	17 (1.1)	326 (6.7)	-2 (1.9)	7 (0.8)	338 (7.1)	-2 (1.2)	
Netherlands	77 (1.4)	544 (2.2)	3 (2.2)	11 (0.8)	525 (4.8)	-1 (1.1)	12 (1.1)	496 (6.7)	-2 (1.8)	
New Zealand	r	60 (1.2)	494 (2.4)	-2 (1.7)	20 (0.7)	491 (4.4)	-1 (1.0)	21 (1.0)	495 (4.0)	3 (1.5)
Norway	85 (0.8)	480 (2.5)	1 (1.1)	10 (0.7)	464 (6.7)	0 (0.9)	5 (0.5)	445 (6.7)	0 (0.8)	
Qatar	49 (0.6)	294 (2.0)	◇ ◇	26 (0.6)	283 (2.4)	◇ ◇	25 (0.5)	333 (2.5)	◇ ◇	
Russian Federation	81 (1.1)	549 (4.9)	2 (1.6)	10 (0.6)	534 (8.5)	-1 (0.9)	8 (0.8)	509 (6.9)	-1 (1.1)	
Scotland	84 (0.7)	498 (2.3)	1 (1.1)	11 (0.6)	486 (4.3)	2 (0.8)	5 (0.4)	453 (10.4)	-2 (0.8) ▼	
Singapore	63 (0.8)	598 (4.1)	-2 (1.2)	20 (0.7)	600 (4.3)	1 (0.9)	16 (0.6)	606 (5.1)	1 (0.9)	
Slovak Republic	87 (0.9)	504 (3.7)	◇ ◇	8 (0.7)	466 (9.5)	◇ ◇	6 (0.5)	443 (8.1)	◇ ◇	
Slovenia	78 (1.1)	508 (2.1)	-3 (1.5)	10 (0.7)	488 (4.5)	-1 (1.0)	12 (0.8)	477 (4.0)	3 (1.1) ▲	
Sweden	74 (1.8)	509 (2.9)	◇ ◇	12 (0.5)	501 (3.8)	◇ ◇	14 (1.7)	475 (4.8)	◇ ◇	
Tunisia	79 (1.4)	339 (4.6)	-21 (1.4) ▼	16 (1.2)	299 (7.6)	16 (1.2) ▲	6 (0.6)	326 (9.9)	6 (0.6) ▲	
Ukraine	76 (1.1)	475 (3.1)	◇ ◇	15 (0.7)	466 (4.4)	◇ ◇	8 (0.9)	441 (7.4)	◇ ◇	
United States	70 (1.1)	536 (2.3)	-2 (1.7)	13 (0.5)	513 (3.8)	2 (0.6) ▲	17 (1.0)	518 (4.8)	0 (1.5)	
Yemen	71 (1.8)	235 (6.6)	◇ ◇	22 (1.4)	212 (6.7)	◇ ◇	7 (0.9)	211 (14.3)	◇ ◇	
International Avg.	77 (0.2)	478 (0.6)		13 (0.1)	458 (1.2)		10 (0.1)	452 (1.3)		
<b>Benchmarking Participants</b>										
Alberta, Canada	62 (2.1)	508 (3.2)	◇ ◇	15 (0.8)	500 (3.9)	◇ ◇	23 (1.8)	503 (4.7)	◇ ◇	
British Columbia, Canada	51 (2.4)	502 (3.2)	◇ ◇	18 (0.9)	506 (4.1)	◇ ◇	31 (2.5)	512 (5.0)	◇ ◇	
Dubai, UAE	r	17 (0.6)	404 (4.2)	◇ ◇	11 (0.8)	411 (7.2)	◇ ◇	72 (1.0)	466 (2.6)	◇ ◇
Massachusetts, US	73 (1.9)	577 (2.8)	◇ ◇	13 (0.7)	565 (8.2)	◇ ◇	14 (1.7)	562 (9.5)	◇ ◇	
Minnesota, US	75 (3.4)	566 (5.2)	◇ ◇	9 (0.8)	528 (9.3)	◇ ◇	15 (3.3)	517 (11.3)	◇ ◇	
Ontario, Canada	52 (2.0)	510 (3.5)	2 (3.4)	17 (0.8)	509 (4.5)	1 (1.3)	30 (2.1)	517 (4.5)	-3 (3.6)	
Quebec, Canada	75 (2.0)	526 (3.1)	15 (2.8) ▲	10 (0.7)	505 (4.6)	-16 (1.7) ▼	15 (1.8)	499 (5.8)	1 (2.3)	

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◇) indicates the country did not participate in the assessment.


**TIMSS & PIRLS**  
 International Study Center  
 Lynch School of Education, Boston College

Exhibit 4.3 Students' Parents Born in the Country with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Both Parents Born in Country			Only One Parent Born in Country			Neither Parent Born in Country		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	--	--	◊ ◊	--	--	◊ ◊	--	--	◊ ◊
Armenia	88 (1.0)	497 (2.8)	-2 (1.2)	9 (1.0)	516 (15.9)	3 (1.1) ▲	3 (0.3)	516 (15.6)	-1 (0.6)
Australia	61 (1.1)	496 (3.7)	7 (2.5) ▲	21 (0.8)	498 (6.6)	0 (1.2)	18 (1.4)	502 (7.7)	-7 (2.8) ▼
Bahrain	78 (0.6)	400 (1.9)	-1 (0.9)	10 (0.5)	387 (4.8)	1 (0.7)	11 (0.4)	413 (3.6)	0 (0.7)
Bosnia and Herzegovina	89 (0.6)	457 (2.7)	◊ ◊	7 (0.5)	470 (5.7)	◊ ◊	4 (0.4)	429 (7.0)	◊ ◊
Botswana	86 (0.6)	367 (2.3)	-3 (1.1) ▼	11 (0.6)	336 (5.1)	3 (0.7) ▲	3 (0.3)	386 (10.6)	0 (0.8)
Bulgaria	96 (0.4)	467 (4.9)	-1 (0.5)	3 (0.4)	440 (14.6)	0 (0.5)	1 (0.2)	~ ~	0 (0.2)
Chinese Taipei	96 (0.3)	600 (4.5)	0 (0.5)	3 (0.3)	568 (16.0)	1 (0.4)	1 (0.2)	~ ~	-1 (0.3)
Colombia	96 (0.4)	382 (3.5)	◊ ◊	3 (0.3)	364 (13.3)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Cyprus	82 (0.6)	469 (1.8)	-2 (0.8) ▼	13 (0.5)	462 (4.2)	2 (0.7) ▲	5 (0.3)	429 (6.9)	1 (0.4)
Czech Republic	91 (0.5)	505 (2.5)	◊ ◊	7 (0.4)	493 (5.0)	◊ ◊	2 (0.3)	~ ~	◊ ◊
Egypt	80 (1.8)	404 (3.4)	2 (2.0)	15 (1.7)	347 (8.3)	4 (1.8) ▲	5 (0.4)	340 (7.7)	-5 (0.8) ▼
El Salvador	94 (0.4)	342 (2.9)	◊ ◊	4 (0.4)	331 (8.0)	◊ ◊	2 (0.2)	~ ~	◊ ◊
England	80 (1.4)	513 (5.2)	-2 (2.5)	11 (0.7)	513 (6.7)	1 (1.1)	9 (0.9)	528 (7.7)	2 (1.9)
Georgia	93 (0.6)	416 (5.8)	◊ ◊	3 (0.4)	383 (15.7)	◊ ◊	3 (0.4)	336 (15.3)	◊ ◊
Ghana	89 (0.7)	316 (4.1)	6 (1.1) ▲	8 (0.6)	274 (8.4)	-4 (0.9) ▼	3 (0.3)	277 (9.4)	-2 (0.5) ▼
Hong Kong SAR	42 (1.4)	578 (6.0)	-1 (1.8)	19 (0.7)	567 (6.3)	3 (0.9) ▲	39 (1.3)	572 (7.5)	-1 (1.7)
Hungary	94 (0.4)	518 (3.4)	-2 (0.6) ▼	4 (0.4)	502 (13.6)	1 (0.5)	2 (0.3)	~ ~	0 (0.3)
Indonesia	97 (0.4)	401 (3.7)	2 (0.5) ▲	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	-1 (0.3)
Iran, Islamic Rep. of	97 (0.3)	405 (4.1)	1 (0.6)	2 (0.3)	~ ~	0 (0.4)	1 (0.2)	~ ~	-1 (0.4)
Israel	63 (1.4)	467 (3.9)	2 (1.9)	16 (0.7)	472 (5.8)	-3 (1.0) ▼	21 (1.4)	469 (7.6)	1 (1.8)
Italy	89 (0.6)	481 (3.2)	-2 (0.8) ▼	7 (0.5)	483 (6.5)	0 (0.6)	5 (0.4)	455 (6.2)	1 (0.6)
Japan	98 (0.3)	571 (2.5)	1 (0.4)	2 (0.2)	~ ~	-1 (0.3)	1 (0.1)	~ ~	0 (0.2)
Jordan	70 (1.2)	423 (4.8)	6 (1.7) ▲	15 (0.7)	427 (6.0)	-2 (1.0) ▼	15 (0.9)	452 (5.1)	-4 (1.4) ▼
Korea, Rep. of	100 (0.1)	598 (2.7)	0 (0.1)	0 (0.1)	~ ~	0 (0.1)	0 (0.1)	~ ~	0 (0.1)
Kuwait	77 (1.0)	356 (2.5)	◊ ◊	13 (0.6)	349 (4.7)	◊ ◊	9 (0.8)	369 (7.0)	◊ ◊
Lebanon	87 (0.9)	453 (3.9)	-3 (1.2) ▼	10 (0.7)	436 (7.3)	2 (1.0) ▲	3 (0.4)	432 (10.2)	1 (0.5)
Lithuania	92 (0.5)	507 (2.5)	3 (0.9) ▲	7 (0.5)	506 (5.2)	-2 (0.8) ▼	1 (0.2)	~ ~	0 (0.3)
Malaysia	93 (0.5)	476 (4.9)	-2 (0.7) ▼	5 (0.4)	448 (10.2)	1 (0.5)	2 (0.3)	~ ~	0 (0.5)
Malta	84 (0.5)	490 (1.4)	◊ ◊	13 (0.5)	482 (3.7)	◊ ◊	3 (0.2)	479 (9.3)	◊ ◊
Norway	84 (1.0)	473 (2.2)	-2 (1.3)	9 (0.6)	469 (4.0)	1 (0.8)	7 (0.7)	436 (4.4)	1 (1.1)
Oman	84 (0.8)	379 (3.4)	◊ ◊	10 (0.6)	341 (6.1)	◊ ◊	6 (0.4)	355 (6.8)	◊ ◊
Palestinian Nat'l Auth.	85 (0.7)	373 (3.5)	0 (1.0)	12 (0.6)	350 (7.1)	-1 (0.8)	3 (0.3)	321 (11.8)	1 (0.4)
Qatar	57 (0.6)	298 (1.6)	◊ ◊	15 (0.4)	297 (3.6)	◊ ◊	28 (0.5)	338 (2.4)	◊ ◊
Romania	99 (0.2)	464 (4.0)	0 (0.3)	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.2)
Russian Federation	83 (1.1)	514 (3.9)	0 (1.5)	11 (0.7)	510 (7.1)	0 (1.0)	6 (0.7)	490 (9.2)	0 (0.8)
Saudi Arabia	80 (1.3)	328 (3.3)	--	9 (0.6)	318 (7.1)	--	11 (1.0)	357 (5.8)	--
Scotland	89 (0.7)	489 (3.7)	-2 (0.9) ▼	7 (0.5)	492 (6.9)	1 (0.7)	3 (0.5)	473 (13.9)	0 (0.6)
Serbia	79 (1.0)	487 (3.5)	-2 (1.3)	12 (0.7)	495 (5.1)	1 (0.9)	9 (0.7)	477 (8.0)	1 (1.0)
Singapore	71 (0.7)	588 (3.9)	-1 (1.0)	16 (0.5)	592 (5.2)	0 (0.7)	13 (0.6)	625 (5.9)	1 (0.8)
Slovenia	82 (1.1)	507 (2.3)	2 (1.7)	9 (0.6)	500 (4.6)	1 (0.9)	9 (0.9)	462 (5.4)	-3 (1.3) ▼
Sweden	77 (1.3)	497 (2.2)	1 (2.2)	11 (0.5)	491 (3.9)	1 (0.8)	12 (1.2)	463 (5.0)	-2 (2.0)
Syrian Arab Republic	86 (0.8)	400 (3.4)	◊ ◊	9 (0.6)	376 (8.4)	◊ ◊	5 (0.4)	370 (7.4)	◊ ◊
Thailand	96 (0.5)	443 (4.9)	◊ ◊	3 (0.4)	408 (14.6)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Tunisia	92 (0.4)	423 (2.5)	-7 (0.5) ▼	5 (0.3)	404 (6.1)	4 (0.3) ▲	3 (0.3)	382 (8.0)	3 (0.3) ▲
Turkey	97 (0.3)	434 (4.8)	◊ ◊	2 (0.3)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ukraine	78 (1.1)	462 (3.7)	◊ ◊	17 (0.9)	473 (5.3)	◊ ◊	5 (0.6)	446 (9.9)	◊ ◊
United States	74 (1.4)	515 (2.9)	-7 (1.8) ▼	9 (0.6)	504 (4.6)	1 (0.7)	17 (1.2)	486 (4.8)	6 (1.5) ▲
‡ Morocco	90 (0.6)	385 (2.9)	--	6 (0.5)	345 (9.2)	--	3 (0.4)	336 (7.5)	--
International Avg.	85 (0.1)	454 (0.5)		9 (0.1)	439 (1.3)		7 (0.1)	430 (1.5)	
<b>Benchmarking Participants</b>									
Basque Country, Spain	89 (0.9)	505 (2.8)	-3 (1.1) ▼	6 (0.6)	474 (9.3)	1 (0.8)	5 (0.7)	453 (9.9)	2 (0.8) ▲
British Columbia, Canada	56 (1.8)	498 (2.8)	◊ ◊	16 (0.7)	506 (3.3)	◊ ◊	29 (1.9)	535 (6.5)	◊ ◊
Dubai, UAE	20 (1.1)	400 (5.2)	◊ ◊	10 (0.6)	411 (4.8)	◊ ◊	70 (1.0)	490 (2.7)	◊ ◊
Massachusetts, US	75 (2.0)	556 (4.1)	◊ ◊	9 (0.7)	541 (6.6)	◊ ◊	16 (1.8)	514 (10.1)	◊ ◊
Minnesota, US	84 (1.9)	538 (4.2)	◊ ◊	5 (0.4)	518 (9.4)	◊ ◊	10 (1.6)	499 (11.3)	◊ ◊
Ontario, Canada	57 (2.2)	512 (4.5)	2 (3.1)	15 (0.9)	520 (4.7)	-1 (1.2)	28 (2.3)	528 (5.3)	-2 (3.3)
Quebec, Canada	78 (2.1)	531 (3.2)	-3 (2.8)	8 (0.6)	539 (7.4)	0 (0.8)	14 (1.9)	517 (8.6)	2 (2.5)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

(where the results were only for Dubai per se and not the country). Increased percentages in this category since 2003 were found in Tunisia, the United States, and the Basque Country, and decreased percentages in Australia, Egypt, Ghana, Jordan, and Slovenia. Similar to the fourth grade, average mathematics achievement at the eighth grade was highest for students reporting both parents born in the country (454 points, on average), next for students with one parent born in the country (439 points), and lowest for students with neither parent born in the country (430 points).

Earlier cycles of TIMSS and PIRLS have shown that students from homes with abundant literacy resources have higher achievement, on average, in mathematics, science, and reading than students from less well-endowed homes.<sup>3</sup> Exhibit 4.4, which displays students' reports about the number of books in their homes, shows that this continues to be true for mathematics achievement at both fourth and eighth grades. For each grade, the exhibit presents for each TIMSS 2007 participant the percentage of students in five categories of book ownership, *more than 200 books*, *101–200 books*, *26–100 books*, *11–25 books*, and *0–10 books*, together with average achievement in each category and changes in percentages since 2003.

As shown in the exhibit, there was a wide range of book ownership within countries at both grade levels. At fourth grade, 12 percent of students, on average across countries, reported having more than 200 books at home, 13 percent having between 101 and 200 books, 30 percent having between 26 and 100 books, 25 percent having between 11 and 25 books, and 20 percent with no more than 10 books. TIMSS participants with the highest percentages of students (at least 30%) reporting many books at home (more than 100—categories one and two combined) included Australia, Denmark, England, Georgia, Germany, Hungary, New Zealand, Norway, Qatar, Scotland, Singapore, Sweden, the United States, the U.S. states of Massachusetts and Minnesota, and the Canadian provinces of Alberta, British Columbia, and Ontario. In contrast, in Algeria, El Salvador, Iran, Morocco, and Yemen, more than half the students reported having no more than 10 books in their homes. In several countries, there was an increase since 2003 in the percentage of students from homes with many books. For example,

3 See, for example, Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 international report: IEA's Progress in International Reading Literacy Study in primary school in 40 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Hong Kong SAR, Morocco, and the province of Quebec had increased percentages of students in the *more than 200* and in the *101–200* books categories. In contrast, Latvia, the Netherlands, and Norway had decreased percentages in both of these categories.

Fourth grade students from homes with more than 100 books had higher average mathematics achievement than those from homes with fewer books. Average achievement of those from homes with more than 200 books (494 points, on average) and from homes with 101–200 books (495 points) exceeded that for students from homes with 26–100 books (486 points), with 11–25 books (466 points), and with 0–10 books (438 points).

At the eighth grade also, there was an association between average mathematics achievement and number of books in the home. Twelve percent of students reported having more than 200 books at home and 12 percent reported having 101–200 books, and these had average achievement of 486 and 481 points, respectively. These averages were higher than the 464-point average of the 27 percent of students with 26–100 books, the 436-point average of the 29 percent of students with 11–25 books, and the 413-point average of the 20 percent of students with 10 books or fewer. TIMSS participants with the highest percentages of students in the *more than 200* book category (20% or more) included Australia, Bulgaria, Georgia, Hungary, Israel, Italy, Korea, Norway, Sweden, and among benchmarking participants, the Basque Country, Massachusetts, Minnesota, and the provinces of British Columbia and Ontario. Countries with the greatest percentages of students (30% or more) with no more than 10 books at home included Algeria, Botswana, Colombia, Egypt, El Salvador, Ghana, Iran, Thailand, and Tunisia. There were increased percentages since 2003 of students in the highest category of book ownership (more than 200 books) in Cyprus, Korea, and Lebanon, but decreases in Australia, Bahrain, Bulgaria, England, Ghana, Hungary, Romania, the Russian Federation, Scotland, Sweden, the United States, and the Canadian province of Ontario.

In today's age of virtually instantaneous access to a vast repository of information, students from homes with a computer, and particularly a computer with Internet access, may have opportunities for enhanced

Exhibit 4.4 Books in the Home with Trends

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Country	More than 200 Books			101–200 Books			26–100 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	2 (0.3)	~ ~	∅ ∅	3 (0.3)	384 (10.0)	∅ ∅	12 (0.9)	399 (6.3)	∅ ∅
Armenia	r 17 (1.2)	499 (4.2)	–1 (1.6)	12 (0.7)	514 (6.5)	–2 (1.0) ▼	25 (1.0)	501 (4.3)	–5 (1.5) ▼
Australia	22 (1.0)	531 (5.1)	–2 (1.6)	22 (1.0)	540 (5.3)	–1 (1.5)	36 (0.9)	517 (3.3)	2 (1.4)
Austria	12 (0.7)	535 (3.7)	∅ ∅	13 (0.6)	533 (3.1)	∅ ∅	35 (1.0)	515 (2.3)	∅ ∅
Chinese Taipei	14 (0.6)	606 (2.8)	–1 (1.0)	13 (0.6)	605 (3.3)	–1 (0.9)	32 (0.9)	588 (2.4)	1 (1.1)
Colombia	5 (0.4)	339 (8.5)	∅ ∅	5 (0.4)	364 (11.9)	∅ ∅	19 (0.9)	379 (8.5)	∅ ∅
Czech Republic	11 (0.9)	505 (5.7)	∅ ∅	16 (0.8)	515 (4.2)	∅ ∅	40 (1.0)	495 (2.5)	∅ ∅
Denmark	12 (1.0)	544 (5.6)	∅ ∅	18 (0.8)	547 (3.2)	∅ ∅	38 (1.2)	526 (2.8)	∅ ∅
El Salvador	3 (0.4)	336 (11.4)	∅ ∅	4 (0.3)	330 (10.2)	∅ ∅	14 (0.7)	355 (5.4)	∅ ∅
England	19 (1.0)	575 (4.9)	0 (1.6)	22 (1.0)	567 (5.0)	2 (1.4)	33 (1.0)	542 (3.0)	–2 (1.6)
Georgia	17 (1.3)	448 (5.6)	∅ ∅	13 (1.0)	456 (7.9)	∅ ∅	29 (1.4)	452 (4.7)	∅ ∅
Germany	14 (0.8)	561 (3.4)	∅ ∅	17 (0.8)	554 (3.3)	∅ ∅	35 (1.0)	535 (2.4)	∅ ∅
Hong Kong SAR	12 (0.7)	628 (4.5)	5 (0.9) ▲	15 (0.9)	621 (5.3)	5 (1.2) ▲	34 (0.9)	611 (3.6)	6 (1.3) ▲
Hungary	16 (1.0)	557 (4.8)	–2 (1.5)	17 (0.7)	545 (3.9)	0 (1.1)	32 (1.2)	523 (4.2)	–3 (1.5)
Iran, Islamic Rep. of	5 (0.5)	449 (8.4)	–1 (0.8)	5 (0.5)	438 (7.6)	1 (0.7)	12 (1.0)	445 (5.0)	–1 (1.3)
Italy	12 (0.7)	517 (4.8)	2 (1.1)	12 (0.5)	521 (4.2)	1 (0.8)	31 (0.8)	517 (3.4)	4 (1.1) ▲
Japan	7 (0.4)	599 (5.7)	0 (0.6)	13 (0.6)	603 (3.6)	–1 (0.9)	38 (1.0)	579 (2.7)	–2 (1.3)
Kazakhstan	6 (0.6)	560 (11.0)	∅ ∅	9 (0.9)	558 (7.2)	∅ ∅	28 (2.9)	548 (9.7)	∅ ∅
Kuwait	r 14 (0.9)	300 (6.7)	∅ ∅	10 (0.5)	325 (9.6)	∅ ∅	24 (1.0)	344 (4.8)	∅ ∅
Latvia	13 (0.9)	556 (5.5)	–6 (1.4) ▼	16 (0.8)	559 (3.9)	–5 (1.4) ▼	41 (1.2)	542 (2.7)	3 (1.7)
Lithuania	6 (0.5)	540 (7.3)	–1 (0.7)	9 (0.6)	555 (5.3)	–2 (0.9) ▼	34 (1.0)	548 (2.7)	–2 (1.4)
Morocco	r 5 (1.2)	377 (22.1)	4 (1.2) ▲	5 (0.7)	368 (17.4)	2 (0.8) ▲	13 (1.0)	364 (7.7)	3 (1.4) ▲
Netherlands	11 (0.9)	547 (6.0)	–3 (1.4) ▼	15 (0.7)	554 (3.9)	–4 (1.2) ▼	40 (1.1)	543 (2.4)	3 (1.6)
New Zealand	17 (0.8)	524 (3.7)	0 (1.1)	22 (0.7)	519 (3.0)	0 (1.0)	34 (0.7)	498 (3.2)	–2 (1.3)
Norway	13 (0.7)	489 (5.2)	–4 (1.1) ▼	19 (0.8)	493 (3.8)	–2 (1.1) ▼	37 (1.2)	480 (2.8)	1 (1.5)
Qatar	22 (0.4)	297 (3.0)	∅ ∅	14 (0.4)	313 (3.1)	∅ ∅	25 (0.5)	319 (2.6)	∅ ∅
Russian Federation	11 (0.7)	556 (6.7)	–1 (1.0)	14 (0.7)	564 (5.6)	–1 (1.1)	39 (1.1)	553 (5.3)	4 (1.6) ▲
Scotland	17 (0.9)	518 (5.2)	–4 (1.4) ▼	19 (0.9)	519 (3.3)	1 (1.2)	33 (1.0)	503 (2.5)	2 (1.4)
Singapore	13 (0.5)	627 (5.1)	2 (0.8) ▲	18 (0.8)	629 (4.4)	1 (1.2)	37 (0.8)	608 (4.0)	–2 (1.2)
Slovak Republic	8 (0.5)	517 (7.6)	∅ ∅	12 (0.6)	527 (3.9)	∅ ∅	36 (1.0)	514 (3.8)	∅ ∅
Slovenia	10 (0.6)	519 (5.1)	–3 (1.1) ▼	13 (0.6)	523 (3.4)	–2 (1.1)	38 (1.0)	515 (2.2)	1 (1.4)
Sweden	17 (1.0)	530 (3.1)	∅ ∅	21 (0.8)	517 (3.1)	∅ ∅	35 (1.0)	504 (2.6)	∅ ∅
Tunisia	r 3 (0.4)	359 (13.6)	–1 (0.7)	5 (0.5)	386 (12.0)	–3 (0.9) ▼	18 (1.1)	375 (6.3)	1 (1.6)
Ukraine	9 (0.6)	488 (6.3)	∅ ∅	12 (0.7)	501 (4.5)	∅ ∅	37 (1.0)	481 (3.3)	∅ ∅
United States	15 (0.6)	552 (3.8)	1 (0.9)	16 (0.5)	554 (3.3)	–1 (0.7)	34 (0.6)	538 (2.4)	0 (0.9)
Yemen	r 4 (0.6)	201 (18.4)	∅ ∅	4 (0.4)	213 (10.6)	∅ ∅	10 (1.0)	235 (9.5)	∅ ∅
International Avg.	12 (0.1)	494 (1.3)		13 (0.1)	495 (1.1)		30 (0.2)	486 (0.8)	
<b>Benchmarking Participants</b>									
Alberta, Canada	18 (1.0)	519 (4.2)	∅ ∅	23 (1.0)	517 (3.9)	∅ ∅	36 (0.8)	509 (3.2)	∅ ∅
British Columbia, Canada	19 (0.8)	525 (3.9)	∅ ∅	21 (0.7)	519 (3.9)	∅ ∅	37 (0.9)	509 (3.0)	∅ ∅
Dubai, UAE	r 11 (0.6)	463 (6.3)	∅ ∅	12 (0.8)	493 (5.3)	∅ ∅	31 (0.9)	470 (3.5)	∅ ∅
Massachusetts, US	22 (1.8)	599 (5.4)	∅ ∅	23 (1.1)	587 (3.9)	∅ ∅	37 (1.4)	567 (3.8)	∅ ∅
Minnesota, US	17 (1.0)	581 (7.6)	∅ ∅	22 (1.2)	574 (5.5)	∅ ∅	36 (1.2)	560 (5.4)	∅ ∅
Ontario, Canada	18 (1.0)	533 (4.2)	–2 (1.8)	23 (1.2)	526 (4.2)	1 (1.6)	34 (1.2)	514 (3.1)	–2 (1.8)
Quebec, Canada	11 (0.8)	531 (4.9)	4 (1.0) ▲	15 (0.9)	535 (4.1)	4 (1.1) ▲	39 (1.1)	528 (2.5)	–4 (1.5) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

Background data provided by students.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (∅) indicates the country did not participate in the assessment.



Exhibit 4.4 Books in the Home with Trends (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	11–25 Books			0–10 Books				
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003		
Algeria	29 (1.4)	395 (6.5)	0 0	54 (1.9)	374 (6.8)	0 0		
Armenia	r 23 (1.6)	502 (9.9)	1 (1.8)	23 (1.5)	507 (7.8)	6 (1.9)	⬆	
Australia	13 (0.8)	486 (5.8)	0 (1.2)	6 (0.6)	458 (8.1)	0 (1.0)		
Austria	29 (0.9)	490 (2.7)	0 0	11 (0.6)	458 (4.1)	0 0		
Chinese Taipei	25 (0.8)	557 (2.8)	1 (1.1)	16 (0.8)	537 (3.6)	-1 (1.1)		
Colombia	26 (0.9)	371 (6.3)	0 0	44 (1.4)	345 (4.4)	0 0		
Czech Republic	26 (1.2)	466 (2.6)	0 0	6 (0.7)	424 (7.0)	0 0		
Denmark	23 (1.1)	509 (3.9)	0 0	9 (0.7)	483 (7.7)	0 0		
El Salvador	26 (0.9)	349 (4.8)	0 0	52 (1.3)	318 (4.9)	0 0		
England	17 (0.8)	513 (3.9)	0 (1.3)	9 (0.7)	473 (5.6)	1 (1.1)		
Georgia	24 (1.4)	439 (4.7)	0 0	17 (1.2)	414 (7.5)	0 0		
Germany	25 (1.0)	506 (3.1)	0 0	8 (0.7)	465 (5.1)	0 0		
Hong Kong SAR	22 (0.9)	597 (4.4)	-8 (1.2)	⬇	16 (1.0)	588 (5.3)	-9 (1.7)	⬇
Hungary	25 (1.0)	484 (3.9)	3 (1.3)	⬆	10 (0.9)	429 (7.5)	2 (1.1)	
Iran, Islamic Rep. of	25 (1.2)	419 (5.2)	3 (1.7)	⬆	53 (1.9)	380 (4.7)	-2 (2.9)	
Italy	31 (0.8)	500 (3.9)	-2 (1.3)	⬇	14 (0.9)	483 (5.7)	-4 (1.3)	⬇
Japan	28 (0.9)	556 (2.6)	1 (1.2)	14 (0.7)	522 (4.3)	2 (1.1)	⬆	
Kazakhstan	34 (2.9)	541 (10.0)	0 0	22 (2.7)	558 (9.1)	0 0		
Kuwait	r 30 (1.2)	328 (4.7)	0 0	22 (1.2)	317 (5.6)	0 0		
Latvia	22 (1.1)	518 (4.3)	5 (1.4)	⬆	8 (0.7)	501 (6.3)	2 (1.0)	⬆
Lithuania	36 (1.3)	522 (3.0)	2 (1.7)	⬆	15 (0.8)	493 (5.9)	3 (1.2)	⬆
Morocco	r 23 (1.3)	357 (6.8)	-2 (2.0)	⬇	53 (2.2)	336 (7.1)	-7 (3.1)	⬇
Netherlands	25 (1.1)	519 (3.2)	3 (1.5)	⬆	9 (0.8)	502 (6.4)	0 (1.1)	
New Zealand	18 (0.6)	460 (3.4)	1 (0.9)	⬆	10 (0.6)	432 (6.3)	1 (0.9)	
Norway	23 (0.8)	460 (3.2)	6 (1.1)	⬆	7 (0.6)	420 (5.0)	0 (0.8)	
Qatar	19 (0.5)	300 (3.4)	0 0	19 (0.5)	287 (3.4)	0 0		
Russian Federation	26 (1.0)	535 (5.4)	-1 (1.8)	10 (1.8)	494 (13.8)	0 (1.9)		
Scotland	20 (0.8)	475 (3.4)	0 (1.4)	12 (0.8)	439 (4.6)	1 (1.1)		
Singapore	21 (0.8)	578 (4.9)	-1 (1.2)	10 (0.6)	540 (5.1)	0 (1.0)		
Slovak Republic	32 (0.9)	489 (4.4)	0 0	11 (1.3)	434 (8.7)	0 0		
Slovenia	30 (1.0)	487 (2.4)	2 (1.5)	9 (0.6)	459 (4.7)	2 (0.8)	⬆	
Sweden	21 (0.9)	483 (3.7)	0 0	7 (0.7)	454 (6.4)	0 0		
Tunisia	r 29 (1.3)	354 (5.7)	0 (2.0)	⬇	44 (2.1)	304 (5.1)	3 (3.1)	
Ukraine	31 (1.1)	459 (3.8)	0 0	11 (0.8)	425 (6.3)	0 0		
United States	21 (0.5)	512 (2.6)	-1 (0.8)	14 (0.7)	480 (3.0)	1 (0.9)		
Yemen	r 22 (1.8)	244 (9.4)	0 0	60 (2.4)	229 (7.0)	0 0		
International Avg.	25 (0.2)	466 (0.8)		20 (0.2)	438 (1.1)			
<b>Benchmarking Participants</b>								
Alberta, Canada	18 (0.9)	481 (4.0)	0 0	6 (0.6)	472 (5.5)	0 0		
British Columbia, Canada	18 (0.8)	478 (4.2)	0 0	6 (0.5)	463 (5.6)	0 0		
Dubai, UAE	r 29 (1.2)	441 (3.8)	0 0	17 (1.2)	410 (8.1)	0 0		
Massachusetts, US	13 (1.2)	538 (6.4)	0 0	5 (0.8)	522 (7.9)	0 0		
Minnesota, US	17 (1.1)	522 (5.9)	0 0	9 (1.3)	492 (7.5)	0 0		
Ontario, Canada	19 (1.3)	493 (4.4)	3 (1.8)	6 (0.9)	454 (9.4)	-1 (1.3)		
Quebec, Canada	23 (0.9)	506 (4.9)	-4 (1.2)	⬇	11 (0.9)	488 (6.4)	0 (1.1)	

⬆ 2007 percent significantly higher

⬇ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 4.4 Books in the Home with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	More than 200 Books			101–200 Books			26–100 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	2 (0.3)	~ ~	◊ ◊	4 (0.3)	395 (5.6)	◊ ◊	17 (0.8)	398 (2.7)	◊ ◊
Armenia	19 (0.9)	511 (3.8)	-1 (1.3)	13 (0.7)	511 (6.1)	0 (0.9)	28 (1.0)	503 (4.7)	0 (1.3)
Australia	22 (1.1)	532 (5.9)	-9 (1.8) ▼	22 (0.8)	516 (4.7)	-1 (1.2)	32 (1.1)	492 (4.4)	2 (1.4)
Bahrain	11 (0.5)	409 (4.3)	-6 (0.7) ▼	13 (0.6)	428 (4.3)	-1 (0.9)	32 (0.7)	411 (2.7)	1 (1.1)
Bosnia and Herzegovina	3 (0.3)	500 (8.5)	◊ ◊	4 (0.4)	487 (7.5)	◊ ◊	22 (0.8)	475 (3.4)	◊ ◊
Botswana	6 (0.4)	376 (6.8)	1 (0.6)	5 (0.4)	376 (6.9)	0 (0.5)	14 (0.7)	383 (4.9)	1 (0.9)
Bulgaria	23 (1.0)	504 (5.6)	-6 (1.7) ▼	15 (0.7)	497 (5.7)	-3 (1.1) ▼	24 (0.9)	474 (5.0)	-1 (1.4)
Chinese Taipei	18 (1.2)	649 (4.9)	3 (1.5)	13 (0.7)	636 (5.1)	-1 (0.9)	31 (0.9)	611 (4.3)	1 (1.1)
Colombia	3 (0.3)	443 (10.4)	◊ ◊	4 (0.5)	429 (9.4)	◊ ◊	20 (1.2)	406 (3.9)	◊ ◊
Cyprus	13 (0.6)	490 (4.1)	2 (0.8) ●	17 (0.7)	499 (3.4)	2 (1.0)	34 (0.6)	474 (2.4)	-1 (1.1)
Czech Republic	12 (0.6)	543 (4.3)	◊ ◊	21 (0.8)	527 (3.2)	◊ ◊	40 (0.8)	506 (2.4)	◊ ◊
Egypt	5 (0.4)	386 (9.1)	-1 (0.6)	5 (0.4)	417 (8.9)	-1 (0.6)	21 (0.7)	411 (4.8)	4 (1.0) ●
El Salvador	3 (0.4)	348 (9.9)	◊ ◊	4 (0.5)	380 (11.7)	◊ ◊	16 (0.8)	367 (4.7)	◊ ◊
England	18 (1.0)	568 (5.8)	-7 (1.5) ▼	18 (0.9)	536 (5.6)	0 (1.4)	28 (0.9)	521 (4.9)	1 (1.3)
Georgia	20 (1.5)	443 (6.0)	◊ ◊	15 (0.9)	436 (8.2)	◊ ◊	27 (1.0)	410 (7.8)	◊ ◊
Ghana	6 (0.5)	315 (10.1)	-4 (0.8) ▼	4 (0.4)	314 (10.9)	-2 (0.6) ▼	13 (0.7)	328 (6.8)	-3 (1.0) ▼
Hong Kong SAR	10 (0.6)	610 (6.7)	1 (0.9)	9 (0.5)	598 (6.4)	1 (0.7)	26 (1.0)	591 (5.8)	-1 (1.1)
Hungary	26 (1.1)	560 (4.3)	-5 (1.6) ▼	21 (0.7)	538 (4.4)	-1 (1.0)	30 (0.9)	510 (3.5)	1 (1.3)
Indonesia	1 (0.2)	~ ~	0 (0.2)	2 (0.3)	~ ~	0 (0.4)	17 (0.8)	425 (6.2)	-3 (1.1) ▼
Iran, Islamic Rep. of	6 (0.5)	445 (9.5)	-1 (0.7)	5 (0.5)	453 (10.0)	0 (0.6)	16 (1.1)	442 (6.2)	-1 (1.3)
Israel	21 (1.1)	493 (5.5)	-1 (1.4)	19 (0.8)	485 (5.3)	-3 (1.1) ▼	31 (1.0)	466 (4.7)	-2 (1.3)
Italy	22 (1.2)	505 (3.5)	3 (1.5)	16 (0.7)	498 (4.4)	2 (0.9) ●	28 (0.8)	482 (3.0)	3 (1.0) ●
Japan	16 (0.8)	604 (4.6)	-1 (1.0)	16 (0.8)	588 (3.9)	0 (0.9)	32 (0.8)	577 (3.3)	0 (1.2)
Jordan	9 (0.6)	463 (6.7)	0 (0.9)	10 (0.6)	453 (7.5)	2 (0.7) ●	29 (0.8)	444 (4.5)	2 (1.2)
Korea, Rep. of	26 (1.0)	643 (3.6)	7 (1.3) ●	25 (0.7)	613 (2.9)	3 (1.0) ●	29 (0.8)	584 (3.0)	-4 (1.1) ▼
Kuwait	10 (0.5)	354 (5.5)	◊ ◊	9 (0.4)	373 (5.2)	◊ ◊	24 (0.7)	367 (3.6)	◊ ◊
Lebanon	10 (0.7)	464 (7.6)	2 (0.9) ●	10 (0.6)	473 (6.1)	2 (1.0)	28 (1.1)	466 (5.2)	3 (1.5) ●
Lithuania	10 (0.6)	544 (4.2)	-2 (1.0)	13 (0.5)	544 (4.2)	-2 (0.8) ▼	33 (0.8)	520 (3.0)	-1 (1.2)
Malaysia	5 (0.6)	532 (9.0)	0 (0.8)	9 (0.7)	510 (6.0)	1 (0.9)	29 (0.8)	493 (5.2)	0 (1.1)
Malta	19 (0.5)	519 (3.3)	◊ ◊	19 (0.5)	516 (3.0)	◊ ◊	37 (0.7)	491 (2.4)	◊ ◊
Norway	25 (0.9)	493 (2.9)	-2 (1.5)	20 (0.7)	482 (2.3)	-2 (1.0)	30 (0.7)	471 (2.7)	-3 (1.1) ▼
Oman	9 (0.7)	395 (6.7)	◊ ◊	11 (0.8)	399 (5.3)	◊ ◊	28 (1.0)	394 (4.1)	◊ ◊
Palestinian Nat'l Auth.	7 (0.6)	380 (9.0)	0 (0.8)	7 (0.4)	398 (7.6)	0 (0.6)	23 (0.9)	386 (4.7)	-1 (1.1)
Qatar	16 (0.5)	317 (3.9)	◊ ◊	13 (0.4)	329 (3.5)	◊ ◊	27 (0.6)	326 (2.4)	◊ ◊
Romania	9 (0.7)	524 (6.4)	-3 (1.4) ▼	11 (0.6)	513 (7.2)	-2 (1.2)	30 (1.1)	485 (3.9)	1 (1.6)
Russian Federation	16 (0.8)	540 (5.9)	-6 (1.5) ▼	21 (0.8)	533 (4.7)	-5 (1.3) ▼	37 (0.9)	511 (5.0)	4 (1.6) ●
Saudi Arabia	8 (0.8)	342 (6.0)	--	7 (0.6)	358 (6.3)	--	25 (1.0)	348 (4.8)	--
Scotland	15 (0.8)	540 (5.7)	-3 (1.3) ▼	14 (0.7)	527 (4.6)	-2 (1.0) ▼	25 (0.8)	499 (3.6)	-4 (1.2) ▼
Serbia	8 (0.6)	532 (6.3)	2 (0.8)	9 (0.6)	520 (6.8)	0 (0.8)	26 (0.9)	514 (3.9)	0 (1.4)
Singapore	14 (0.6)	636 (3.6)	-1 (0.8)	15 (0.6)	625 (3.9)	-1 (0.7)	32 (0.8)	607 (3.8)	-2 (1.1)
Slovenia	11 (0.6)	535 (4.1)	-2 (1.0)	15 (0.7)	529 (3.9)	0 (1.0)	37 (0.9)	509 (2.4)	0 (1.3)
Sweden	26 (1.0)	521 (2.8)	-5 (1.6) ▼	20 (0.7)	502 (3.0)	-1 (0.9)	29 (0.8)	486 (2.8)	2 (1.2)
Syrian Arab Republic	5 (0.4)	401 (8.1)	◊ ◊	7 (0.4)	409 (6.7)	◊ ◊	22 (0.8)	409 (4.3)	◊ ◊
Thailand	3 (0.5)	538 (14.5)	◊ ◊	4 (0.4)	506 (13.4)	◊ ◊	21 (1.0)	471 (7.0)	◊ ◊
Tunisia	3 (0.3)	461 (8.0)	-1 (0.5)	5 (0.5)	477 (6.3)	-1 (0.8)	21 (1.0)	441 (3.3)	-1 (1.4)
Turkey	5 (0.5)	494 (10.8)	◊ ◊	9 (0.6)	497 (7.9)	◊ ◊	23 (0.9)	467 (5.4)	◊ ◊
Ukraine	12 (0.9)	500 (7.0)	◊ ◊	16 (0.7)	489 (4.5)	◊ ◊	35 (0.9)	472 (3.8)	◊ ◊
United States	18 (0.8)	546 (3.4)	-6 (1.2) ▼	17 (0.6)	538 (3.3)	-1 (0.8)	28 (0.7)	515 (2.4)	1 (0.9)
‡ Morocco	6 (0.7)	400 (7.4)	--	8 (0.8)	406 (5.1)	--	22 (1.4)	395 (5.9)	--
International Avg.	12 (0.1)	486 (1.0)		12 (0.1)	481 (0.9)		27 (0.1)	464 (0.6)	
<b>Benchmarking Participants</b>									
Basque Country, Spain	26 (1.3)	527 (3.9)	1 (1.9)	22 (1.1)	510 (3.4)	2 (1.4)	33 (1.3)	493 (3.8)	-3 (1.8)
British Columbia, Canada	24 (1.0)	531 (3.7)	◊ ◊	21 (0.8)	519 (3.5)	◊ ◊	31 (0.8)	513 (3.3)	◊ ◊
Dubai, UAE	11 (0.9)	501 (6.6)	◊ ◊	14 (0.9)	500 (5.1)	◊ ◊	29 (0.9)	481 (3.0)	◊ ◊
Massachusetts, US	26 (2.0)	587 (5.3)	◊ ◊	19 (1.1)	564 (4.1)	◊ ◊	27 (1.5)	551 (5.1)	◊ ◊
Minnesota, US	23 (1.9)	560 (6.1)	◊ ◊	21 (1.5)	551 (5.4)	◊ ◊	30 (1.6)	528 (3.9)	◊ ◊
Ontario, Canada	23 (1.3)	544 (3.8)	-5 (2.0) ▼	22 (1.0)	528 (4.0)	1 (1.3)	31 (0.9)	517 (3.6)	1 (1.5)
Quebec, Canada	12 (0.9)	567 (7.6)	-1 (1.2)	13 (0.7)	553 (6.1)	-3 (1.1) ▼	32 (1.0)	533 (3.6)	-2 (1.3)

● 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.



Exhibit 4.4 Books in the Home with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	11–25 Books			0–10 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	41 (0.8)	386 (2.8)	0 0	36 (1.2)	382 (2.5)	0 0
Armenia	24 (1.0)	487 (4.9)	0 (1.3)	16 (0.9)	485 (7.1)	0 (1.3)
Australia	15 (1.0)	464 (4.9)	4 (1.2) ▲	9 (0.6)	438 (5.5)	4 (0.8) ▲
Bahrain	27 (0.8)	381 (2.8)	1 (1.1)	17 (0.7)	375 (4.0)	6 (0.8) ▲
Bosnia and Herzegovina	45 (1.0)	454 (2.9)	0 0	26 (1.0)	435 (3.8)	0 0
Botswana	37 (1.0)	364 (2.5)	7 (1.3) ▲	39 (0.8)	358 (3.0)	-10 (1.5) ▼
Bulgaria	16 (0.9)	444 (7.1)	1 (1.1)	22 (1.4)	410 (9.7)	8 (2.1) ▲
Chinese Taipei	21 (0.9)	577 (5.6)	-3 (1.2) ▼	17 (1.1)	518 (5.8)	0 (1.4)
Colombia	35 (1.1)	383 (4.4)	0 0	37 (1.9)	351 (3.3)	0 0
Cyprus	25 (0.7)	444 (3.1)	-2 (1.0)	10 (0.5)	407 (4.9)	-1 (0.7)
Czech Republic	20 (0.7)	469 (3.4)	0 0	7 (0.5)	451 (5.5)	0 0
Egypt	38 (0.9)	390 (4.3)	0 (1.2)	31 (1.1)	381 (4.8)	-2 (1.6)
El Salvador	32 (1.0)	348 (3.6)	0 0	44 (1.4)	322 (3.1)	0 0
England	21 (0.9)	485 (5.3)	4 (1.3) ▲	15 (1.0)	452 (6.4)	2 (1.5)
Georgia	25 (1.3)	389 (8.8)	0 0	13 (1.4)	375 (8.6)	0 0
Ghana	39 (1.3)	306 (4.4)	5 (1.6) ▲	38 (1.7)	308 (5.6)	3 (2.2)
Hong Kong SAR	30 (0.8)	568 (6.3)	1 (1.1)	26 (1.0)	537 (7.4)	-2 (1.3)
Hungary	15 (0.9)	469 (4.5)	2 (1.1)	7 (0.6)	431 (7.5)	3 (0.9) ▲
Indonesia	55 (1.2)	389 (3.8)	10 (1.5) ▲	25 (1.3)	393 (5.4)	-7 (1.6) ▼
Iran, Islamic Rep. of	30 (1.2)	402 (5.1)	-1 (1.4)	43 (1.8)	379 (3.9)	4 (2.2)
Israel	20 (1.0)	440 (5.0)	3 (1.3)	9 (0.6)	417 (9.4)	3 (0.8) ▲
Italy	23 (0.8)	458 (4.3)	-6 (1.1) ▼	11 (0.6)	439 (6.3)	-2 (0.9) ▼
Japan	21 (0.7)	551 (4.0)	0 (0.9)	15 (0.8)	526 (4.4)	1 (1.1)
Jordan	35 (0.9)	417 (5.1)	2 (1.3)	17 (0.9)	395 (7.5)	-6 (1.2) ▼
Korea, Rep. of	11 (0.6)	548 (4.9)	0 (0.8)	9 (0.6)	528 (4.6)	-6 (0.9) ▼
Kuwait	30 (0.8)	354 (3.6)	0 0	27 (0.9)	341 (3.7)	0 0
Lebanon	30 (1.1)	442 (4.8)	-6 (1.6) ▼	22 (1.3)	425 (4.4)	-1 (1.9)
Lithuania	32 (1.0)	483 (3.1)	3 (1.5)	12 (0.9)	458 (6.1)	2 (1.2)
Malaysia	38 (1.0)	460 (4.6)	-2 (1.4)	19 (1.0)	439 (5.7)	2 (1.4)
Malta	18 (0.6)	460 (3.6)	0 0	8 (0.3)	401 (4.2)	0 0
Norway	17 (0.8)	443 (3.4)	6 (1.0) ▲	7 (0.5)	415 (3.9)	1 (0.6)
Oman	31 (0.9)	366 (4.0)	0 0	21 (1.0)	338 (4.6)	0 0
Palestinian Nat'l Auth.	35 (1.0)	369 (4.3)	-1 (1.3)	29 (1.2)	349 (4.7)	2 (1.6)
Qatar	25 (0.5)	295 (2.3)	0 0	19 (0.5)	275 (2.8)	0 0
Romania	33 (1.1)	442 (5.9)	7 (1.7) ▲	17 (1.1)	398 (6.2)	-3 (2.1)
Russian Federation	22 (0.8)	484 (5.1)	5 (1.3) ▲	5 (0.6)	467 (9.7)	1 (0.8)
Saudi Arabia	32 (0.9)	328 (4.0)	--	27 (1.1)	306 (4.7)	--
Scotland	24 (0.9)	469 (4.1)	3 (1.3) ▲	22 (1.1)	439 (4.5)	6 (1.4) ▲
Serbia	39 (1.3)	470 (3.6)	1 (1.6)	18 (1.0)	443 (5.0)	-3 (1.5)
Singapore	24 (0.8)	568 (5.0)	0 (1.0)	16 (0.8)	536 (6.6)	4 (1.0) ▲
Slovenia	29 (0.9)	479 (3.1)	3 (1.2) ▲	7 (0.5)	449 (4.5)	0 (0.8)
Sweden	16 (0.7)	468 (3.0)	2 (1.0)	8 (0.5)	442 (5.1)	2 (0.7) ▲
Syrian Arab Republic	39 (0.8)	393 (4.1)	0 0	27 (1.1)	386 (4.8)	0 0
Thailand	42 (1.2)	434 (4.3)	0 0	30 (1.5)	413 (5.5)	0 0
Tunisia	41 (1.0)	412 (2.5)	-3 (1.5) ▼	30 (1.4)	406 (3.0)	7 (1.8) ▲
Turkey	37 (1.0)	427 (4.9)	0 0	26 (1.5)	378 (4.1)	0 0
Ukraine	30 (1.1)	435 (4.3)	0 0	7 (0.5)	406 (7.3)	0 0
United States	20 (0.7)	482 (3.0)	2 (0.9) ▲	17 (0.9)	461 (3.6)	4 (1.0) ▲
‡ Morocco	38 (1.2)	374 (4.0)	--	25 (1.7)	367 (4.6)	--
International Avg.	29 (0.1)	436 (0.6)		20 (0.2)	413 (0.8)	
<b>Benchmarking Participants</b>						
Basque Country, Spain	15 (1.0)	468 (5.3)	-1 (1.3)	5 (0.6)	429 (8.1)	0 (0.8)
British Columbia, Canada	15 (0.8)	485 (6.2)	0 0	9 (0.6)	460 (5.9)	0 0
Dubai, UAE	29 (1.4)	445 (3.8)	0 0	17 (0.9)	414 (4.9)	0 0
Massachusetts, US	15 (0.7)	509 (6.1)	0 0	12 (1.0)	478 (9.6)	0 0
Minnesota, US	16 (1.1)	511 (7.5)	0 0	10 (0.9)	483 (6.4)	0 0
Ontario, Canada	16 (1.0)	489 (4.9)	3 (1.3) ▲	8 (0.9)	474 (10.7)	1 (1.1)
Quebec, Canada	26 (1.0)	515 (3.6)	2 (1.4)	18 (0.8)	501 (3.0)	3 (1.1) ▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower



learning experiences. Exhibit 4.5 presents fourth and eighth grade students' reports of having a computer at home and whether or not it has an Internet connection, in relation to their average achievement in mathematics.

At both grades, 70 percent of students reported having a computer at home, and about half (56% at fourth grade, 50% at eighth grade) had an Internet connection. Ninety percent or more of the fourth grade students reported having a computer at home in Australia, Austria, the Czech Republic, Denmark, England, Germany, Hong Kong SAR, the Netherlands, New Zealand, Norway, Scotland, Singapore, Sweden, the United States, as well as Massachusetts, Minnesota, and the four Canadian provinces. In addition, in Denmark, the Netherlands, Norway, Sweden, and the state of Massachusetts, more than 90 percent of students reported having an Internet connection for the computer. Although having a computer at home is clearly very common in many countries, there also are countries where relatively few fourth grade students come from computer equipped homes, and even fewer from homes with computers connected to the Internet. More than 60 percent of students in Algeria, Colombia, El Salvador, Georgia, Iran, Kazakhstan, and Yemen are from homes without a computer, and about 80 percent (or more) do not have a computer connected to the Internet.

On average across countries at the fourth grade, students from homes with a computer had mathematics achievement nearly 40 points above those from homes without a computer (483 points, on average vs. 444 points), and those from homes with an Internet-connected computer nearly 30 points above students from homes without such a facility (483 vs. 455). These achievement differences may be at least partly a reflection of socioeconomic differences, since, in many countries, computers and Internet connections require significant financial outlay.

At the eighth grade, in 18 of the 49 countries and in all 7 benchmarking entities, 90 percent or more of the students reported that they had a computer in the home, and the vast majority of students in these countries also reported having an Internet connection for the computer. However, there also were countries where many students did not have a computer at home, including

Armenia, Botswana, Colombia, El Salvador, Georgia, Ghana, Indonesia, and Tunisia, where 60 percent or more of students reported not having a computer at home, and 80 percent or more did not have Internet access at home. Like at the fourth grade, eighth grade students with a computer at home had higher average mathematics achievement than students without a computer, and students with an Internet-connected computer had higher achievement than students than those that did not.

From an educational perspective, actually using a computer may be more important for a student than merely having one in the home. Exhibit 4.6 presents students' reports on where, if anywhere, they use a computer. This exhibit presents, for each TIMSS participant at fourth and eighth grades, the percentage of students that reported using a computer both at home and at school, at home but not at school, at school but not at home, only at places other than home and school, and not using a computer at all. Also shown is the average mathematics achievement for students in each category of computer use, as well as changes in the percentages in each category since 2003. Countries are ordered by the percentage of students using a computer both at home and at school.

At fourth grade, on average across countries, 38 percent of students reported using a computer both at home and at school and a further 31 percent at home but not at school. Just 9 percent reported using a computer at school but not at home, 5 percent only at places other than home and school, and 17 percent reported not using a computer at all. Average achievement was highest among those reporting using a computer at home and at school and at home only, perhaps reflecting an economic advantage for those with a computer at home, and lowest among those reporting that they do not use a computer at all or use one only at places other than the home and the school.

TIMSS participants with the highest percentage (more than 70%) of students reporting using a computer both at home and at school included Chinese Taipei, Scotland, Australia, England, Hong Kong SAR, the Netherlands, Denmark, and Canadian provinces of Alberta, Ontario, and British Columbia. As a contrast, 40 percent or more of fourth grade students in

Exhibit 4.5 Computer and Internet Connection in the Home

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Have Computer		Do Not Have Computer		Have Internet Connection		Do Not Have Internet Connection	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	32 (1.5)	391 (6.6)	68 (1.5)	375 (5.4)	13 (1.0)	369 (7.6)	87 (1.0)	382 (5.3)
Armenia	38 (1.6)	499 (4.5)	62 (1.6)	504 (5.4)	21 (1.3)	506 (13.6)	79 (1.3)	500 (3.9)
Australia	95 (0.6)	521 (3.3)	5 (0.6)	446 (11.0)	84 (0.8)	527 (3.3)	16 (0.8)	470 (6.0)
Austria	93 (0.5)	509 (2.0)	7 (0.5)	471 (4.4)	73 (1.2)	516 (2.0)	27 (1.2)	478 (2.9)
Chinese Taipei	87 (0.6)	583 (1.7)	13 (0.6)	535 (3.9)	80 (0.7)	582 (1.8)	20 (0.7)	554 (3.7)
Colombia	39 (1.2)	379 (6.8)	61 (1.2)	346 (4.8)	16 (0.9)	382 (10.1)	84 (0.9)	354 (4.8)
Czech Republic	90 (0.7)	491 (2.5)	10 (0.7)	449 (6.0)	65 (1.2)	498 (3.0)	35 (1.2)	467 (3.6)
Denmark	95 (0.4)	526 (2.4)	5 (0.4)	482 (9.1)	93 (0.4)	527 (2.4)	7 (0.4)	483 (6.7)
El Salvador	26 (1.3)	358 (6.2)	74 (1.3)	325 (4.2)	14 (0.9)	348 (8.7)	86 (0.9)	331 (4.1)
England	95 (0.4)	545 (2.7)	5 (0.4)	489 (8.7)	86 (0.7)	549 (2.8)	14 (0.7)	499 (4.6)
Georgia	33 (1.5)	439 (4.8)	67 (1.5)	443 (5.0)	17 (1.5)	432 (6.1)	83 (1.5)	443 (4.6)
Germany	93 (0.5)	532 (2.3)	7 (0.5)	489 (5.9)	81 (0.8)	536 (2.2)	19 (0.8)	495 (4.0)
Hong Kong SAR	94 (0.5)	609 (3.6)	6 (0.5)	580 (7.2)	86 (0.8)	611 (3.6)	14 (0.8)	583 (5.0)
Hungary	81 (0.7)	525 (3.5)	19 (0.7)	462 (6.1)	54 (1.3)	531 (4.0)	46 (1.3)	488 (3.8)
Iran, Islamic Rep. of	29 (1.7)	444 (5.3)	71 (1.7)	388 (4.5)	18 (1.3)	450 (6.4)	82 (1.3)	394 (4.3)
Italy	88 (0.8)	510 (3.0)	12 (0.8)	482 (5.9)	54 (1.0)	513 (2.7)	46 (1.0)	499 (4.5)
Japan	82 (0.9)	577 (2.1)	18 (0.9)	539 (3.5)	70 (1.2)	579 (2.2)	30 (1.2)	545 (2.8)
Kazakhstan	28 (1.8)	555 (6.4)	72 (1.8)	547 (8.7)	16 (1.6)	547 (7.9)	84 (1.6)	549 (7.9)
Kuwait	82 (1.0)	331 (3.4)	18 (1.0)	281 (6.0)	64 (1.4)	328 (4.2)	36 (1.4)	310 (4.8)
Latvia	76 (1.2)	547 (2.4)	24 (1.2)	512 (4.0)	57 (1.3)	548 (2.5)	43 (1.3)	523 (3.5)
Lithuania	77 (0.9)	538 (2.4)	23 (0.9)	505 (4.8)	58 (1.4)	545 (2.4)	42 (1.4)	512 (3.3)
Morocco	32 (2.0)	370 (6.9)	68 (2.0)	336 (5.4)	26 (1.7)	361 (7.9)	74 (1.7)	342 (4.9)
Netherlands	95 (0.5)	537 (2.2)	5 (0.5)	494 (6.3)	96 (0.4)	537 (2.2)	4 (0.4)	498 (6.7)
New Zealand	91 (0.5)	499 (2.2)	9 (0.5)	445 (5.3)	77 (0.9)	507 (2.2)	23 (0.9)	449 (3.7)
Norway	95 (0.4)	478 (2.4)	5 (0.4)	413 (7.4)	95 (0.4)	477 (2.6)	5 (0.4)	429 (7.2)
Qatar	80 (0.5)	310 (1.2)	20 (0.5)	268 (2.8)	58 (0.6)	308 (1.3)	42 (0.6)	294 (2.4)
Russian Federation	51 (1.8)	558 (4.5)	49 (1.8)	532 (6.6)	26 (1.4)	560 (4.9)	74 (1.4)	540 (5.7)
Scotland	94 (0.5)	498 (2.2)	6 (0.5)	447 (8.3)	85 (0.7)	502 (2.3)	15 (0.7)	453 (4.2)
Singapore	90 (0.5)	606 (3.7)	10 (0.5)	543 (6.0)	80 (0.7)	612 (3.6)	20 (0.7)	552 (4.8)
Slovak Republic	77 (1.2)	507 (3.8)	23 (1.2)	471 (6.8)	43 (1.1)	509 (4.0)	57 (1.1)	489 (5.0)
Slovenia	85 (0.6)	512 (2.1)	15 (0.6)	463 (3.8)	75 (0.8)	508 (1.9)	25 (0.8)	486 (2.9)
Sweden	98 (0.2)	503 (2.6)	2 (0.2)	~ ~	93 (0.5)	506 (2.5)	7 (0.5)	468 (6.1)
Tunisia	34 (1.3)	358 (6.6)	66 (1.3)	319 (4.1)	21 (1.1)	323 (6.8)	79 (1.1)	336 (4.7)
Ukraine	40 (1.3)	491 (3.1)	60 (1.3)	459 (3.3)	24 (1.1)	484 (4.0)	76 (1.1)	468 (3.1)
United States	90 (0.5)	534 (2.5)	10 (0.5)	489 (4.0)	78 (0.9)	541 (2.4)	22 (0.9)	492 (2.9)
Yemen	18 (1.5)	225 (8.5)	82 (1.5)	228 (6.9)	11 (1.3)	216 (7.0)	89 (1.3)	229 (6.5)
International Avg.	70 (0.2)	483 (0.7)	30 (0.2)	444 (1.2)	56 (0.2)	483 (0.8)	44 (0.2)	455 (0.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Alberta, Canada	94 (0.5)	508 (2.8)	6 (0.5)	470 (6.8)	88 (0.9)	509 (2.8)	12 (0.9)	480 (5.5)
British Columbia, Canada	95 (0.5)	508 (2.7)	5 (0.5)	467 (7.3)	89 (0.8)	510 (2.7)	11 (0.8)	475 (6.2)
Dubai, UAE	89 (0.7)	455 (2.6)	11 (0.7)	398 (6.8)	78 (0.8)	461 (2.6)	22 (0.8)	408 (5.2)
Massachusetts, US	96 (0.7)	575 (3.3)	4 (0.7)	529 (11.5)	91 (1.1)	577 (3.3)	9 (1.1)	529 (8.2)
Minnesota, US	92 (0.9)	558 (5.9)	8 (0.9)	514 (5.8)	81 (1.6)	565 (5.3)	19 (1.6)	506 (9.1)
Ontario, Canada	96 (0.4)	514 (3.1)	4 (0.4)	475 (9.9)	89 (1.0)	518 (2.9)	11 (1.0)	470 (5.5)
Quebec, Canada	95 (0.6)	521 (3.0)	5 (0.6)	486 (6.2)	87 (1.0)	524 (2.8)	13 (1.0)	488 (5.3)

Background data provided by students.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.



Exhibit 4.5 Computer and Internet Connection in the Home (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Have Computer		Do Not Have Computer		Have Internet Connection		Do Not Have Internet Connection	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	53 (1.7)	386 (2.4)	47 (1.7)	389 (3.0)	15 (0.9)	386 (3.2)	85 (0.9)	388 (2.2)
Armenia	34 (1.2)	508 (6.3)	66 (1.2)	495 (3.2)	17 (0.9)	513 (9.0)	83 (0.9)	497 (3.0)
Australia	97 (0.3)	499 (4.0)	3 (0.3)	425 (9.3)	89 (0.7)	503 (3.9)	11 (0.7)	443 (6.2)
Bahrain	86 (0.8)	401 (1.7)	14 (0.8)	390 (3.8)	74 (0.8)	405 (2.0)	26 (0.8)	381 (3.2)
Bosnia and Herzegovina	72 (1.1)	468 (2.7)	28 (1.1)	427 (3.7)	31 (1.3)	485 (3.3)	69 (1.3)	445 (2.7)
Botswana	26 (0.8)	371 (3.5)	74 (0.8)	364 (2.4)	13 (0.7)	357 (5.2)	87 (0.7)	367 (2.4)
Bulgaria	70 (1.3)	480 (5.1)	30 (1.3)	434 (7.3)	57 (1.3)	486 (4.8)	43 (1.3)	438 (6.8)
Chinese Taipei	94 (0.4)	605 (4.3)	6 (0.4)	505 (9.8)	89 (0.7)	605 (4.3)	11 (0.7)	542 (7.4)
Colombia	37 (1.7)	405 (4.5)	63 (1.7)	366 (3.7)	15 (1.4)	423 (7.1)	85 (1.4)	373 (3.8)
Cyprus	94 (0.3)	471 (1.5)	6 (0.3)	395 (6.9)	65 (0.9)	479 (1.9)	35 (0.9)	443 (2.8)
Czech Republic	94 (0.5)	506 (2.4)	6 (0.5)	459 (6.6)	76 (1.1)	512 (2.3)	24 (1.1)	478 (3.8)
Egypt	48 (1.2)	407 (3.9)	52 (1.2)	384 (4.3)	25 (1.2)	405 (4.4)	75 (1.2)	390 (3.8)
El Salvador	30 (1.3)	362 (4.3)	70 (1.3)	333 (2.8)	10 (0.9)	375 (6.8)	90 (0.9)	338 (2.6)
England	98 (0.2)	515 (4.9)	2 (0.2)	~ ~	92 (0.6)	518 (4.8)	8 (0.6)	467 (8.8)
Georgia	26 (1.4)	420 (5.1)	74 (1.4)	408 (6.5)	14 (1.0)	423 (7.0)	86 (1.0)	409 (6.2)
Ghana	25 (1.2)	310 (6.9)	75 (1.2)	313 (4.4)	10 (0.7)	259 (7.7)	90 (0.7)	318 (4.0)
Hong Kong SAR	99 (0.3)	574 (5.7)	1 (0.3)	~ ~	97 (0.4)	575 (5.7)	3 (0.4)	514 (14.1)
Hungary	90 (0.8)	525 (3.4)	10 (0.8)	458 (6.3)	62 (1.6)	538 (3.7)	38 (1.6)	484 (4.0)
Indonesia	17 (1.3)	433 (8.7)	83 (1.3)	393 (3.8)	8 (0.8)	407 (14.1)	92 (0.8)	398 (3.7)
Iran, Islamic Rep. of	39 (1.9)	440 (6.3)	61 (1.9)	384 (3.6)	25 (1.6)	450 (6.9)	75 (1.6)	389 (3.4)
Israel	95 (0.7)	469 (3.9)	5 (0.7)	391 (12.3)	84 (1.2)	474 (4.2)	16 (1.2)	421 (7.5)
Italy	95 (0.4)	482 (2.9)	5 (0.4)	435 (8.9)	70 (1.1)	491 (3.0)	30 (1.1)	453 (3.9)
Japan	88 (0.7)	577 (2.4)	12 (0.7)	529 (4.4)	77 (0.9)	581 (2.5)	23 (0.9)	534 (3.5)
Jordan	66 (1.3)	445 (3.7)	34 (1.3)	395 (5.3)	24 (1.2)	453 (5.0)	76 (1.2)	421 (4.4)
Korea, Rep. of	99 (0.2)	599 (2.7)	1 (0.2)	~ ~	96 (0.3)	601 (2.6)	4 (0.3)	502 (9.7)
Kuwait	94 (0.5)	358 (2.2)	6 (0.5)	312 (7.6)	71 (0.7)	360 (2.5)	29 (0.7)	343 (2.9)
Lebanon	77 (1.4)	459 (4.4)	23 (1.4)	422 (4.0)	36 (1.6)	463 (5.6)	64 (1.6)	443 (4.1)
Lithuania	85 (0.8)	514 (2.3)	15 (0.8)	462 (4.3)	66 (1.2)	521 (2.5)	34 (1.2)	477 (3.2)
Malaysia	59 (1.7)	496 (5.5)	41 (1.7)	442 (4.5)	27 (1.7)	517 (6.3)	73 (1.7)	458 (4.6)
Malta	--	--	--	--	--	--	--	--
Norway	99 (0.2)	471 (1.9)	1 (0.2)	~ ~	97 (0.3)	471 (2.0)	3 (0.3)	427 (7.4)
Oman	67 (1.1)	388 (3.3)	33 (1.1)	348 (4.4)	35 (1.3)	393 (4.0)	65 (1.3)	365 (3.5)
Palestinian Nat'l Auth.	66 (1.3)	382 (3.5)	34 (1.3)	346 (4.9)	31 (1.2)	386 (4.5)	69 (1.2)	363 (3.9)
Qatar	92 (0.3)	313 (1.4)	8 (0.3)	252 (4.5)	74 (0.5)	315 (1.9)	26 (0.5)	289 (2.5)
Romania	64 (1.3)	481 (4.2)	36 (1.3)	436 (5.5)	33 (1.6)	498 (4.7)	67 (1.6)	447 (4.6)
Russian Federation	61 (1.8)	528 (4.4)	39 (1.8)	487 (4.5)	32 (1.4)	534 (5.1)	68 (1.4)	502 (3.9)
Saudi Arabia	81 (1.2)	335 (2.9)	19 (1.2)	313 (5.1)	41 (1.5)	350 (3.2)	59 (1.5)	318 (3.5)
Scotland	98 (0.3)	490 (3.7)	2 (0.3)	~ ~	92 (0.5)	492 (3.7)	8 (0.5)	446 (6.6)
Serbia	77 (1.0)	499 (3.5)	23 (1.0)	447 (5.0)	47 (1.4)	514 (3.7)	53 (1.4)	464 (3.8)
Singapore	94 (0.5)	599 (3.5)	6 (0.5)	509 (6.6)	87 (0.7)	604 (3.5)	13 (0.7)	514 (5.7)
Slovenia	97 (0.3)	504 (2.0)	3 (0.3)	435 (7.1)	86 (0.7)	506 (2.0)	14 (0.7)	473 (4.4)
Sweden	99 (0.2)	492 (2.3)	1 (0.2)	~ ~	97 (0.3)	493 (2.2)	3 (0.3)	455 (6.5)
Syrian Arab Republic	62 (1.3)	400 (3.8)	38 (1.3)	393 (4.7)	19 (1.1)	411 (5.2)	81 (1.1)	394 (3.7)
Thailand	41 (1.6)	478 (7.7)	59 (1.6)	417 (4.4)	20 (1.4)	503 (10.6)	80 (1.4)	426 (4.3)
Tunisia	39 (2.0)	444 (3.1)	61 (2.0)	409 (2.2)	18 (1.2)	444 (4.5)	82 (1.2)	417 (2.2)
Turkey	43 (1.6)	467 (5.6)	57 (1.6)	408 (4.5)	20 (1.2)	491 (7.3)	80 (1.2)	418 (4.2)
Ukraine	46 (1.6)	491 (4.0)	54 (1.6)	439 (3.8)	22 (1.2)	486 (5.3)	78 (1.2)	458 (3.5)
United States	94 (0.4)	511 (2.8)	6 (0.4)	463 (4.8)	87 (0.6)	514 (2.8)	13 (0.6)	472 (3.9)
‡ Morocco	45 (1.8)	399 (4.2)	55 (1.8)	368 (3.0)	37 (1.6)	391 (3.7)	63 (1.6)	376 (3.8)
International Avg.	70 (0.2)	462 (0.7)	30 (0.2)	409 (1.1)	50 (0.2)	466 (0.9)	50 (0.2)	429 (0.9)
<b>Benchmarking Participants</b>								
Basque Country, Spain	96 (0.5)	502 (2.9)	4 (0.5)	431 (10.9)	84 (1.0)	504 (2.9)	16 (1.0)	471 (5.2)
British Columbia, Canada	98 (0.2)	511 (3.1)	2 (0.2)	~ ~	96 (0.5)	513 (3.1)	4 (0.5)	451 (5.9)
Dubai, UAE	95 (0.5)	469 (2.6)	5 (0.5)	396 (7.2)	84 (0.6)	473 (2.6)	16 (0.6)	415 (4.1)
Massachusetts, US	97 (0.4)	549 (4.4)	3 (0.4)	490 (11.3)	93 (0.7)	552 (4.1)	7 (0.7)	482 (10.5)
Minnesota, US	96 (0.5)	535 (4.2)	4 (0.5)	474 (12.1)	89 (1.2)	537 (4.0)	11 (1.2)	492 (8.7)
Ontario, Canada	99 (0.2)	518 (3.5)	1 (0.2)	~ ~	96 (0.5)	519 (3.6)	4 (0.5)	479 (8.7)
Quebec, Canada	97 (0.4)	530 (3.5)	3 (0.4)	490 (8.1)	93 (0.6)	531 (3.5)	7 (0.6)	500 (6.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.



Exhibit 4.6 Computer Use with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Use Computer Both at Home and at School			Use Computer at Home but Not at School			Use Computer at School but Not at Home		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	84 (0.7)	582 (2.0)	3 (1.6)	8 (0.4)	554 (4.9)	2 (1.3)	7 (0.5)	544 (5.7)	-5 (0.9)
Scotland	79 (1.0)	502 (2.2)	2 (1.4)	12 (0.7)	474 (5.7)	5 (1.0)	7 (0.5)	461 (6.6)	-6 (0.9)
Australia	79 (1.4)	525 (3.7)	-2 (2.1)	13 (1.2)	493 (6.2)	7 (1.5)	7 (0.6)	471 (8.9)	-4 (1.2)
England	78 (1.0)	551 (2.9)	-1 (1.5)	13 (0.9)	521 (5.2)	6 (1.1)	7 (0.6)	489 (8.5)	-4 (1.0)
Hong Kong SAR	78 (1.1)	613 (3.6)	2 (1.7)	16 (0.8)	587 (5.0)	7 (1.2)	4 (0.4)	591 (8.3)	-8 (1.0)
Netherlands	77 (1.3)	540 (2.2)	-2 (2.4)	16 (1.3)	521 (4.0)	4 (2.1)	3 (0.3)	517 (9.3)	-1 (0.5)
Denmark	75 (1.4)	528 (2.6)	0 0	21 (1.3)	515 (4.7)	0 0	3 (0.4)	495 (10.3)	0 0
Singapore	67 (1.1)	614 (3.5)	-4 (1.7)	22 (0.8)	584 (4.8)	5 (1.3)	7 (0.5)	548 (6.9)	0 (0.7)
New Zealand	66 (1.0)	506 (2.3)	-5 (1.5)	20 (0.9)	483 (4.4)	8 (1.2)	10 (0.5)	446 (4.9)	-2 (0.9)
Kuwait	61 (1.6)	330 (3.8)	0 0	23 (1.2)	313 (6.1)	0 0	11 (0.7)	291 (6.9)	0 0
Norway	59 (1.8)	482 (3.2)	-1 (2.5)	34 (1.7)	469 (3.2)	6 (2.4)	3 (0.3)	437 (10.9)	-2 (0.6)
United States	58 (1.0)	540 (2.6)	-16 (1.5)	26 (1.0)	524 (3.2)	14 (1.4)	10 (0.5)	496 (3.5)	-1 (0.8)
Sweden	53 (2.0)	508 (2.6)	0 0	42 (2.0)	498 (3.3)	0 0	3 (0.3)	493 (8.9)	0 0
Japan	47 (1.4)	587 (2.3)	-8 (1.8)	19 (1.2)	565 (3.2)	10 (1.4)	26 (1.0)	550 (3.0)	-5 (1.4)
Czech Republic	44 (2.5)	498 (3.4)	0 0	46 (2.4)	483 (3.0)	0 0	6 (0.7)	448 (8.0)	0 0
Qatar	44 (0.6)	314 (1.8)	0 0	38 (0.6)	297 (3.0)	0 0	11 (0.3)	267 (5.5)	0 0
Italy	37 (1.4)	523 (3.1)	7 (2.3)	24 (1.3)	505 (4.1)	-14 (2.3)	5 (0.4)	501 (7.0)	-6 (1.0)
Hungary	33 (2.0)	527 (5.7)	9 (2.9)	49 (2.1)	516 (4.4)	6 (2.9)	7 (0.8)	450 (9.2)	-2 (1.3)
Germany	30 (1.5)	533 (3.8)	0 0	55 (1.5)	528 (2.6)	0 0	3 (0.3)	486 (9.8)	0 0
Slovak Republic	30 (1.7)	517 (5.0)	0 0	46 (1.7)	496 (4.3)	0 0	13 (1.0)	478 (5.5)	0 0
Slovenia	28 (1.5)	508 (2.7)	-4 (2.4)	64 (1.4)	503 (2.0)	18 (2.4)	2 (0.3)	~ ~	-3 (0.7)
Austria	27 (1.5)	515 (2.7)	0 0	56 (1.6)	505 (2.5)	0 0	4 (0.3)	478 (6.5)	0 0
Tunisia	18 (1.4)	336 (9.2)	11 (1.6)	28 (1.5)	353 (6.5)	3 (2.1)	23 (2.1)	323 (7.2)	16 (2.3)
Colombia	15 (1.0)	383 (10.2)	0 0	18 (1.3)	369 (8.4)	0 0	30 (1.8)	357 (6.1)	0 0
Kazakhstan	14 (1.9)	560 (13.2)	0 0	22 (2.0)	543 (6.6)	0 0	26 (2.6)	547 (12.4)	0 0
Latvia	14 (1.2)	546 (6.5)	4 (1.8)	61 (1.6)	546 (2.4)	34 (2.3)	8 (1.0)	504 (8.7)	-9 (2.3)
Morocco	13 (2.2)	346 (21.1)	-3 (2.5)	25 (1.5)	354 (4.8)	0 (2.3)	6 (0.7)	310 (8.2)	-1 (1.0)
Lithuania	13 (1.2)	537 (5.0)	3 (1.7)	64 (1.7)	538 (2.4)	29 (2.2)	7 (0.9)	495 (8.2)	-11 (1.8)
El Salvador	11 (1.3)	356 (12.4)	0 0	20 (1.2)	332 (5.4)	0 0	17 (1.6)	338 (6.4)	0 0
Russian Federation	11 (1.4)	568 (7.9)	7 (1.5)	45 (2.2)	554 (4.4)	25 (2.4)	12 (1.7)	537 (15.0)	1 (2.3)
Yemen	9 (0.9)	209 (9.6)	0 0	23 (1.7)	229 (7.1)	0 0	9 (0.9)	201 (11.9)	0 0
Algeria	8 (1.1)	328 (20.0)	0 0	25 (1.7)	385 (5.8)	0 0	4 (0.5)	332 (15.4)	0 0
Armenia	7 (0.8)	489 (7.3)	2 (0.9)	44 (1.9)	493 (4.3)	14 (2.3)	15 (1.6)	508 (8.2)	6 (2.0)
Ukraine	6 (0.7)	493 (7.0)	0 0	34 (1.3)	489 (3.5)	0 0	8 (1.2)	463 (7.6)	0 0
Georgia	6 (0.6)	404 (10.0)	0 0	37 (1.8)	428 (4.5)	0 0	6 (0.9)	427 (10.9)	0 0
Iran, Islamic Rep. of	2 (0.5)	~ ~	-1 (0.6)	19 (1.3)	457 (4.2)	8 (1.9)	1 (0.2)	~ ~	-2 (0.5)
International Avg.	38 (0.2)	483 (1.3)		31 (0.2)	472 (0.8)		9 (0.2)	449 (1.5)	
<b>Benchmarking Participants</b>									
Alberta, Canada	77 (1.2)	512 (2.8)	0 0	13 (0.9)	483 (5.2)	0 0	7 (0.5)	484 (5.1)	0 0
Ontario, Canada	73 (1.6)	517 (3.0)	-5 (2.6)	20 (1.5)	504 (4.3)	7 (2.2)	5 (0.6)	481 (9.4)	-2 (0.8)
British Columbia, Canada	72 (1.4)	512 (3.0)	0 0	19 (1.2)	496 (4.1)	0 0	6 (0.5)	474 (6.6)	0 0
Minnesota, US	66 (1.8)	564 (5.4)	0 0	22 (1.9)	547 (9.8)	0 0	8 (1.0)	510 (7.7)	0 0
Quebec, Canada	66 (1.7)	526 (3.1)	-10 (2.2)	26 (1.5)	511 (4.5)	14 (1.9)	5 (0.6)	491 (6.7)	-4 (1.0)
Dubai, UAE	63 (1.6)	459 (2.6)	0 0	29 (1.2)	440 (4.4)	0 0	6 (0.7)	386 (14.0)	0 0
Massachusetts, US	62 (2.4)	581 (3.9)	0 0	31 (2.4)	564 (4.0)	0 0	4 (0.8)	526 (13.4)	0 0

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (0) indicates the country did not participate in the assessment.



Exhibit 4.6 Computer Use with Trends (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.1)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Scotland	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	-1 (0.3)
Australia	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	1 (0.2)	~ ~	0 (0.3)
Hong Kong SAR	1 (0.2)	~ ~	-1 (0.3)	2 (0.3)	~ ~	-1 (0.5)
Netherlands	0 (0.1)	~ ~	0 (0.2)	4 (0.5)	515 (5.8)	0 (0.7)
Denmark	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Singapore	1 (0.2)	~ ~	0 (0.3)	2 (0.2)	~ ~	0 (0.3)
New Zealand	2 (0.2)	~ ~	-1 (0.4)	2 (0.2)	~ ~	0 (0.3)
Kuwait	2 (0.2)	~ ~	0 0	3 (0.5)	327 (12.3)	0 0
Norway	1 (0.1)	~ ~	-1 (0.4)	2 (0.3)	~ ~	-3 (0.7)
United States	3 (0.2)	502 (5.5)	1 (0.3)	3 (0.3)	515 (5.6)	1 (0.3)
Sweden	1 (0.1)	~ ~	0 0	2 (0.3)	~ ~	0 0
Japan	2 (0.3)	~ ~	0 (0.4)	6 (0.6)	533 (6.4)	2 (0.7)
Czech Republic	3 (0.3)	460 (8.7)	0 0	2 (0.2)	~ ~	0 0
Qatar	3 (0.2)	267 (8.4)	0 0	4 (0.2)	310 (9.0)	0 0
Italy	1 (0.1)	~ ~	-8 (0.6)	33 (1.0)	491 (4.3)	21 (1.2)
Hungary	4 (0.6)	477 (7.0)	-8 (1.0)	7 (0.5)	488 (8.5)	-5 (1.0)
Germany	1 (0.2)	~ ~	0 0	11 (0.6)	535 (4.4)	0 0
Slovak Republic	4 (0.6)	481 (7.8)	0 0	7 (1.0)	478 (11.7)	0 0
Slovenia	1 (0.1)	~ ~	-4 (0.6)	4 (0.4)	487 (5.7)	-7 (1.0)
Austria	1 (0.2)	~ ~	0 0	12 (0.8)	503 (4.0)	0 0
Tunisia	6 (0.6)	352 (7.6)	-9 (1.2)	25 (2.6)	317 (6.9)	-21 (3.4)
Colombia	9 (0.9)	362 (7.6)	0 0	28 (1.9)	338 (6.0)	0 0
Kazakhstan	12 (1.4)	543 (7.5)	0 0	26 (3.4)	561 (8.4)	0 0
Latvia	10 (0.8)	524 (5.2)	-14 (2.0)	7 (0.7)	519 (6.2)	-16 (2.0)
Morocco	9 (0.7)	362 (6.6)	-6 (1.4)	46 (2.4)	339 (7.0)	9 (4.0)
Lithuania	8 (0.7)	522 (4.8)	-15 (1.3)	7 (0.6)	504 (7.4)	-6 (1.2)
El Salvador	12 (0.9)	341 (6.5)	0 0	40 (2.4)	327 (5.2)	0 0
Russian Federation	14 (0.9)	543 (5.4)	-16 (1.6)	19 (2.0)	522 (9.0)	-16 (2.6)
Yemen	4 (0.5)	212 (14.1)	0 0	55 (3.0)	232 (8.3)	0 0
Algeria	7 (1.0)	382 (14.6)	0 0	55 (2.5)	385 (5.1)	0 0
Armenia	12 (0.9)	516 (9.4)	-12 (1.4)	21 (1.5)	508 (7.8)	-10 (2.1)
Ukraine	12 (0.8)	496 (5.6)	0 0	40 (1.4)	450 (3.6)	0 0
Georgia	10 (1.0)	455 (5.9)	0 0	42 (2.3)	459 (5.6)	0 0
Iran, Islamic Rep. of	4 (0.5)	425 (7.0)	-4 (1.1)	75 (1.7)	386 (4.4)	-1 (2.6)
International Avg.	5 (0.1)	433 (1.9)		17 (0.2)	441 (1.4)	
<b>Benchmarking Participants</b>						
Alberta, Canada	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Ontario, Canada	1 (0.3)	~ ~	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
British Columbia, Canada	1 (0.2)	~ ~	0 0	1 (0.3)	~ ~	0 0
Minnesota, US	2 (0.3)	~ ~	0 0	2 (0.3)	~ ~	0 0
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	2 (0.3)	~ ~	1 (0.4)
Dubai, UAE	1 (0.2)	~ ~	0 0	1 (0.2)	~ ~	0 0
Massachusetts, US	2 (0.3)	~ ~	0 0	1 (0.3)	~ ~	0 0

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- 2007 percent significantly higher  
 ▼ 2007 percent significantly lower



Exhibit 4.6 Computer Use with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Use Computer Both at Home and at School			Use Computer at Home but Not at School			Use Computer at School but Not at Home		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	87 (0.7)	608 (4.2)	-1 (1.1)	8 (0.5)	562 (7.6)	6 (0.5)	3 (0.4)	511 (10.8)	-6 (0.9)
Hong Kong SAR	84 (1.0)	582 (5.1)	-4 (1.2)	13 (0.9)	537 (9.1)	5 (1.1)	1 (0.3)	~ ~	-1 (0.4)
Malta	84 (0.6)	495 (1.4)	0 0	12 (0.5)	473 (3.8)	0 0	3 (0.3)	376 (8.1)	0 0
Australia	77 (1.0)	506 (4.0)	-6 (1.4)	17 (0.9)	480 (5.8)	7 (1.3)	4 (0.4)	435 (9.4)	-1 (0.6)
England	76 (1.1)	526 (4.9)	-5 (1.4)	20 (1.0)	486 (5.5)	10 (1.2)	3 (0.4)	450 (10.1)	-4 (0.8)
Czech Republic	76 (1.1)	511 (2.3)	0 0	15 (0.9)	497 (4.4)	0 0	8 (0.6)	458 (6.3)	0 0
Cyprus	74 (0.7)	477 (1.7)	3 (1.0)	17 (0.6)	459 (4.6)	10 (0.7)	6 (0.3)	410 (7.1)	-10 (0.7)
Scotland	71 (1.1)	498 (3.9)	-7 (1.5)	25 (1.0)	473 (4.8)	13 (1.3)	3 (0.3)	442 (9.4)	-6 (0.7)
United States	69 (1.0)	519 (2.7)	-10 (1.4)	22 (0.9)	496 (4.0)	10 (1.3)	6 (0.4)	468 (4.5)	-2 (0.6)
Norway	67 (1.2)	477 (2.3)	-3 (2.0)	30 (1.2)	459 (2.3)	8 (1.9)	1 (0.2)	~ ~	-3 (0.5)
Singapore	67 (1.0)	609 (3.6)	-12 (1.2)	25 (0.8)	579 (4.5)	11 (1.0)	5 (0.4)	503 (7.7)	0 (0.6)
Hungary	67 (1.1)	531 (3.6)	6 (1.8)	21 (0.9)	511 (4.0)	13 (1.3)	10 (0.7)	456 (6.0)	-16 (1.3)
Sweden	67 (1.4)	498 (2.4)	-11 (1.9)	31 (1.4)	485 (2.7)	14 (1.9)	1 (0.1)	~ ~	-2 (0.4)
Qatar	65 (0.5)	323 (1.8)	0 0	23 (0.5)	290 (2.9)	0 0	8 (0.3)	265 (4.7)	0 0
Kuwait	63 (1.0)	363 (2.7)	0 0	26 (1.0)	349 (3.4)	0 0	6 (0.5)	322 (6.2)	0 0
Japan	58 (1.6)	585 (2.5)	3 (2.0)	23 (1.5)	572 (4.6)	7 (1.9)	17 (0.9)	532 (4.2)	-10 (1.2)
Italy	54 (1.9)	490 (3.3)	16 (2.7)	36 (1.9)	478 (3.0)	-2 (2.7)	2 (0.3)	~ ~	-7 (0.7)
Jordan	53 (1.5)	451 (3.7)	17 (2.1)	14 (1.2)	418 (6.8)	5 (1.4)	26 (1.4)	392 (5.8)	-18 (2.0)
Slovenia	51 (1.5)	511 (2.6)	1 (2.1)	46 (1.5)	495 (2.4)	12 (2.3)	2 (0.2)	~ ~	-6 (0.8)
Israel	50 (2.0)	476 (4.0)	-22 (2.7)	43 (2.1)	471 (5.3)	25 (2.6)	4 (0.6)	391 (13.8)	-2 (0.8)
Lebanon	50 (2.3)	473 (4.3)	11 (2.7)	27 (2.1)	434 (6.6)	11 (2.5)	11 (1.4)	430 (5.7)	-10 (2.4)
Palestinian Nat'l Auth.	48 (1.5)	387 (4.1)	23 (2.1)	16 (1.2)	352 (5.3)	-2 (1.7)	26 (1.2)	350 (5.4)	-7 (2.0)
Bosnia and Herzegovina	46 (1.3)	471 (2.8)	0 0	25 (1.3)	463 (4.4)	0 0	22 (1.0)	426 (4.2)	0 0
Russian Federation	41 (2.0)	536 (4.3)	29 (2.3)	21 (1.8)	509 (6.3)	3 (2.9)	25 (1.9)	487 (4.8)	-3 (2.6)
Oman	38 (1.9)	391 (4.6)	0 0	27 (1.7)	378 (3.9)	0 0	18 (1.3)	349 (6.5)	0 0
Serbia	36 (1.7)	507 (4.6)	21 (2.2)	40 (1.8)	491 (4.2)	17 (2.4)	14 (1.0)	450 (6.0)	-9 (2.2)
Bahrain	36 (0.9)	415 (2.5)	5 (1.7)	50 (1.0)	397 (2.1)	5 (1.7)	5 (0.4)	348 (7.4)	-3 (0.5)
Syrian Arab Republic	36 (1.3)	405 (4.1)	0 0	14 (0.9)	399 (6.0)	0 0	34 (1.5)	384 (5.0)	0 0
Lithuania	33 (1.8)	514 (3.1)	7 (2.3)	49 (1.8)	517 (3.1)	27 (2.3)	9 (0.7)	466 (5.1)	-25 (1.8)
Korea, Rep. of	31 (1.5)	613 (3.1)	-4 (2.2)	64 (1.6)	596 (3.1)	3 (2.3)	1 (0.1)	~ ~	0 (0.2)
Romania	30 (1.9)	482 (6.0)	15 (2.6)	37 (2.3)	477 (5.1)	22 (2.6)	18 (1.7)	436 (8.6)	-8 (2.7)
Malaysia	30 (2.0)	508 (5.5)	4 (2.6)	29 (1.7)	489 (6.8)	4 (2.5)	23 (1.4)	445 (5.9)	-1 (2.2)
Thailand	29 (1.4)	491 (8.2)	0 0	8 (0.6)	483 (10.3)	0 0	50 (1.6)	419 (4.7)	0 0
Turkey	26 (1.3)	486 (6.6)	0 0	12 (1.0)	449 (8.9)	0 0	46 (1.9)	414 (4.5)	0 0
Egypt	23 (1.0)	403 (4.9)	5 (1.2)	19 (0.9)	402 (4.8)	13 (1.0)	41 (1.5)	379 (4.9)	-20 (2.0)
Colombia	21 (1.3)	420 (4.8)	0 0	10 (0.9)	404 (6.2)	0 0	48 (1.7)	365 (3.9)	0 0
Bulgaria	21 (1.7)	478 (8.8)	16 (1.9)	47 (1.5)	482 (4.9)	25 (2.0)	17 (1.2)	433 (11.3)	8 (1.6)
Saudi Arabia	18 (1.7)	331 (6.0)	--	51 (1.6)	338 (3.3)	--	7 (0.7)	298 (7.1)	--
Ukraine	16 (1.4)	503 (7.5)	0 0	32 (1.8)	481 (4.1)	0 0	22 (1.7)	445 (5.6)	0 0
Indonesia	14 (1.2)	450 (8.6)	7 (1.9)	2 (0.3)	~ ~	0 (0.4)	66 (2.5)	400 (3.8)	35 (4.1)
Botswana	13 (0.8)	389 (5.6)	8 (1.1)	3 (0.4)	370 (11.0)	-2 (0.6)	57 (1.6)	372 (3.2)	34 (2.9)
El Salvador	13 (1.3)	384 (5.5)	0 0	12 (0.8)	352 (6.0)	0 0	27 (2.2)	340 (4.2)	0 0
Ghana	11 (1.0)	317 (12.8)	1 (1.3)	13 (1.0)	312 (8.8)	4 (1.2)	20 (1.7)	300 (8.6)	-1 (2.3)
Armenia	10 (0.8)	502 (6.0)	3 (1.1)	30 (1.3)	506 (7.2)	16 (1.5)	21 (1.9)	496 (6.0)	6 (2.7)
Georgia	6 (1.1)	427 (11.3)	0 0	20 (1.4)	413 (8.9)	0 0	17 (2.2)	394 (9.2)	0 0
Algeria	6 (0.7)	378 (4.3)	0 0	27 (1.5)	395 (2.8)	0 0	6 (0.8)	372 (5.5)	0 0
Iran, Islamic Rep. of	4 (1.0)	515 (16.7)	2 (1.2)	30 (1.8)	437 (6.1)	13 (2.2)	2 (0.7)	~ ~	1 (0.8)
Tunisia	3 (0.5)	400 (6.7)	-2 (0.7)	39 (1.9)	442 (3.1)	19 (2.4)	7 (0.7)	382 (4.5)	-8 (1.7)
‡ Morocco	20 (1.3)	402 (6.4)	--	24 (1.5)	390 (5.0)	--	19 (1.5)	367 (5.4)	--
International Avg.	42 (0.2)	470 (0.8)		25 (0.2)	453 (0.8)		16 (0.2)	409 (1.1)	
<b>Benchmarking Participants</b>									
Ontario, Canada	80 (1.3)	522 (3.7)	-5 (1.7)	17 (1.4)	506 (5.7)	6 (1.7)	1 (0.3)	~ ~	-2 (0.6)
Minnesota, US	79 (1.5)	539 (4.5)	0 0	15 (1.3)	522 (5.4)	0 0	4 (0.5)	487 (12.0)	0 0
Massachusetts, US	71 (1.6)	556 (4.2)	0 0	25 (1.7)	536 (5.4)	0 0	2 (0.4)	~ ~	0 0
Basque Country, Spain	67 (2.2)	503 (3.5)	-3 (3.0)	27 (2.1)	501 (4.4)	11 (2.8)	3 (0.4)	451 (9.1)	-8 (0.9)
Dubai, UAE	66 (1.2)	477 (3.1)	0 0	28 (1.4)	449 (3.6)	0 0	3 (0.5)	409 (9.6)	0 0
British Columbia, Canada	65 (1.4)	513 (2.9)	0 0	32 (1.3)	511 (4.6)	0 0	2 (0.3)	~ ~	0 0
Quebec, Canada	61 (1.8)	541 (4.0)	-9 (2.6)	34 (1.7)	516 (3.7)	12 (2.5)	3 (0.4)	488 (7.4)	-3 (0.7)

● 2007 percent significantly higher  
▼ 2007 percent significantly lower

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (0) indicates the country did not participate in the assessment.

Exhibit 4.6 Computer Use with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.2)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Hong Kong SAR	0 (0.1)	~ ~	0 (0.1)	1 (0.1)	~ ~	0 (0.2)
Malta	0 (0.1)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Australia	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	-1 (0.2)
Czech Republic	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Cyprus	0 (0.1)	~ ~	-2 (0.3) ▼	3 (0.2)	408 (8.4)	-2 (0.4) ▼
Scotland	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	-1 (0.2)
United States	3 (0.2)	461 (6.6)	1 (0.3)	1 (0.1)	~ ~	0 (0.2)
Norway	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.2)
Singapore	2 (0.2)	~ ~	1 (0.3)	0 (0.1)	~ ~	0 (0.1)
Hungary	1 (0.2)	~ ~	-1 (0.4)	1 (0.2)	~ ~	-2 (0.5) ▼
Sweden	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.3)
Qatar	2 (0.2)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
Kuwait	3 (0.3)	308 (10.2)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Japan	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.3)
Italy	0 (0.1)	~ ~	-5 (0.4) ▼	8 (0.5)	433 (6.4)	-1 (0.7)
Jordan	1 (0.2)	~ ~	-6 (0.8) ▼	5 (0.5)	422 (9.1)	1 (0.7)
Slovenia	1 (0.1)	~ ~	-3 (0.4) ▼	1 (0.1)	~ ~	-4 (0.4) ▼
Israel	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	1 (0.3)
Lebanon	7 (1.1)	418 (7.0)	-6 (1.6) ▼	4 (0.8)	424 (9.1)	-5 (1.5) ▼
Palestinian Nat'l Auth.	3 (0.3)	348 (9.1)	-10 (1.1) ▼	7 (0.8)	366 (8.1)	-3 (1.2) ▼
Bosnia and Herzegovina	4 (0.4)	444 (6.5)	◊ ◊	3 (0.3)	429 (7.5)	◊ ◊
Russian Federation	8 (1.0)	499 (6.6)	-13 (1.5) ▼	5 (1.0)	484 (11.7)	-15 (2.0) ▼
Oman	3 (0.4)	354 (8.2)	◊ ◊	14 (1.1)	364 (6.6)	◊ ◊
Serbia	5 (0.6)	457 (7.5)	-14 (1.3) ▼	4 (0.5)	443 (6.7)	-15 (1.2) ▼
Bahrain	2 (0.3)	~ ~	-7 (0.6) ▼	6 (0.4)	389 (5.9)	0 (0.6)
Syrian Arab Republic	2 (0.2)	~ ~	◊ ◊	14 (1.1)	405 (5.8)	◊ ◊
Lithuania	4 (0.4)	475 (7.2)	-8 (1.1) ▼	5 (0.4)	460 (6.6)	0 (0.7)
Korea, Rep. of	2 (0.2)	~ ~	0 (0.3)	2 (0.3)	~ ~	2 (0.3) ▲
Romania	8 (0.8)	438 (7.5)	-16 (1.6) ▼	7 (1.3)	419 (7.5)	-13 (2.2) ▼
Malaysia	10 (0.9)	448 (4.6)	-3 (1.3) ▼	8 (0.8)	428 (7.1)	-3 (1.4) ▼
Thailand	4 (0.5)	432 (9.4)	◊ ◊	9 (0.9)	397 (6.8)	◊ ◊
Turkey	13 (1.2)	401 (8.5)	◊ ◊	4 (0.7)	366 (7.9)	◊ ◊
Egypt	10 (0.7)	404 (5.8)	2 (0.9) ▲	7 (0.5)	406 (6.2)	0 (0.9)
Colombia	12 (0.9)	380 (4.6)	◊ ◊	9 (0.8)	346 (7.4)	◊ ◊
Bulgaria	8 (0.7)	436 (9.3)	-32 (1.9) ▼	7 (0.7)	435 (9.9)	-17 (1.8) ▼
Saudi Arabia	3 (0.4)	309 (8.1)	--	20 (1.0)	327 (4.2)	--
Ukraine	19 (1.0)	451 (4.7)	◊ ◊	11 (0.9)	422 (5.8)	◊ ◊
Indonesia	3 (0.4)	385 (12.8)	-16 (1.3) ▼	15 (2.0)	367 (6.5)	-26 (3.4) ▼
Botswana	2 (0.2)	~ ~	-3 (0.5) ▼	25 (1.4)	339 (3.8)	-36 (2.9) ▼
El Salvador	21 (1.4)	339 (4.7)	◊ ◊	28 (1.9)	327 (2.6)	◊ ◊
Ghana	14 (1.0)	326 (6.1)	-12 (1.8) ▼	42 (2.5)	314 (5.9)	8 (3.5) ▲
Armenia	19 (1.1)	502 (4.6)	0 (1.6)	20 (1.2)	491 (4.3)	-25 (2.5) ▼
Georgia	12 (1.1)	420 (9.5)	◊ ◊	44 (2.6)	419 (8.4)	◊ ◊
Algeria	11 (0.8)	394 (4.0)	◊ ◊	49 (1.9)	387 (2.6)	◊ ◊
Iran, Islamic Rep. of	7 (0.6)	408 (6.8)	-5 (1.0) ▼	57 (2.1)	380 (3.8)	-11 (2.7) ▼
Tunisia	18 (0.9)	416 (3.3)	-5 (1.4) ▼	32 (1.5)	414 (2.3)	-4 (2.3)
‡ Morocco	19 (1.5)	380 (5.8)	--	18 (1.7)	369 (4.6)	--
International Avg.	6 (0.1)	409 (1.4)		10 (0.1)	399 (1.2)	
<b>Benchmarking Participants</b>						
Ontario, Canada	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Minnesota, US	2 (0.4)	~ ~	◊ ◊	0 (0.2)	~ ~	◊ ◊
Massachusetts, US	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Basque Country, Spain	2 (0.3)	~ ~	-1 (0.5)	1 (0.2)	~ ~	0 (0.3)
Dubai, UAE	1 (0.3)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
British Columbia, Canada	1 (0.2)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	1 (0.2)	~ ~	0 (0.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower



Morocco (46%), El Salvador (40%), Yemen and Algeria (55%), the Ukraine (40%), Georgia (42%), and Iran (75%) reported never using a computer.

At the fourth grade, computer use increased in a number of countries between 2003 and 2007. Students reported increases in using the computer both at home and in school in Italy, Hungary, Tunisia, Latvia, and the Russian Federation and in using the computer at home but not in school in 16 countries and 2 benchmarking entities.

At eighth grade, 42 percent of students, on average across countries, reported using a computer both at home and at school and 25 percent at home only. Compared to fourth grade, relatively more students (16% vs. 9%) reported using a computer at school but not at home and relatively fewer reported not using a computer at all (10% vs. 17%). There was a stronger association between using a computer and mathematics achievement at eighth grade, with highest average achievement (470 points) among students using a computer both at home and at school, next highest (453 points) among those using a computer at home but not at school, somewhat similar among those using a computer at school but not at home and those using a computer only at places other than home and school (409 for both), and lowest (399 points) among those not using a computer at all.

Eighth grade TIMSS participants with the highest percentages of students (more than 70%) using a computer both at home and at school included Chinese Taipei, Hong Kong SAR, Malta, Australia, England, the Czech Republic, Cyprus, Scotland, the province of Ontario, and the states of Minnesota and Massachusetts. Lowest levels of computer use were reported in Ghana, Georgia, Algeria, and Iran, where 40 percent or more of eighth grade students reported never using a computer.

Similar to the findings at the fourth grade, computer use also increased at the eighth grade in a substantial number of countries. Students in 16 countries reported more use both at home and at school, and in 11 of those countries there also were increases in use at home but not in school. Students in an additional 15 countries and 3 benchmarking entities reported increases in use at home but not at school. However, in 9 of these countries and 2 benchmarking entities the increase in use at home corresponded to a decrease in the use both at home and at school category.

### How Much of Their Out-of-school Time Do Students Spend on Homework During the School Week?

Homework provides an opportunity for students to extend and consolidate what they have learned in school, and for teachers to extend the time for learning beyond what is available during the hours of formal schooling. Consequently, it might be expected that students who are assigned homework and who spend time on it would have higher achievement than students who do little or no homework. However, the situation is not as straightforward as that. The tradition of assigning homework and expecting students to devote a portion of their after-school time to completing this assignment varies from country to country and from grade to grade. In some countries and especially at the fourth grade, homework is rarely assigned, and when students spend time on homework, it often can be for remedial purposes, to enable them to catch up on material not fully mastered during class. Under these circumstances, lower achievement is associated with time spent on homework. Also, even when homework is regularly assigned as a means of extending classroom learning, the more able students may accomplish the assignment more expeditiously, resulting in a situation where high achievement is associated with less time spent on homework.

To summarize the amount of time typically devoted to mathematics homework in each country, TIMSS constructed an index that assigns students to a high, medium, or low level on the basis of the frequency of mathematics homework they are assigned each week and the amount of time they spend on it. Students at the high level of the Index of Time Spent Doing Mathematics Homework (TMH) reported that they were assigned mathematics homework at least 3–4 times a week and spend more than 30 minutes on each assignment. Students at the low level reported being assigned homework no more than twice a week and spending no more than 30 minutes on each assignment. The medium level included all other response combinations. For each TIMSS 2007 participant, Exhibit 4.7 presents the percentages of fourth and eighth grade students at the three levels of the index, together with their average mathematics achievement. Participants are ordered by the percentage of students at the high level of the index. As described in the *TIMSS 2007*

Exhibit 4.7 **Index of Time Students Spend Doing Mathematics Homework (TMH) in a Normal School Week**

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

Country	High TMH		Medium TMH		Low TMH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan	42 (2.0)	549 (9.3)	56 (1.9)	552 (7.3)	2 (0.3)	~ ~
Russian Federation	37 (1.4)	541 (5.7)	61 (1.3)	550 (5.0)	1 (0.3)	~ ~
Ukraine	37 (1.3)	475 (3.3)	61 (1.3)	475 (3.4)	1 (0.2)	~ ~
Algeria	r 35 (1.7)	397 (6.6)	54 (1.5)	385 (6.0)	11 (1.0)	373 (9.1)
Latvia	34 (1.3)	534 (3.2)	65 (1.3)	545 (2.6)	1 (0.2)	~ ~
Iran, Islamic Rep. of	34 (1.7)	424 (5.8)	51 (1.6)	401 (4.5)	15 (1.4)	386 (6.9)
Singapore	34 (0.9)	607 (4.4)	52 (0.9)	603 (3.7)	15 (0.8)	581 (5.6)
Tunisia	r 33 (1.7)	362 (5.5)	53 (1.4)	352 (4.8)	14 (1.2)	342 (7.7)
Armenia	r 31 (1.5)	510 (5.3)	64 (1.4)	503 (3.7)	5 (0.7)	509 (24.8)
Yemen	s 30 (2.4)	243 (9.7)	64 (2.5)	245 (6.6)	6 (1.0)	218 (11.8)
Colombia	r 29 (1.5)	384 (5.5)	58 (1.4)	369 (4.8)	13 (1.4)	354 (6.9)
Lithuania	29 (1.3)	526 (3.5)	68 (1.3)	537 (2.5)	3 (0.5)	530 (10.7)
Georgia	r 27 (1.5)	451 (5.6)	71 (1.5)	449 (4.4)	2 (0.4)	~ ~
El Salvador	r 24 (1.2)	345 (6.3)	62 (1.2)	340 (4.6)	14 (1.1)	346 (6.5)
Morocco	r 24 (1.6)	360 (9.1)	61 (1.9)	352 (5.3)	16 (1.7)	350 (12.7)
Denmark	23 (1.2)	514 (3.3)	52 (1.2)	524 (2.7)	25 (1.4)	538 (3.8)
Hungary	21 (1.0)	517 (4.3)	75 (1.1)	518 (3.5)	4 (0.7)	493 (16.6)
Qatar	s 20 (0.6)	301 (3.1)	61 (0.7)	315 (2.3)	19 (0.5)	311 (3.3)
Germany	r 19 (0.8)	517 (3.4)	76 (0.9)	534 (2.4)	5 (0.6)	496 (10.0)
Slovenia	19 (0.9)	487 (3.2)	79 (1.0)	510 (2.1)	3 (0.3)	479 (9.0)
Hong Kong SAR	18 (1.1)	599 (6.2)	78 (1.1)	613 (3.5)	4 (0.5)	562 (6.2)
Italy	18 (1.3)	498 (4.7)	62 (1.6)	508 (3.8)	19 (1.8)	515 (3.9)
Kuwait	r 17 (0.9)	313 (6.4)	63 (1.7)	336 (3.8)	20 (1.4)	350 (6.9)
Chinese Taipei	17 (0.9)	568 (4.0)	63 (1.4)	584 (1.7)	20 (1.3)	569 (3.8)
Austria	16 (0.8)	493 (3.9)	76 (1.0)	511 (2.1)	8 (0.8)	501 (5.0)
United States	12 (0.5)	522 (3.6)	65 (1.2)	535 (2.8)	23 (1.3)	528 (3.2)
Norway	12 (1.0)	465 (7.4)	53 (1.8)	478 (2.9)	35 (2.1)	487 (3.4)
Japan	11 (0.9)	542 (4.6)	64 (1.9)	573 (2.4)	25 (1.9)	572 (3.5)
Slovak Republic	10 (0.6)	481 (4.0)	79 (1.2)	508 (3.2)	11 (1.0)	496 (9.1)
Czech Republic	8 (0.6)	473 (4.7)	65 (2.0)	489 (2.9)	28 (1.9)	491 (4.6)
New Zealand	8 (0.5)	469 (5.3)	38 (1.1)	487 (3.7)	54 (1.4)	509 (2.4)
Australia	7 (0.7)	508 (10.6)	42 (1.5)	517 (3.9)	51 (1.8)	525 (4.4)
Sweden	5 (0.6)	472 (6.4)	34 (1.2)	493 (2.9)	60 (1.4)	513 (3.0)
England	3 (0.4)	525 (11.2)	31 (1.6)	547 (5.0)	66 (1.6)	544 (2.9)
Scotland	3 (0.3)	453 (10.7)	30 (1.7)	484 (3.1)	67 (1.8)	505 (2.9)
Netherlands	1 (0.2)	~ ~	10 (0.9)	507 (4.7)	89 (0.9)	541 (2.3)
International Avg.	21 (0.2)	469 (1.0)	58 (0.2)	479 (0.7)	21 (0.2)	468 (1.5)
<b>Benchmarking Participants</b>						
Dubai, UAE	r 17 (1.2)	456 (5.9)	62 (1.8)	450 (2.8)	21 (1.7)	469 (6.9)
Massachusetts, US	16 (1.3)	573 (5.4)	75 (1.5)	574 (3.4)	9 (1.6)	569 (12.6)
British Columbia, Canada	15 (0.9)	493 (4.4)	49 (1.3)	506 (3.2)	37 (1.6)	513 (3.6)
Ontario, Canada	13 (1.1)	513 (6.7)	52 (1.8)	514 (2.9)	35 (2.2)	515 (4.4)
Alberta, Canada	11 (0.8)	499 (5.3)	45 (1.5)	502 (3.5)	44 (1.9)	512 (3.4)
Minnesota, US	11 (1.5)	543 (12.6)	59 (3.7)	560 (6.5)	31 (4.3)	555 (8.4)
Quebec, Canada	6 (0.6)	488 (5.4)	41 (1.6)	510 (3.5)	53 (1.8)	533 (3.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of mathematics homework they are given and the amount of time they spend on that homework. High level indicates mathematics homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates mathematics homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

- ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A tilde (~) indicates insufficient data to report achievement.  
 An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 4.7 Index of Time Students Spend Doing Mathematics Homework (TMH) in a Normal School Week (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>** Grade

Country	High TMH		Medium TMH		Low TMH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Romania	66 (1.3)	488 (4.0)	29 (1.3)	433 (5.1)	5 (0.5)	432 (11.4)
Russian Federation	50 (1.3)	510 (4.4)	49 (1.2)	520 (4.2)	2 (0.3)	~ ~
El Salvador	46 (1.4)	351 (3.2)	45 (1.0)	337 (3.3)	9 (0.7)	337 (5.2)
Tunisia	45 (1.3)	425 (2.8)	44 (1.0)	419 (2.9)	11 (0.9)	417 (4.1)
Italy	45 (1.3)	475 (3.1)	47 (1.2)	488 (4.1)	7 (0.6)	483 (5.5)
Syrian Arab Republic	44 (1.1)	408 (3.9)	48 (0.9)	399 (3.8)	8 (0.6)	409 (6.8)
Singapore	42 (1.0)	616 (3.2)	43 (0.9)	595 (4.3)	16 (0.9)	547 (6.9)
Malaysia	41 (1.1)	486 (5.1)	47 (1.0)	473 (5.1)	12 (0.9)	446 (9.1)
Ukraine	40 (1.2)	468 (4.5)	53 (1.1)	467 (3.5)	7 (0.7)	466 (6.8)
Thailand	39 (1.4)	461 (5.6)	45 (1.1)	435 (5.4)	15 (1.0)	419 (6.7)
Colombia	36 (1.3)	386 (4.5)	48 (0.9)	379 (3.8)	16 (1.0)	378 (6.0)
Bulgaria	36 (1.4)	475 (6.4)	48 (1.2)	472 (5.4)	15 (1.5)	458 (8.1)
Israel	34 (1.5)	485 (4.9)	53 (1.4)	472 (4.1)	13 (0.9)	448 (9.0)
Hong Kong SAR	34 (1.6)	589 (4.9)	48 (1.2)	576 (5.9)	18 (1.4)	555 (9.0)
Georgia	34 (1.5)	432 (5.1)	62 (1.6)	414 (7.0)	4 (0.5)	372 (14.2)
Armenia	32 (1.2)	501 (4.6)	64 (1.2)	502 (4.4)	4 (0.5)	499 (12.7)
Serbia	31 (1.4)	490 (5.0)	40 (1.3)	496 (4.3)	28 (1.4)	481 (4.3)
Chinese Taipei	31 (1.9)	628 (4.0)	46 (1.3)	613 (4.1)	23 (1.7)	563 (8.7)
Egypt	30 (1.1)	381 (4.6)	58 (1.1)	404 (3.6)	13 (1.0)	416 (6.8)
Botswana	29 (0.9)	383 (3.0)	50 (0.9)	365 (2.8)	20 (1.0)	356 (3.4)
Indonesia	29 (1.1)	417 (5.0)	53 (0.9)	397 (4.0)	18 (0.8)	384 (5.1)
Ghana	28 (1.2)	332 (5.2)	55 (1.0)	307 (4.8)	16 (1.0)	313 (5.4)
Lithuania	27 (1.1)	498 (2.8)	69 (1.1)	515 (2.7)	4 (0.8)	481 (8.8)
United States	26 (1.1)	522 (3.8)	62 (1.2)	510 (3.0)	12 (1.2)	484 (4.3)
Jordan	26 (1.2)	424 (5.0)	62 (1.1)	439 (4.4)	12 (0.9)	422 (7.1)
Norway	25 (1.5)	466 (2.6)	53 (1.3)	474 (2.0)	22 (1.6)	473 (3.5)
Lebanon	25 (1.3)	445 (6.0)	67 (1.4)	460 (3.9)	8 (0.9)	434 (9.0)
Palestinian Nat'l Auth.	24 (1.1)	374 (4.4)	68 (1.2)	378 (3.8)	7 (0.8)	345 (9.1)
Malta	24 (0.7)	508 (2.8)	71 (0.7)	498 (1.7)	5 (0.3)	402 (7.4)
Bosnia and Herzegovina	24 (1.2)	466 (4.0)	51 (1.2)	458 (3.2)	25 (1.4)	459 (3.8)
Turkey	22 (1.1)	428 (5.8)	49 (1.0)	433 (5.0)	29 (1.2)	443 (5.9)
Slovenia	20 (1.1)	503 (2.6)	64 (1.3)	505 (2.4)	16 (1.0)	498 (4.1)
Cyprus	20 (0.9)	463 (4.1)	70 (0.9)	480 (1.8)	11 (0.7)	451 (4.8)
Iran, Islamic Rep. of	19 (1.4)	440 (7.7)	55 (1.6)	404 (3.8)	26 (1.5)	378 (5.0)
Hungary	16 (0.9)	517 (5.6)	78 (1.2)	524 (3.4)	6 (1.0)	488 (8.0)
Qatar	16 (0.4)	300 (3.2)	67 (0.5)	319 (1.5)	17 (0.4)	308 (4.0)
Bahrain	15 (0.7)	391 (4.0)	67 (1.1)	404 (1.8)	18 (1.0)	405 (5.2)
Australia	15 (1.1)	523 (6.6)	44 (1.5)	511 (5.2)	42 (2.0)	481 (4.6)
Kuwait	14 (0.7)	334 (5.1)	58 (1.3)	358 (2.7)	27 (1.5)	373 (3.9)
Saudi Arabia	13 (0.8)	316 (4.8)	61 (1.8)	339 (3.3)	26 (1.8)	334 (4.4)
Oman	12 (0.7)	374 (5.2)	73 (1.3)	383 (3.1)	15 (1.4)	367 (7.9)
Japan	8 (1.1)	566 (10.0)	36 (1.3)	569 (3.3)	57 (2.0)	574 (3.3)
Scotland	8 (0.7)	519 (7.2)	41 (1.8)	505 (4.4)	51 (2.1)	478 (4.3)
Korea, Rep. of	6 (0.7)	591 (5.8)	31 (1.5)	595 (3.7)	62 (1.7)	605 (3.1)
Czech Republic	5 (0.6)	473 (6.4)	46 (2.1)	504 (4.1)	49 (2.4)	511 (3.4)
England	5 (0.6)	518 (11.0)	31 (1.3)	530 (6.8)	65 (1.7)	513 (4.9)
Sweden	3 (0.4)	461 (7.7)	35 (1.2)	490 (3.1)	62 (1.3)	498 (2.4)
Algeria	--	--	--	--	--	--
‡ Morocco	34 (1.3)	396 (5.0)	57 (1.2)	383 (4.2)	9 (0.7)	360 (7.9)
<b>International Avg.</b>	<b>27 (0.2)</b>	<b>458 (0.9)</b>	<b>53 (0.2)</b>	<b>457 (0.7)</b>	<b>20 (0.2)</b>	<b>441 (1.1)</b>
<b>Benchmarking Participants</b>						
British Columbia, Canada	33 (1.3)	508 (3.9)	55 (1.2)	514 (3.3)	11 (1.1)	507 (5.9)
Basque Country, Spain	33 (1.9)	494 (3.8)	58 (2.1)	508 (3.1)	9 (1.5)	486 (12.5)
Massachusetts, US	31 (3.0)	564 (7.3)	63 (2.8)	546 (4.5)	6 (1.3)	500 (11.3)
Minnesota, US	30 (2.5)	542 (7.6)	62 (2.4)	535 (4.3)	8 (1.6)	495 (7.1)
Quebec, Canada	30 (1.7)	545 (5.5)	47 (1.6)	529 (4.0)	23 (2.0)	517 (4.9)
Ontario, Canada	29 (1.5)	508 (3.5)	59 (1.6)	526 (3.8)	12 (1.5)	505 (12.3)
Dubai, UAE	29 (1.3)	461 (5.1)	57 (1.3)	463 (2.9)	15 (1.1)	488 (6.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of mathematics homework they are given and the amount of time they spend on that homework. High level indicates mathematics homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates mathematics homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.



*Encyclopedia*, countries have different policies about assigning homework and the students' responses often reflect these different policies. For example, as explained in the *TIMSS 2007 Encyclopedia* in the chapter prepared by the Netherlands, students in primary education in the Netherlands generally are not expected to do homework. However, schools can decide for themselves how to deal with homework and some primary schools give homework to prepare students for homework in secondary education.

At fourth grade, students generally reported that they spent relatively little time on mathematics homework, with 21 percent of students, on average across countries, at the low level of the index (30 minutes or less no more than twice a week) and 58 percent at the medium level. However, 21 percent were at the high level. Countries with one third or more of students at the high level of the index included Kazakhstan, the Russian Federation, the Ukraine, Algeria, Latvia, Iran, Singapore, and Tunisia. The highest percentages of students at the low level of the index (50% or more) were in Australia, New Zealand, Sweden, England, Scotland, and the Netherlands. Average mathematics achievement was highest among students at the medium level of the homework index (479 points), and about the same for students at the high and low levels (469 and 468, respectively).

At the eighth grade, 27 percent of students were at the high level of the mathematics homework index, 53 percent at the medium level, and 20 percent at the low level. Countries with the greatest homework emphasis (40% or more at the high level) included Romania, the Russian Federation, El Salvador, Tunisia, Italy, Syrian Arab Republic, Singapore, Malaysia, and the Ukraine. In contrast, 40 percent or more of students were at the low level of the index in Australia, Japan, Scotland, Korea, the Czech Republic, England, and Sweden. Average mathematics achievement was lower among students at the low level of the index than among students at the medium or high levels.



### What Are Students' Attitudes Toward Mathematics?

Developing positive attitudes toward mathematics is an important goal of the mathematics curriculum in many countries. To summarize information about progress toward these goals, TIMSS examined students' general attitudes toward mathematics, the value they place on mathematics as a way of improving their lives, and their self-confidence in learning mathematics.

To investigate how students feel about mathematics, TIMSS created an Index of Students' Positive Affect Toward Mathematics (PATM), based on students' responses to three statements about mathematics:

- ▶ I enjoy learning mathematics.
- ▶ Mathematics is boring.<sup>4</sup>
- ▶ I like mathematics.

Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all three statements were assigned to the high level of the index (i.e., have a positive attitude toward mathematics), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. For each TIMSS participant at the fourth and eighth grades, the percentage of students at each level of the index is presented in Exhibit 4.8, together with average mathematics achievement. The exhibit also shows changes in percentages since 1995 at the fourth grade, and since 1995 and 1999 at the eighth grade (comparable data were not available from 2003).

Fourth grade students generally had very positive attitudes toward mathematics, with 72 percent, on average across countries, at the high level of the index. There were 14 percent of students at the medium level and 14 percent at the low level. The highest percentages of students at the high level of the index (85% or more) were in Georgia, Kazakhstan, Morocco, the Ukraine, Colombia, and Tunisia, while countries with proportionately more students with less positive attitudes included the Netherlands and Chinese Taipei where more than 25 percent of students were at the low level.

4 The response categories for this statement were reversed in constructing the index.

No participants had increased percentages of students at the high level in 2007 compared to 1995, whereas 11 countries and 4 benchmarking entities had declines. Fourteen countries and three benchmarking entities had increases (small but statistically significant) at the low level. Across countries, fourth grade students at the high level of the Index of Positive Affect Toward Mathematics had higher average mathematics achievement than students at the medium or low level.

For eighth grade students, on average across countries, 54 percent were at the high level of the positive affect index, compared with 21 percent at the medium level and 26 percent at the low level. Countries with most students expressing positive attitudes included Algeria, Egypt, Botswana, Oman, and Morocco, where 75 percent or more were at the high index level. In contrast, in 22 countries and six benchmarking participants less than half the students were at the high level of the index. Only the Russian Federation and Lithuania from 1995 and Korea from 1999 showed increased percentages at the high level in 2007, while 19 countries and 4 benchmarking entities had declines since 1995, 1999, or both previous cycles. Average mathematics achievement was highest among students at the high index level (471 points), next highest among those at the medium level (441 points), and lowest at the low level (428 points).

In addition to having a positive attitude toward mathematics, students' may be more attracted to mathematics and more motivated to learn it if they perceive mathematics achievement as advantageous to their future education and the world of work. The TIMSS Index of Students Valuing Mathematics (SVM) is based on eighth grade students' responses to four statements about mathematics:

- ▶ I think learning mathematics will help me in my daily life.
- ▶ I need mathematics to learn other school subjects.
- ▶ I need to do well in mathematics to get into the university of my choice.
- ▶ I need to do well in mathematics to get the job I want.

**Exhibit 4.8 Index of Students' Positive Affect Toward Mathematics (PATM) with Trends**

**TIMSS2007**  
**Mathematics** 4<sup>th</sup> Grade

Country	High PATM			Medium PATM			Low PATM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995
Georgia	90 (0.9)	450 (3.7)	◊ ◊	6 (0.6)	415 (9.0)	◊ ◊	4 (0.5)	415 (10.2)	◊ ◊
Kazakhstan	89 (0.9)	554 (6.5)	◊ ◊	8 (0.7)	518 (16.0)	◊ ◊	3 (0.4)	493 (11.1)	◊ ◊
Morocco	87 (1.0)	356 (4.8)	◊ ◊	8 (0.7)	301 (10.0)	◊ ◊	5 (0.6)	301 (17.1)	◊ ◊
Ukraine	86 (0.7)	479 (2.9)	◊ ◊	8 (0.5)	449 (5.8)	◊ ◊	5 (0.5)	442 (8.3)	◊ ◊
Colombia	86 (0.8)	365 (4.6)	◊ ◊	9 (0.6)	338 (10.0)	◊ ◊	5 (0.5)	355 (15.9)	◊ ◊
Tunisia	85 (0.9)	349 (4.3)	◊ ◊	10 (0.6)	282 (7.0)	◊ ◊	5 (0.6)	273 (12.6)	◊ ◊
Algeria	84 (1.0)	389 (5.0)	◊ ◊	10 (0.6)	343 (7.7)	◊ ◊	5 (0.6)	339 (12.3)	◊ ◊
Iran, Islamic Rep. of	r 83 (1.0)	418 (4.1)	-1 (1.6)	9 (0.8)	370 (6.6)	-5 (1.4) ▼	8 (0.7)	355 (9.9)	6 (0.8) ▲
Qatar	81 (0.5)	314 (1.3)	◊ ◊	10 (0.4)	267 (3.8)	◊ ◊	9 (0.3)	286 (3.9)	◊ ◊
Russian Federation	80 (1.3)	552 (5.0)	◊ ◊	13 (1.0)	524 (6.9)	◊ ◊	8 (0.5)	511 (8.7)	◊ ◊
Armenia	r 79 (1.4)	509 (4.3)	◊ ◊	12 (0.9)	492 (10.0)	◊ ◊	9 (0.9)	507 (12.9)	◊ ◊
Kuwait	78 (1.1)	332 (3.5)	--	12 (0.7)	295 (7.4)	--	10 (0.7)	306 (7.6)	--
El Salvador	77 (0.9)	340 (4.0)	◊ ◊	16 (0.8)	306 (6.4)	◊ ◊	7 (0.5)	320 (9.4)	◊ ◊
Italy	75 (0.9)	514 (3.3)	--	13 (0.6)	494 (4.9)	--	12 (0.7)	490 (4.4)	--
Lithuania	74 (1.2)	541 (2.3)	◊ ◊	14 (0.8)	498 (4.8)	◊ ◊	12 (0.8)	505 (5.0)	◊ ◊
Yemen	r 73 (1.4)	240 (6.5)	◊ ◊	19 (1.0)	215 (8.1)	◊ ◊	8 (0.6)	211 (9.6)	◊ ◊
Singapore	71 (0.8)	610 (3.5)	-15 (1.1) ▼	14 (0.6)	575 (5.9)	5 (0.8) ▲	15 (0.6)	575 (5.6)	11 (0.7) ▲
Slovenia	71 (1.1)	508 (2.0)	-10 (1.6) ▼	13 (0.6)	487 (3.8)	-1 (1.1)	16 (0.9)	490 (4.0)	11 (1.1) ▲
Germany	70 (0.9)	534 (2.7)	◊ ◊	16 (0.6)	520 (3.7)	◊ ◊	14 (0.7)	509 (3.6)	◊ ◊
Slovak Republic	68 (1.2)	505 (4.7)	◊ ◊	14 (0.7)	484 (4.1)	◊ ◊	18 (1.0)	482 (5.6)	◊ ◊
Norway	68 (1.2)	478 (3.1)	-4 (2.1)	15 (0.6)	470 (5.1)	1 (1.1)	18 (1.0)	462 (3.7)	3 (1.6) ▲
Sweden	67 (1.2)	505 (2.8)	◊ ◊	16 (0.7)	501 (3.2)	◊ ◊	17 (1.0)	497 (4.1)	◊ ◊
Hong Kong SAR	67 (1.3)	619 (3.5)	-5 (1.8) ▼	15 (0.7)	588 (4.2)	-2 (1.2)	19 (1.1)	579 (5.1)	7 (1.5) ▲
Australia	66 (1.4)	525 (3.6)	-7 (1.7) ▼	16 (0.8)	512 (4.6)	3 (1.0) ▲	18 (1.1)	494 (5.1)	4 (1.2) ▲
United States	66 (0.8)	535 (2.7)	-8 (1.4) ▼	16 (0.5)	526 (3.0)	3 (0.8) ▲	18 (0.6)	517 (2.5)	5 (1.0) ▲
New Zealand	66 (1.0)	499 (2.6)	-5 (1.6) ▼	18 (0.8)	485 (3.8)	3 (1.2) ▲	17 (0.8)	484 (3.3)	3 (1.2) ▲
Latvia	65 (1.1)	544 (3.0)	-6 (1.7) ▼	17 (0.8)	528 (4.8)	-1 (1.2)	17 (0.9)	527 (3.4)	7 (1.2) ▲
Hungary	64 (1.3)	522 (3.5)	-4 (2.1)	15 (0.7)	498 (6.4)	-3 (1.1) ▼	21 (1.1)	492 (5.8)	7 (1.6) ▲
Czech Republic	64 (1.3)	495 (3.1)	-9 (1.8) ▼	15 (0.7)	479 (4.3)	-1 (1.0)	21 (1.0)	471 (3.4)	10 (1.3) ▲
England	62 (1.4)	548 (3.1)	-14 (1.8) ▼	17 (0.8)	544 (4.7)	7 (1.0) ▲	21 (1.1)	524 (4.1)	7 (1.5) ▲
Austria	62 (1.0)	513 (2.0)	-5 (1.7) ▼	16 (0.7)	499 (4.1)	1 (1.1)	22 (0.9)	492 (2.9)	4 (1.3) ▲
Japan	62 (1.4)	584 (2.4)	-1 (1.8)	21 (0.8)	547 (3.3)	-1 (1.2)	17 (1.0)	543 (4.4)	3 (1.2) ▲
Scotland	59 (1.3)	497 (2.7)	--	18 (0.8)	496 (3.5)	--	24 (1.1)	490 (3.9)	--
Netherlands	56 (1.4)	540 (2.7)	-5 (2.0) ▼	17 (0.9)	531 (3.6)	3 (1.2) ▲	27 (1.3)	528 (3.4)	3 (1.9) ▲
Denmark	55 (1.8)	526 (3.0)	◊ ◊	24 (1.0)	521 (3.4)	◊ ◊	21 (1.4)	523 (3.1)	◊ ◊
Chinese Taipei	50 (1.2)	595 (2.4)	◊ ◊	21 (0.8)	563 (3.2)	◊ ◊	29 (0.9)	555 (2.9)	◊ ◊
<b>International Avg.</b>	<b>72 (0.2)</b>	<b>483 (0.6)</b>		<b>14 (0.1)</b>	<b>457 (1.1)</b>		<b>14 (0.1)</b>	<b>454 (1.3)</b>	
<b>Benchmarking Participants</b>									
Dubai, UAE	81 (1.0)	452 (2.3)	◊ ◊	10 (0.7)	442 (7.2)	◊ ◊	9 (0.8)	431 (8.3)	◊ ◊
Quebec, Canada	72 (1.3)	528 (3.1)	-10 (2.4) ▼	13 (0.9)	503 (5.9)	3 (1.4) ▲	15 (0.8)	494 (4.1)	7 (1.9) ▲
Massachusetts, US	67 (1.6)	579 (4.6)	◊ ◊	16 (1.1)	570 (5.9)	◊ ◊	17 (1.1)	553 (4.2)	◊ ◊
Alberta, Canada	66 (1.2)	513 (3.3)	-12 (2.2) ▼	16 (0.7)	498 (4.1)	5 (1.1) ▲	17 (1.0)	486 (4.4)	7 (1.9) ▲
Minnesota, US	64 (2.4)	561 (6.9)	-8 (3.4) ▼	19 (1.4)	550 (7.0)	4 (2.0)	18 (1.5)	536 (7.1)	4 (2.2)
British Columbia, Canada	64 (1.3)	514 (3.2)	◊ ◊	18 (0.8)	496 (3.1)	◊ ◊	19 (0.9)	490 (4.1)	◊ ◊
Ontario, Canada	59 (1.5)	519 (3.6)	-21 (1.9) ▼	18 (0.9)	512 (4.2)	6 (1.1) ▲	24 (1.4)	495 (4.6)	15 (1.5) ▲

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

Index based on students' responses to three statements about mathematics: 1) I enjoy learning mathematics; 2) Mathematics is boring (Reversed); 3) I like mathematics. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
A dash (-) indicates comparable data are not available.  
An "r" indicates data are available for at least 70 but less than 85% of the students.  
A diamond (◊) indicates the country did not participate in the assessment.

**Exhibit 4.8 Index of Students' Positive Affect Toward Mathematics (PATM) with Trends (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	High PATM				Medium PATM			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Algeria	83 (0.7)	394 (2.2)	0 (0)	0 (0)	10 (0.5)	364 (3.9)	0 (0)	0 (0)
Egypt	78 (1.1)	404 (3.4)	0 (0)	0 (0)	14 (0.8)	362 (6.5)	0 (0)	0 (0)
Botswana	78 (1.0)	376 (2.3)	0 (0)	0 (0)	13 (0.6)	339 (3.8)	0 (0)	0 (0)
Oman	78 (0.9)	386 (3.3)	0 (0)	0 (0)	16 (0.8)	335 (4.7)	0 (0)	0 (0)
Tunisia	73 (1.0)	430 (2.5)	0 (1.4)	0 (0)	14 (0.6)	398 (4.2)	1 (0.8)	0 (0)
Malaysia	73 (1.0)	485 (5.2)	-16 (1.2) ▼	0 (0)	18 (0.8)	445 (5.6)	9 (0.9) ▲	0 (0)
Jordan	72 (1.4)	448 (4.0)	3 (1.9)	0 (0)	15 (0.8)	396 (5.5)	-3 (1.1) ▼	0 (0)
Indonesia	72 (1.3)	400 (3.9)	-10 (1.7) ▼	0 (0)	21 (1.0)	390 (4.9)	7 (1.3) ▲	0 (0)
Turkey	71 (1.2)	450 (5.1)	--	0 (0)	17 (0.8)	399 (6.3)	--	0 (0)
Syrian Arab Republic	70 (1.1)	410 (3.6)	0 (0)	0 (0)	17 (0.8)	376 (5.4)	0 (0)	0 (0)
Ghana	70 (1.2)	327 (4.2)	0 (0)	0 (0)	22 (0.8)	282 (6.3)	0 (0)	0 (0)
Colombia	69 (1.3)	385 (3.5)	0 (0)	-1 (1.9)	20 (1.0)	377 (4.7)	0 (0)	-2 (1.5)
El Salvador	68 (1.3)	351 (2.7)	0 (0)	0 (0)	22 (1.0)	327 (3.8)	0 (0)	0 (0)
Iran, Islamic Rep. of	64 (1.2)	425 (4.4)	-7 (1.5) ▼	-3 (1.8)	21 (1.0)	382 (4.5)	2 (1.2)	0 (1.4)
Lebanon	63 (1.3)	465 (4.3)	0 (0)	0 (0)	19 (0.9)	428 (5.9)	0 (0)	0 (0)
Singapore	60 (1.0)	615 (3.6)	-7 (1.5) ▼	-7 (1.6) ▼	20 (0.6)	575 (5.3)	1 (1.0)	0 (1.0)
Bahrain	59 (0.9)	412 (2.0)	0 (0)	0 (0)	18 (0.6)	389 (2.8)	0 (0)	0 (0)
Georgia	58 (1.7)	436 (5.0)	0 (0)	0 (0)	22 (1.0)	399 (7.8)	0 (0)	0 (0)
Qatar	57 (0.5)	321 (1.6)	0 (0)	0 (0)	19 (0.5)	299 (4.0)	0 (0)	0 (0)
Thailand	57 (1.5)	457 (5.6)	-2 (1.9)	--	31 (1.1)	420 (5.1)	-1 (1.4)	--
Kuwait	57 (1.0)	367 (2.4)	0 (0)	--	20 (0.7)	349 (3.7)	0 (0)	--
Palestinian Nat'l Auth.	56 (1.3)	392 (4.1)	0 (0)	0 (0)	22 (0.8)	340 (5.0)	0 (0)	0 (0)
Armenia	55 (1.4)	511 (3.9)	0 (0)	0 (0)	23 (0.7)	494 (6.4)	0 (0)	0 (0)
Ukraine	54 (1.5)	485 (3.9)	0 (0)	0 (0)	23 (0.8)	456 (4.3)	0 (0)	0 (0)
Saudi Arabia	54 (1.4)	340 (3.7)	0 (0)	0 (0)	22 (0.8)	321 (4.0)	0 (0)	0 (0)
Russian Federation	53 (1.1)	533 (4.6)	0 (1.9)	5 (1.7) ▲	27 (0.8)	494 (4.7)	-5 (1.3) ▼	-7 (1.3) ▼
Israel	49 (1.1)	475 (4.8)	-12 (1.9) ▼	--	22 (0.8)	470 (5.3)	2 (1.2)	--
Romania	47 (1.4)	486 (4.9)	-6 (2.1) ▼	-8 (2.0) ▼	21 (0.8)	451 (5.1)	-5 (1.4) ▼	-7 (1.3) ▼
Hong Kong SAR	47 (1.2)	603 (5.5)	-9 (1.6) ▼	-2 (1.9)	22 (0.9)	566 (6.4)	-2 (1.1)	-4 (1.2) ▼
Bulgaria	46 (1.2)	487 (5.6)	-4 (2.5)	--	22 (0.9)	463 (5.5)	-3 (1.4) ▼	--
Cyprus	44 (0.9)	497 (2.4)	-23 (1.4) ▼	-21 (1.4) ▼	21 (0.6)	455 (3.4)	2 (1.0) ▲	2 (0.9)
Malta	42 (0.6)	517 (1.8)	0 (0)	0 (0)	21 (0.6)	474 (3.2)	0 (0)	0 (0)
United States	41 (0.8)	524 (2.9)	-11 (1.4) ▼	-9 (1.4) ▼	24 (0.5)	511 (3.3)	2 (0.8) ▲	-2 (0.9) ▼
Bosnia and Herzegovina	41 (1.2)	476 (3.2)	0 (0)	0 (0)	16 (0.6)	459 (4.2)	0 (0)	0 (0)
England	40 (1.4)	532 (5.7)	-25 (1.9) ▼	-27 (2.1) ▼	25 (0.9)	515 (6.1)	6 (1.2) ▲	7 (1.3) ▲
Sweden	39 (1.1)	517 (2.9)	0 (0)	-9 (2.1) ▼	24 (0.6)	488 (2.9)	0 (0)	-3 (1.4)
Lithuania	38 (1.1)	531 (3.4)	-14 (1.9) ▼	5 (1.8) ▲	28 (0.8)	503 (2.7)	-1 (1.3)	-6 (1.5) ▼
Italy	38 (1.2)	506 (3.3)	-16 (1.8) ▼	--	23 (0.8)	482 (4.5)	1 (1.2)	--
Chinese Taipei	37 (1.2)	657 (3.7)	-8 (1.6) ▼	0 (0)	18 (0.6)	605 (5.1)	-4 (0.8) ▼	0 (0)
Norway	37 (1.1)	488 (2.4)	0 (0)	-12 (1.6) ▼	24 (0.6)	474 (2.6)	0 (0)	-2 (1.1) ▼
Serbia	35 (1.4)	518 (4.3)	0 (0)	0 (0)	16 (0.7)	499 (5.7)	0 (0)	0 (0)
Australia	34 (1.3)	521 (6.2)	--	-10 (1.8) ▼	27 (0.8)	498 (3.7)	--	-1 (1.0)
Scotland	33 (1.0)	502 (4.5)	0 (0)	--	29 (0.8)	490 (4.1)	0 (0)	--
Korea, Rep. of	33 (0.9)	650 (2.9)	3 (1.1) ▲	-2 (1.4)	23 (0.6)	600 (3.4)	-12 (0.9) ▼	-13 (1.2) ▼
Czech Republic	31 (1.0)	530 (3.0)	-1 (1.9)	-1 (1.6)	22 (0.6)	501 (3.6)	-10 (1.3) ▼	-8 (1.3) ▼
Japan	30 (1.1)	609 (3.7)	-1 (1.5)	-7 (1.8) ▼	30 (1.0)	567 (3.0)	-4 (1.2) ▼	-6 (1.2) ▼
Hungary	30 (1.0)	554 (4.4)	-6 (1.6) ▼	-5 (1.6) ▼	22 (1.0)	517 (4.9)	-13 (1.2) ▼	-12 (1.5) ▼
Slovenia	25 (1.1)	520 (4.3)	--	-15 (2.0) ▼	22 (0.7)	507 (3.0)	--	-12 (1.2) ▼
‡ Morocco	84 (0.7)	387 (3.1)	--	--	10 (0.6)	353 (7.1)	--	--
International Avg.	54 (0.2)	471 (0.6)			21 (0.1)	441 (0.7)		
<b>Benchmarking Participants</b>								
Dubai, UAE	54 (1.3)	480 (2.9)	0 (0)	0 (0)	22 (1.1)	451 (5.0)	0 (0)	0 (0)
Ontario, Canada	48 (1.7)	537 (3.9)	-12 (2.4) ▼	-10 (2.4) ▼	23 (0.9)	512 (4.0)	3 (1.3) ▲	-2 (1.4)
Quebec, Canada	47 (1.4)	544 (4.4)	4 (2.4)	-2 (2.8) ▼	19 (0.7)	529 (4.9)	-15 (2.1) ▼	-3 (1.9)
Minnesota, US	43 (2.2)	551 (5.3)	0 (0)	-10 (3.6) ▼	25 (1.1)	530 (5.6)	0 (0)	2 (1.9)
Massachusetts, US	41 (1.6)	565 (5.2)	-6 (2.9) ▼	0 (0)	26 (1.1)	549 (5.1)	1 (1.7)	0 (0)
Basque Country, Spain	37 (1.5)	525 (3.4)	0 (0)	0 (0)	24 (0.9)	499 (3.7)	0 (0)	0 (0)
British Columbia, Canada	35 (1.0)	532 (3.5)	-7 (2.5) ▼	0 (0)	26 (0.8)	515 (4.3)	-3 (1.5)	0 (0)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to three statements about mathematics: 1) I enjoy learning mathematics; 2) Mathematics is boring (Reversed); 3) I like mathematics. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

A diamond (0) indicates the country did not participate in the assessment.



Exhibit 4.8 Index of Students' Positive Affect Toward Mathematics (PATM) with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Low PATM			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Algeria	7 (0.5)	357 (3.8)	◇ ◇	◇ ◇
Egypt	8 (0.5)	376 (7.6)	◇ ◇	◇ ◇
Botswana	9 (0.7)	332 (5.0)	◇ ◇	◇ ◇
Oman	6 (0.4)	334 (7.5)	◇ ◇	◇ ◇
Tunisia	13 (0.7)	395 (4.2)	-1 (1.0)	◇ ◇
Malaysia	10 (0.6)	445 (6.0)	7 (0.6) ▲	◇ ◇
Jordan	13 (1.0)	385 (9.2)	0 (1.3)	◇ ◇
Indonesia	7 (0.6)	402 (7.3)	3 (0.7) ▲	◇ ◇
Turkey	11 (0.8)	386 (5.8)	--	◇ ◇
Syrian Arab Republic	13 (0.6)	368 (4.5)	◇ ◇	◇ ◇
Ghana	8 (0.6)	269 (8.4)	◇ ◇	◇ ◇
Colombia	11 (0.7)	380 (6.7)	◇ ◇	2 (1.1) ▲
El Salvador	10 (0.7)	327 (6.0)	◇ ◇	◇ ◇
Iran, Islamic Rep. of	15 (0.9)	382 (6.6)	5 (1.1) ▲	2 (1.3)
Lebanon	17 (0.9)	428 (4.9)	◇ ◇	◇ ◇
Singapore	20 (0.8)	545 (5.4)	6 (1.1) ▲	6 (1.2) ▲
Bahrain	23 (0.8)	376 (3.0)	◇ ◇	◇ ◇
Georgia	20 (1.2)	392 (6.5)	◇ ◇	◇ ◇
Qatar	24 (0.5)	296 (2.8)	◇ ◇	◇ ◇
Thailand	12 (0.7)	427 (5.8)	3 (0.9) ▲	--
Kuwait	24 (0.9)	338 (4.3)	◇ ◇	--
Palestinian Nat'l Auth.	22 (1.0)	347 (4.1)	◇ ◇	◇ ◇
Armenia	22 (1.2)	489 (4.5)	◇ ◇	◇ ◇
Ukraine	23 (1.1)	440 (4.0)	◇ ◇	◇ ◇
Saudi Arabia	24 (1.0)	323 (4.7)	◇ ◇	◇ ◇
Russian Federation	20 (0.8)	488 (5.7)	5 (1.3) ▲	2 (1.2)
Israel	28 (1.1)	451 (4.8)	10 (1.4) ▲	--
Romania	31 (1.2)	443 (4.5)	11 (1.6) ▲	15 (1.5) ▲
Hong Kong SAR	31 (1.2)	532 (7.3)	11 (1.4) ▲	6 (1.7) ▲
Bulgaria	32 (1.2)	448 (6.4)	8 (2.2) ▲	--
Cyprus	35 (0.8)	436 (2.4)	21 (1.2) ▲	19 (1.2) ▲
Malta	37 (0.7)	465 (2.4)	◇ ◇	◇ ◇
United States	35 (0.8)	490 (3.3)	9 (1.2) ▲	11 (1.1) ▲
Bosnia and Herzegovina	43 (1.3)	444 (3.4)	◇ ◇	◇ ◇
England	35 (1.5)	495 (4.9)	19 (1.8) ▲	20 (1.8) ▲
Sweden	37 (1.1)	470 (2.7)	◇ ◇	12 (1.7) ▲
Lithuania	34 (1.1)	481 (3.5)	14 (1.6) ▲	0 (1.8)
Italy	39 (1.1)	455 (3.2)	15 (1.6) ▲	--
Chinese Taipei	45 (1.4)	547 (4.6)	12 (1.7) ▲	◇ ◇
Norway	39 (1.1)	451 (2.1)	◇ ◇	14 (1.5) ▲
Serbia	49 (1.6)	467 (3.7)	◇ ◇	◇ ◇
Australia	39 (1.2)	476 (4.1)	--	11 (1.5) ▲
Scotland	38 (1.0)	476 (4.1)	◇ ◇	--
Korea, Rep. of	44 (0.9)	558 (3.1)	8 (1.3) ▲	15 (1.4) ▲
Czech Republic	47 (1.1)	489 (2.7)	11 (1.9) ▲	9 (1.9) ▲
Japan	40 (1.2)	543 (2.5)	5 (1.6) ▲	13 (1.8) ▲
Hungary	48 (1.4)	496 (3.6)	19 (2.0) ▲	16 (1.9) ▲
Slovenia	53 (1.1)	492 (2.1)	--	27 (1.9) ▲
‡ Morocco	6 (0.6)	353 (9.4)	--	--
International Avg.	26 (0.1)	428 (0.7)		
<b>Benchmarking Participants</b>				
Dubai, UAE	24 (1.1)	442 (4.9)	◇ ◇	◇ ◇
Ontario, Canada	29 (1.4)	491 (4.9)	9 (1.9) ▲	12 (2.0) ▲
Quebec, Canada	34 (1.4)	509 (3.1)	11 (2.5) ▲	6 (2.3) ▲
Minnesota, US	32 (2.5)	509 (5.5)	◇ ◇	8 (3.4) ▲
Massachusetts, US	33 (2.1)	524 (6.4)	5 (2.8)	◇ ◇
Basque Country, Spain	39 (1.5)	476 (3.8)	◇ ◇	◇ ◇
British Columbia, Canada	38 (1.2)	486 (3.0)	10 (2.7) ▲	◇ ◇

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all four statements were assigned to the high level of the index (i.e., placed a high value on mathematics), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. The percentage of students at each level of the index is presented in Exhibit 4.9 for each eighth-grade TIMSS participant, together with average mathematics achievement and changes in percentages since 2003.

Eighth grade students generally placed a high value on mathematics, with 78 percent of students, on average across countries, at the high level of the valuing mathematics index. In addition, 17 percent of students were at the medium level and 5 percent at the low level. The highest percentages of students at the high level of the index were in Indonesia, Ghana, Oman, Thailand, Algeria, Jordan, Tunisia, El Salvador, and Morocco with more than 90 percent which included some of the lower performing countries. In contrast, less than half the students were in the high category in Chinese Taipei and Japan, two of the highest performing countries on the TIMSS assessment. There was an increase since 2003 in the percentage of students at the high level of the index in 19 countries and the Basque Country in Spain, compared to declines in only five countries. On average across the countries, eighth grade mathematics achievement was higher among students at the high level of the valuing mathematics index (458 points) than at the medium level (438 points) or the low level (435 points).

Regardless of how much students like mathematics or value it for how it can help them in their lives, students' confidence in their ability to learn mathematics is based to some extent on their past experience in learning the subject. This in turn is likely to be determined by the difficulty of the subject as well as the individual student's own learning ability.

Exhibit 4.9 Index of Students' Valuing Mathematics (SVM) with Trends

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High SVM			Medium SVM			Low SVM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	95 (0.6)	399 (3.7)	10 (1.0) ▲	5 (0.5)	379 (10.6)	-9 (0.9) ▼	1 (0.2)	~ ~	0 (0.3)
Ghana	92 (0.6)	316 (4.1)	5 (1.1) ▲	6 (0.5)	262 (11.9)	-4 (0.9) ▼	2 (0.2)	~ ~	-1 (0.4)
Oman	92 (0.5)	381 (3.2)	0 0	6 (0.5)	310 (8.3)	0 0	2 (0.2)	~ ~	0 0
Thailand	92 (0.5)	445 (4.9)	0 0	7 (0.5)	410 (7.5)	0 0	1 (0.1)	~ ~	0 0
Algeria	92 (0.5)	390 (2.0)	0 0	6 (0.4)	370 (4.9)	0 0	2 (0.2)	~ ~	0 0
Jordan	91 (0.7)	436 (3.8)	3 (1.0) ▲	7 (0.4)	391 (7.9)	-3 (0.8) ▼	2 (0.3)	~ ~	0 (0.4)
Tunisia	91 (0.5)	423 (2.5)	4 (0.8) ▲	6 (0.4)	403 (5.2)	-3 (0.6) ▼	3 (0.3)	385 (6.1)	-1 (0.5)
El Salvador	91 (0.5)	342 (2.6)	0 0	8 (0.4)	355 (5.2)	0 0	2 (0.3)	~ ~	0 0
Egypt	89 (0.7)	401 (3.3)	3 (1.0) ▲	9 (0.6)	355 (7.2)	-3 (0.8) ▼	2 (0.2)	~ ~	-1 (0.4)
Colombia	89 (0.7)	383 (3.6)	0 0	9 (0.6)	383 (5.4)	0 0	2 (0.4)	~ ~	0 0
Bahrain	88 (0.6)	401 (1.4)	6 (0.9) ▲	9 (0.5)	390 (5.2)	-5 (0.8) ▼	3 (0.3)	367 (8.5)	-1 (0.5)
Syrian Arab Republic	88 (0.6)	402 (3.6)	0 0	9 (0.5)	373 (6.4)	0 0	3 (0.3)	372 (8.7)	0 0
Turkey	87 (0.6)	438 (4.8)	0 0	10 (0.5)	407 (6.5)	0 0	3 (0.3)	361 (11.3)	0 0
Palestinian Nat'l Auth.	86 (0.9)	380 (3.6)	1 (1.2) ▲	11 (0.7)	313 (7.1)	-1 (0.9) ▼	3 (0.4)	311 (10.1)	0 (0.5)
Lithuania	85 (0.6)	511 (2.3)	-1 (0.9) ▼	11 (0.6)	489 (5.0)	0 (0.8)	4 (0.3)	454 (7.9)	1 (0.4)
Kuwait	84 (0.8)	361 (2.1)	0 0	10 (0.5)	342 (5.3)	0 0	6 (0.5)	311 (9.5)	0 0
Ukraine	84 (0.8)	470 (3.5)	0 0	13 (0.6)	454 (5.3)	0 0	3 (0.4)	451 (10.5)	0 0
Iran, Islamic Rep. of	83 (0.8)	408 (4.1)	6 (1.1) ▲	13 (0.6)	392 (7.5)	-3 (0.9) ▼	4 (0.4)	354 (9.5)	-3 (0.6) ▼
Botswana	83 (0.8)	377 (2.1)	-4 (1.0) ▼	15 (0.8)	318 (4.2)	4 (0.9) ▲	3 (0.3)	325 (8.5)	0 (0.4)
Saudi Arabia	82 (0.9)	334 (2.9)	--	13 (0.8)	322 (5.8)	--	5 (0.5)	307 (8.6)	--
United States	82 (0.7)	511 (2.8)	1 (0.8) ▲	14 (0.5)	501 (3.9)	0 (0.6)	4 (0.3)	485 (5.3)	0 (0.4)
Scotland	82 (0.7)	491 (3.8)	4 (1.2) ▲	15 (0.6)	477 (4.5)	-3 (0.9) ▼	4 (0.4)	467 (8.2)	-1 (0.6)
Georgia	81 (1.2)	421 (5.9)	0 0	15 (0.9)	403 (8.8)	0 0	4 (0.5)	381 (12.4)	0 0
Qatar	80 (0.5)	317 (1.4)	0 0	13 (0.4)	292 (3.9)	0 0	6 (0.3)	268 (5.0)	0 0
Cyprus	80 (0.7)	472 (1.8)	3 (0.9) ▲	15 (0.5)	453 (3.3)	-1 (0.7) ▼	5 (0.4)	415 (7.6)	-2 (0.6) ▼
Bosnia and Herzegovina	79 (0.9)	459 (3.0)	0 0	15 (0.7)	461 (4.0)	0 0	6 (0.5)	454 (5.9)	0 0
Russian Federation	79 (0.9)	515 (4.1)	0 (1.2)	17 (0.8)	511 (5.3)	0 (1.0)	4 (0.4)	489 (7.7)	0 (0.5)
Norway	79 (0.9)	475 (2.0)	7 (1.4) ▲	17 (0.7)	458 (3.4)	-4 (1.2) ▼	5 (0.3)	441 (6.8)	-3 (0.7) ▼
Lebanon	77 (1.2)	459 (4.5)	-3 (1.5) ▼	18 (1.1)	423 (5.5)	3 (1.4) ▲	5 (0.6)	425 (7.5)	1 (0.7)
Malta	77 (0.6)	495 (1.5)	0 0	18 (0.5)	473 (3.1)	0 0	5 (0.3)	440 (6.0)	0 0
Israel	77 (1.1)	473 (4.1)	4 (1.5) ▲	17 (0.9)	458 (5.2)	-3 (1.3) ▼	6 (0.5)	409 (9.6)	0 (0.7)
Singapore	77 (0.8)	598 (3.8)	-3 (1.0) ▼	19 (0.7)	590 (5.3)	2 (0.9) ▲	4 (0.3)	528 (8.4)	2 (0.4) ▲
Malaysia	76 (1.0)	480 (4.8)	-9 (1.3) ▼	21 (0.9)	459 (6.1)	6 (1.1) ▲	3 (0.5)	418 (15.9)	2 (0.5) ▲
Hungary	75 (1.0)	522 (3.7)	-4 (1.2) ▼	20 (0.8)	504 (4.7)	3 (1.1) ▲	5 (0.4)	494 (8.7)	1 (0.5)
Australia	75 (1.1)	502 (4.4)	1 (1.4) ▲	19 (0.9)	484 (3.8)	0 (1.2)	6 (0.4)	470 (7.0)	-1 (0.7)
England	74 (1.0)	515 (5.2)	10 (1.7) ▲	21 (0.8)	514 (5.5)	-6 (1.5) ▼	5 (0.4)	505 (8.8)	-3 (0.8) ▼
Romania	72 (1.0)	463 (5.1)	2 (1.5) ▲	20 (0.8)	470 (4.8)	-1 (1.2) ▼	7 (0.6)	455 (6.7)	-1 (0.8)
Serbia	72 (0.8)	489 (3.7)	3 (1.2) ▲	19 (0.6)	493 (5.3)	-2 (0.9) ▼	9 (0.6)	474 (5.9)	-2 (0.8) ▼
Bulgaria	71 (1.1)	471 (5.3)	-1 (1.6) ▼	20 (0.9)	471 (5.7)	0 (1.2)	9 (0.7)	447 (7.5)	1 (1.1)
Czech Republic	70 (0.8)	505 (2.7)	0 0	25 (0.7)	502 (3.3)	0 0	5 (0.4)	493 (5.0)	0 0
Sweden	68 (0.8)	497 (2.5)	9 (1.5) ▲	28 (0.7)	485 (2.6)	-9 (1.4) ▼	4 (0.3)	463 (5.5)	0 (0.5)
Slovenia	67 (0.9)	504 (2.3)	1 (1.6) ▲	29 (0.8)	501 (3.1)	0 (1.3)	5 (0.4)	472 (4.8)	-1 (0.6)
Armenia	64 (0.9)	504 (4.3)	0 (1.4)	24 (0.8)	499 (5.9)	2 (1.1) ▲	13 (0.7)	498 (5.3)	-1 (1.1)
Hong Kong SAR	60 (1.4)	588 (5.8)	3 (1.7) ▲	31 (1.1)	561 (6.5)	-5 (1.4) ▼	8 (0.7)	510 (9.7)	2 (0.8) ▲
Korea, Rep. of	53 (0.9)	617 (3.0)	10 (1.4) ▲	37 (0.7)	582 (3.4)	-6 (1.2) ▼	10 (0.5)	551 (4.8)	-4 (0.7) ▼
Italy	53 (0.8)	488 (3.7)	5 (1.4) ▲	39 (0.9)	477 (3.1)	-3 (1.3) ▼	8 (0.5)	448 (4.5)	-2 (0.8) ▼
Chinese Taipei	45 (1.2)	623 (5.3)	3 (1.6) ▲	39 (1.0)	598 (4.2)	-2 (1.3) ▼	16 (0.8)	534 (5.8)	-1 (1.1)
Japan	43 (0.9)	584 (3.3)	8 (1.2) ▲	43 (0.7)	568 (2.5)	-6 (1.0) ▼	14 (0.7)	536 (5.4)	-2 (1.0)
‡ Morocco	94 (0.5)	384 (2.9)	--	5 (0.5)	358 (13.6)	--	1 (0.2)	~ ~	--
International Avg.	78 (0.1)	458 (0.5)		17 (0.1)	438 (0.9)		5 (0.1)	435 (1.3)	

Benchmarking Participants

Minnesota, US	85 (1.4)	537 (4.8)	0 0	12 (1.0)	516 (4.4)	0 0	3 (0.6)	481 (14.2)	0 0
Ontario, Canada	84 (1.0)	522 (3.4)	0 (1.4)	13 (0.8)	498 (5.8)	1 (1.1)	3 (0.4)	479 (14.2)	-1 (0.5)
Dubai, UAE	83 (0.8)	469 (2.9)	0 0	13 (0.7)	454 (5.3)	0 0	3 (0.3)	416 (12.0)	0 0
Massachusetts, US	81 (1.2)	552 (4.8)	0 0	15 (1.1)	534 (6.2)	0 0	4 (0.5)	515 (9.5)	0 0
Quebec, Canada	80 (0.8)	534 (3.6)	-2 (1.1) ▼	17 (0.7)	514 (4.5)	2 (1.0)	3 (0.3)	486 (10.2)	0 (0.4)
British Columbia, Canada	80 (0.9)	515 (3.2)	0 0	16 (0.8)	497 (4.3)	0 0	4 (0.3)	461 (6.2)	0 0
Basque Country, Spain	69 (1.1)	508 (3.0)	7 (1.7) ▲	22 (1.1)	484 (4.0)	-4 (1.5) ▼	9 (0.7)	465 (5.8)	-3 (1.1) ▼

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on students' responses to four statements about mathematics: 1) I think learning mathematics will help me in my daily life; 2) I need mathematics to learn other school subjects; 3) I need to do well in mathematics to get into the university of my choice; 4) I need to do well in mathematics to get the job I want. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average across the four statements are assigned to the low level. All other students are assigned to the middle level.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (0) indicates the country did not participate in the assessment.

To investigate how students think about their abilities in mathematics, TIMSS created an Index of Students' Self-Confidence in Learning Mathematics (SCM), based on students' responses to four statements about their mathematics ability:

- ▶ I usually do well in mathematics.
- ▶ Mathematics is harder for me than for many of my classmates.<sup>5</sup>
- ▶ I am just not good at mathematics.<sup>6</sup>
- ▶ I learn things quickly in mathematics.

Students were asked to indicate if they *agreed a lot*, *agreed a little*, *disagreed a little*, or *disagreed a lot* with each statement. Students who agreed a little or a lot on average with all four statements were assigned to the high level of the index (i.e., are confident about their mathematics ability), while those who disagreed a little or a lot, on average, were assigned to the low level of the index. The medium level includes all other response combinations. For each TIMSS participant at the fourth and eighth grades, the percentage of students at each level of the index is presented in Exhibit 4.10, together with average mathematics achievement. The exhibit also shows changes in percentages since 2003.

At fourth grade, on average across the countries, students expressed considerable self-confidence in their mathematics ability, with 57 percent at the high level of the index, and a further 32 percent at the medium level. Just 11 percent, on average were at the low level of the index. Highest levels of self-confidence were reported in Sweden, Austria, Germany, and Denmark, and the two benchmarking states of Massachusetts and Minnesota, with 70 percent or more at the high level of the index, and lowest levels in El Salvador (39%), Chinese Taipei (36%), and Yemen (35%), all with less than 40 percent. Ten countries showed an increase since 2003 in the percentage of students at the high index level, and five countries and one benchmarking participant had a decrease. There was a positive association between level of self-confidence in learning mathematics and mathematics achievement at the fourth grade. Achievement was highest among students at the high

5 The response categories for this statement were reversed in constructing the index.

6 The response categories for this statement were reversed in constructing the index.



level of the mathematics self-confidence index (500 points, on average), next highest among students at the medium level (449 points), and lowest among those at the low level (429 points).

Students' confidence in learning mathematics at the eighth grade was lower than at the fourth grade, on average across countries, with just 43 percent of students at the high level of the index (compared with 57% at fourth grade). At the medium level, there were 37 percent of students, on average, and 20 percent at the low level. Self-confidence levels were highest in Israel, Jordan, Qatar, and Egypt (55% or more at the high level) and lowest in Korea, Indonesia, Malaysia, Chinese Taipei, Thailand, and Japan (less than 30% at the high level). There were increased percentages since 2003 at the high level in 10 countries, compared to decreases in only three countries. As at the fourth grade, there was a positive association between self-confidence in learning mathematics and mathematics achievement at the eighth grade. Students at the high level of the self-confidence index had the highest average mathematics achievement (492 points), followed by students the medium level (433 points), and students at the low index level (412 points).

As shown in Exhibit 4.11, more boys than girls at the fourth grade reported having self-confidence in learning mathematics. On average across countries, 54 percent of the girls compared to 60 percent of the boys were at the high level of the self-confidence index. There were four countries with a difference in favor of girls at the high index level compared to 22 countries and 6 benchmarking participants with a difference in favor of boys. In contrast, more girls than boys were at the medium and low levels of the self-confidence index. At the medium level, there was a greater percentage of girls than boys in 19 countries and 4 benchmarking participants, and a greater percentage of boys in only 2 countries. At the low level, there was a greater percentage of girls than boys in 19 countries and 5 benchmarking participants, and a greater percentage of boys in only 4 countries.

At the eighth grade, the pattern was similar to that at the fourth grade, with boys having higher self-confidence in learning mathematics than girls. On average across countries, 45 percent of boys were at the high level of the

**Exhibit 4.10 Index of Students' Self-Confidence in Learning Mathematics (SCM) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High SCM			Medium SCM			Low SCM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Sweden	77 (0.9)	514 (2.4)	◇ ◇	19 (0.8)	467 (4.5)	◇ ◇	5 (0.4)	459 (5.2)	◇ ◇
Austria	70 (0.8)	524 (1.9)	◇ ◇	22 (0.8)	470 (2.6)	◇ ◇	8 (0.5)	445 (5.5)	◇ ◇
Germany	70 (0.9)	548 (2.1)	◇ ◇	21 (0.7)	493 (3.5)	◇ ◇	10 (0.5)	468 (4.5)	◇ ◇
Denmark	70 (1.1)	540 (2.5)	◇ ◇	23 (1.0)	493 (3.5)	◇ ◇	7 (0.6)	469 (5.8)	◇ ◇
Norway	69 (0.8)	490 (2.7)	5 (1.2) ▲	24 (0.8)	441 (3.8)	-3 (1.2) ▼	7 (0.4)	429 (7.1)	-1 (0.7)
Slovenia	68 (0.9)	522 (2.0)	-8 (1.3) ▼	25 (0.8)	467 (2.9)	7 (1.2) ▲	6 (0.4)	431 (4.5)	1 (0.6)
Georgia	68 (1.3)	464 (3.9)	◇ ◇	25 (1.1)	412 (5.2)	◇ ◇	7 (0.7)	413 (11.7)	◇ ◇
United States	67 (0.8)	551 (2.4)	13 (1.1) ▲	22 (0.6)	493 (2.8)	-17 (0.9) ▼	10 (0.4)	478 (3.1)	3 (0.5) ▲
Scotland	67 (1.1)	511 (2.4)	3 (1.4) ▲	24 (1.0)	472 (3.5)	-2 (1.3)	9 (0.6)	450 (5.3)	-1 (0.8)
Netherlands	66 (1.0)	551 (2.5)	0 (1.4)	22 (0.9)	511 (3.1)	-1 (1.3)	12 (0.7)	489 (4.2)	1 (0.9)
Kazakhstan	66 (1.7)	563 (6.5)	◇ ◇	24 (1.7)	524 (7.9)	◇ ◇	10 (1.1)	516 (12.4)	◇ ◇
Italy	66 (0.9)	525 (3.2)	5 (1.4) ▲	27 (0.8)	481 (3.9)	-2 (1.2)	7 (0.4)	457 (5.4)	-3 (0.7) ▼
Iran, Islamic Rep. of	66 (1.3)	428 (3.8)	23 (2.0) ▲	28 (1.2)	377 (5.6)	-23 (2.0) ▼	7 (0.7)	330 (10.2)	0 (0.9)
England	64 (1.0)	566 (3.0)	5 (1.5) ▲	26 (0.8)	507 (3.7)	-4 (1.3) ▼	10 (0.7)	483 (5.0)	-1 (0.9)
Australia	64 (1.3)	542 (2.8)	0 (1.6)	26 (0.9)	480 (3.8)	1 (1.2)	10 (0.8)	457 (6.7)	-1 (1.1)
Hungary	62 (1.0)	543 (3.0)	-2 (1.3)	27 (0.8)	468 (4.6)	0 (1.1)	11 (0.5)	447 (6.0)	1 (0.7)
Qatar	61 (0.7)	328 (1.3)	◇ ◇	33 (0.6)	273 (2.2)	◇ ◇	6 (0.3)	275 (5.2)	◇ ◇
Slovak Republic	59 (1.1)	526 (3.5)	◇ ◇	28 (0.9)	464 (4.6)	◇ ◇	12 (0.7)	445 (8.2)	◇ ◇
Lithuania	57 (0.8)	562 (2.2)	-4 (1.5) ▼	33 (0.8)	495 (2.9)	3 (1.3) ▲	9 (0.6)	466 (6.6)	2 (0.9)
Czech Republic	56 (1.0)	512 (2.5)	◇ ◇	31 (1.0)	460 (3.3)	◇ ◇	12 (0.6)	442 (4.9)	◇ ◇
Kuwait	56 (1.4)	353 (3.7)	◇ ◇	39 (1.3)	296 (4.5)	◇ ◇	5 (0.4)	280 (9.0)	◇ ◇
Ukraine	55 (1.0)	505 (2.8)	◇ ◇	34 (0.9)	443 (4.0)	◇ ◇	11 (0.7)	432 (5.4)	◇ ◇
Russian Federation	54 (1.2)	570 (5.0)	1 (1.9)	31 (1.0)	522 (5.5)	-1 (1.4)	15 (1.1)	505 (6.5)	-1 (1.3)
New Zealand	52 (0.7)	527 (2.3)	13 (1.3) ▲	37 (0.7)	465 (2.6)	-19 (1.2) ▼	11 (0.5)	438 (4.8)	7 (0.6) ▲
Armenia	52 (1.4)	517 (3.8)	8 (1.8) ▲	35 (1.3)	500 (9.9)	-9 (1.7) ▼	13 (0.7)	489 (5.9)	0 (1.0)
Latvia	50 (0.9)	568 (2.6)	1 (1.6)	36 (0.8)	515 (2.7)	1 (1.4)	15 (0.8)	493 (4.1)	-2 (1.2)
Colombia	49 (1.4)	389 (5.0)	◇ ◇	43 (1.4)	338 (5.7)	◇ ◇	7 (0.6)	329 (6.7)	◇ ◇
Singapore	46 (1.2)	639 (3.0)	-3 (2.0)	35 (0.8)	580 (3.8)	-1 (1.3)	19 (0.8)	544 (4.9)	3 (1.2) ▲
Hong Kong SAR	46 (1.0)	634 (3.7)	6 (1.5) ▲	38 (1.0)	588 (3.6)	-3 (1.3) ▼	16 (0.7)	574 (4.6)	-3 (1.1) ▼
Tunisia	46 (1.4)	383 (4.4)	-10 (2.3) ▼	46 (1.4)	305 (4.5)	9 (2.1) ▲	8 (0.6)	278 (10.0)	1 (0.9)
Morocco	45 (1.5)	370 (6.1)	-9 (2.3) ▼	46 (1.6)	331 (6.1)	6 (2.2) ▲	9 (1.0)	329 (16.1)	3 (1.2) ▲
Japan	45 (1.1)	602 (2.4)	6 (1.4) ▲	36 (0.9)	553 (2.9)	-5 (1.2) ▼	20 (0.7)	522 (3.1)	-1 (1.1)
Algeria	41 (1.5)	404 (5.3)	◇ ◇	49 (1.3)	374 (5.6)	◇ ◇	11 (0.9)	342 (8.7)	◇ ◇
El Salvador	39 (1.3)	365 (4.5)	◇ ◇	53 (1.2)	315 (4.4)	◇ ◇	8 (0.6)	303 (9.0)	◇ ◇
Chinese Taipei	36 (1.0)	612 (2.1)	-5 (1.3) ▼	37 (0.8)	566 (2.7)	-2 (1.2)	27 (0.8)	542 (2.7)	7 (1.1) ▲
Yemen	35 (1.5)	261 (7.4)	◇ ◇	52 (1.5)	225 (5.8)	◇ ◇	13 (1.0)	210 (9.6)	◇ ◇
International Avg.	57 (0.2)	500 (0.6)		32 (0.2)	449 (0.8)		11 (0.1)	429 (1.2)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Massachusetts, US	74 (1.4)	589 (3.6)	◇ ◇	19 (1.2)	534 (5.2)	◇ ◇	8 (0.8)	519 (5.7)	◇ ◇
Minnesota, US	71 (2.2)	575 (5.3)	◇ ◇	21 (1.4)	512 (6.2)	◇ ◇	8 (1.1)	482 (7.9)	◇ ◇
Alberta, Canada	68 (1.0)	523 (2.6)	◇ ◇	24 (0.8)	475 (3.6)	◇ ◇	8 (0.6)	451 (5.8)	◇ ◇
Quebec, Canada	68 (1.2)	540 (3.0)	-3 (1.6)	24 (1.0)	484 (3.6)	2 (1.4)	8 (0.6)	457 (5.0)	1 (0.8)
Dubai, UAE	68 (1.1)	468 (2.3)	◇ ◇	26 (1.1)	416 (4.3)	◇ ◇	6 (0.7)	401 (7.4)	◇ ◇
British Columbia, Canada	65 (0.9)	526 (2.9)	◇ ◇	27 (0.7)	475 (3.1)	◇ ◇	8 (0.7)	457 (5.7)	◇ ◇
Ontario, Canada	63 (1.3)	534 (3.0)	-4 (1.9) ▼	27 (1.1)	484 (3.9)	4 (1.6) ▲	10 (0.8)	457 (4.9)	1 (1.1)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is harder for me than for many of my classmates (Reversed); 3) I'm just not good at mathematics (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◇) indicates the country did not participate in the assessment.



**Exhibit 4.10 Index of Students' Self-Confidence in Learning Mathematics (SCM) with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High SCM			Medium SCM			Low SCM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Israel	59 (1.0)	495 (4.1)	0 (1.5)	29 (0.9)	432 (5.3)	-1 (1.3)	12 (0.7)	417 (7.2)	1 (1.0)
Jordan	58 (1.5)	468 (3.7)	9 (1.9) ▲	34 (1.2)	388 (4.2)	-5 (1.6) ▼	9 (0.6)	361 (6.6)	-4 (0.9) ▼
Qatar	55 (0.6)	339 (2.3)	0 0	34 (0.6)	279 (2.3)	0 0	11 (0.3)	267 (3.4)	0 0
Egypt	55 (1.5)	422 (3.7)	-3 (1.8)	38 (1.4)	368 (3.8)	3 (1.7)	7 (0.4)	356 (8.0)	0 (0.6)
Kuwait	54 (0.9)	381 (2.5)	0 0	35 (0.9)	331 (2.6)	0 0	11 (0.6)	319 (5.7)	0 0
Scotland	53 (1.3)	515 (4.0)	1 (2.0)	33 (1.0)	465 (3.6)	1 (1.4)	14 (0.7)	442 (4.6)	-1 (1.2)
United States	53 (1.0)	537 (2.5)	2 (1.3)	28 (0.7)	487 (3.2)	-1 (0.9)	19 (0.7)	462 (3.0)	-1 (1.0)
England	53 (1.4)	543 (4.9)	6 (2.1) ▲	32 (1.0)	494 (4.7)	-2 (1.6)	15 (0.8)	457 (5.5)	-4 (1.3) ▼
Bahrain	53 (0.8)	435 (2.1)	8 (1.2) ▲	33 (0.7)	366 (2.4)	-5 (1.1) ▼	15 (0.6)	350 (3.0)	-4 (0.9) ▼
Cyprus	50 (1.0)	508 (1.7)	4 (1.3) ▲	30 (0.8)	437 (2.5)	-2 (1.1) ▼	20 (0.7)	411 (3.3)	-2 (1.0) ▼
Norway	50 (0.8)	505 (2.1)	4 (1.4) ▲	31 (0.7)	450 (2.1)	-1 (1.1)	19 (0.7)	415 (2.2)	-2 (1.1) ▼
Sweden	49 (1.0)	528 (2.6)	1 (1.6)	35 (0.7)	468 (2.4)	-1 (1.2)	16 (0.6)	438 (3.6)	0 (1.1)
Lebanon	49 (1.2)	483 (4.1)	6 (1.8) ▲	39 (1.3)	425 (4.2)	-5 (1.8) ▼	12 (0.9)	416 (4.9)	-1 (1.1)
Serbia	48 (1.3)	539 (3.4)	4 (1.7) ▲	25 (0.8)	464 (3.6)	-1 (1.1)	27 (1.1)	426 (3.9)	-3 (1.6)
Italy	48 (1.0)	514 (3.1)	2 (1.3)	28 (0.7)	462 (3.6)	-1 (1.1)	24 (0.9)	434 (3.7)	-2 (1.4)
Syrian Arab Republic	47 (1.1)	429 (3.5)	0 0	40 (0.9)	378 (4.2)	0 0	13 (0.7)	361 (4.7)	0 0
Saudi Arabia	47 (1.2)	361 (3.2)	--	42 (1.0)	310 (3.5)	--	11 (0.7)	294 (4.9)	--
Colombia	46 (1.3)	409 (3.6)	0 0	40 (1.2)	363 (3.8)	0 0	13 (0.7)	351 (4.5)	0 0
Algeria	46 (1.0)	412 (2.2)	0 0	41 (0.9)	372 (2.7)	0 0	12 (0.6)	358 (2.7)	0 0
Australia	45 (1.2)	539 (4.8)	-5 (2.1) ▼	35 (0.8)	472 (4.1)	5 (1.3) ▲	19 (0.9)	445 (3.7)	0 (1.5)
Iran, Islamic Rep. of	45 (1.2)	443 (5.0)	10 (1.5) ▲	40 (1.1)	380 (3.7)	-8 (1.4) ▼	14 (0.9)	368 (6.1)	-2 (1.1)
Oman	45 (1.1)	415 (3.4)	0 0	47 (1.1)	346 (3.7)	0 0	8 (0.5)	327 (5.6)	0 0
Tunisia	45 (1.3)	452 (2.8)	1 (1.6)	34 (0.8)	400 (2.6)	-2 (1.1)	21 (1.0)	391 (2.7)	1 (1.3)
Georgia	44 (1.8)	455 (4.9)	0 0	37 (1.5)	401 (7.5)	0 0	19 (1.0)	379 (7.0)	0 0
Ghana	44 (1.3)	341 (4.8)	0 (1.9)	46 (0.9)	292 (4.8)	1 (1.5)	11 (0.8)	285 (7.4)	-2 (1.0)
Palestinian Nat'l Auth.	44 (1.1)	414 (3.6)	0 (1.5)	44 (1.0)	341 (4.3)	3 (1.3) ▲	13 (0.7)	333 (5.0)	-3 (1.0) ▼
Czech Republic	43 (0.9)	542 (2.6)	0 0	31 (0.7)	490 (2.8)	0 0	25 (0.8)	456 (3.1)	0 0
Botswana	42 (1.0)	385 (3.0)	4 (1.3) ▲	41 (0.9)	355 (2.6)	-4 (1.2) ▼	17 (0.7)	354 (3.6)	0 (1.0)
Hungary	42 (1.0)	566 (3.5)	-3 (1.4)	32 (0.9)	499 (4.2)	1 (1.3)	26 (1.0)	464 (3.7)	2 (1.3)
Singapore	41 (1.0)	638 (3.3)	2 (1.3)	34 (0.9)	572 (4.6)	0 (1.1)	25 (0.8)	547 (4.7)	-2 (1.0)
Bosnia and Herzegovina	41 (1.2)	502 (2.6)	0 0	27 (0.8)	441 (3.2)	0 0	32 (1.1)	422 (3.5)	0 0
Russian Federation	41 (1.1)	560 (4.3)	-2 (1.5)	31 (0.8)	496 (4.9)	1 (1.2)	28 (0.8)	466 (4.1)	1 (1.2)
Lithuania	41 (1.0)	556 (2.7)	4 (1.4) ▲	34 (0.9)	481 (2.9)	-3 (1.2) ▼	25 (0.9)	461 (3.1)	-1 (1.2)
Slovenia	40 (1.1)	541 (2.9)	-1 (1.4)	41 (0.9)	485 (2.2)	2 (1.3)	19 (0.8)	458 (3.2)	-1 (1.2)
Turkey	39 (1.1)	494 (6.1)	0 0	36 (0.8)	403 (4.7)	0 0	24 (1.0)	384 (4.3)	0 0
Malta	38 (0.7)	536 (2.1)	0 0	35 (0.7)	467 (2.0)	0 0	27 (0.6)	449 (2.2)	0 0
Bulgaria	37 (1.3)	516 (5.5)	4 (1.8)	38 (1.1)	452 (5.3)	-1 (1.8)	25 (1.1)	430 (7.6)	-3 (1.6)
Armenia	37 (0.9)	521 (4.0)	-4 (1.5) ▼	38 (1.1)	496 (4.6)	-2 (1.5)	26 (1.0)	485 (4.7)	7 (1.4) ▲
Ukraine	36 (1.2)	523 (3.8)	0 0	36 (0.9)	448 (3.5)	0 0	28 (1.1)	423 (3.2)	0 0
El Salvador	35 (1.1)	377 (3.2)	0 0	52 (1.1)	327 (2.7)	0 0	13 (0.8)	323 (4.5)	0 0
Romania	33 (1.2)	517 (5.3)	3 (1.7)	41 (1.1)	449 (4.6)	-4 (1.6) ▼	27 (1.2)	426 (4.4)	2 (1.5)
Hong Kong SAR	30 (1.1)	622 (5.1)	1 (1.4)	40 (1.0)	562 (6.7)	2 (1.2)	30 (0.7)	539 (5.8)	-2 (1.1) ▼
Korea, Rep. of	29 (0.8)	668 (2.6)	-2 (1.1)	34 (0.7)	606 (3.1)	-2 (1.0) ▼	38 (0.8)	536 (2.8)	4 (1.2) ▲
Indonesia	28 (1.0)	405 (5.4)	2 (1.6)	58 (1.0)	394 (3.8)	-1 (1.3)	14 (0.8)	401 (5.0)	-1 (1.2)
Malaysia	27 (1.4)	521 (5.3)	-11 (1.8) ▼	50 (1.2)	458 (5.1)	5 (1.5) ▲	23 (0.8)	453 (4.5)	6 (1.0) ▲
Chinese Taipei	27 (1.1)	674 (3.7)	1 (1.5)	27 (0.7)	610 (5.0)	-3 (1.0) ▼	46 (1.2)	547 (4.4)	2 (1.6)
Thailand	22 (1.1)	489 (6.9)	0 0	60 (0.9)	428 (4.6)	0 0	18 (0.7)	430 (5.6)	0 0
Japan	17 (0.6)	638 (3.9)	0 (0.9)	35 (0.8)	586 (2.9)	-3 (1.1) ▼	48 (0.9)	535 (2.6)	2 (1.2) ▲
‡ Morocco	43 (1.6)	417 (3.7)	--	39 (1.2)	360 (3.6)	--	18 (0.9)	348 (5.4)	--
<b>International Avg.</b>	<b>43 (0.2)</b>	<b>492 (0.6)</b>		<b>37 (0.1)</b>	<b>433 (0.6)</b>		<b>20 (0.1)</b>	<b>412 (0.7)</b>	
<b>Benchmarking Participants</b>									
Massachusetts, US	60 (1.6)	577 (4.0)	0 0	24 (1.1)	515 (5.1)	0 0	17 (1.1)	489 (7.6)	0 0
Ontario, Canada	59 (1.5)	548 (2.9)	-3 (2.0)	24 (1.0)	485 (4.7)	2 (1.3)	16 (1.0)	456 (5.0)	1 (1.3)
Minnesota, US	59 (1.6)	560 (4.3)	0 0	24 (1.4)	507 (5.0)	0 0	17 (1.0)	476 (5.5)	0 0
British Columbia, Canada	52 (1.3)	545 (3.2)	0 0	28 (0.9)	486 (3.9)	0 0	20 (0.9)	454 (2.9)	0 0
Quebec, Canada	51 (1.2)	560 (4.2)	-8 (1.8) ▼	27 (1.0)	511 (3.6)	3 (1.3) ▲	22 (0.9)	479 (3.5)	5 (1.3) ▲
Dubai, UAE	51 (1.1)	500 (3.1)	0 0	35 (0.8)	434 (3.4)	0 0	14 (0.9)	417 (5.9)	0 0
Basque Country, Spain	46 (1.5)	534 (3.0)	0 (2.2)	29 (1.1)	484 (3.8)	0 (1.5)	25 (1.2)	456 (4.3)	1 (1.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher      ▼ 2007 percent significantly lower

Index based on students' responses to four statements about mathematics:  
 1) I usually do well in mathematics; 2) Mathematics is more difficult for me than for many of my classmates (Reversed); 3) Mathematics is not one of my strengths (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (-) indicates comparable data are not available.  
 An "r" indicates data are available for at least 70 but less than 85% of the students.  
 A diamond (0) indicates the country did not participate in the assessment.

**Exhibit 4.11 Index of Students' Self-Confidence in Learning Mathematics (SCM) by Gender**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High SCM Percent of Students		Medium SCM Percent of Students		Low SCM Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	40 (1.8)	41 (1.6)	51 (1.7)	47 (1.5)	9 (0.8)	12 (1.3)
Armenia	50 (1.7)	53 (1.8)	36 (1.5)	35 (1.7)	14 (1.0)	12 (1.0)
Australia	60 (1.7)	68 (1.7)	30 (1.2)	23 (1.3)	11 (1.1)	9 (0.9)
Austria	64 (1.2)	76 (1.0)	24 (1.1)	19 (0.9)	11 (0.8)	5 (0.5)
Chinese Taipei	29 (1.3)	43 (1.3)	39 (1.1)	36 (1.2)	33 (1.1)	21 (1.1)
Colombia	46 (1.6)	52 (1.9)	45 (1.5)	42 (1.9)	9 (0.9)	6 (0.7)
Czech Republic	52 (1.6)	60 (1.4)	34 (1.4)	29 (1.3)	14 (0.8)	10 (0.9)
Denmark	66 (1.9)	73 (1.3)	25 (1.6)	21 (1.1)	9 (0.8)	6 (0.8)
El Salvador	36 (1.5)	42 (1.7)	55 (1.4)	50 (1.6)	9 (0.9)	8 (0.8)
England	59 (1.4)	69 (1.2)	29 (1.3)	22 (1.0)	12 (0.9)	8 (0.9)
Georgia	69 (1.5)	68 (1.7)	24 (1.1)	26 (1.5)	6 (1.0)	7 (0.8)
Germany	63 (1.1)	76 (1.1)	24 (1.0)	17 (1.0)	12 (1.0)	7 (0.6)
Hong Kong SAR	37 (1.3)	54 (1.3)	43 (1.2)	34 (1.2)	20 (1.0)	12 (0.9)
Hungary	58 (1.5)	67 (1.2)	30 (1.4)	24 (1.1)	12 (0.7)	10 (0.7)
Iran, Islamic Rep. of	65 (1.9)	66 (1.8)	29 (1.7)	26 (1.8)	6 (1.0)	8 (0.8)
Italy	62 (1.2)	70 (1.2)	30 (1.1)	24 (1.1)	8 (0.6)	6 (0.5)
Japan	37 (1.4)	53 (1.4)	38 (1.1)	33 (1.2)	25 (1.1)	14 (1.0)
Kazakhstan	69 (1.9)	63 (1.7)	21 (1.8)	27 (1.9)	10 (1.0)	10 (1.4)
Kuwait	60 (1.6)	51 (2.4)	36 (1.5)	43 (2.4)	5 (0.4)	6 (0.6)
Latvia	44 (1.4)	55 (1.5)	38 (1.5)	33 (1.3)	18 (1.3)	12 (0.8)
Lithuania	52 (1.3)	62 (1.2)	37 (1.4)	30 (1.2)	11 (0.8)	8 (0.7)
Morocco	46 (2.1)	45 (2.0)	47 (2.1)	45 (2.0)	7 (1.1)	10 (1.2)
Netherlands	59 (1.4)	73 (1.2)	26 (1.2)	18 (1.1)	15 (1.3)	9 (0.8)
New Zealand	49 (1.1)	54 (1.1)	39 (1.0)	35 (1.1)	12 (0.8)	11 (0.7)
Norway	68 (1.4)	71 (1.1)	26 (1.3)	23 (1.0)	7 (0.7)	7 (0.6)
Qatar	63 (0.7)	60 (1.0)	32 (0.7)	34 (1.0)	5 (0.4)	7 (0.4)
Russian Federation	52 (1.8)	57 (1.3)	31 (1.4)	31 (1.3)	16 (1.3)	13 (1.3)
Scotland	65 (1.5)	68 (1.3)	26 (1.4)	22 (1.1)	9 (0.9)	10 (0.8)
Singapore	39 (1.3)	52 (1.5)	38 (1.0)	31 (1.1)	23 (1.0)	16 (0.9)
Slovak Republic	56 (1.5)	63 (1.4)	30 (1.3)	27 (1.3)	15 (0.9)	10 (0.9)
Slovenia	65 (1.2)	72 (1.3)	29 (1.0)	22 (1.2)	6 (0.6)	6 (0.5)
Sweden	76 (1.1)	77 (1.2)	19 (1.1)	19 (1.1)	5 (0.4)	4 (0.5)
Tunisia	48 (1.8)	43 (1.6)	45 (1.7)	48 (1.6)	7 (0.6)	9 (0.9)
Ukraine	54 (1.5)	56 (1.3)	34 (1.5)	34 (1.2)	12 (0.8)	10 (0.9)
United States	65 (0.9)	70 (1.1)	23 (0.8)	22 (0.9)	12 (0.6)	8 (0.5)
Yemen	36 (2.1)	34 (2.2)	51 (1.9)	53 (2.2)	13 (1.3)	13 (1.1)
<b>International Avg.</b>	<b>54 (0.3)</b>	<b>60 (0.2)</b>	<b>34 (0.2)</b>	<b>31 (0.2)</b>	<b>12 (0.2)</b>	<b>9 (0.1)</b>
<b>Benchmarking Participants</b>						
Alberta, Canada	65 (1.3)	71 (1.3)	26 (1.2)	22 (1.0)	9 (0.8)	7 (0.8)
British Columbia, Canada	60 (1.2)	70 (1.3)	30 (1.0)	24 (1.1)	10 (0.9)	6 (0.8)
Dubai, UAE	65 (1.6)	70 (1.5)	28 (1.4)	25 (1.5)	6 (0.9)	6 (0.7)
Massachusetts, US	69 (2.0)	79 (1.4)	21 (1.8)	16 (1.3)	10 (1.1)	5 (1.0)
Minnesota, US	71 (2.6)	72 (2.8)	23 (2.1)	20 (1.6)	7 (1.1)	8 (1.5)
Ontario, Canada	59 (1.8)	66 (1.8)	29 (1.4)	26 (1.7)	12 (1.2)	9 (0.8)
Quebec, Canada	60 (1.8)	75 (1.3)	28 (1.4)	20 (1.2)	11 (1.0)	5 (0.6)

▲ Percent significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is harder for me than for many of my classmates (Reversed); 3) I am just not good at mathematics (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students

disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.



Exhibit 4.11 Index of Students' Self-Confidence in Learning Mathematics (SCM) by Gender (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High SCM Percent of Students		Medium SCM Percent of Students		Low SCM Percent of Students					
	Girls	Boys	Girls	Boys	Girls	Boys				
Algeria	43 (1.1)	50 (1.3)	▲	43 (1.2)	▲	39 (1.2)	14 (0.9)	▲	11 (0.7)	
Armenia	37 (1.4)	36 (1.3)		36 (1.6)		39 (1.4)	27 (1.6)		25 (1.3)	
Australia	39 (1.8)	51 (1.5)	▲	37 (1.3)		34 (1.5)	24 (1.5)	▲	15 (0.8)	
Bahrain	58 (1.1)	▲	47 (0.9)	29 (1.1)		37 (0.9)	▲	13 (0.9)	16 (0.8)	
Bosnia and Herzegovina	43 (1.6)	39 (1.6)		25 (1.2)		29 (1.1)	▲	32 (1.5)	32 (1.5)	
Botswana	40 (1.1)	44 (1.4)	▲	42 (1.0)		40 (1.3)		18 (0.9)	▲	16 (1.0)
Bulgaria	36 (1.6)	38 (1.7)		37 (1.5)		39 (1.6)		27 (1.6)		23 (1.3)
Chinese Taipei	20 (1.1)	35 (1.4)	▲	25 (0.9)		28 (1.0)	▲	55 (1.4)	▲	37 (1.3)
Colombia	43 (1.7)	50 (1.6)	▲	41 (1.6)		40 (1.2)		16 (1.2)	▲	11 (0.9)
Cyprus	52 (1.5)	▲	48 (1.1)	28 (1.2)		33 (1.0)	▲	21 (1.1)		19 (0.9)
Czech Republic	41 (1.2)	46 (1.2)	▲	30 (0.9)		32 (1.0)		29 (1.2)	▲	22 (1.1)
Egypt	52 (1.8)	57 (1.8)	▲	40 (1.8)		36 (1.8)		7 (0.6)		7 (0.6)
El Salvador	31 (1.6)	38 (1.4)	▲	53 (1.6)		51 (1.5)		15 (1.0)	▲	11 (0.9)
England	44 (1.6)	62 (1.7)	▲	35 (1.3)	▲	29 (1.4)		21 (1.2)	▲	9 (0.8)
Georgia	40 (2.2)	48 (2.1)	▲	38 (2.4)		36 (1.8)		21 (1.2)	▲	16 (1.5)
Ghana	37 (1.5)	50 (1.5)	▲	51 (1.2)	▲	41 (1.2)		12 (1.0)	▲	9 (0.8)
Hong Kong SAR	23 (1.1)	38 (1.5)	▲	39 (1.2)		40 (1.6)		38 (1.2)	▲	23 (1.0)
Hungary	38 (1.4)	45 (1.5)	▲	33 (1.3)		32 (1.3)		29 (1.3)	▲	23 (1.2)
Indonesia	28 (1.2)	29 (1.4)		57 (1.3)		58 (1.3)		15 (1.2)		13 (0.9)
Iran, Islamic Rep. of	46 (1.9)	44 (1.5)		39 (1.9)		42 (1.2)		15 (1.5)		14 (1.1)
Israel	58 (1.6)	61 (1.2)		29 (1.4)		29 (1.4)		13 (1.0)		10 (1.0)
Italy	45 (1.4)	52 (1.3)	▲	29 (1.0)		28 (1.0)		26 (1.3)	▲	21 (1.1)
Japan	11 (0.8)	22 (1.0)	▲	34 (1.1)		36 (1.2)		54 (1.1)	▲	41 (1.2)
Jordan	56 (2.3)	59 (1.9)		35 (1.9)		33 (1.5)		9 (0.8)		8 (1.0)
Korea, Rep. of	23 (1.0)	33 (1.2)	▲	35 (1.1)	▲	32 (0.9)		41 (1.1)	▲	34 (1.2)
Kuwait	55 (1.2)	54 (1.3)		34 (1.1)		36 (1.2)		11 (0.8)		10 (0.8)
Lebanon	46 (1.6)	52 (1.7)	▲	39 (1.6)		39 (1.8)		15 (1.2)	▲	9 (0.9)
Lithuania	39 (1.4)	42 (1.3)		32 (1.2)		36 (1.2)	▲	29 (1.3)	▲	22 (1.0)
Malaysia	29 (1.7)	26 (1.5)		47 (1.4)		53 (1.6)	▲	24 (1.1)	▲	21 (0.9)
Malta	36 (1.0)	40 (1.0)	▲	33 (1.1)		37 (1.0)	▲	31 (1.0)	▲	23 (0.8)
Norway	47 (1.1)	53 (1.1)	▲	32 (1.3)		30 (1.0)		22 (1.2)	▲	17 (0.8)
Oman	47 (1.7)	43 (1.4)		45 (1.7)		49 (1.4)		8 (0.8)		8 (0.7)
Palestinian Nat'l Auth.	42 (1.5)	45 (1.8)		44 (1.3)		43 (1.4)		13 (1.0)		12 (1.1)
Qatar	57 (0.8)	▲	54 (0.9)	32 (0.8)		37 (0.9)	▲	12 (0.5)	▲	10 (0.5)
Romania	33 (1.6)	32 (1.4)		39 (1.5)		42 (1.5)		28 (1.9)		25 (1.3)
Russian Federation	42 (1.7)	39 (1.4)		28 (1.1)		34 (1.3)	▲	30 (1.4)		27 (1.1)
Saudi Arabia	50 (1.6)	▲	44 (1.7)	40 (1.3)		43 (1.5)		10 (0.9)		13 (1.0)
Scotland	49 (1.7)	58 (1.6)	▲	35 (1.3)	▲	30 (1.4)		16 (0.9)	▲	12 (0.9)
Serbia	50 (1.5)	47 (1.8)		23 (1.1)		27 (1.2)	▲	27 (1.4)		27 (1.5)
Singapore	39 (1.4)	43 (1.3)	▲	33 (1.1)		35 (1.3)		28 (1.2)	▲	22 (1.0)
Slovenia	37 (1.5)	42 (1.3)	▲	43 (1.3)		40 (1.3)		20 (1.1)		18 (1.2)
Sweden	43 (1.2)	55 (1.3)	▲	36 (1.1)		34 (1.1)		21 (1.0)	▲	11 (0.7)
Syrian Arab Republic	45 (1.6)	49 (1.5)		40 (1.3)		40 (1.0)		14 (0.9)	▲	11 (1.0)
Thailand	21 (1.2)	24 (1.3)	▲	58 (1.2)		61 (1.2)	▲	22 (1.1)	▲	15 (0.8)
Tunisia	43 (1.5)	48 (1.6)	▲	33 (1.1)		34 (1.3)		24 (1.3)	▲	18 (1.2)
Turkey	38 (1.5)	41 (1.3)		35 (1.1)		38 (1.1)	▲	27 (1.5)	▲	22 (1.2)
Ukraine	37 (1.7)	36 (1.3)		35 (1.1)		37 (1.3)		28 (1.5)		27 (1.2)
United States	49 (1.2)	57 (1.2)	▲	30 (0.9)	▲	26 (0.8)		21 (0.9)	▲	17 (0.9)
‡ Morocco	40 (1.8)	46 (2.0)	▲	40 (1.9)		38 (1.5)		20 (1.3)		15 (1.8)
International Avg.	41 (0.2)	45 (0.2)	▲	37 (0.2)		37 (0.2)	▲	22 (0.2)	▲	18 (0.2)
<b>Benchmarking Participants</b>										
Basque Country, Spain	43 (1.9)	48 (1.8)	▲	29 (1.4)		29 (1.5)		27 (1.7)		23 (1.6)
British Columbia, Canada	46 (1.6)	58 (1.6)	▲	30 (1.3)	▲	26 (1.2)		24 (1.2)	▲	16 (0.9)
Dubai, UAE	47 (1.6)	54 (2.0)	▲	35 (1.3)		34 (1.4)		18 (1.0)	▲	11 (1.6)
Massachusetts, US	56 (1.6)	63 (1.9)	▲	25 (1.3)		22 (1.2)		20 (1.3)	▲	14 (1.4)
Minnesota, US	55 (2.0)	64 (1.7)	▲	25 (1.4)		24 (1.9)		21 (1.3)	▲	13 (1.2)
Ontario, Canada	54 (2.3)	65 (1.9)	▲	25 (1.5)		23 (1.5)		20 (1.5)	▲	12 (1.1)
Quebec, Canada	45 (1.6)	57 (1.5)	▲	28 (1.3)		26 (1.4)		27 (1.5)	▲	17 (1.0)

▲ Percent significantly higher than other gender

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is more difficult for me than for many of my classmates (Reversed); 3) Mathematics is not one of my strengths (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high

level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.

self-confidence index, compared to 41 percent of girls, while 22 percent of girls were at the low level, compared to 18 percent of boys. At the high level of the index, there were higher percentages of boys than girls in 27 countries and all 7 benchmarking entities, compared to higher percentages of girls in just 4 countries. At the low level, the pattern was reversed, with higher percentages of girls in 29 countries and 6 benchmarking entities, and higher percentages of boys in just 2 countries. There was less difference in the medium category than at the fourth grade, although the boys had higher percentages at the medium level of self-confidence in 12 countries compared to higher percentages of girls in 6 countries and 1 benchmarking participant (British Columbia).







# Chapter 5



## *The Mathematics Curriculum*

The first section of Chapter 5 contains information about the time provided for mathematics instruction at the fourth and eighth grades. Data are presented about the time intended for mathematics instruction as specified in curriculum guidelines, the time teachers report that they actually spend, and changes over time. The remainder of the chapter describes the coverage of the TIMSS mathematics topics in the intended curriculum for each country, as well as teachers' reports about the mathematics topics actually taught to their students, also known as the implemented curriculum.

In comparing achievement across countries, it is important to consider differences in students' curricular experiences, how these differences may affect the mathematics they have studied, and their subsequent achievement. Students' opportunities to learn the mathematics covered by the TIMSS 2007 content and cognitive domains depend initially to some degree on that mathematics being part of each country's guidelines and policies for mathematics education. Thus, participants provided information about various educational policies and the curriculum topics covered in their respective curriculum guidelines (intended curriculum). Inclusion in the country's curriculum, however, does not guarantee students' opportunity to learn. Just as important is what their teachers choose to teach them. The lessons provided by the teachers ultimately determine the mathematics students are taught (implemented curriculum).

This chapter contains information for each country about whether the TIMSS 2007 mathematics topics were in the intended curriculum,

and teachers' reports about whether the topics were taught. As might be anticipated, there is very close agreement between curriculum guidelines and teachers' reports about the topics covered. Also, there is a substantial correspondence between topics in the intended and implemented curricula in various countries and students' achievement.

### **How Much Instructional Time Is Spent on Mathematics?**

Exhibit 5.1 presents the hours per week for mathematics instruction designated by countries in their curriculum at the fourth and eighth grades, and teachers' reports about the amount of instructional time actually provided. In each case, the total amount of instructional time is given together with the percentage of that time devoted to mathematics. For teachers' reports, changes are provided between 2003 and 2007. At the fourth grade, most of the countries reported that the curriculum prescribed a specific amount of time for instruction in all subjects and for mathematics instruction. There was some variation, but the countries averaged 23 hours of total instruction per week, with about one fifth of the time (18%) being prescribed for mathematics instruction. On average, there was very close agreement between the curriculum guidelines and teachers' reports about the implementation. On average internationally, fourth grade teachers reported a total of 24 hours of weekly instruction, with 16 percent being devoted to mathematics. Across countries, teachers reported a decrease (slight but statistically significant) in total instructional time in 10 countries and an increase in 2 countries and 1 benchmarking entity. The teachers reported increases in the percentage of instructional time per week devoted to mathematics (again slight but significant statistically) in 10 countries and 1 benchmarking entity. In 8 countries, teachers reported decreases in total instructional time accompanied with increases in the percentages of time devoted to mathematics instruction.

At the eighth grade, the average total instruction time per week was 27 hours with 14 percent being devoted to mathematics instruction. Teachers' reports of 28 hours per week in total and 12 percent devoted to mathematics instruction corresponded with the instructional time guidelines across the countries' curricula. At the eighth grade, teachers reported increases in total instructional time in 8 countries and decreases in 14 countries. They reported increases in the percentages of time devoted to mathematics instruction in 10 countries and decreases in 5 countries.

Exhibit 5.2 presents the total instructional time in mathematics per year at the fourth and eighth grades and changes from 2003 for each TIMSS 2007 country and benchmarking participant. At the fourth grade, those reporting that students averaged more than 200 hours of mathematics instruction per year included Italy and Singapore (each with 201 hours) and the benchmarking state of Massachusetts (208 hours). Singapore, the United States, Hong Kong SAR, and Chinese Taipei had increases in the yearly hours of mathematics instruction, and Lithuania, Hungary, and the Russian Federation had decreases. At the eighth grade, those reporting that students averaged more than 150 hours of mathematics instruction per year included Chinese Taipei (158), Colombia (151), and Oman (150) as well as the Canadian province of Ontario (159) and the U.S. state of Massachusetts (155).

Exhibit 5.3 shows teachers' reports about how the instructional time for mathematics is distributed across the TIMSS 2007 content areas. At the fourth grade, on average across countries, teachers reported devoting half the mathematics instructional time to the content area of number, about one fourth (24%) to geometric shapes and measures, 16 percent to data display, and 10 percent to other areas. At the eighth grade, on average internationally, teachers reported devoting 24 percent of the mathematics instructional time to number, 29 percent to algebra, 27 percent to geometry, 13 percent to data and chance, and 7 percent to other areas.

**Exhibit 5.1 Weekly Intended and Implemented Instructional Time for Mathematics with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools				
	Total Hours of Instructional Time per Week	Mathematics Instructional Time as a Percent of Total Instructional Time	Total Hours of Instructional Time per Week		Mathematics Instructional Time as a Percent of Total Instructional Time		
			2007 Hours	Difference from 2003	2007 Percent	Difference from 2003	
Algeria	32	16	30 (0.3)	◇ ◇	r	17 (0.3)	◇ ◇
Armenia	23	20	27 (0.5)	-1 (0.7)	▼	15 (0.4)	--
Australia	27	20	25 (0.2)	0 (0.2)	r	18 (0.5)	0 (0.6)
Austria	21	18	21 (0.1)	◇ ◇		17 (0.2)	◇ ◇
Chinese Taipei	20	14	23 (0.4)	-1 (0.4)	▼	13 (0.3)	2 (0.4) ●
Colombia	25	np	27 (0.4)	◇ ◇		17 (0.5)	◇ ◇
Czech Republic	18	21	19 (0.1)	◇ ◇		19 (0.1)	◇ ◇
Denmark	20	17	21 (0.2)	◇ ◇	r	15 (0.2)	◇ ◇
El Salvador	19	20	24 (0.7)	◇ ◇		17 (0.4)	◇ ◇
England	24	20	25 (0.2)	1 (0.4)	▲	19 (0.2)	--
Georgia	23	20	19 (0.3)	◇ ◇	s	19 (0.4)	◇ ◇
Germany	21	18	22 (0.2)	◇ ◇	r	17 (0.2)	◇ ◇
Hong Kong SAR	23	13	27 (0.3)	0 (0.4)	s	15 (0.4)	1 (0.5)
Hungary	17	13	20 (0.3)	-4 (0.3)	▼	16 (0.3)	2 (0.3) ●
Iran, Islamic Rep. of	21	16	21 (0.2)	-3 (0.4)	▼	15 (0.4)	--
Italy	30	20	30 (0.3)	0 (0.4)	r	19 (0.3)	0 (0.5)
Japan	20	16	22 (0.2)	-5 (0.3)	▼	16 (0.2)	3 (0.3) ●
Kazakhstan	20	19	22 (0.2)	◇ ◇		18 (0.3)	◇ ◇
Kuwait	30	14	26 (0.3)	◇ ◇	s	4 (0.4)	◇ ◇
Latvia	17	20	20 (0.4)	-3 (0.5)	▼	18 (0.4)	3 (0.5) ●
Lithuania	18	19	20 (0.2)	-3 (0.3)	▼	18 (0.3)	2 (0.4) ●
Mongolia	22	13	--	◇ ◇		--	◇ ◇
Morocco	28	18	28 (0.4)	0 (0.5)	s	17 (0.3)	--
Netherlands	np	np	27 (0.1)	0 (0.1)	s	16 (0.4)	0 (0.6)
New Zealand	np	np	24 (0.1)	0 (0.2)		16 (0.2)	1 (0.4) ●
Norway	19	16	23 (0.0)	0 (0.0)		13 (0.3)	1 (0.4)
Qatar	26	11	31 (0.0)	◇ ◇	s	12 (0.0)	◇ ◇
Russian Federation	15	20	19 (0.2)	-4 (0.3)	▼	17 (0.2)	3 (0.3) ●
Scotland	25	15	25 (0.1)	0 (0.2)	s	19 (0.3)	0 (0.5)
Singapore	25	22	26 (0.0)	-5 (0.2)	▼	21 (0.1)	3 (0.2) ●
Slovak Republic	20	20	21 (0.3)	◇ ◇		18 (0.2)	◇ ◇
Slovenia	18	21	19 (0.1)	-3 (0.2)	▼	20 (0.2)	2 (0.3) ●
Sweden	np	np	24 (0.3)	◇ ◇	r	12 (0.3)	◇ ◇
Tunisia	25	20	29 (0.9)	0 (0.9)	r	18 (0.4)	--
Ukraine	16	17	18 (0.2)	◇ ◇		17 (0.3)	◇ ◇
United States	32	16	30 (0.2)	1 (0.3)	▲	16 (0.4)	2 (0.5) ●
Yemen	23	18	24 (0.4)	◇ ◇		15 (0.5)	◇ ◇
<b>International Avg.</b>	<b>23</b>	<b>18</b>	<b>24 (0.1)</b>			<b>16 (0.1)</b>	
<b>Benchmarking Participants</b>							
Alberta, Canada	25	15	27 (0.2)	◇ ◇		15 (0.3)	◇ ◇
British Columbia, Canada	24	np	24 (0.2)	◇ ◇	r	17 (0.3)	◇ ◇
Dubai, UAE	24	17	28 (0.0)	◇ ◇	x x		◇ ◇
Massachusetts, US	25	np	28 (0.5)	◇ ◇	r	21 (0.9)	◇ ◇
Minnesota, US	29	4	29 (0.5)	◇ ◇		15 (0.8)	◇ ◇
Ontario, Canada	25	np	26 (0.5)	0 (0.5)	r	18 (0.5)	2 (0.6) ●
Quebec, Canada	25	20	25 (0.1)	1 (0.2)	▲	22 (0.4)	-1 (0.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 significantly higher ▲

2007 significantly lower ▼

Intended instructional time provided by National Research Coordinators. Implemented instructional time for mathematics provided by teachers, and total instructional time provided by schools.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

An "np" indicates not prescribed by the curriculum.

A diamond (◇) indicates the country did not participate in the assessment.

Note: For Norway, hours of intended instructional time is only an estimate and only prescribed for grades 1–7 and 8–10, not for single grades.



**Exhibit 5.1 Weekly Intended and Implemented Instructional Time for Mathematics with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Intended Time Prescribed in the Curriculum		Time Implemented in Schools					
	Total Hours of Instructional Time per Week	Mathematics Instructional Time as a Percent of Total Instructional Time	Total Hours of Instructional Time per Week			Mathematics Instructional Time as a Percent of Total Instructional Time		
			2007 Hours	Difference from 2003		2007 Percent	Difference from 2003	
Algeria	30	17	r	36 (0.5)	◊ ◊	s	13 (0.4)	◊ ◊
Armenia	27	20	r	31 (0.6)	-2 (0.7)	▼	11 (0.4)	--
Australia	25	17		26 (0.2)	0 (0.3)	r	13 (0.2)	-1 (0.4)
Bahrain	31	17		28 (0.0)	3 (0.0)	▲	9 (0.3)	-7 (0.3)
Bosnia and Herzegovina	26	10		29 (0.9)	◊ ◊	r	11 (0.3)	◊ ◊
Botswana	30	13	s	30 (0.6)	2 (0.8)	▲	13 (0.3)	--
Bulgaria	32	12		24 (0.4)	-2 (0.5)	▼	12 (0.3)	0 (0.4)
Chinese Taipei	25	15		29 (0.3)	1 (0.4)		14 (0.2)	1 (0.3)
Colombia	30	np		31 (0.4)	◊ ◊	r	12 (0.7)	◊ ◊
Cyprus	26	8	r	26 (0.0)	-1 (0.0)	▼	8 (0.0)	0 (0.1)
Czech Republic	23	13		24 (0.3)	◊ ◊	r	14 (0.2)	◊ ◊
Egypt	26	14		32 (0.4)	1 (0.6)	▲	8 (0.4)	--
El Salvador	19	20		23 (0.6)	◊ ◊		17 (0.5)	◊ ◊
England	25	12	s	26 (0.2)	0 (0.2)		12 (0.2)	--
Georgia	23	12		24 (0.4)	◊ ◊		13 (0.2)	◊ ◊
Ghana	27	14	r	28 (0.4)	1 (0.6)	▲	13 (0.5)	--
Hong Kong SAR	27	13		28 (0.3)	0 (0.4)	s	14 (0.4)	-1 (0.6)
Hungary	21	11	r	22 (0.3)	-7 (0.3)	▼	13 (0.2)	2 (0.3)
Indonesia	32	10	r	34 (0.6)	0 (0.8)	s	11 (0.3)	-2 (0.4)
Iran, Islamic Rep. of	31	12		27 (0.2)	-2 (0.4)	▼	11 (0.3)	-1 (0.5)
Israel	23	17		32 (0.6)	0 (0.7)	s	12 (0.3)	--
Italy	30	15	r	31 (0.4)	0 (0.5)	r	13 (0.2)	0 (0.2)
Japan	23	11		25 (0.2)	-3 (0.3)	▼	10 (0.1)	1 (0.2)
Jordan	26	15		28 (0.3)	3 (0.4)	▲	14 (0.2)	1 (0.2)
Korea, Rep. of	26	12		29 (0.4)	-7 (0.4)	▼	11 (0.2)	3 (0.2)
Kuwait	30	14	r	26 (0.4)	◊ ◊	s	6 (0.6)	◊ ◊
Lebanon	35	16	r	30 (0.3)	--		x x	--
Lithuania	23	13		24 (0.3)	-3 (0.4)	▼	13 (0.2)	1 (0.2)
Malaysia	29	11		30 (0.3)	3 (0.3)	▲	11 (0.1)	-1 (0.2)
Malta	27	14		27 (0.0)	◊ ◊		13 (0.0)	◊ ◊
Mongolia	30	13		--	◊ ◊		--	◊ ◊
Norway	23	12		22 (0.0)	0 (0.0)		13 (0.2)	0 (0.3)
Oman	27	20		27 (0.4)	◊ ◊		15 (0.5)	◊ ◊
Palestinian Nat'l Auth.	20	14	r	26 (0.3)	-2 (0.3)	▼	11 (0.4)	-3 (0.5)
Qatar	26	12	r	28 (0.0)	◊ ◊	s	13 (0.0)	◊ ◊
Romania	24	13		26 (0.3)	-3 (0.5)	▼	14 (0.3)	1 (0.4)
Russian Federation	23	16		26 (0.3)	-1 (0.4)	▼	15 (0.2)	1 (0.4)
Saudi Arabia	--	12	r	27 (0.3)	--	r	11 (0.3)	--
Scotland	28	13	s	28 (0.2)	0 (0.2)	s	13 (0.2)	-1 (0.3)
Serbia	24	13	r	23 (0.3)	-1 (0.4)	s	13 (0.2)	0 (0.3)
Singapore	23	13		29 (0.0)	-5 (0.0)	▼	13 (0.1)	1 (0.2)
Slovenia	23	13		23 (0.1)	-5 (0.2)	▼	13 (0.1)	2 (0.1)
Sweden	np	np		26 (0.3)	-1 (0.4)	▼	10 (0.2)	1 (0.3)
Syrian Arab Republic	30	12		24 (0.4)	◊ ◊		10 (0.4)	◊ ◊
Thailand	35	8		32 (0.3)	◊ ◊		10 (0.2)	◊ ◊
Tunisia	32	13	r	39 (0.7)	8 (0.8)	▲	10 (0.2)	--
Turkey	20	13		27 (0.9)	◊ ◊		11 (0.3)	◊ ◊
Ukraine	25	12		24 (0.2)	◊ ◊		15 (0.2)	◊ ◊
United States	29	13		31 (0.2)	2 (0.3)	▲	13 (0.2)	0 (0.3)
‡ Morocco	28	13		37 (1.0)	--	r	11 (0.6)	--
International Avg.	27	14		28 (0.1)			12 (0.0)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Basque Country, Spain	30	10		30 (0.2)	0 (0.2)		12 (0.2)	0 (0.3)
British Columbia, Canada	26	np		26 (0.2)	◊ ◊	r	14 (0.4)	◊ ◊
Dubai, UAE	28	16	s	29 (0.1)	◊ ◊		x x	◊ ◊
Massachusetts, US	28	np		29 (0.3)	◊ ◊		15 (0.3)	◊ ◊
Minnesota, US	29	4		30 (0.5)	◊ ◊		13 (0.4)	◊ ◊
Ontario, Canada	25	np		26 (0.2)	0 (0.3)	r	16 (0.3)	-1 (0.6)
Quebec, Canada	25	17		26 (0.2)	0 (0.2)	r	16 (0.3)	-1 (0.5)

2007 significantly higher ▲

2007 significantly lower ▼

Intended instructional time provided by National Research Coordinators. Implemented instructional time for mathematics provided by teachers, and total instructional time provided by schools.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s"

indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

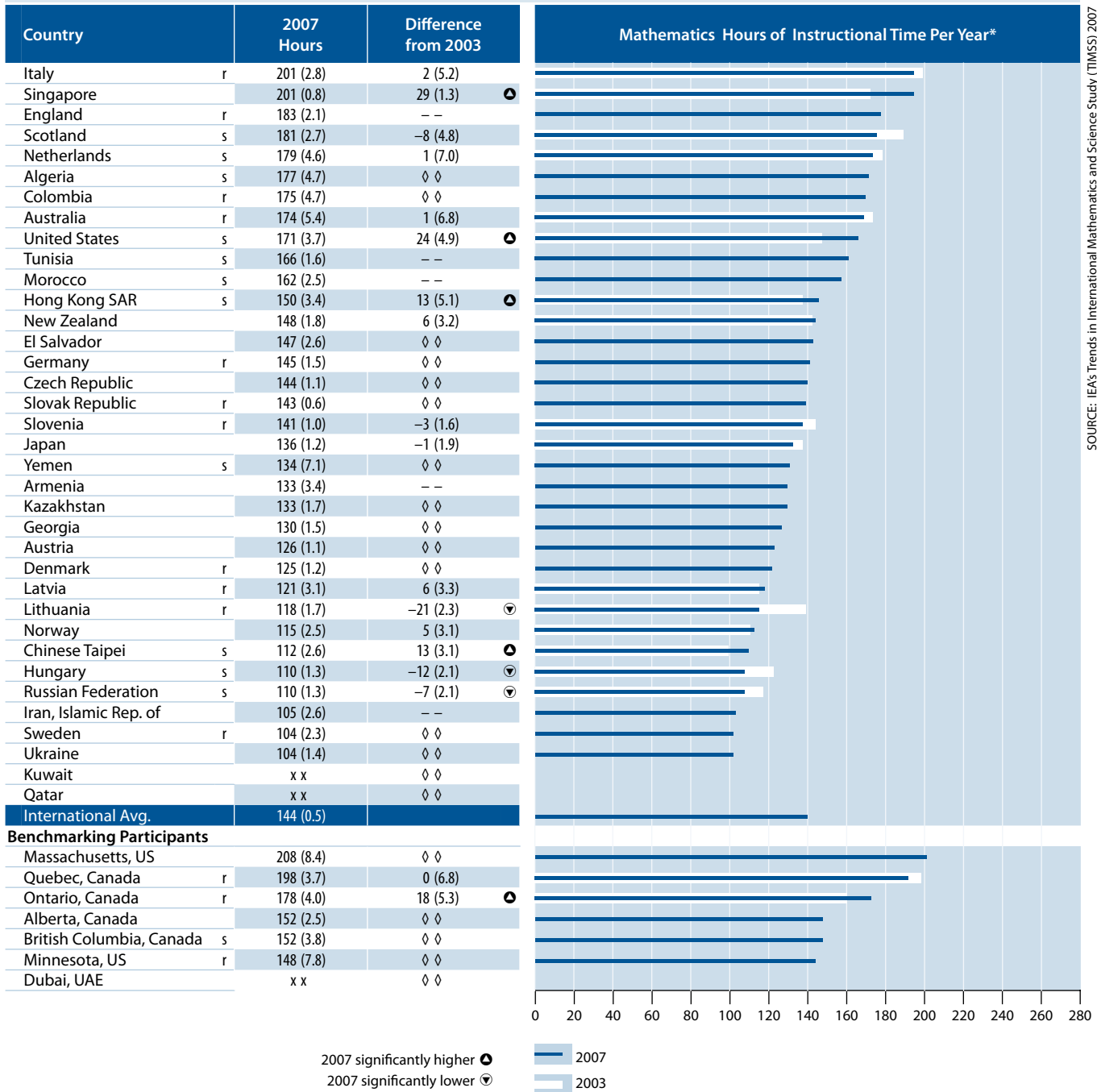
An "np" indicates not prescribed by the curriculum.

A diamond (◊) indicates the country did not participate in the assessment.

Note: Total instructional time for Thailand is only applicable to the majority of schools. For Norway, hours of intended instructional time is only an estimate and only prescribed for grades 1-7 and 8-10, not for single grades.

**Exhibit 5.2 Yearly Hours of Implemented Instructional Time for Mathematics with Trends**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

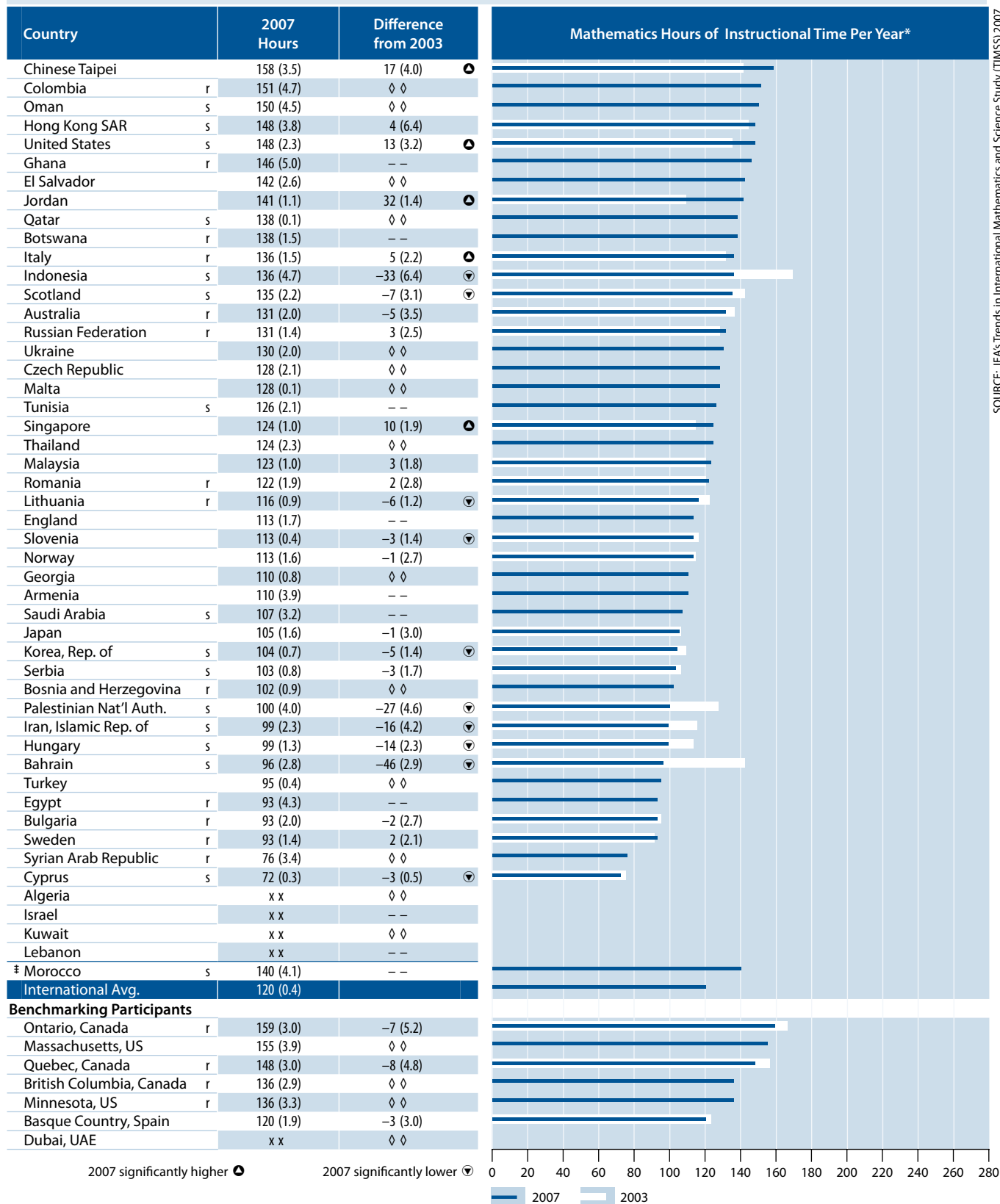
Implemented instructional time for mathematics provided by teachers, and total instructional time provided by schools.

\* The yearly hours of instructional time for mathematics are computed by multiplying the number of hours per week that teachers teach mathematics by the number of instructional weeks per year. The number of instructional weeks per year was computed by dividing the number of days per year a school is open for instruction by the number of instructional days in a calendar week.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
A dash (-) indicates comparable data are not available.  
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.  
A diamond (◊) indicates the country did not participate in the assessment.

**Exhibit 5.2 Yearly Hours of Implemented Instructional Time for Mathematics with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Implemented instructional time for mathematics provided by teachers, and total instructional time provided by schools.

\* The yearly hours of instructional time for mathematics are computed by multiplying the number of hours per week that teachers teach mathematics by the number of instructional weeks per year. The number of instructional weeks per year was computed by dividing the number of days per year a school is open for instruction by the number of instructional days in a calendar week.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students. An “x” indicates data are available for less than 50% of the students.

A diamond (◇) indicates the country did not participate in the assessment.

Exhibit 5.3 **Percentage of Time in Mathematics Class Devoted to TIMSS Content Domains During the School Year**

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

Country	Number	Geometric Shapes and Measures	Data Display	Other
Algeria	r 44 (1.4)	r 26 (0.5)	r 18 (0.9)	r 13 (1.0)
Armenia	r 54 (1.8)	r 24 (0.8)	r 13 (1.0)	r 11 (0.8)
Australia	57 (1.1)	22 (0.7)	15 (0.6)	6 (0.7)
Austria	48 (1.2)	25 (0.6)	9 (0.4)	18 (1.2)
Chinese Taipei	53 (1.0)	28 (0.6)	14 (0.6)	5 (0.7)
Colombia	45 (1.5)	23 (0.8)	20 (0.8)	12 (1.6)
Czech Republic	56 (1.0)	26 (0.5)	11 (0.5)	6 (0.7)
Denmark	49 (1.2)	26 (0.6)	17 (0.6)	8 (0.8)
El Salvador	38 (1.1)	27 (0.8)	25 (0.7)	10 (1.2)
England	56 (0.9)	22 (0.5)	18 (0.5)	4 (0.7)
Georgia	41 (1.5)	27 (0.7)	17 (0.7)	16 (1.4)
Germany	54 (0.7)	21 (0.5)	13 (0.4)	12 (0.7)
Hong Kong SAR	53 (1.0)	29 (0.7)	15 (0.5)	3 (0.6)
Hungary	60 (1.1)	19 (0.7)	10 (0.4)	10 (0.9)
Iran, Islamic Rep. of	34 (0.9)	27 (0.7)	18 (0.7)	21 (1.2)
Italy	48 (0.9)	27 (0.4)	15 (0.4)	10 (0.7)
Japan	49 (1.1)	29 (0.8)	18 (0.6)	4 (0.6)
Kazakhstan	--	--	--	--
Kuwait	s 44 (1.8)	s 27 (1.2)	s 17 (1.2)	s 13 (1.4)
Latvia	52 (0.9)	20 (0.6)	15 (0.6)	13 (1.0)
Lithuania	44 (0.9)	25 (0.6)	17 (0.4)	14 (0.9)
Morocco	44 (1.1)	29 (0.8)	16 (0.8)	10 (0.7)
Netherlands	64 (1.2)	14 (0.5)	16 (0.7)	6 (0.8)
New Zealand	66 (0.8)	17 (0.4)	13 (0.3)	4 (0.4)
Norway	61 (1.1)	24 (0.7)	11 (0.5)	4 (0.7)
Qatar	s 48 (0.1)	s 24 (0.0)	s 15 (0.0)	s 13 (0.1)
Russian Federation	--	--	--	--
Scotland	r 56 (1.0)	r 21 (0.6)	r 16 (0.5)	r 7 (0.7)
Singapore	55 (0.7)	27 (0.6)	14 (0.5)	5 (0.5)
Slovak Republic	63 (0.9)	26 (0.5)	8 (0.5)	3 (0.6)
Slovenia	50 (1.0)	24 (0.5)	17 (0.5)	10 (1.0)
Sweden	56 (1.7)	21 (0.8)	13 (0.6)	10 (1.2)
Tunisia	41 (1.3)	26 (0.8)	19 (0.8)	14 (1.1)
Ukraine	36 (1.5)	24 (0.7)	18 (0.8)	22 (1.5)
United States	54 (1.0)	20 (0.4)	19 (0.5)	6 (0.6)
Yemen	r 37 (1.5)	r 28 (0.7)	r 20 (0.7)	r 15 (1.1)
International Avg.	50 (0.2)	24 (0.1)	16 (0.1)	10 (0.2)
<b>Benchmarking Participants</b>				
Alberta, Canada	55 (1.0)	21 (0.6)	18 (0.6)	6 (0.8)
British Columbia, Canada	r 57 (1.2)	r 19 (0.7)	r 17 (0.7)	r 6 (0.7)
Dubai, UAE	s 55 (1.4)	s 20 (1.0)	s 13 (0.7)	s 12 (1.4)
Massachusetts, US	51 (2.0)	22 (1.0)	20 (0.8)	6 (1.2)
Minnesota, US	58 (2.5)	21 (1.2)	17 (1.2)	4 (1.1)
Ontario, Canada	48 (1.2)	25 (0.7)	18 (0.6)	9 (1.1)
Quebec, Canada	53 (1.3)	23 (0.7)	14 (0.5)	10 (1.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.



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**Exhibit 5.3 Percentage of Time in Mathematics Class Devoted to TIMSS Content Domains During the School Year (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>**  
Grade

Country	Number	Algebra	Geometry	Data and Chance	Other
Algeria	31 (0.8)	16 (0.6)	30 (0.8)	16 (0.6)	7 (0.7)
Armenia	19 (1.0)	36 (1.0)	29 (0.6)	10 (0.5)	6 (0.8)
Australia	29 (0.8)	24 (0.6)	20 (0.5)	17 (0.7)	9 (0.9)
Bahrain	24 (0.5)	26 (0.4)	25 (0.3)	16 (0.4)	9 (0.5)
Bosnia and Herzegovina	r 20 (1.0)	r 28 (1.3)	r 35 (1.8)	r 7 (0.5)	r 10 (1.2)
Botswana	35 (1.2)	23 (0.9)	17 (0.9)	12 (0.8)	14 (1.2)
Bulgaria	13 (0.7)	37 (0.6)	41 (0.6)	6 (0.5)	3 (0.4)
Chinese Taipei	20 (1.1)	35 (1.0)	40 (1.6)	4 (0.5)	1 (0.3)
Colombia	26 (0.8)	41 (1.5)	17 (0.8)	13 (0.7)	5 (0.6)
Cyprus	r 31 (0.6)	r 34 (0.5)	r 22 (0.6)	r 3 (0.3)	s 12 (0.7)
Czech Republic	21 (0.8)	39 (0.9)	26 (0.6)	8 (0.4)	7 (0.8)
Egypt	22 (0.7)	26 (0.5)	27 (0.6)	15 (0.5)	10 (0.7)
El Salvador	26 (0.7)	36 (1.2)	16 (0.9)	18 (0.8)	3 (0.5)
England	28 (0.7)	27 (0.6)	21 (0.4)	20 (0.4)	4 (0.5)
Georgia	20 (0.9)	30 (0.8)	31 (0.7)	12 (0.5)	7 (0.9)
Ghana	23 (0.7)	23 (0.7)	23 (0.5)	21 (0.6)	10 (0.7)
Hong Kong SAR	18 (0.7)	34 (0.8)	31 (1.0)	12 (0.6)	4 (0.8)
Hungary	25 (0.8)	27 (0.6)	28 (0.7)	11 (0.5)	7 (0.8)
Indonesia	r 20 (0.7)	r 27 (1.0)	r 26 (1.1)	r 16 (0.8)	r 14 (1.3)
Iran, Islamic Rep. of	22 (0.7)	28 (0.8)	27 (0.7)	10 (0.4)	12 (0.9)
Israel	r 13 (0.7)	r 41 (0.9)	r 30 (0.7)	r 10 (0.6)	r 5 (0.6)
Italy	16 (0.7)	35 (0.6)	34 (0.6)	12 (0.4)	3 (0.4)
Japan	19 (0.9)	33 (0.8)	33 (0.7)	14 (1.1)	2 (0.4)
Jordan	26 (0.6)	26 (0.6)	23 (0.5)	16 (0.6)	10 (0.9)
Korea, Rep. of	18 (0.6)	30 (0.7)	34 (1.0)	15 (0.5)	2 (0.4)
Kuwait	s 27 (1.3)	s 21 (0.6)	s 25 (1.1)	s 19 (0.8)	s 8 (1.1)
Lebanon	21 (0.7)	27 (0.8)	35 (0.9)	12 (0.7)	r 5 (0.8)
Lithuania	22 (0.6)	37 (0.7)	24 (0.4)	11 (0.4)	6 (0.7)
Malaysia	28 (0.9)	24 (0.5)	24 (0.6)	16 (0.5)	9 (1.0)
Malta	24 (0.0)	30 (0.0)	28 (0.0)	13 (0.0)	7 (0.1)
Norway	30 (0.8)	20 (0.7)	25 (0.5)	16 (0.6)	9 (0.7)
Oman	25 (0.9)	27 (0.6)	24 (0.6)	17 (0.5)	7 (0.8)
Palestinian Nat'l Auth.	24 (1.0)	23 (0.7)	26 (0.6)	16 (0.5)	11 (0.9)
Qatar	r 22 (0.0)	r 27 (0.0)	r 27 (0.0)	r 15 (0.0)	r 10 (0.0)
Romania	18 (0.5)	29 (0.6)	36 (0.9)	10 (0.5)	8 (0.9)
Russian Federation	11 (0.8)	48 (1.1)	33 (0.6)	5 (0.6)	2 (0.4)
Saudi Arabia	r 30 (1.0)	r 23 (0.8)	r 29 (0.8)	r 12 (0.8)	r 7 (1.0)
Scotland	36 (0.8)	24 (0.7)	22 (0.6)	14 (0.5)	4 (0.5)
Serbia	18 (0.8)	26 (1.1)	37 (1.7)	7 (0.6)	13 (1.9)
Singapore	16 (0.5)	40 (0.8)	21 (0.5)	13 (0.4)	9 (0.7)
Slovenia	37 (0.7)	25 (0.6)	23 (0.6)	10 (0.3)	5 (0.6)
Sweden	35 (0.7)	24 (0.6)	23 (0.5)	14 (0.5)	5 (0.7)
Syrian Arab Republic	21 (0.8)	28 (0.9)	27 (0.7)	15 (0.7)	10 (0.6)
Thailand	28 (0.7)	25 (0.6)	24 (0.7)	16 (0.5)	7 (0.9)
Tunisia	32 (0.8)	17 (0.8)	34 (0.7)	11 (0.6)	7 (0.7)
Turkey	24 (0.9)	24 (0.8)	28 (0.9)	15 (0.5)	9 (1.1)
Ukraine	18 (0.8)	33 (0.9)	29 (0.8)	9 (0.6)	12 (1.0)
United States	23 (0.7)	47 (1.1)	16 (0.6)	12 (0.4)	2 (0.3)
‡ Morocco	r 29 (1.9)	r 22 (0.6)	r 28 (0.9)	r 12 (0.6)	r 8 (1.3)
<b>International Avg.</b>	<b>24 (0.1)</b>	<b>29 (0.1)</b>	<b>27 (0.1)</b>	<b>13 (0.1)</b>	<b>7 (0.1)</b>
<b>Benchmarking Participants</b>					
Basque Country, Spain	38 (1.0)	32 (0.7)	22 (0.8)	6 (0.6)	r 3 (0.7)
British Columbia, Canada	37 (1.0)	26 (0.7)	20 (0.6)	12 (0.5)	4 (0.6)
Dubai, UAE	s 20 (0.9)	s 30 (1.3)	s 29 (0.8)	s 12 (0.5)	s 9 (1.1)
Massachusetts, US	19 (1.4)	50 (2.3)	14 (0.8)	13 (0.9)	3 (1.0)
Minnesota, US	21 (1.6)	49 (2.2)	15 (1.1)	14 (1.0)	1 (0.4)
Ontario, Canada	33 (1.0)	22 (0.6)	19 (0.5)	17 (0.5)	10 (0.8)
Quebec, Canada	24 (0.9)	32 (0.8)	26 (0.7)	14 (0.6)	3 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



### **Are the TIMSS Mathematics Topics Included in the Intended Curriculum Taught in School?**

The mathematics content and topic areas assessed in TIMSS 2007 are elaborated in the Mathematics Framework, with each topic area for fourth and eighth grade presented as a comprehensive list of objectives. The aim was to cover goals of mathematics education that a significant number of countries regarded as important to assess. Because the topics do not represent the “least common denominator” but rather a forward-looking conception of mathematics instruction, not all TIMSS topics are in all countries’ curriculum.

National Research Coordinators were asked to indicate whether each of the TIMSS 2007 mathematics topics was included in their countries’ intended curriculum through fourth or eighth grade, and if so, whether the topics were intended to be taught to “all or almost all students” or “only the more able students.” At the fourth grade, countries were asked about a total of 35 topics, 19 in number, 11 in geometric shapes and measures, and 5 in data display. At the eighth grade, countries were asked about 39 topics in total, with 10 in number, 8 in algebra, 14 in geometry, and 7 in data and chance. The responses for the countries are summarized in this section and the topic-by-topic data follows in the next sections.

Exhibit 5.4 shows that, for most countries, much of the mathematics content assessed by TIMSS is included in their intended curricula. On average across countries at the fourth grade, the majority of the assessment topics (22 out of 35) were intended for all or almost all students. There was variation among participants, with 34 to 35 of the topics included in the curriculum for all or almost all students in Australia, Austria, Colombia, Denmark, Italy, and the United States, and 17 or fewer of the topics (less than half) included for Georgia, Mongolia, Morocco, the Netherlands, Norway, Qatar, Scotland, the Russian Federation, the Slovak Republic, Tunisia, and the Ukraine. On average across countries, 12 out of 19 topics were included in the number domain, 7 out of 11 topics in the geometric shapes and measures domain, and 3 out of 5 topics in the data display domain.

On average across countries at the eighth grade, most of the assessment topics (31 out of 39) were intended for all or almost all students. Almost all of the countries included all of the number topics for all or almost all students—10 out of 10 topics included on average internationally. On average across countries, the coverage for the other content areas ranged from almost all the topics for algebra to fewer than half the topics for data and chance. The inclusion for algebra topics was 7 out of 8 topics, for geometry 11 out of 14 topics, and for data and chance 3 out of 7 topics (with some countries not including any of the topics).

In addition to asking national coordinators about the mathematics topics in the intended curriculum, TIMSS asked mathematics teachers about the topics actually taught in the mathematics classroom. Teachers of the students assessed in TIMSS were asked to indicate whether each of the TIMSS 2007 mathematics topics was *mostly taught before this year*, *mostly taught this year*, or *not yet taught or just introduced*. Exhibit 5.5 presents, for fourth and eighth grades, teachers' reports on students having been taught the TIMSS mathematics topics either prior to or during the year of the assessment. The exhibit shows, for each TIMSS participant, averaged across mathematics content domains, the percentage of students whose teachers reported that the students had been taught each topic.

At fourth grade, according to their teachers, 66 percent of students, on average across countries, had been taught the mathematics topics, with more than 80 percent in England, Singapore, the United States, and the U.S. states of Massachusetts and Minnesota. The percentages of students taught the three content domains were similar, although a little higher for the number topics (70%, on average) and a little lower for geometric shapes and measures and for data display (64% each). At eighth grade, an average of 72 percent of students had been taught the mathematics topics overall, and about the same for the algebra (73%) and geometry topics (71%). Almost all students, 95 percent, on average, had been taught the number topics at eighth grade, but there was much less attention to data and chance, with just 47 percent of students taught the topics in this domain. According to

Exhibit 5.4 Summary of TIMSS Mathematics Topics in the Intended Curriculum\*

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Number of TIMSS Mathematics Topics Intended to Be Taught up to and Including Fourth Grade									
	All Mathematics (35 topics)			Number (19 topics)			Geometric Shapes and Measures (11 topics)			
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4	
Algeria	29	3	3	14	3	2	10	0	1	
Armenia	21	0	14	13	0	6	8	0	3	
Australia	34	0	1	19	0	0	10	0	1	
Austria	35	0	0	19	0	0	11	0	0	
Chinese Taipei	21	0	14	13	0	6	5	0	6	
Colombia	34	0	1	19	0	0	10	0	1	
Czech Republic	20	0	15	10	0	9	8	0	3	
Denmark	34	0	1	18	0	1	11	0	0	
El Salvador	23	2	10	14	0	5	8	2	1	
England	25	6	4	13	3	3	9	2	0	
Georgia	15	3	17	12	2	5	3	1	7	
Germany	23	1	11	12	1	6	7	0	4	
Hong Kong SAR	25	1	9	12	0	7	8	1	2	
Hungary	31	0	4	17	0	2	9	0	2	
Iran, Islamic Rep. of	23	0	12	16	0	3	7	0	4	
Italy	35	0	0	19	0	0	11	0	0	
Japan	24	0	11	14	0	5	5	0	6	
Kazakhstan	19	1	15	11	1	7	7	0	4	
Kuwait	18	2	15	14	2	3	4	0	7	
Latvia	19	1	15	11	0	8	7	1	3	
Lithuania	27	0	8	15	0	4	7	0	4	
Mongolia	11	6	18	8	1	10	2	4	5	
Morocco	7	2	26	5	1	13	2	1	8	
Netherlands	14	0	21	8	0	11	4	0	7	
New Zealand	23	5	7	11	3	5	9	1	1	
Norway	10	0	25	4	0	15	5	0	6	
Qatar	15	1	19	11	1	7	4	0	7	
Russian Federation	10	0	25	4	0	15	6	0	5	
Scotland	17	11	7	8	7	4	7	1	3	
Singapore	27	0	8	15	0	4	8	0	3	
Slovak Republic	14	0	21	9	0	10	5	0	6	
Slovenia	21	2	12	11	2	6	6	0	5	
Sweden	26	0	9	14	0	5	8	0	3	
Tunisia	16	0	19	4	0	15	7	0	4	
Ukraine	11	0	24	6	0	13	5	0	6	
United States	34	0	1	19	0	0	10	0	1	
Yemen	24	0	11	15	0	4	7	0	4	
<b>International Avg.</b>	<b>22</b>	<b>1</b>	<b>12</b>	<b>12</b>	<b>1</b>	<b>6</b>	<b>7</b>	<b>0</b>	<b>4</b>	
<b>Benchmarking Participants</b>										
Alberta, Canada	22	0	13	10	0	9	8	0	3	
British Columbia, Canada	30	0	5	15	0	4	10	0	1	
Dubai, UAE	28	0	7	17	0	2	7	0	4	
Massachusetts, US	32	0	3	17	0	2	10	0	1	
Minnesota, US	28	0	7	13	0	6	10	0	1	
Ontario, Canada	28	0	7	15	0	4	10	0	1	
Quebec, Canada	30	0	5	15	0	4	10	0	1	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

\* See Exhibits 5.6 through 5.8 for data on individual topics.

Note: For Sweden number of mathematics topics intended to be taught up to and including fifth grade.


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Exhibit 5.4 Summary of TIMSS Mathematics Topics in the Intended Curriculum\* (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Number of TIMSS Mathematics Topics Intended to Be Taught up to and Including Fourth Grade		
	Data Display (5 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 4
Algeria	5	0	0
Armenia	0	0	5
Australia	5	0	0
Austria	5	0	0
Chinese Taipei	3	0	2
Colombia	5	0	0
Czech Republic	2	0	3
Denmark	5	0	0
El Salvador	1	0	4
England	3	1	1
Georgia	0	0	5
Germany	4	0	1
Hong Kong SAR	5	0	0
Hungary	5	0	0
Iran, Islamic Rep. of	0	0	5
Italy	5	0	0
Japan	5	0	0
Kazakhstan	1	0	4
Kuwait	0	0	5
Latvia	1	0	4
Lithuania	5	0	0
Mongolia	1	1	3
Morocco	0	0	5
Netherlands	2	0	3
New Zealand	3	1	1
Norway	1	0	4
Qatar	0	0	5
Russian Federation	0	0	5
Scotland	2	3	0
Singapore	4	0	1
Slovak Republic	0	0	5
Slovenia	4	0	1
Sweden	4	0	1
Tunisia	5	0	0
Ukraine	0	0	5
United States	5	0	0
Yemen	2	0	3
<b>International Avg.</b>	<b>3</b>	<b>0</b>	<b>2</b>
<b>Benchmarking Participants</b>			
Alberta, Canada	4	0	1
British Columbia, Canada	5	0	0
Dubai, UAE	4	0	1
Massachusetts, US	5	0	0
Minnesota, US	5	0	0
Ontario, Canada	3	0	2
Quebec, Canada	5	0	0

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.4 Summary of TIMSS Mathematics Topics in the Intended Curriculum\* (Continued) **TIMSS2007** **8<sup>th</sup>** **Grade** **Mathematics**

Country	Number of TIMSS Mathematics Topics Intended to Be Taught up to and Including Eighth Grade								
	All Mathematics (39 topics)			Number (10 topics)			Algebra (8 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8
Algeria	30	0	7	10	0	0	8	0	0
Armenia	32	0	7	10	0	0	8	0	0
Australia	32	7	0	10	0	0	5	3	0
Bahrain	35	0	4	10	0	0	8	0	0
Bosnia and Herzegovina	33	1	5	10	0	0	7	0	1
Botswana	26	0	13	9	0	1	6	0	2
Bulgaria	28	0	11	10	0	0	7	0	1
Chinese Taipei	35	0	4	10	0	0	8	0	0
Colombia	38	0	1	10	0	0	8	0	0
Cyprus	19	7	13	10	0	0	4	0	4
Czech Republic	31	4	4	10	0	0	6	0	2
Egypt	34	2	3	10	0	0	6	2	0
El Salvador	32	0	7	10	0	0	6	0	2
England	29	9	1	9	1	0	4	4	0
Georgia	29	8	2	10	0	0	8	0	0
Ghana	33	0	6	10	0	0	7	0	1
Hong Kong SAR	35	1	3	10	0	0	8	0	0
Hungary	35	0	4	10	0	0	8	0	0
Indonesia	20	16	3	10	0	0	5	3	0
Iran, Islamic Rep. of	35	0	4	10	0	0	7	0	1
Israel	31	0	8	10	0	0	8	0	0
Italy	37	0	2	10	0	0	8	0	0
Japan	34	0	5	10	0	0	8	0	0
Jordan	36	0	3	10	0	0	8	0	0
Korea, Rep. of	33	0	6	10	0	0	8	0	0
Kuwait	28	0	11	9	0	1	8	0	0
Lebanon	30	6	3	9	1	0	7	1	0
Lithuania	22	7	10	10	0	0	4	3	1
Malaysia	30	0	9	10	0	0	7	0	1
Malta	24	8	7	9	1	0	6	0	2
Mongolia	26	4	9	10	0	0	8	0	0
Morocco	22	0	17	10	0	0	4	0	4
Norway	23	0	16	9	0	1	3	0	5
Oman	36	0	3	10	0	0	8	0	0
Palestinian Nat'l Auth.	32	0	7	10	0	0	5	0	3
Qatar	33	1	5	10	0	0	8	0	0
Romania	32	0	7	10	0	0	7	0	1
Russian Federation	34	0	5	10	0	0	7	0	1
Saudi Arabia	27	0	11	10	0	0	7	0	1
Scotland	21	11	7	8	2	0	3	2	3
Serbia	31	2	6	10	0	0	7	1	0
Singapore	38	0	1	10	0	0	8	0	0
Slovenia	33	0	6	10	0	0	8	0	0
Sweden	34	0	5	10	0	0	8	0	0
Syrian Arab Republic	32	0	7	10	0	0	7	0	1
Thailand	31	0	8	10	0	0	6	0	2
Tunisia	26	0	13	10	0	0	5	0	3
Turkey	33	0	6	10	0	0	7	0	1
Ukraine	29	3	7	9	1	0	7	1	0
United States	38	1	0	10	0	0	7	1	0
International Avg.	31	2	6	10	0	0	7	0	1
<b>Benchmarking Participants</b>									
Basque Country, Spain	29	0	10	10	0	0	7	0	1
British Columbia, Canada	33	0	6	10	0	0	5	0	3
Dubai, UAE	39	0	0	10	0	0	8	0	0
Massachusetts, US	38	0	1	10	0	0	8	0	0
Minnesota, US	37	0	2	10	0	0	8	0	0
Ontario, Canada	35	0	4	10	0	0	5	0	3
Quebec, Canada	35	0	4	10	0	0	5	0	3

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

\* See Exhibits 5.9 through 5.12 for data on individual topics.

Note: For Sweden number of mathematics topics intended to be taught up to and including ninth grade.

Exhibit 5.4 Summary of TIMSS Mathematics Topics in the Intended Curriculum\* (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Number of TIMSS Mathematics Topics Intended to Be Taught up to and Including Eighth Grade					
	Geometry (14 topics)			Data and Chance (7 topics)		
	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8	Topics for All or Almost All Students	Topics for Only the More Able Students (top track)	Not Included in the Curriculum Through Grade 8
Algeria	9	0	3	3	0	4
Armenia	14	0	0	0	0	7
Australia	12	2	0	5	2	0
Bahrain	14	0	0	3	0	4
Bosnia and Herzegovina	13	1	0	3	0	4
Botswana	9	0	5	2	0	5
Bulgaria	11	0	3	0	0	7
Chinese Taipei	14	0	0	3	0	4
Colombia	13	0	1	7	0	0
Cyprus	5	0	9	0	7	0
Czech Republic	12	1	1	3	3	1
Egypt	12	0	2	6	0	1
El Salvador	11	0	3	5	0	2
England	11	2	1	5	2	0
Georgia	9	4	1	2	4	1
Ghana	12	0	2	4	0	3
Hong Kong SAR	13	1	0	4	0	3
Hungary	13	0	1	4	0	3
Indonesia	5	9	0	0	4	3
Iran, Islamic Rep. of	14	0	0	4	0	3
Israel	10	0	4	3	0	4
Italy	14	0	0	5	0	2
Japan	11	0	3	5	0	2
Jordan	13	0	1	5	0	2
Korea, Rep. of	13	0	1	2	0	5
Kuwait	9	0	5	2	0	5
Lebanon	11	3	0	3	1	3
Lithuania	7	3	4	1	1	5
Malaysia	11	0	3	2	0	5
Malta	7	3	4	2	4	1
Mongolia	8	2	4	0	2	5
Morocco	8	0	6	0	0	7
Norway	7	0	7	4	0	3
Oman	14	0	0	4	0	3
Palestinian Nat'l Auth.	12	0	2	5	0	2
Qatar	12	1	1	3	0	4
Romania	12	0	2	3	0	4
Russian Federation	12	0	2	5	0	2
Saudi Arabia	9	0	4	1	0	6
Scotland	7	3	4	3	4	0
Serbia	12	0	2	2	1	4
Singapore	14	0	0	6	0	1
Slovenia	13	0	1	2	0	5
Sweden	10	0	4	6	0	1
Syrian Arab Republic	13	0	1	2	0	5
Thailand	13	0	1	2	0	5
Tunisia	9	0	5	2	0	5
Turkey	13	0	1	3	0	4
Ukraine	11	1	2	2	0	5
United States	14	0	0	7	0	0
<b>International Avg.</b>	<b>11</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>
<b>Benchmarking Participants</b>						
Basque Country, Spain	10	0	4	2	0	5
British Columbia, Canada	11	0	3	7	0	0
Dubai, UAE	14	0	0	7	0	0
Massachusetts, US	14	0	0	6	0	1
Minnesota, US	14	0	0	5	0	2
Ontario, Canada	13	0	1	7	0	0
Quebec, Canada	13	0	1	7	0	0

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 5.5 Summary of Students Taught the TIMSS Mathematics Topics\*

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Average Percentage of Students Taught** the TIMSS Mathematics Topics			
	All Mathematics (35 topics)	Number (19 topics)	Geometric Shapes and Measures (11 topics)	Data Display (5 topics)
Algeria	67 (2.3)	70 (2.2)	73 (1.7)	57 (3.9)
Armenia	70 (1.6)	73 (1.1)	73 (2.0)	64 (3.0)
Australia	77 (1.1)	75 (1.3)	81 (1.3)	76 (2.0)
Austria	55 (1.1)	67 (0.9)	67 (1.3)	32 (2.1)
Chinese Taipei	76 (1.2)	83 (1.0)	72 (1.2)	74 (2.7)
Colombia	70 (2.2)	79 (1.4)	67 (2.7)	65 (3.7)
Czech Republic	51 (1.2)	54 (0.9)	49 (1.3)	50 (2.4)
Denmark	69 (1.5)	73 (1.5)	80 (1.7)	53 (3.2)
El Salvador	76 (1.2)	76 (1.4)	71 (2.0)	81 (1.8)
England	85 (1.0)	85 (0.9)	88 (1.0)	83 (2.0)
Georgia	62 (1.5)	63 (1.4)	55 (1.6)	67 (3.5)
Germany	63 (1.1)	66 (0.6)	65 (1.2)	58 (2.2)
Hong Kong SAR	78 (0.9)	71 (1.2)	75 (1.0)	89 (1.5)
Hungary	71 (1.3)	78 (0.7)	74 (1.3)	61 (2.9)
Iran, Islamic Rep. of	56 (1.5)	54 (1.4)	63 (1.3)	50 (2.8)
Italy	75 (0.9)	81 (0.9)	67 (0.9)	76 (1.8)
Japan	58 (1.1)	67 (1.1)	50 (0.8)	56 (2.1)
Kazakhstan	--	--	--	--
Kuwait	r 53 (1.7)	r 69 (1.5)	r 59 (1.6)	r 32 (3.5)
Latvia	72 (1.1)	76 (1.0)	63 (1.3)	76 (2.0)
Lithuania	79 (1.1)	75 (1.5)	71 (1.2)	89 (1.3)
Morocco	54 (1.3)	56 (1.1)	59 (1.5)	47 (3.0)
Netherlands	60 (1.3)	64 (1.5)	45 (1.5)	71 (2.3)
New Zealand	73 (0.9)	72 (0.9)	64 (1.3)	82 (1.5)
Norway	59 (1.3)	61 (1.3)	64 (1.6)	51 (2.6)
Qatar	54 (0.1)	67 (0.1)	54 (0.1)	42 (0.1)
Russian Federation	--	--	--	--
Scotland	71 (1.1)	67 (1.3)	69 (1.4)	77 (1.9)
Singapore	87 (0.6)	91 (0.5)	82 (0.7)	88 (1.0)
Slovak Republic	55 (1.2)	69 (0.7)	51 (1.1)	46 (2.6)
Slovenia	69 (0.6)	69 (0.7)	50 (0.7)	88 (1.2)
Sweden	47 (1.4)	51 (1.2)	36 (1.3)	54 (2.7)
Tunisia	63 (1.5)	55 (1.3)	64 (1.2)	69 (2.8)
Ukraine	63 (1.4)	72 (1.0)	56 (1.2)	61 (2.9)
United States	86 (0.8)	86 (0.9)	83 (1.5)	90 (1.1)
Yemen	46 (1.9)	67 (2.1)	44 (2.2)	26 (3.0)
International Avg.	66 (0.2)	70 (0.2)	64 (0.2)	64 (0.4)
<b>Benchmarking Participants</b>				
Alberta, Canada	68 (1.7)	69 (1.5)	56 (2.6)	79 (3.0)
British Columbia, Canada	r 66 (1.3)	r 67 (1.3)	r 55 (2.4)	r 77 (2.7)
Dubai, UAE	s 57 (2.1)	s 71 (2.1)	s 53 (2.6)	s 49 (3.5)
Massachusetts, US	84 (1.7)	83 (1.6)	83 (2.6)	87 (2.0)
Minnesota, US	83 (2.6)	82 (3.0)	84 (2.8)	84 (3.1)
Ontario, Canada	78 (1.3)	66 (1.7)	76 (1.8)	91 (1.4)
Quebec, Canada	73 (1.6)	75 (1.4)	78 (1.6)	67 (3.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers at the time of testing.

\* See Exhibits 5.6 through 5.8 for data on individual topics.

\*\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.





Exhibit 5.5 Summary of Students Taught the TIMSS Mathematics Topics\* (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Average Percentage of Students Taught** the TIMSS Mathematics Topics				
	All Mathematics (39 topics)	Number (10 topics)	Algebra (8 topics)	Geometry (14 topics)	Data and Chance (7 topics)
Algeria	58 (1.3)	86 (1.4)	39 (2.6)	56 (1.1)	49 (2.2)
Armenia	68 (1.7)	68 (3.5)	78 (2.0)	75 (2.2)	51 (3.1)
Australia	73 (1.0)	95 (0.6)	73 (1.7)	66 (1.2)	58 (2.0)
Bahrain	70 (0.8)	97 (0.3)	58 (1.4)	71 (0.7)	54 (1.9)
Bosnia and Herzegovina	84 (0.7)	100 (0.1)	98 (0.6)	94 (0.7)	42 (2.9)
Botswana	44 (1.5)	88 (0.7)	48 (2.6)	26 (2.2)	14 (2.3)
Bulgaria	70 (0.8)	97 (1.1)	91 (0.9)	67 (0.8)	24 (1.8)
Chinese Taipei	68 (0.7)	97 (1.1)	95 (0.9)	76 (1.1)	6 (1.5)
Colombia	72 (1.5)	96 (0.8)	74 (2.3)	68 (2.0)	48 (2.9)
Cyprus	49 (0.5)	97 (0.5)	42 (1.1)	51 (0.6)	3 (0.7)
Czech Republic	65 (0.8)	99 (0.2)	70 (1.6)	76 (1.0)	16 (1.9)
Egypt	85 (0.9)	96 (1.0)	89 (1.2)	87 (0.9)	68 (1.7)
El Salvador	69 (1.2)	95 (0.8)	68 (1.8)	47 (2.3)	68 (2.1)
England	86 (0.9)	97 (0.6)	84 (1.4)	83 (1.1)	81 (1.5)
Georgia	73 (1.1)	99 (0.7)	76 (1.4)	75 (1.4)	42 (3.1)
Ghana	73 (1.4)	91 (1.0)	78 (1.8)	62 (1.9)	61 (2.6)
Hong Kong SAR	78 (0.9)	96 (1.1)	83 (1.6)	83 (1.2)	50 (2.4)
Hungary	86 (0.8)	100 (0.1)	93 (0.7)	93 (0.7)	57 (2.5)
Indonesia	64 (1.5)	94 (1.6)	73 (1.9)	76 (1.4)	18 (2.9)
Iran, Islamic Rep. of	72 (0.9)	96 (0.6)	70 (1.4)	80 (0.9)	41 (2.0)
Israel	r 69 (1.2)	r 96 (1.0)	r 82 (1.3)	r 47 (1.4)	r 51 (2.8)
Italy	78 (0.9)	99 (0.2)	77 (1.2)	87 (0.8)	50 (2.2)
Japan	76 (0.8)	96 (1.0)	93 (0.9)	79 (0.7)	36 (2.1)
Jordan	84 (0.8)	99 (0.6)	97 (0.6)	84 (1.0)	56 (2.6)
Korea, Rep. of	84 (0.7)	97 (0.9)	92 (0.7)	81 (0.8)	65 (1.6)
Kuwait	r 66 (1.7)	r 95 (0.9)	r 54 (2.9)	r 60 (1.8)	r 55 (3.0)
Lebanon	74 (1.3)	93 (1.0)	76 (2.2)	75 (1.3)	49 (2.5)
Lithuania	78 (0.7)	98 (0.9)	77 (1.4)	81 (0.9)	57 (1.5)
Malaysia	82 (1.0)	99 (0.3)	86 (1.4)	90 (0.9)	50 (2.7)
Malta	76 (0.0)	98 (0.0)	79 (0.1)	71 (0.0)	55 (0.1)
Norway	54 (0.8)	89 (0.9)	36 (1.8)	43 (1.1)	48 (2.0)
Oman	79 (0.9)	98 (0.4)	78 (1.4)	76 (1.3)	64 (1.9)
Palestinian Nat'l Auth.	73 (0.8)	98 (0.5)	64 (1.8)	73 (0.8)	57 (1.8)
Qatar	65 (0.1)	96 (0.0)	60 (0.1)	61 (0.1)	42 (0.1)
Romania	84 (1.1)	97 (1.4)	93 (0.9)	92 (0.8)	53 (2.9)
Russian Federation	--	--	--	--	--
Saudi Arabia	55 (1.4)	90 (1.9)	48 (2.1)	55 (1.5)	24 (2.9)
Scotland	72 (1.1)	95 (0.7)	63 (1.8)	72 (1.3)	60 (1.7)
Serbia	86 (1.1)	98 (1.2)	94 (1.4)	95 (0.7)	53 (2.8)
Singapore	82 (0.5)	100 (0.1)	95 (0.7)	71 (0.8)	62 (1.3)
Slovenia	65 (0.5)	93 (0.2)	68 (1.3)	69 (0.7)	28 (0.9)
Sweden	62 (0.8)	94 (0.4)	48 (1.6)	51 (0.9)	52 (1.6)
Syrian Arab Republic	65 (1.1)	93 (1.0)	64 (2.1)	59 (1.2)	42 (2.4)
Thailand	63 (1.3)	95 (1.2)	50 (2.6)	69 (1.6)	38 (2.0)
Tunisia	63 (1.1)	92 (1.2)	61 (1.9)	70 (1.0)	29 (2.2)
Turkey	78 (1.2)	98 (1.0)	84 (1.4)	75 (1.4)	55 (3.0)
Ukraine	74 (0.6)	99 (0.3)	85 (0.7)	81 (0.8)	30 (1.7)
United States	88 (0.6)	100 (0.1)	90 (0.9)	78 (1.4)	83 (1.1)
‡ Morocco	67 (1.7)	94 (0.8)	r 54 (2.7)	64 (1.3)	r 52 (3.2)
<b>International Avg.</b>	<b>72 (0.2)</b>	<b>95 (0.1)</b>	<b>73 (0.2)</b>	<b>71 (0.2)</b>	<b>47 (0.3)</b>
<b>Benchmarking Participants</b>					
Basque Country, Spain	63 (1.2)	98 (0.5)	75 (2.2)	61 (2.5)	17 (2.5)
British Columbia, Canada	62 (1.6)	97 (0.5)	68 (2.6)	43 (2.8)	39 (3.0)
Dubai, UAE	s 69 (1.7)	s 96 (1.7)	s 69 (2.4)	s 63 (2.3)	s 45 (2.4)
Massachusetts, US	91 (1.4)	99 (0.7)	92 (1.5)	81 (3.6)	90 (1.8)
Minnesota, US	83 (1.6)	100 (0.2)	85 (3.0)	69 (3.6)	78 (3.4)
Ontario, Canada	82 (1.3)	91 (1.2)	76 (2.5)	78 (2.2)	83 (1.7)
Quebec, Canada	74 (1.0)	99 (0.3)	75 (1.5)	72 (1.3)	50 (3.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers at the time of testing.

\* See Exhibits 5.9 through 5.12 for data on individual topics.

\*\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



their mathematics teachers, 80 percent, or more, of the students had been taught the TIMSS mathematics topics in Bosnia and Herzegovina, Egypt, England, Hungary, Jordan, Korea, Malaysia, Romania, Serbia, Singapore, and the United States, as well as the states of Massachusetts and Minnesota and the province of Ontario.

#### **Fourth Grade: Which TIMSS Mathematics Topics Are in the Intended and Implemented Curriculum?**

For the fourth grade, Exhibit 5.6 provides detailed information about each topic within the number domain, including the student population to be taught the topic, the grades within which the topics are intended to be taught, and the teachers' reports about the percent of students taught the topics. With the exception of the Ukraine, all countries and benchmarking participants included the three whole number topics in their curriculum for all or almost all students. On average across countries, teachers generally reported that these three topics were taught, with representation 86 percent, place value 96 percent, and computation 95 percent. Fewer countries included multiples and factors, but teachers reported that 83 percent of the students had been taught this topic. Most countries included estimation, with 85 percent of the students taught the topic. In comparison, only about half the countries included problems involving proportions in their curriculum and only 43 percent of the students had been taught this topic.

At the fourth grade within the number domain, TIMSS asked about five topics related to teaching fractions. On average across countries, teachers reported that 70 percent of students had been taught about fractions generally, 56 percent about equivalent fractions, 68 percent about comparing and ordering simple fractions, 70 percent about representations of fractions,

and 50 percent about adding and subtracting simple fractions. For the two topics about decimals, teachers reported that 53 percent of the students had been taught about decimal place value and 51 percent about adding and subtracting with decimals. Within the six pre-algebra topics, teachers reported that 93 percent of the students had been taught about number sentences, 71 percent to model unknown situations with number sentences, 77 percent to extend patterns, 63 percent to describe relationships between adjacent terms in a sequence, 66 percent to generate pairs of numbers following a given rule, and 56 percent to find a rule for a relationship given some pairs of numbers. In general, the emphasis reported for the topics in the intended curriculum was reflected in the implemented curriculum.

Exhibit 5.7 contains the topic-by-topic results for the fourth grade content domain of geometric shapes and measures. All countries and benchmarking participants included the topic of measuring and estimating length in the intended curriculum for all or almost all students with the exception of Mongolia that included it for the most able students, and teachers reported that 95 percent of the students had been taught this topic. Teachers reported, on average across countries, that about the same percentage of students had been taught about parallel and perpendicular lines (70%) as comparing angle size and drawing angles (71%), although lines were included in somewhat fewer curricula than angles (25 countries compared to 28). Elementary properties of geometric shapes were in nearly all curricula and, on average across countries, taught to 89 percent of the students, whereas relationships between three- and two-dimensional shapes was much less common and taught to only 46 percent of the students. Within geometric measurement, calculating perimeters and areas of squares and rectangles was commonly

Exhibit 5.6 Intended and Taught\* TIMSS Number Topics

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Represent whole numbers using words, diagrams, or symbols			Whole numbers including place value and ordering			Computation with whole numbers		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	59 (5.1)	●	4	75 (4.9)	●	4	85 (3.3)
Armenia	●	4	83 (2.5)	●	5	77 (3.4)	●	4	72 (3.9)
Australia	●	K–6	98 (1.2)	●	K–6	100 (0.2)	●	1–2	99 (0.5)
Austria	●	3	80 (2.6)	●	3	98 (1.0)	●	1	100 (0.2)
Chinese Taipei	●	1–3	89 (2.5)	●	1–3	98 (1.1)	●	1–4	100 (0.0)
Colombia	●	1–3	87 (3.8)	●	1–3	89 (3.6)	●	1–3	83 (4.5)
Czech Republic	●	1–5	84 (3.4)	●	1–5	100 (0.4)	●	1–5	100 (0.0)
Denmark	●	4–6	90 (2.4)	●	4–6	98 (1.3)	●	4–6	100 (0.0)
El Salvador	●	K–12	86 (3.1)	●	1–12	97 (1.4)	●	1–12	94 (2.1)
England	●	K–2	93 (2.2)	●	K–2	100 (0.4)	●	K–5	96 (1.8)
Georgia	●	1–2	80 (4.8)	●	3	90 (4.0)	●	2	88 (4.2)
Germany	●	1	88 (2.3)	●	3	99 (0.9)	●	1	99 (0.7)
Hong Kong SAR	●	1	78 (3.7)	●	1	99 (0.7)	●	3	100 (0.0)
Hungary	●	1–4	99 (0.4)	●	1–4	100 (0.0)	●	1–4	99 (0.9)
Iran, Islamic Rep. of	●	4–5	76 (3.8)	●	2	100 (0.0)	●	1,3–4	92 (1.9)
Italy	●	1–5	99 (0.6)	●	2–5	100 (0.0)	●	1–6	100 (0.0)
Japan	●	1–3	92 (2.2)	●	1–4	100 (0.0)	●	1–4	100 (0.2)
Kazakhstan	●	1	--	●	1	--	●	1	--
Kuwait	●	1–3	r 78 (3.8)	●	2–3	r 91 (2.3)	●	2–3	r 86 (3.1)
Latvia	●	1	97 (0.9)	●	1	100 (0.4)	●	1–4	100 (0.0)
Lithuania	●	4	96 (1.4)	●	4	97 (1.4)	●	4	100 (0.4)
Mongolia	●	1–5	--	●	1–5	--	●	1–5	--
Morocco	●	1	91 (2.5)	●	3	98 (1.1)	●	2	99 (0.9)
Netherlands	●	4	81 (3.6)	●	4	99 (0.5)	●	4	99 (0.5)
New Zealand	●	K–5	98 (0.6)	●	K–5	99 (0.8)	●	K–5	98 (0.6)
Norway	●	1–4	79 (3.8)	●	3–4	99 (0.5)	●	3–7	99 (0.4)
Qatar	●	1–5	73 (0.2)	●	1–5	94 (0.1)	●	1–5	89 (0.1)
Russian Federation	●	1–4	--	●	1–5	--	●	1–5	--
Scotland	●	2	r 93 (2.3)	●	3	99 (0.7)	●	3	97 (1.3)
Singapore	●	1–6	99 (0.6)	●	1–6	100 (0.0)	●	1–6	100 (0.0)
Slovak Republic	●	3–9	90 (2.4)	●	3–6	93 (2.1)	●	1–9	92 (2.2)
Slovenia	●	1–6	99 (0.5)	●	2–6	99 (0.6)	●	1–6	100 (0.0)
Sweden	●	1–5	80 (3.5)	●	1–5	99 (0.5)	●	1–5	100 (0.4)
Tunisia	●	1–5	81 (3.1)	●	1–5	93 (2.0)	●	1–5	94 (1.7)
Ukraine	○	5–6	69 (3.6)	○	5–6	89 (2.6)	○	5–6	95 (1.7)
United States	●	K–2	99 (0.5)	●	3–5	100 (0.2)	●	3–5	100 (0.0)
Yemen	●	1–6	57 (5.1)	●	1–6	84 (3.0)	●	1–6	85 (3.1)
International Avg.			86 (0.5)			96 (0.3)			95 (0.3)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	K–5	100 (0.4)	●	2–5	100 (0.4)	●	1–5	99 (0.4)
British Columbia, Canada	●	K–1	r 100 (0.0)	●	2–3	r 100 (0.0)	●	K–1	r 100 (0.0)
Dubai, UAE	●	3	s 89 (4.1)	●	4	s 99 (0.1)	●	4	s 96 (1.5)
Massachusetts, US	●	1–6	100 (0.0)	●	1–6	100 (0.0)	●	1–6	100 (0.0)
Minnesota, US	●	K–5	99 (1.0)	●	K–5	99 (1.4)	●	K–6	100 (0.0)
Ontario, Canada	●	K–4	99 (0.9)	●	4–6	100 (0.0)	●	K–6	100 (0.0)
Quebec, Canada	●	1–8	94 (2.1)	●	1–6	98 (1.2)	●	1–6	99 (1.2)

● All or almost all students    ◎ Only the more able students    ○ Not included in the curriculum through fourth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.



Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Multiples and factors of numbers			Estimation with whole numbers			Problems involving proportions		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	3	93 (2.4)	●	4	70 (4.3)	●	4	44 (4.9)
Armenia	●	4	83 (3.2)	●	4	64 (3.7)	●	4	59 (3.5)
Australia	●	3–6	86 (2.4)	●	K–6	94 (1.9)	●	3–4	50 (4.0)
Austria	●	1–2	95 (1.5)	●	3	97 (1.0)	●	2–4	80 (2.8)
Chinese Taipei	○	5	99 (0.5)	●	4	85 (2.9)	●	4	32 (4.1)
Colombia	●	1–3	96 (2.7)	●	4–5	70 (4.6)	●	4–5	34 (4.3)
Czech Republic	●	2–3	99 (0.8)	●	3–5	95 (1.8)	●	7	39 (4.2)
Denmark	●	4–6	83 (3.7)	●	4–6	90 (2.7)	●	4–6	r 57 (4.7)
El Salvador	●	3–12	86 (3.1)	●	2–12	90 (2.4)	●	1–12	62 (4.0)
England	●	3–7	98 (1.3)	●	1–6	96 (1.7)	⊙	4–10	54 (3.8)
Georgia	⊙	3	37 (4.2)	●	3–4	81 (4.6)	●	4	32 (4.0)
Germany	●	4	86 (2.3)	●	3	95 (1.4)	○	5	27 (3.2)
Hong Kong SAR	●	4	100 (0.0)	●	1–3	90 (2.6)	○	–	24 (3.7)
Hungary	●	2	93 (2.1)	●	1–4	100 (0.0)	●	4	55 (4.3)
Iran, Islamic Rep. of	●	3,6	82 (2.9)	○	5	61 (3.9)	○	5	14 (2.5)
Italy	●	2–6	86 (2.2)	●	2–3	77 (3.0)	●	4–6	29 (3.2)
Japan	○	6	9 (2.1)	●	4	82 (3.0)	○	6	14 (2.8)
Kazakhstan	●	3	–	●	1	–	●	1	–
Kuwait	●	3–4	r 92 (2.3)	●	–	r 65 (4.4)	○	7–8	r 33 (4.4)
Latvia	●	–	100 (0.0)	●	–	99 (0.4)	○	7–9	39 (3.7)
Lithuania	●	4	63 (4.0)	●	4	74 (3.5)	○	5–6	27 (3.8)
Mongolia	●	1–5	–	●	1–5	–	○	6	–
Morocco	○	5	87 (3.1)	○	6	84 (3.0)	○	6	23 (3.4)
Netherlands	○	6	89 (2.9)	●	4	96 (1.4)	●	4	58 (4.3)
New Zealand	○	5–6	74 (2.5)	●	K–9	89 (1.6)	○	8–10	54 (3.0)
Norway	○	3–10	72 (3.8)	●	1–7	80 (3.1)	○	–	53 (3.7)
Qatar	●	5–7	94 (0.1)	●	3–6	78 (0.1)	○	6–7	31 (0.2)
Russian Federation	○	6	–	○	5	–	○	6	–
Scotland	○	6	88 (2.1)	●	3	93 (1.9)	○	8	r 27 (3.8)
Singapore	●	1–6	99 (0.4)	●	1–6	100 (0.2)	●	4–6	51 (2.5)
Slovak Republic	●	3–9	98 (1.1)	●	3,4,6	91 (2.3)	●	3–4,6	94 (2.1)
Slovenia	●	3–6	99 (0.6)	●	4–6	92 (1.8)	○	9	78 (2.8)
Sweden	●	1–5	56 (4.1)	●	1–5	88 (2.8)	○	6–9	39 (3.9)
Tunisia	○	5	87 (2.5)	○	5	91 (2.1)	○	5	20 (3.2)
Ukraine	○	6	67 (4.0)	○	5–6	58 (4.3)	○	5–6	34 (4.0)
United States	●	3–5	90 (1.5)	●	3–5	98 (0.6)	●	3–5	56 (2.9)
Yemen	●	2,4–6	66 (4.3)	●	2–3	65 (4.1)	●	6	28 (4.5)
International Avg.			83 (0.4)			85 (0.5)			43 (0.6)
<b>Benchmarking Participants</b>									
Alberta, Canada	○	5–7	73 (3.6)	●	1–6	96 (1.3)	○	5–6	39 (4.5)
British Columbia, Canada	○	5	r 79 (3.6)	●	2–3	r 97 (1.1)	○	6	r 36 (4.0)
Dubai, UAE	●	4	s 88 (3.7)	●	4	s 81 (4.1)	○	10–12	s 24 (4.8)
Massachusetts, US	●	3–8	97 (2.0)	●	K–8	100 (0.0)	●	4–10	39 (6.5)
Minnesota, US	○	5–6	91 (4.2)	●	1–5	97 (2.0)	○	6–8	50 (8.1)
Ontario, Canada	●	1–3,6–8	80 (3.9)	●	1–5	97 (1.5)	●	4–8	31 (4.3)
Quebec, Canada	●	3–6	88 (2.3)	●	3–6	89 (3.0)	●	1–6	53 (4.4)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Fractions			Equivalent fractions			Comparing and ordering simple fractions		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	87 (3.0)	●	4	62 (4.3)	○	5	87 (3.0)
Armenia	●	4	86 (2.5)	●	4	87 (3.0)	○	5	86 (2.8)
Australia	●	3–4	86 (2.3)	●	3–4	58 (3.4)	●	3–4	66 (3.2)
Austria	●	4	28 (2.8)	●	4	14 (1.6)	●	4	26 (2.5)
Chinese Taipei	●	4	93 (2.3)	○	5	62 (4.1)	●	4	98 (1.0)
Colombia	●	4–5	90 (3.0)	●	1–3	94 (1.8)	●	4–5	92 (2.5)
Czech Republic	●	4,7	9 (2.3)	○	7	3 (0.7)	○	7	5 (1.5)
Denmark	●	4–6	80 (3.6)	●	4–6	25 (3.6)	●	4–6	75 (4.0)
El Salvador	●	3–12	83 (3.5)	●	3–12	83 (3.6)	●	5–12	75 (3.0)
England	●	1–3	99 (0.6)	●	2–6	90 (2.5)	●	3–7	98 (0.8)
Georgia	●	4	57 (4.5)	○	5	22 (4.3)	●	4	80 (3.8)
Germany	○	6	18 (2.3)	○	6	1 (0.6)	○	6	18 (2.3)
Hong Kong SAR	●	3–4	98 (1.0)	●	4	99 (0.9)	●	3	98 (1.4)
Hungary	●	4	84 (3.0)	●	4	77 (3.5)	●	4	76 (3.2)
Iran, Islamic Rep. of	●	3	38 (4.3)	●	4	32 (4.1)	●	4–5	50 (4.1)
Italy	●	4	99 (0.6)	●	4–7	92 (1.9)	●	4–7	96 (1.3)
Japan	●	4	99 (0.6)	○	5	57 (3.8)	○	5–6	86 (2.5)
Kazakhstan	●	3	--	○	5	--	○	5	--
Kuwait	●	3–5	r 80 (3.6)	●	4–5	r 87 (2.6)	●	4–5	r 94 (2.1)
Latvia	●	3–4	58 (4.1)	●	3–4	76 (3.5)	●	3–4	72 (3.1)
Lithuania	○	6	90 (2.3)	○	5–6	81 (3.3)	●	4	90 (2.3)
Mongolia	○	6	--	●	1–5	--	○	6	--
Morocco	○	5	32 (3.9)	○	5	11 (2.6)	○	5	19 (3.5)
Netherlands	○	5	81 (3.3)	○	5	47 (4.3)	○	5	67 (3.7)
New Zealand	●	2–4	84 (2.1)	○	6–8	62 (2.7)	○	6–8	81 (2.1)
Norway	○	5–10	59 (3.8)	○	8–10	48 (4.2)	○	8–10	48 (4.2)
Qatar	●	2–4	80 (0.1)	●	3–5	82 (0.1)	●	3–4	81 (0.1)
Russian Federation	○	5–6	--	○	6	--	○	5–6	--
Scotland	●	4	81 (3.6)	⊙	5	51 (4.4)	⊙	5	63 (4.5)
Singapore	●	2–6	99 (0.5)	●	3–6	100 (0.4)	●	2–6	100 (0.0)
Slovak Republic	○	6	65 (3.3)	○	6	16 (2.6)	○	6	23 (2.7)
Slovenia	⊙	4–7	65 (3.1)	○	7	14 (2.5)	○	6	53 (3.4)
Sweden	●	1–5	28 (3.2)	●	1–5	8 (1.6)	●	1–5	28 (3.0)
Tunisia	○	5	16 (2.7)	○	6	14 (2.6)	○	6	15 (2.7)
Ukraine	○	5	78 (3.1)	○	6	87 (2.5)	○	5–	88 (2.8)
United States	●	3–5	91 (1.6)	●	3–5	83 (2.1)	●	3–8	83 (2.2)
Yemen	●	1–4	60 (4.7)	●	3–4	91 (3.1)	●	3–5	92 (2.7)
International Avg.			70 (0.5)			56 (0.5)			68 (0.5)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	2–6	73 (3.6)	○	5–7	44 (3.8)	○	5–6	55 (3.9)
British Columbia, Canada	●	K–1	r 58 (4.0)	○	5	r 42 (3.9)	●	2–3	r 45 (3.9)
Dubai, UAE	●	4	s 81 (4.3)	●	4	s 81 (5.2)	●	4	s 78 (5.0)
Massachusetts, US	●	K–8	87 (4.7)	●	3–8	81 (4.7)	●	1–5	81 (5.4)
Minnesota, US	●	3–5	86 (5.1)	●	4–7	77 (4.5)	●	3–5	77 (4.3)
Ontario, Canada	●	1–6	48 (5.6)	●	4–5	29 (4.4)	●	2,4–7	34 (4.8)
Quebec, Canada	●	3–6	89 (2.3)	○	5–6	75 (3.2)	○	5–6	74 (3.6)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Fractions represented by words, numbers or models			Adding and subtracting simple fractions			Decimal place value including writing decimals using words and numbers		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	75 (4.9)	●	4	68 (4.6)	⊙	4	72 (4.8)
Armenia	●	4	80 (2.9)	●	4	87 (2.9)	●	4	57 (3.9)
Australia	●	3–4	83 (3.2)	●	3–4	48 (3.7)	●	3–4	75 (3.5)
Austria	●	4	26 (2.4)	●	4	22 (2.3)	●	4	49 (3.3)
Chinese Taipei	●	2–4	97 (1.4)	●	3	97 (1.4)	●	3–4	97 (1.4)
Colombia	●	4–5	91 (2.5)	●	4–5	96 (1.5)	●	4–5	78 (4.6)
Czech Republic	●	4,7	15 (3.1)	○	7	3 (1.2)	○	5–6	1 (0.9)
Denmark	●	4–6	82 (3.6)	●	4–6	41 (4.3)	●	4–6	83 (3.6)
El Salvador	●	3–12	71 (3.8)	●	3–12	89 (3.1)	●	4–12	83 (3.1)
England	●	1–2	95 (1.4)	○	6–8	59 (4.0)	●	4–5	94 (1.6)
Georgia	●	4	83 (3.7)	●	4	31 (4.5)	○	5	5 (1.9)
Germany	○	5–6	21 (2.4)	○	6	6 (1.6)	⊙	5–6	76 (2.8)
Hong Kong SAR	●	3–5	94 (2.2)	●	4–5	98 (1.4)	●	4	94 (2.3)
Hungary	●	4	78 (3.2)	○	5	21 (3.2)	●	5	2 (1.2)
Iran, Islamic Rep. of	●	4	42 (3.8)	●	4	48 (3.6)	●	4	9 (2.3)
Italy	●	4–7	97 (1.1)	●	4–6	76 (2.7)	●	4–7	99 (0.6)
Japan	●	4	73 (3.3)	○	5	41 (3.8)	●	4	93 (1.9)
Kazakhstan	○	5	--	○	5	--	○	5	--
Kuwait	●	3–4	r 86 (2.7)	●	3–4	r 93 (2.1)	○	5–6	r 42 (4.6)
Latvia	●	3–4	66 (4.3)	○	5	61 (3.8)	○	5	20 (3.0)
Lithuania	●	3	84 (2.5)	○	5–6	45 (3.9)	●	4	83 (2.6)
Mongolia	○	6	--	○	6	--	○	5	--
Morocco	⊙	5	28 (4.0)	○	6	11 (2.6)	●	4	82 (3.3)
Netherlands	○	5	r 59 (4.2)	○	5	26 (4.3)	○	5	10 (2.4)
New Zealand	●	2–5	83 (2.1)	○	8–10	59 (2.6)	⊙	4–6	54 (2.8)
Norway	○	5–10	55 (3.8)	○	5–10	30 (3.8)	○	5–10	56 (4.1)
Qatar	●	2–4	76 (0.2)	●	4–5	77 (0.2)	○	5	42 (0.2)
Russian Federation	○	5	--	○	5–6	--	○	5	--
Scotland	●	4	79 (3.4)	○	6	23 (3.3)	⊙	5	28 (4.0)
Singapore	●	2–6	98 (0.8)	●	2–6	100 (0.0)	●	4–6	99 (0.7)
Slovak Republic	○	6	70 (3.6)	○	6	6 (1.5)	○	5–6	1 (0.7)
Slovenia	⊙	4–6	74 (2.9)	○	6–7	11 (2.1)	○	6	2 (0.7)
Sweden	●	1–5	32 (3.6)	○	6–9	13 (2.7)	●	1–5	14 (2.7)
Tunisia	○	5–6	21 (2.9)	○	6	15 (2.7)	○	5	22 (3.2)
Ukraine	○	5–6	93 (2.1)	○	5–6	28 (2.9)	○	5	18 (2.7)
United States	●	3–5	90 (1.6)	●	3–5	78 (2.3)	●	3–5	80 (2.1)
Yemen	●	1–4	86 (3.2)	●	3–6	94 (2.5)	○	4–5	77 (3.7)
International Avg.			70 (0.5)			50 (0.5)			53 (0.5)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	2–6	68 (3.7)	○	6	24 (3.4)	●	4–6	70 (3.8)
British Columbia, Canada	●	K–1	r 53 (3.8)	●	4	r 33 (4.0)	●	4	r 63 (4.1)
Dubai, UAE	●	4	s 77 (5.4)	●	4	s 63 (4.9)	●	4	s 58 (5.2)
Massachusetts, US	●	K–8	90 (4.3)	○	5–6	70 (4.8)	●	4–8	71 (6.7)
Minnesota, US	●	3–6	80 (5.5)	○	5–6	67 (7.2)	○	5–6	76 (7.3)
Ontario, Canada	●	1–4	46 (5.6)	○	7–8	19 (3.9)	●	4–6	48 (4.7)
Quebec, Canada	●	3–6	84 (3.1)	○	5–6	31 (3.9)	●	3–6	59 (4.4)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Adding and subtracting with decimals			Finding the missing number in a number sentence			Model simple situations involving unknowns with expressions or number sentences		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	5	85 (3.3)	●	4	95 (1.9)	●	1	73 (4.8)
Armenia	●	4	56 (4.0)	○	6	73 (3.4)	●	4	73 (3.6)
Australia	●	3–4	64 (3.7)	●	3–4	95 (1.0)	●	3–4	72 (3.6)
Austria	●	3–4	56 (3.2)	●	1	97 (1.1)	●	3	89 (1.9)
Chinese Taipei	●	3–4	96 (1.8)	●	3	97 (1.5)	●	3	82 (3.4)
Colombia	●	4–5	79 (4.4)	●	4–5	93 (2.4)	●	4–5	65 (4.6)
Czech Republic	○	5–6	1 (0.5)	●	2–5	100 (0.0)	●	2–7	82 (3.3)
Denmark	●	4–6	89 (2.6)	●	4–6	90 (2.8)	○	7–9	45 (4.0)
El Salvador	●	4–12	87 (3.0)	●	3–12	89 (2.9)	○	7–12	61 (4.2)
England	●	3–6	83 (2.6)	●	1–3	99 (0.5)	⊙	5–6	67 (4.2)
Georgia	○	5	5 (1.9)	●	3–4	95 (1.3)	●	2–3	89 (2.8)
Germany	●	4	84 (2.3)	●	1	99 (0.5)	●	2	95 (1.5)
Hong Kong SAR	○	5	34 (4.0)	●	1–2,5–6	53 (4.3)	○	5–6	20 (3.4)
Hungary	○	5	3 (1.4)	●	1–12	100 (0.4)	●	1–12	97 (1.4)
Iran, Islamic Rep. of	●	4	10 (2.0)	●	3	88 (2.3)	●	5	50 (4.0)
Italy	●	4–6	98 (0.8)	●	3–5	84 (2.4)	●	8–10	44 (3.1)
Japan	●	4	92 (2.3)	●	2–4	95 (1.7)	●	3–4	76 (3.9)
Kazakhstan	○	5	--	●	1	--	●	1	--
Kuwait	○	5–6	r 37 (4.5)	●	2–3	r 92 (2.4)	●	2–4	r 75 (4.3)
Latvia	○	5	15 (2.7)	●	1–4	99 (0.5)	●	--	95 (1.3)
Lithuania	●	4	72 (3.2)	●	4	100 (0.0)	●	4	69 (3.8)
Mongolia	○	5	--	●	1–5	--	●	1–5	--
Morocco	●	4	94 (1.8)	○	6	86 (2.8)	○	6	66 (4.1)
Netherlands	○	5	11 (2.5)	○	7	99 (0.7)	○	7	r 44 (4.3)
New Zealand	⊙	4–6	40 (2.5)	●	2–6	97 (1.0)	●	2–6	80 (2.2)
Norway	○	5–10	50 (4.1)	○	5–10	98 (1.2)	○	8–10	27 (3.5)
Qatar	○	5	40 (0.2)	●	1–4	94 (0.1)	○	7	66 (0.2)
Russian Federation	○	5	--	●	1–4	--	○	5–6	--
Scotland	⊙	6	26 (3.2)	●	3	99 (0.7)	⊙	5	r 61 (3.6)
Singapore	●	4–6	99 (0.5)	●	2–5	100 (0.1)	○	6	90 (1.5)
Slovak Republic	○	6	1 (0.6)	●	2–4,6–9	100 (0.3)	○	7	91 (2.1)
Slovenia	○	6	1 (0.4)	●	2–6	96 (1.2)	●	4–8	91 (2.0)
Sweden	○	6–9	15 (3.0)	●	1–5	96 (2.2)	●	1–5	64 (4.1)
Tunisia	○	5	23 (3.1)	●	1–5	85 (3.0)	○	--	87 (3.1)
Ukraine	○	5	11 (2.3)	●	3–5	100 (0.0)	●	3–5	97 (1.4)
United States	●	3–5	83 (2.3)	●	1–4	99 (0.4)	●	3–5	91 (1.4)
Yemen	○	4–6	85 (3.6)	●	1–6	93 (2.9)	○	7	41 (4.7)
International Avg.			51 (0.5)			93 (0.3)			71 (0.6)
<b>Benchmarking Participants</b>									
Alberta, Canada	○	5–6	66 (4.2)	●	2–7	85 (2.9)	○	7	66 (3.7)
British Columbia, Canada	●	4	r 64 (4.1)	●	1	r 89 (2.5)	○	6	r 63 (4.0)
Dubai, UAE	●	4	s 56 (4.8)	●	3	s 93 (3.9)	●	4	s 71 (5.1)
Massachusetts, US	●	3–8	74 (6.8)	●	1–5	93 (2.9)	●	1–12	89 (3.2)
Minnesota, US	○	5–6	77 (6.4)	●	3–7	98 (1.4)	○	5–7	83 (5.7)
Ontario, Canada	●	4–6	55 (5.0)	●	2–5	85 (3.4)	○	5–8	70 (4.1)
Quebec, Canada	●	3–6	61 (4.1)	●	1–6	95 (1.9)	●	3–6	77 (3.9)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007





Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Extending patterns and finding missing terms in them			Describing relationships between adjacent terms in a sequence			Generating pairs of numbers following a given rule			
	Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	⊙	4–5	64 (4.0)	⊙	4–5	32 (4.1)	●	4	59 (4.7)	
Armenia	○	6	71 (3.5)	○	6	63 (3.5)	○	5	73 (3.0)	
Australia	●	K–6	87 (2.4)	●	4–8	47 (4.3)	●	4–6	58 (3.5)	
Austria	●	3	92 (1.8)	●	1	73 (2.9)	●	2–3	84 (2.6)	
Chinese Taipei	○	5	73 (3.9)	○	5	72 (4.0)	○	6	54 (3.7)	
Colombia	●	4–5	76 (3.3)	●	4–5	50 (4.1)	●	4–5	72 (4.0)	
Czech Republic	○	–	94 (2.1)	○	–	80 (3.6)	○	–	68 (3.9)	
Denmark	●	4–6	81 (3.6)	●	4–6	65 (4.2)	●	4–6	65 (4.1)	
El Salvador	○	7–12	63 (3.3)	○	7–12	37 (4.2)	○	7–12	60 (3.9)	
England	●	4–6	87 (2.7)	⊙	5–7	73 (4.0)	○	6–8	69 (3.6)	
Georgia	●	2–4	92 (1.9)	○	6	86 (2.6)	⊙	4	82 (3.4)	
Germany	●	2	95 (1.3)	●	2	94 (1.4)	●	2	82 (2.5)	
Hong Kong SAR	○	5–6	49 (4.3)	○	5–6	43 (4.2)	○	5–6	45 (4.1)	
Hungary	●	1–12	100 (0.0)	●	1–12	99 (0.7)	●	1–12	99 (0.4)	
Iran, Islamic Rep. of	●	–	62 (4.2)	●	1	57 (3.7)	●	1	63 (3.6)	
Italy	●	3–7	67 (2.8)	●	3–6	55 (3.7)	●	3–6	71 (3.0)	
Japan	●	4	36 (3.9)	●	4	45 (3.7)	●	4	31 (3.8)	
Kazakhstan	○	6	–	●	1	–	⊙	2	–	
Kuwait	●	3–4	r 61 (4.5)	●	2	r 39 (4.6)	⊙	7	r 48 (4.0)	
Latvia	○	7–9	100 (0.4)	○	7–9	87 (2.2)	○	–	85 (3.1)	
Lithuania	●	4	60 (3.4)	●	4	91 (2.1)	●	4	62 (3.8)	
Mongolia	⊙	1–5	–	○	1–5	–	○	6	–	
Morocco	○	7	53 (4.0)	○	8	32 (4.3)	○	11	40 (4.5)	
Netherlands	●	4	70 (4.3)	○	–	67 (4.4)	●	4	54 (4.3)	
New Zealand	●	K–5	73 (2.6)	●	2–4	47 (2.7)	⊙	4–6	54 (2.6)	
Norway	○	3–7	79 (3.1)	○	–	60 (3.4)	○	–	31 (3.6)	
Qatar	⊙	2–4	r 60 (0.2)	○	7	r 35 (0.2)	○	7	47 (0.2)	
Russian Federation	○	9	–	○	9	–	○	–	–	
Scotland	●	3	89 (2.3)	⊙	5	r 63 (3.5)	⊙	5	71 (3.3)	
Singapore	●	1–6	92 (1.5)	○	–	68 (2.7)	○	–	78 (2.6)	
Slovak Republic	●	1–6	96 (1.3)	●	1–6	97 (1.1)	○	7	98 (0.7)	
Slovenia	●	2–4	92 (1.6)	●	4–5	91 (1.8)	●	4–6	92 (1.8)	
Sweden	●	1–5	90 (1.7)	●	1–5	68 (3.9)	○	–	41 (3.5)	
Tunisia	○	7	75 (3.8)	○	7	63 (4.1)	○	7	73 (3.7)	
Ukraine	●	3–5	93 (2.0)	●	3–5	88 (2.5)	●	3–5	95 (1.9)	
United States	●	3–5	92 (1.2)	●	3–5	62 (2.7)	●	3–5	75 (2.4)	
Yemen	●	1–5	63 (4.3)	●	1–3	25 (4.4)	●	1–4	49 (4.9)	
International Avg.			77 (0.5)			63 (0.6)			66 (0.6)	
<b>Benchmarking Participants</b>										
Alberta, Canada	●	K–9	89 (2.6)	●	K–7	55 (3.9)	○	5–7	52 (4.4)	
British Columbia, Canada	●	K–1	r 87 (2.6)	●	K–1	r 56 (4.4)	●	4	r 55 (4.3)	
Dubai, UAE	●	4	s 76 (6.2)	○	5	s 50 (5.7)	●	2	s 52 (5.7)	
Massachusetts, US	●	PK–12	93 (2.9)	●	1–12	56 (5.1)	○	5–10	78 (4.8)	
Minnesota, US	●	K–8	84 (5.3)	●	K–8	60 (5.7)	●	K–8	72 (6.6)	
Ontario, Canada	●	1–6	96 (1.6)	●	4–6	68 (4.7)	○	6–8	78 (3.6)	
Quebec, Canada	●	1–6	87 (3.1)	●	1–6	r 56 (4.8)	●	3–6	60 (4.4)	

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.6 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Number (19 topics)	Finding a rule for a relationship given some pairs of numbers		
	Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught
Algeria	●	4	48 (5.2)
Armenia	○	5	63 (3.8)
Australia	●	4–6	50 (3.8)
Austria	●	2	67 (3.0)
Chinese Taipei	○	6	54 (3.9)
Colombia	●	4–5	59 (4.8)
Czech Republic	○	–	58 (4.0)
Denmark	●	4–6	46 (5.2)
El Salvador	○	7–12	39 (4.0)
England	○	7–10	60 (3.7)
Georgia	○	6	63 (4.3)
Germany	●	2	70 (2.9)
Hong Kong SAR	○	5–6	39 (4.0)
Hungary	●	1–12	95 (1.5)
Iran, Islamic Rep. of	○	9	51 (3.6)
Italy	●	3–6	70 (3.4)
Japan	●	4	55 (4.1)
Kazakhstan	●	1	–
Kuwait	⊙	10	r 29 (4.0)
Latvia	○	–	76 (3.8)
Lithuania	●	4	46 (3.4)
Mongolia	○	6	–
Morocco	○	11	33 (4.2)
Netherlands	●	4	r 47 (4.8)
New Zealand	●	2–6	52 (2.5)
Norway	○	–	30 (3.9)
Qatar	○	7	34 (0.2)
Russian Federation	○	–	–
Scotland	○	7	r 54 (4.1)
Singapore	○	–	61 (2.9)
Slovak Republic	○	8	91 (1.9)
Slovenia	●	4–8	71 (2.8)
Sweden	○	–	17 (3.2)
Tunisia	○	7	71 (3.5)
Ukraine	●	3–5	85 (2.6)
United States	●	3–5	75 (2.2)
Yemen	○	–	31 (4.4)
<b>International Avg.</b>			<b>56 (0.6)</b>
<b>Benchmarking Participants</b>			
Alberta, Canada	○	5–6	53 (3.9)
British Columbia, Canada	●	4	r 50 (3.8)
Dubai, UAE	●	4	s 40 (4.2)
Massachusetts, US	●	3–12	80 (5.5)
Minnesota, US	●	K–8	81 (5.6)
Ontario, Canada	○	6–8	79 (3.7)
Quebec, Canada	○	7–8	r 62 (4.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade



included in curricula, on average, taught to 78 percent of the students, as was finding areas by covering with shapes or counting squares, taught to 75 percent of the students. In comparison, only about half the curricula included estimating areas and volumes and this was only taught to about half the students (49%). The topics within location and movement were the least common in the curricula, with using informal coordinate systems taught, on average, to 40 percent of the students, figures with line symmetry to 60 percent of the students, and reflections and rotations to only 34 percent of the students.

Exhibit 5.8 presents the information about inclusion in the intended and implemented curriculum for the five data display topics at the fourth grade. Reading data from tables and graphs was included in the intended curriculum for 27 countries, the most of any of the five topics. Three topics were included in the curriculum for about 20 countries, comparing information from related data sets (21), going beyond the data displayed to answer questions (19), and organizing and displaying data in tables and graphs (21). The topic included in the fewest curricula was comparing and matching different representations of the same data (16). Across the five topics, on average across countries, teachers reported that about three-fourths of the students (72 to 76%) had been taught each of the topics, with the exception of going beyond the data displayed to answer questions, which was 57 percent.

Exhibit 5.7 **Intended and Taught\* TIMSS Geometric Shapes and Measures Topics**

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

Country	Measuring and estimating lengths			Parallel and perpendicular lines			Comparing angles by size and drawing angles		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	2	97 (1.3)	●	4	97 (1.5)	●	4	94 (2.0)
Armenia	●	4	80 (3.0)	●	4	75 (3.1)	●	4	84 (3.1)
Australia	●	K–6	100 (0.2)	●	3–6	72 (3.5)	●	K–6	74 (3.5)
Austria	●	2	99 (0.4)	●	3	89 (2.0)	●	3–4	78 (2.8)
Chinese Taipei	●	1–2	99 (0.7)	●	4	82 (3.1)	●	4	98 (1.0)
Colombia	●	1–3	82 (3.8)	●	1–3	89 (3.6)	●	4–5	90 (2.5)
Czech Republic	●	2–7	96 (1.1)	●	3–4	99 (0.6)	○	6	21 (3.7)
Denmark	●	4–6	100 (0.3)	●	4–6	91 (2.5)	●	4–6	83 (4.1)
El Salvador	●	3–12	86 (3.1)	⊙	5–12	95 (1.8)	●	3–12	92 (2.4)
England	●	K–4	98 (1.4)	●	4–6	87 (2.8)	●	1–3	94 (1.9)
Georgia	●	2–3	99 (0.9)	○	6	22 (4.0)	○	5	70 (4.5)
Germany	●	2	98 (0.9)	●	4	70 (3.1)	○	5	40 (3.4)
Hong Kong SAR	●	1–2	98 (1.3)	●	3	91 (2.6)	●	2–3	85 (3.1)
Hungary	●	1–3	100 (0.5)	●	4	93 (1.4)	●	3,5	81 (3.0)
Iran, Islamic Rep. of	●	3,5	87 (2.5)	●	3–4	100 (0.4)	●	3	100 (0.4)
Italy	●	2–4	93 (1.8)	●	3–4,6,9	100 (0.0)	●	3–4,6,9	99 (0.8)
Japan	●	1–3,6	95 (1.6)	○	5	16 (3.0)	●	4	98 (1.1)
Kazakhstan	●	1	--	●	4	--	●	2	--
Kuwait	●	3–4	r 96 (1.6)	○	5	r 50 (4.3)	●	4–5	r 95 (1.4)
Latvia	●	1–3	100 (0.2)	○	6	31 (3.4)	●	2	87 (2.8)
Lithuania	●	2	100 (0.0)	○	5–6	63 (3.6)	●	4	77 (3.0)
Mongolia	⊙	4–11	--	●	1–6	--	●	1–6	--
Morocco	●	4	99 (0.8)	○	5	99 (0.8)	○	5	50 (4.6)
Netherlands	●	4	89 (3.0)	○	7	6 (2.2)	○	7	2 (1.1)
New Zealand	●	K–5	90 (1.7)	●	4–6	54 (2.9)	●	4–6	32 (2.3)
Norway	●	1–4	98 (0.9)	○	5–10	42 (4.3)	○	5–10	34 (4.2)
Qatar	●	3–5	91 (0.1)	○	5	45 (0.2)	○	5	93 (0.1)
Russian Federation	●	2–4	--	○	6	--	●	4–6	--
Scotland	●	3	r 95 (1.7)	○	6	22 (3.3)	●	4	73 (3.4)
Singapore	●	2–6	99 (0.6)	●	4–6	99 (0.6)	●	3–6	99 (0.6)
Slovak Republic	●	3–9	99 (0.6)	●	4–9	95 (1.6)	○	5	31 (3.6)
Slovenia	●	4	99 (0.5)	●	4	96 (1.3)	○	6	0 (0.4)
Sweden	●	1–5	96 (1.2)	●	1–5	29 (3.6)	●	1–5	31 (3.6)
Tunisia	●	1–5	96 (1.4)	●	1–5	93 (1.6)	●	1–5	86 (2.9)
Ukraine	●	1–4,5–9	98 (1.1)	○	6–7	32 (3.7)	●	4,6–7	85 (2.8)
United States	●	3–5	93 (1.3)	●	3–5,6–8	91 (1.8)	●	6–8	85 (2.2)
Yemen	●	1–3	76 (3.9)	●	4	75 (4.2)	●	3–4	76 (4.1)
International Avg.			95 (0.3)			70 (0.5)			71 (0.5)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	1–4	76 (3.5)	●	3–4	56 (4.7)	●	4–8	48 (4.4)
British Columbia, Canada	●	K–1	r 72 (3.6)	●	2–3	r 55 (4.0)	●	4	r 60 (4.3)
Dubai, UAE	●	4	s 76 (5.7)	○	5	s 50 (4.8)	●	4	s 56 (4.7)
Massachusetts, US	●	PK–4	93 (2.3)	●	3–12	91 (3.0)	●	3–12	88 (2.9)
Minnesota, US	●	K–5	87 (5.2)	●	4–5	95 (2.7)	●	1–4	92 (4.4)
Ontario, Canada	●	1–4	91 (2.6)	●	3–4,7–8	76 (4.5)	●	3–4	83 (2.7)
Quebec, Canada	●	1–6	97 (1.1)	●	3–4	88 (2.7)	●	3–4	81 (3.5)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 5.7 Intended and Taught\* TIMSS Geometric Shapes and Measures Topics (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Geometric Shapes and Measures (11 topics)	Elementary properties of common geometric shapes			Recognizing relationships between three-dimensional shapes and their two-dimensional representations			Calculating areas and perimeters of squares and rectangles of given dimensions			
	Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	94 (2.1)	●	4	36 (5.0)	●	4	92 (2.2)	
Armenia	●	4	78 (3.3)	●	4	68 (3.8)	●	4	87 (3.0)	
Australia	●	3–6	93 (2.0)	●	3–6	86 (2.3)	○	6–8	70 (2.7)	
Austria	●	2	94 (1.6)	●	2	59 (3.1)	●	4	77 (2.6)	
Chinese Taipei	●	4	96 (1.3)	○	5	66 (3.7)	○	5	99 (0.7)	
Colombia	●	1–3	80 (3.9)	●	4–5	45 (5.3)	●	4–5	83 (3.7)	
Czech Republic	●	3–7	97 (1.3)	●	4–8	33 (3.6)	●	3–5	43 (4.2)	
Denmark	●	4–6	89 (2.8)	●	4–6	35 (4.7)	●	4–6	92 (2.4)	
El Salvador	●	4–12	89 (2.9)	⊙	5–12	39 (3.8)	●	4–12	71 (3.8)	
England	●	K–4	95 (1.2)	●	3–6	81 (2.9)	●	3–5	96 (1.7)	
Georgia	●	1–3	90 (3.1)	⊙	3–4	23 (3.9)	●	4–5	99 (0.7)	
Germany	●	2	95 (1.6)	●	3	62 (3.1)	○	5	55 (2.8)	
Hong Kong SAR	●	3–4	98 (1.1)	○	5–6	51 (4.3)	●	4	99 (0.5)	
Hungary	●	2–12	96 (1.6)	○	6	43 (3.9)	●	3–4	86 (2.5)	
Iran, Islamic Rep. of	●	3	90 (2.0)	○	5	26 (4.0)	●	3–4	73 (3.5)	
Italy	●	3–10	94 (1.5)	●	5–13	45 (3.3)	●	4–6	56 (2.9)	
Japan	●	3	96 (1.6)	○	6	9 (2.4)	●	4	98 (1.2)	
Kazakhstan	●	2	--	○	9	--	●	2–3	--	
Kuwait	○	5	r 88 (3.1)	○	5–6	r 42 (4.3)	●	4–5	r 89 (2.8)	
Latvia	●	1–2	98 (0.9)	●	3	28 (3.6)	●	4–5	99 (1.0)	
Lithuania	●	4	93 (1.9)	●	4	69 (3.3)	●	4	100 (0.0)	
Mongolia	⊙	3–7	--	⊙	3–10	--	⊙	2–11	--	
Morocco	●	4	97 (1.3)	⊙	5	45 (4.1)	○	5	77 (3.9)	
Netherlands	○	7	25 (3.7)	○	5	33 (3.8)	○	5	68 (4.2)	
New Zealand	●	K–6	82 (2.2)	●	3–6	72 (2.6)	⊙	4–8	61 (2.7)	
Norway	●	1–4	91 (2.3)	○	--	30 (4.0)	○	5–7	79 (3.5)	
Qatar	●	1–3	72 (0.2)	○	6–7	r 24 (0.2)	●	4–6	79 (0.1)	
Russian Federation	●	2–7	--	○	5–9	--	●	3–6	--	
Scotland	●	4	88 (2.7)	●	4	86 (3.0)	○	5	56 (4.5)	
Singapore	●	4–6	97 (0.9)	○	6	73 (2.6)	●	3–6	99 (0.6)	
Slovak Republic	●	3–9	97 (1.3)	○	6	36 (3.7)	○	5–9	89 (2.2)	
Slovenia	●	2–4	98 (1.0)	●	1–4	54 (3.2)	○	5–6	2 (0.9)	
Sweden	●	1–5	91 (2.0)	●	1–5	8 (2.2)	●	1–5	45 (3.4)	
Tunisia	●	1–5	95 (1.5)	○	6	30 (3.8)	●	1–5	94 (1.9)	
Ukraine	●	4–7	98 (1.1)	○	9–10	18 (2.9)	●	4–6,9	99 (0.6)	
United States	●	3–5	91 (1.8)	●	3–5	74 (2.6)	●	3–5	90 (1.8)	
Yemen	●	1–7	71 (4.2)	●	1–8	28 (4.3)	●	4	58 (4.6)	
International Avg.			89 (0.4)			46 (0.6)			78 (0.5)	
<b>Benchmarking Participants</b>										
Alberta, Canada	●	K–6	72 (4.0)	●	2–4	60 (4.3)	○	5–6	61 (3.9)	
British Columbia, Canada	●	K–1	r 71 (4.0)	●	2–3	r 55 (4.4)	●	4	r 55 (3.9)	
Dubai, UAE	●	1	s 76 (5.8)	○	5	s 40 (5.4)	●	4	s 72 (5.4)	
Massachusetts, US	●	PK–8	95 (2.6)	○	8	72 (5.0)	●	3–10	87 (4.5)	
Minnesota, US	●	K–4	95 (2.6)	●	4–12	67 (6.9)	●	3–5	92 (2.8)	
Ontario, Canada	●	1–5	96 (1.8)	●	4–6	76 (4.1)	●	4–5	72 (4.7)	
Quebec, Canada	●	3–6	96 (1.7)	●	3–6	65 (4.3)	●	3–4	89 (2.1)	

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Exhibit 5.7 Intended and Taught\* TIMSS Geometric Shapes and Measures Topics (Continued)**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Geometric Shapes and Measures (11 topics)	Finding areas by covering with a given shape or counting squares			Estimating areas and volumes			Using informal coordinate systems to locate points in a plane		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	87 (4.5)	○	5	54 (5.1)	●	4	44 (4.8)
Armenia	●	4	84 (3.0)	●	4	79 (3.0)	○	6	51 (3.9)
Australia	●	4-7	88 (1.6)	●	3-6	63 (3.1)	●	4-6	80 (3.1)
Austria	●	4	66 (3.2)	●	4	31 (2.8)	●	3	32 (3.0)
Chinese Taipei	●	4	98 (1.2)	○	5	68 (3.5)	○	5	53 (4.0)
Colombia	●	1-3	70 (4.4)	●	4-5	69 (4.3)	○	6-7	41 (5.1)
Czech Republic	●	4	26 (3.2)	●	4-8	12 (2.8)	○	5-7	26 (3.4)
Denmark	●	4-6	97 (1.3)	●	4-6	59 (4.8)	●	4-6	72 (4.0)
El Salvador	●	2-12	65 (3.6)	●	4-12	65 (4.3)	●	3-12	78 (3.5)
England	●	3-5	94 (1.7)	⊙	5-6	72 (3.6)	●	4-5	88 (2.6)
Georgia	○	5	92 (2.5)	○	6	41 (4.7)	○	6	23 (3.9)
Germany	●	4	68 (3.0)	○	5	48 (2.9)	○	6-7	28 (3.0)
Hong Kong SAR	●	4	98 (1.2)	●	4-5	62 (4.3)	○	7-8	25 (3.6)
Hungary	●	3	84 (2.7)	○	-	45 (4.2)	○	4	29 (3.3)
Iran, Islamic Rep. of	●	5	57 (3.6)	○	5	27 (3.7)	○	7	17 (3.3)
Italy	●	4-5	45 (3.3)	●	5-10	7 (1.4)	●	3-6	59 (2.9)
Japan	○	5	94 (1.9)	○	6	16 (3.1)	●	4	28 (3.2)
Kazakhstan	●	3	--	●	4	--	○	6	--
Kuwait	●	4	r 81 (3.3)	○	5,7	r 64 (4.7)	○	7	r 22 (3.9)
Latvia	●	4	92 (2.3)	⊙	4-6	71 (4.2)	○	0	17 (2.9)
Lithuania	●	4	89 (2.1)	○	5-6	48 (4.1)	○	5-6	46 (3.9)
Mongolia	○	7-11	--	○	5-10	--	○	6-11	--
Morocco	○	5	80 (3.6)	○	6	40 (4.1)	○	8	33 (4.4)
Netherlands	○	5	80 (3.4)	●	4	39 (4.2)	●	4	62 (4.3)
New Zealand	●	K-6	68 (2.9)	●	K-6	50 (2.2)	○	6-8	47 (2.6)
Norway	●	3-4	89 (2.6)	○	5-10	56 (3.9)	●	3-4	62 (4.1)
Qatar	●	3-4	73 (0.2)	○	6-7	51 (0.2)	○	7-8	13 (0.1)
Russian Federation	●	3-4	--	●	3-4	--	○	-	--
Scotland	●	4	85 (3.1)	⊙	6	59 (4.2)	●	4	75 (3.4)
Singapore	●	3-6	98 (0.7)	●	2	88 (1.7)	○	-	25 (2.3)
Slovak Republic	●	4-6	43 (3.6)	●	4-6	33 (3.8)	○	8	13 (2.3)
Slovenia	○	5	21 (2.4)	○	5	8 (1.9)	●	3	13 (2.3)
Sweden	○	-	32 (3.0)	●	1-5	19 (2.8)	○	6-9	23 (3.5)
Tunisia	●	1-5	83 (2.9)	○	7	62 (3.9)	●	1-5	35 (3.9)
Ukraine	●	4-6	98 (0.7)	○	7-11	57 (4.3)	○	6,8	9 (2.3)
United States	○	-	87 (1.9)	●	3-5	62 (2.8)	●	3-5	77 (2.6)
Yemen	●	4	35 (4.1)	○	-	25 (4.0)	○	7-9	14 (3.6)
International Avg.			75 (0.5)			49 (0.6)			40 (0.6)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	1-6	62 (4.0)	●	1-6	47 (4.2)	○	5-6	46 (3.8)
British Columbia, Canada	●	K-1	r 55 (3.9)	●	4	r 43 (4.3)	●	4	r 56 (4.3)
Dubai, UAE	●	4	s 55 (5.6)	●	4	s 42 (4.3)	●	4	s 29 (4.4)
Massachusetts, US	●	PK-4	83 (5.5)	●	1-8	59 (6.1)	●	3-6	88 (3.3)
Minnesota, US	●	3-5	91 (3.0)	●	2-5	54 (7.4)	○	5-6	81 (4.7)
Ontario, Canada	●	1-4	81 (3.7)	●	1-6	54 (4.6)	○	5	67 (3.8)
Quebec, Canada	●	3-4	90 (2.2)	○	5-6	62 (4.2)	●	1-4	63 (3.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

**Exhibit 5.7 Intended and Taught\* TIMSS Geometric Shapes and Measures Topics (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

Geometric Shapes and Measures (11 topics)	Figures with line symmetry			Reflections and rotations			
	Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	2	86 (2.9)	●	4	18 (3.8)	
Armenia	○	7	58 (3.6)	○	8	53 (3.8)	
Australia	●	3–4	89 (2.3)	●	3–4	71 (3.6)	
Austria	●	1	79 (2.5)	●	2	31 (2.9)	
Chinese Taipei	○	5	25 (3.9)	○	5	9 (2.4)	
Colombia	●	4–5	55 (5.3)	●	4–5	33 (5.4)	
Czech Republic	●	4–6	67 (4.0)	○	10–12	15 (3.1)	
Denmark	●	4–6	80 (3.4)	●	4–6	77 (4.5)	
El Salvador	●	4–12	67 (4.3)	○	6–12	28 (3.8)	
England	●	2–5	93 (2.1)	⊙	5–10	69 (3.9)	
Georgia	○	6	45 (4.8)	○	7	7 (2.3)	
Germany	●	2	85 (2.2)	●	4	68 (2.7)	
Hong Kong SAR	●	4	98 (1.0)	⊙	7–8	18 (3.1)	
Hungary	●	3	86 (2.4)	●	2–4	72 (2.8)	
Iran, Islamic Rep. of	●	1	96 (1.0)	○	8	21 (3.3)	
Italy	●	5–6,9,13	87 (2.2)	●	5–9,13	51 (3.3)	
Japan	○	7	1 (0.6)	○	–	1 (0.8)	
Kazakhstan	○	6	–	○	8	–	
Kuwait	○	7	12 (3.0)	○	8–9	13 (3.1)	
Latvia	●	1–4	63 (4.1)	○	7–9	9 (2.2)	
Lithuania	●	4	82 (2.7)	○	5–6	17 (3.1)	
Mongolia	○	6–11	–	○	9–11	–	
Morocco	○	7	25 (3.8)	○	12	8 (2.3)	
Netherlands	●	4	29 (4.2)	○	7	56 (3.9)	
New Zealand	●	K–4	74 (2.4)	●	2–6	77 (2.3)	
Norway	●	3–7	63 (4.1)	○	5–10	60 (4.2)	
Qatar	○	7	27 (0.2)	○	7–10	24 (0.1)	
Russian Federation	○	8–9	–	○	8–9	–	
Scotland	●	4	92 (2.2)	○	6	34 (3.9)	
Singapore	●	4	95 (1.3)	○	–	26 (2.4)	
Slovak Republic	○	7	23 (3.2)	○	7	6 (1.4)	
Slovenia	●	2–3	98 (1.0)	○	7	59 (3.2)	
Sweden	●	1–5	17 (3.0)	○	–	7 (1.7)	
Tunisia	○	5	18 (3.1)	○	12	16 (2.9)	
Ukraine	○	8–9	14 (2.6)	○	8–9	6 (1.8)	
United States	●	3–5	86 (2.0)	●	3–5	75 (2.5)	
Yemen	○	9	15 (3.5)	○	7–10	7 (2.1)	
<b>International Avg.</b>			<b>60 (0.5)</b>			<b>34 (0.5)</b>	
<b>Benchmarking Participants</b>							
Alberta, Canada	●	4	57 (3.9)	○	6–7	29 (3.9)	
British Columbia, Canada	●	4	55 (4.3)	○	5	29 (3.7)	
Dubai, UAE	○	6	51 (5.8)	○	6	29 (4.3)	
Massachusetts, US	●	1–10	87 (3.1)	●	4–12	69 (6.3)	
Minnesota, US	●	1–4	87 (5.3)	●	1–4	80 (6.1)	
Ontario, Canada	●	1,2,4	85 (3.3)	●	3–8	56 (5.0)	
Quebec, Canada	●	3–6	83 (2.9)	●	3–4	48 (4.2)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

Exhibit 5.8 Intended and Taught\* TIMSS Data Display Topics

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Data Display (5 topics)	Reading data from tables, pictographs, bar graphs, or pie charts			Comparing information from related data sets			Using information from data displays to answer questions that go beyond directly reading the data displayed		
	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	4	62 (4.9)	●	4	53 (5.0)	●	1	65 (5.3)
Armenia	○	–	64 (3.8)	○	–	59 (3.5)	○	–	65 (3.4)
Australia	●	2–4	94 (1.6)	●	3–4	93 (2.2)	●	4–6	59 (4.6)
Austria	●	3	47 (2.8)	●	3	31 (2.8)	●	4	43 (3.4)
Chinese Taipei	●	3	84 (3.1)	●	3	85 (3.2)	●	4	55 (3.8)
Colombia	●	4–5	69 (4.3)	●	4–5	71 (4.4)	●	4–5	65 (4.5)
Czech Republic	●	4–8	67 (4.1)	○	5–8	64 (4.3)	○	8	42 (4.2)
Denmark	●	4–6	73 (4.0)	●	4–6	63 (4.2)	●	4–6	39 (4.1)
El Salvador	●	4–12	90 (2.8)	○	6–12	95 (2.0)	○	7–12	61 (4.0)
England	●	K–8	96 (1.8)	●	4–5	96 (1.7)	⊙	5–8	73 (3.3)
Georgia	○	6	69 (4.4)	○	6	72 (4.1)	○	6	60 (4.3)
Germany	●	3	77 (2.9)	●	3	61 (3.3)	●	4	68 (2.8)
Hong Kong SAR	●	2–6	98 (1.2)	●	2–6	97 (1.4)	●	2–6	82 (3.3)
Hungary	●	3	70 (3.6)	●	3	88 (2.9)	●	4	47 (3.9)
Iran, Islamic Rep. of	○	1,5,6,10	60 (3.5)	○	5	54 (3.5)	○	5	41 (4.1)
Italy	●	3–10	89 (1.8)	●	3–10	89 (1.7)	●	4–7	64 (3.1)
Japan	●	3	76 (3.2)	●	3–4	82 (3.1)	●	3–4	34 (3.4)
Kazakhstan	●	1	–	○	5	–	○	6	–
Kuwait	○	6–7	r 43 (5.0)	○	7–8	r 24 (4.1)	○	7–8	r 34 (4.5)
Latvia	●	2–3	95 (1.7)	○	–	89 (2.4)	○	–	65 (3.6)
Lithuania	●	4	97 (1.0)	●	4	94 (1.6)	●	4	82 (3.1)
Mongolia	○	6–11	–	●	1–11	–	○	5–11	–
Morocco	○	–	48 (4.1)	○	–	54 (4.0)	○	–	46 (4.6)
Netherlands	●	4	95 (1.7)	○	–	84 (2.9)	○	–	51 (4.3)
New Zealand	●	K–6	92 (1.5)	●	2–8	91 (1.6)	⊙	4–8	71 (2.4)
Norway	●	1–7	77 (3.2)	○	5–7	58 (3.7)	○	5–7	33 (3.7)
Qatar	○	6–8	50 (0.2)	○	6–8	38 (0.2)	○	6–8	51 (0.2)
Russian Federation	○	5	–	○	5–6	–	○	5–6	–
Scotland	●	4	96 (1.4)	●	4	96 (1.3)	⊙	5	59 (4.4)
Singapore	●	1–7	98 (0.5)	●	1–7	99 (0.5)	●	1–7	84 (2.3)
Slovak Republic	○	7	65 (3.4)	○	8	52 (3.4)	○	8–9	26 (2.8)
Slovenia	●	3–5	98 (0.8)	●	3–5	93 (1.5)	●	8–9	88 (1.9)
Sweden	●	1–5	75 (3.2)	●	1–5	74 (3.5)	○	6–9	38 (3.7)
Tunisia	●	1–5	67 (3.9)	●	1–5	65 (4.2)	●	1–5	77 (3.5)
Ukraine	○	6–9	57 (4.2)	○	6–9	58 (4.1)	○	6–9	68 (4.0)
United States	●	3–5	98 (0.7)	●	3–5	97 (0.8)	●	3–5	86 (1.8)
Yemen	●	2–6	35 (4.6)	○	6–7	17 (3.7)	○	6–7	26 (4.4)
International Avg.			76 (0.5)			72 (0.5)			57 (0.6)
<b>Benchmarking Participants</b>									
Alberta, Canada	●	2–6	86 (3.1)	●	K–1	86 (3.1)	●	3–6	74 (3.6)
British Columbia, Canada	●	2–3	r 88 (2.5)	●	K–1	r 84 (3.1)	●	2–3	r 70 (3.7)
Dubai, UAE	●	4	s 61 (3.6)	●	4	s 52 (4.4)	●	4	s 44 (4.7)
Massachusetts, US	●	2–12	96 (2.1)	●	K–10	98 (1.6)	●	3–12	80 (5.2)
Minnesota, US	●	2–6	99 (1.0)	●	2–6	98 (1.3)	●	3–6	76 (6.2)
Ontario, Canada	●	1–8	99 (0.5)	●	4–5	96 (1.6)	○	7–8	83 (3.0)
Quebec, Canada	●	1–6	80 (3.4)	●	1–6	81 (3.2)	●	3–6	55 (4.2)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 5.8 Intended and Taught\* TIMSS Data Display Topics (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Data Display (5 topics)	Comparing and matching different representations of the same data			Organizing and displaying data using tables, pictographs, bar graphs, or pie charts		
	Country	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 4th grade	Grade(s) topic is intended to be taught
Algeria	●	4	52 (4.6)	●	4–5	53 (4.7)
Armenia	○	–	67 (3.7)	○	–	65 (3.4)
Australia	●	3–4	53 (3.5)	●	3–4	83 (2.2)
Austria	●	4	21 (2.6)	●	4	16 (2.4)
Chinese Taipei	○	6	66 (3.5)	○	6	79 (3.3)
Colombia	●	4–5	58 (5.4)	●	4–5	64 (5.2)
Czech Republic	○	8	39 (4.4)	●	4–8	36 (4.1)
Denmark	●	4–6	35 (4.5)	●	4–6	55 (4.7)
El Salvador	○	7–12	69 (3.8)	○	7–12	88 (2.9)
England	○	6–10	58 (3.8)	●	K–8	91 (2.5)
Georgia	○	6	70 (4.3)	○	6	65 (4.5)
Germany	○	4	39 (3.7)	●	4	47 (3.0)
Hong Kong SAR	●	2–6	70 (4.1)	●	2–6	97 (1.3)
Hungary	●	4	49 (4.2)	●	4	53 (4.0)
Iran, Islamic Rep. of	○	10	44 (4.2)	○	8	47 (4.0)
Italy	●	4–7	63 (3.2)	●	4–10	76 (3.0)
Japan	●	3	26 (3.6)	●	3	62 (4.1)
Kazakhstan	○	6	–	○	5	–
Kuwait	○	7	r 20 (3.8)	○	7	r 38 (4.9)
Latvia	○	–	48 (3.7)	○	–	82 (3.2)
Lithuania	●	4	80 (2.7)	●	4	93 (1.8)
Mongolia	⊙	2–11	–	○	6–11	–
Morocco	○	–	39 (4.0)	○	–	47 (4.4)
Netherlands	○	–	54 (4.3)	●	4	r 74 (3.8)
New Zealand	○	6–9	64 (2.6)	●	K–6	91 (1.7)
Norway	○	5–7	29 (3.6)	○	5–7	58 (4.1)
Qatar	○	7–8	26 (0.2)	○	6–8	46 (0.2)
Russian Federation	○	5–6	–	○	5–6	–
Scotland	⊙	6	46 (4.2)	⊙	5	90 (2.5)
Singapore	○	–	76 (2.5)	●	1–7	82 (2.3)
Slovak Republic	○	7–9	39 (3.6)	○	7–9	46 (4.0)
Slovenia	○	9	74 (2.8)	●	3–9	88 (2.2)
Sweden	●	1–5	28 (3.5)	●	1–5	52 (4.2)
Tunisia	●	1–5	76 (3.7)	●	1–5	62 (3.9)
Ukraine	○	6–9	75 (3.5)	○	6–9	47 (4.3)
United States	●	3–5	79 (2.4)	●	3–5	92 (1.3)
Yemen	●	2–6	35 (4.6)	○	6–7	17 (3.7)
International Avg.			76 (0.5)			72 (0.5)
<b>Benchmarking Participants</b>						
Alberta, Canada	●	2–6	86 (3.1)	●	K–1	86 (3.1)
British Columbia, Canada	●	2–3	r 88 (2.5)	●	K–1	r 84 (3.1)
Dubai, UAE	●	4	s 61 (3.6)	●	4	s 52 (4.4)
Massachusetts, US	●	2–12	96 (2.1)	●	K–10	98 (1.6)
Minnesota, US	●	2–6	99 (1.0)	●	2–6	98 (1.3)
Ontario, Canada	●	1–8	99 (0.5)	●	4–5	96 (1.6)
Quebec, Canada	●	1–6	80 (3.4)	●	1–6	81 (3.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through fourth grade

### **Eighth Grade: Which TIMSS Mathematics Topics Are in the Intended and Implemented Curriculum?**

For the eighth grade, Exhibit 5.9 provides detailed information about each topic within the number domain, including the student population to be taught the topic, the grades within which the topics were intended to be taught, and the teachers' reports about the percent of students taught the topics. Practically without exception, all countries and benchmarking participants included 9 of the 10 number topics in their curriculum for all or almost all students including whole numbers, computations/estimations with whole numbers, common fractions, decimals, representing fractions and decimals, computations with fractions, computations with decimals, working with integers, and conversion of percents to fractions or decimals (and vice versa). Also, on average across countries, teachers' reported that these topics were taught to 95 percent or more of the students. Although the tenth topic, ratios, was in almost all curricula, it was taught, on average, to somewhat fewer students (87%).

Exhibit 5.10 contains information about the algebra topics in the intended and implemented curricula at the eighth grade. Of the eight algebra topics, evaluating expressions for a given numeric value was in every curriculum—all countries and benchmarking participants—for all or almost all students, while sums, products, and powers of expressions containing variables, simplifying/comparing expressions, modeling situations using expressions, and evaluating functions/formulas for given values were in nearly all the curricula. On average across countries, teachers reported that 85 to 88 percent of the students had been taught the first three of these topics, but that fewer had been taught about modeling situations with expressions (70%) or evaluating functions/formulas (69%). The remaining three algebra topics—patterns and sequences, simple linear equations and inequalities, and equivalent representations of functions—were in the intended curriculum for most of the countries (all but about 8 to 10), and, on average, taught to 60 to 66% of the eighth grade students.

Exhibit 5.9 Intended and Taught\* TIMSS Number Topics

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Number (10 topics)	Whole numbers including place value, factorization, and the four operations			Computations, estimations, or approximations involving whole numbers			Common fractions		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7–8	83 (3.2)	●	7–8	81 (3.6)	●	7	94 (2.0)
Armenia	●	4	69 (3.5)	●	4	67 (3.5)	●	4	68 (3.4)
Australia	●	3–10	99 (0.6)	●	3–10	97 (1.2)	●	3–8	97 (1.2)
Bahrain	●	4	100 (0.0)	●	4	98 (0.4)	●	4	100 (0.3)
Bosnia and Herzegovina	●	4–6	100 (0.0)	●	4–5	99 (0.8)	●	5–6	100 (0.0)
Botswana	●	4–12	97 (1.3)	●	8	96 (1.9)	●	4–12	100 (0.0)
Bulgaria	●	2–4,6	98 (1.0)	●	5–6	95 (1.7)	●	5–6	98 (1.2)
Chinese Taipei	●	7	98 (1.2)	●	7	96 (1.6)	●	7	98 (1.2)
Colombia	●	6–7	97 (1.3)	●	6–7	97 (1.0)	●	4–5	98 (0.6)
Cyprus	●	5–7	94 (0.9)	●	5–6	94 (1.3)	●	5–7	100 (0.4)
Czech Republic	●	1–6	100 (0.0)	●	1–5	100 (0.0)	●	7	100 (0.0)
Egypt	●	1–4	99 (0.7)	●	1–6	96 (1.5)	●	1–5	96 (1.6)
El Salvador	●	3–8	96 (1.7)	●	4–8	96 (1.5)	●	3–8	96 (1.3)
England	●	K–7	99 (0.4)	●	1–8	97 (1.5)	●	2–7	99 (0.5)
Georgia	●	7–8	99 (0.7)	●	2–3,7–8	99 (0.7)	●	5–8	99 (0.7)
Ghana	●	4–10	97 (1.4)	●	7–12	86 (3.2)	●	2–10	99 (0.6)
Hong Kong SAR	●	7	97 (1.5)	●	7	96 (1.9)	●	7	92 (2.2)
Hungary	●	5–6	100 (0.0)	●	6	100 (0.0)	●	4–5	100 (0.0)
Indonesia	●	7	97 (1.5)	●	7	92 (2.4)	●	7	97 (1.7)
Iran, Islamic Rep. of	●	6	100 (0.4)	●	5	98 (0.9)	●	4	99 (1.0)
Israel	●	1–4 r	98 (1.2)	●	1–7 r	92 (1.7)	●	4–8 r	98 (1.1)
Italy	●	2–6	100 (0.0)	●	1–6	97 (1.3)	●	4–7	100 (0.0)
Japan	●	1–4	96 (1.6)	●	4–6	96 (1.6)	●	5	98 (1.3)
Jordan	●	3–6	99 (0.5)	●	4–6	99 (0.5)	●	4–7	99 (0.5)
Korea, Rep. of	●	7	96 (1.4)	●	4	98 (0.8)	●	5	95 (1.6)
Kuwait	●	4–5 r	100 (0.0)	●	4–5 r	95 (1.6)	○	9–10 r	100 (0.0)
Lebanon	●	4	98 (1.2)	●	6	89 (2.5)	●	5	96 (1.8)
Lithuania	●	6	99 (0.9)	●	8	98 (0.8)	●	6	99 (1.0)
Malaysia	●	8	97 (1.5)	●	8	98 (1.0)	●	8	99 (0.6)
Malta	●	6	100 (0.0)	●	6	99 (0.1)	●	6	99 (0.1)
Mongolia	●	2–8	--	●	2–8	--	●	6–8	--
Norway	●	1–10	100 (0.0)	●	3–10	97 (1.3)	●	5–10	93 (2.1)
Oman	●	1–4	99 (0.9)	●	1–4	100 (0.3)	●	1–5	99 (0.9)
Palestinian Nat'l Auth.	●	1–7	99 (0.8)	●	1–7	99 (0.8)	●	2–6	98 (0.9)
Qatar	●	4–7	100 (0.0)	●	4–6	94 (0.1)	●	5–7	98 (0.0)
Romania	●	1–6	97 (1.4)	●	4–6	97 (1.4)	●	5–9	97 (1.4)
Russian Federation	●	1–6	--	●	2–5	--	●	5–6	--
Saudi Arabia	●	1–7	93 (2.7)	●	4	93 (1.8)	●	4–5	98 (1.1)
Scotland	●	7	99 (0.6)	●	6	100 (0.3)	●	8	95 (1.6)
Serbia	●	1–8	98 (1.3)	●	1–8	97 (1.6)	●	2–8	98 (1.2)
Singapore	●	1–7	99 (0.5)	●	1–7	99 (0.5)	●	2–7	100 (0.0)
Slovenia	●	1–6	100 (0.0)	●	2–6	100 (0.1)	●	4–8	100 (0.0)
Sweden	●	6–9	100 (0.0)	●	6–9	99 (0.6)	●	6–9	99 (0.7)
Syrian Arab Republic	●	5	100 (0.0)	●	6	95 (1.8)	●	5–6	99 (0.7)
Thailand	●	1–9	92 (2.4)	●	7	93 (2.2)	●	5–7	95 (1.9)
Tunisia	●	7–9	96 (1.6)	●	7–9	90 (2.7)	●	7–9	99 (0.9)
Turkey	●	1–6	100 (0.0)	●	1–6	98 (1.6)	●	1–6	99 (1.4)
Ukraine	●	6–7	100 (0.0)	⊙	9	98 (1.2)	●	5–6	99 (0.8)
United States	●	3–5,6–8	100 (0.0)	●	3–5	99 (0.4)	●	3–8	100 (0.0)
‡ Morocco	●	6	96 (1.0)	●	6	93 (1.4)	●	7	99 (0.7)
International Avg.			97 (0.2)			96 (0.2)			97 (0.2)
<b>Benchmarking Participants</b>									
Basque Country, Spain	●	5–6	100 (0.0)	●	6–7	98 (1.3)	●	5	100 (0.0)
British Columbia, Canada	●	5	100 (0.0)	●	5	100 (0.0)	●	5	99 (1.1)
Dubai, UAE	●	6 s	98 (1.6)	●	4 s	97 (1.6)	●	1 s	98 (1.6)
Massachusetts, US	●	1–6	99 (0.9)	●	K–8	99 (0.9)	●	PK–8	99 (0.9)
Minnesota, US	●	K–7	100 (0.0)	●	K–3	100 (0.0)	●	3–5	100 (0.0)
Ontario, Canada	●	4–6	99 (0.6)	●	K–6	100 (0.2)	●	4–6	97 (1.2)
Quebec, Canada	●	7–8	97 (1.4)	●	7–8	98 (1.1)	●	7–8	100 (0.0)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.



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International Study Center  
Lynch School of Education, Boston College

Exhibit 5.9 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Number (10 topics)	Decimal fractions			Representing decimals and fractions			Computations with fractions		
	Student population intended to be taught through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7	78 (3.3)	●	7	75 (4.1)	●	7	98 (1.2)
Armenia	●	4	69 (3.6)	●	4	68 (3.8)	●	4	68 (3.4)
Australia	●	3–8	99 (0.6)	●	4–8	98 (0.7)	●	5–10	96 (1.1)
Bahrain	●	5	96 (0.4)	●	5	96 (1.3)	●	4	98 (0.4)
Bosnia and Herzegovina	●	5–6	100 (0.0)	●	5–6	100 (0.0)	●	5–6	100 (0.3)
Botswana	●	6–12	99 (0.7)	●	4–7	92 (2.5)	●	5–12	94 (2.1)
Bulgaria	●	5–6	98 (1.2)	●	5–6	97 (1.2)	●	5–6	98 (1.0)
Chinese Taipei	●	7	98 (1.2)	●	7	98 (1.2)	●	7	98 (1.2)
Colombia	●	6–7	96 (1.3)	●	6–7	98 (0.8)	●	4–5	98 (0.9)
Cyprus	●	5–7	97 (0.6)	●	5–7	93 (1.6)	●	5–7	99 (0.6)
Czech Republic	●	6–7	100 (0.0)	●	6–7	98 (1.2)	●	7	100 (0.0)
Egypt	●	4–6	95 (1.9)	●	4–6	96 (1.5)	●	4–6	97 (1.3)
El Salvador	●	4–7	97 (1.5)	●	4–7	97 (1.1)	●	3–7	98 (1.2)
England	●	4–8	98 (0.8)	●	4–8	98 (1.3)	⊙	6–10	94 (2.0)
Georgia	●	8–9	99 (0.7)	●	6–8	97 (2.0)	●	5–8	99 (0.7)
Ghana	●	4–10	98 (1.2)	●	3–9	95 (1.5)	●	4–9	89 (2.6)
Hong Kong SAR	●	7	94 (1.7)	●	7	93 (2.5)	●	7	99 (0.9)
Hungary	●	5–6	100 (0.0)	●	4–5	99 (0.7)	●	5–6	100 (0.0)
Indonesia	●	7	95 (2.0)	●	7	95 (1.9)	●	7	97 (1.6)
Iran, Islamic Rep. of	●	4–7	98 (1.2)	●	4–7	87 (2.7)	●	4–6	99 (0.8)
Israel	●	6–8	r 97 (1.1)	●	6–8	r 97 (1.1)	●	5–8	r 98 (1.1)
Italy	●	4–7	99 (0.6)	●	4–7	99 (0.6)	●	4–7	99 (0.6)
Japan	●	5	98 (1.3)	●	4	97 (1.5)	●	5–6	99 (1.0)
Jordan	●	4–7	99 (0.8)	●	4–7	97 (1.4)	●	4–7	99 (0.7)
Korea, Rep. of	●	6	99 (0.7)	●	4	98 (1.1)	●	6	98 (1.1)
Kuwait	●	5–6	r 98 (1.4)	●	5	r 88 (3.2)	●	6–8	r 98 (1.4)
Lebanon	●	6	96 (1.4)	⊙	7	89 (2.7)	●	6	98 (1.4)
Lithuania	●	6	98 (1.2)	●	6	98 (1.2)	●	6	98 (1.2)
Malaysia	●	8	99 (0.6)	●	8	99 (0.6)	●	7	100 (0.0)
Malta	●	6	100 (0.0)	●	6	99 (0.0)	●	6	98 (0.1)
Mongolia	●	5–8	--	●	5–8	--	●	5–8	--
Norway	●	5–10	96 (1.7)	●	5–10	89 (2.5)	●	8–10	87 (2.8)
Oman	●	3–6	100 (0.1)	●	3–6	96 (1.2)	●	2–6	100 (0.0)
Palestinian Nat'l Auth.	●	4–6	100 (0.0)	●	7	96 (2.1)	●	4–6	99 (0.8)
Qatar	●	5–7	94 (0.1)	●	5–7	95 (0.1)	●	4–7	98 (0.0)
Romania	●	5–9	97 (1.4)	●	5–8	97 (1.4)	●	5–6,8	97 (1.4)
Russian Federation	●	5–6	--	●	5–6	--	●	6	--
Saudi Arabia	●	4–6	86 (3.4)	●	4–6	86 (3.1)	●	4–8	92 (2.9)
Scotland	●	8	99 (0.4)	●	8	98 (1.0)	⊙	9	86 (2.1)
Serbia	●	5–8	98 (1.2)	●	5–8	98 (1.2)	●	2–8	98 (1.2)
Singapore	●	4–7	100 (0.4)	●	4–7	99 (0.5)	●	2–7	100 (0.3)
Slovenia	●	6–8	100 (0.0)	●	6–8	100 (0.0)	●	6–7	100 (0.0)
Sweden	●	6–9	100 (0.4)	●	6–9	98 (0.8)	●	6–9	96 (1.2)
Syrian Arab Republic	●	5–6	89 (2.7)	●	5–6	84 (3.2)	●	5–6	96 (1.1)
Thailand	●	5–7	96 (1.8)	●	4–7	93 (2.2)	●	4–7	97 (1.3)
Tunisia	●	7–9	97 (1.4)	●	7–9	95 (1.8)	●	7–9	99 (0.9)
Turkey	●	4–7	98 (1.6)	●	4–7	99 (1.4)	●	3–6	98 (1.6)
Ukraine	●	5–6	100 (0.0)	●	5–6	98 (1.2)	●	5–6	100 (0.0)
United States	●	--	99 (0.4)	●	--	99 (0.4)	●	6–8	100 (0.3)
‡ Morocco	●	7	95 (1.6)	●	5	r 87 (3.8)	●	7	99 (1.3)
International Avg.			97 (0.2)			95 (0.3)			97 (0.2)
<b>Benchmarking Participants</b>									
Basque Country, Spain	●	6	96 (1.8)	●	7	95 (2.4)	●	6	100 (0.0)
British Columbia, Canada	●	5	99 (1.0)	●	5	95 (1.9)	●	7	99 (0.6)
Dubai, UAE	●	4	s 98 (1.6)	●	4	s 96 (1.7)	●	7	s 97 (1.9)
Massachusetts, US	●	4–8	99 (0.9)	●	K–8	100 (0.0)	●	5–8	99 (0.9)
Minnesota, US	●	4–7	100 (0.0)	●	3–7	100 (0.0)	●	5–7	100 (0.0)
Ontario, Canada	●	4–6	93 (2.5)	●	2–6	93 (2.0)	●	7–8	92 (2.5)
Quebec, Canada	●	7–8	100 (0.0)	●	7–8	98 (0.8)	●	7–8	100 (0.0)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.9 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Number (10 topics)	Computations with decimals			Representing, comparing, ordering, and computing with integers			Ratios		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7	87 (3.1)	●	8	94 (1.9)	●	8	r 76 (3.4)
Armenia	●	5	68 (3.6)	●	5	70 (3.5)	●	5	68 (3.7)
Australia	●	5–10	99 (0.5)	●	7–10	95 (1.2)	●	7–10	76 (2.9)
Bahrain	●	5	93 (0.7)	●	7	100 (0.0)	●	6	95 (1.0)
Bosnia and Herzegovina	●	5–6	100 (0.3)	●	6–7	100 (0.0)	●	7–8	100 (0.0)
Botswana	●	6–12	95 (1.8)	●	7–12	91 (2.3)	○	9	18 (3.7)
Bulgaria	●	5–6	98 (1.2)	●	5–6	98 (1.0)	●	6	97 (1.2)
Chinese Taipei	●	7	97 (1.4)	●	7	97 (1.4)	●	7	98 (1.1)
Colombia	●	4–5	95 (2.4)	●	6–7	97 (1.1)	●	6–7	92 (2.3)
Cyprus	●	5–7	98 (0.8)	●	5–7	99 (0.5)	●	6–8	100 (0.0)
Czech Republic	●	6	100 (0.0)	●	7	100 (0.0)	●	7	99 (0.9)
Egypt	●	3–6	95 (1.3)	●	7–8	98 (0.9)	●	5–9	95 (1.9)
El Salvador	●	4–7	98 (1.2)	●	2–7	98 (1.0)	●	3–7	85 (3.2)
England	●	6–8	98 (1.0)	●	4–8	99 (0.5)	●	5–8	94 (1.4)
Georgia	●	6–8	99 (0.7)	●	2–4,7–8	99 (0.7)	●	6	98 (1.9)
Ghana	●	4–9	87 (3.0)	●	6–9	95 (1.6)	●	4–9	79 (3.5)
Hong Kong SAR	●	7	98 (1.2)	●	7	95 (2.0)	●	8	96 (1.8)
Hungary	●	5–6	100 (0.0)	●	5–6	100 (0.0)	●	6–7	100 (0.0)
Indonesia	●	7	98 (1.5)	●	7	96 (1.8)	●	7	76 (3.8)
Iran, Islamic Rep. of	●	4–6	100 (0.2)	●	8	99 (0.5)	●	5–8	89 (2.7)
Israel	●	6–8	r 97 (1.1)	●	7	r 98 (1.1)	●	6–8	r 89 (2.3)
Italy	●	4–7	100 (0.0)	●	6–7	100 (0.0)	●	6–8	100 (0.0)
Japan	●	4–5	98 (1.3)	●	7	100 (0.0)	●	6	87 (2.9)
Jordan	●	4–7	99 (0.5)	●	5–7	98 (1.0)	●	5–7	97 (1.3)
Korea, Rep. of	●	6	98 (1.1)	●	7	98 (1.1)	●	6	95 (1.7)
Kuwait	●	6–8	r 90 (2.9)	●	6–8	r 97 (1.6)	●	7–8	r 87 (3.5)
Lebanon	●	6	99 (1.0)	●	7	99 (0.7)	●	7	89 (3.5)
Lithuania	●	6	98 (1.2)	●	6	98 (1.2)	●	8	93 (2.1)
Malaysia	●	8	100 (0.0)	●	8	100 (0.0)	●	8	99 (0.8)
Malta	●	6	99 (0.1)	●	6	98 (0.1)	⊙	10	90 (0.1)
Mongolia	●	5–8	--	●	6–8	--	●	5–8	--
Norway	●	5–10	100 (0.4)	●	1–10	97 (1.2)	○	--	41 (3.3)
Oman	●	3–6	98 (1.2)	●	7	100 (0.0)	●	6–7	96 (1.4)
Palestinian Nat'l Auth.	●	4–6	99 (0.8)	●	2–6	99 (0.6)	●	6–7	95 (2.0)
Qatar	●	5–7	95 (0.1)	●	6–8	99 (0.0)	●	6–7	89 (0.1)
Romania	●	5–6,8	97 (1.4)	●	6–9	97 (1.4)	●	6–9	97 (1.4)
Russian Federation	●	5–6	--	●	6	--	●	6	--
Saudi Arabia	●	4–6	83 (3.8)	●	7	95 (2.4)	●	4–8	92 (2.9)
Scotland	●	6	98 (0.8)	●	8	93 (1.5)	●	8	83 (2.6)
Serbia	●	5–8	98 (1.2)	●	1–8	98 (1.2)	●	6–8	98 (1.2)
Singapore	●	4–7	100 (0.3)	●	7	99 (0.5)	●	6–7	100 (0.0)
Slovenia	●	6	100 (0.0)	●	8	100 (0.0)	●	8	29 (2.3)
Sweden	●	6–9	100 (0.0)	●	6–9	99 (0.5)	●	6–9	55 (2.6)
Syrian Arab Republic	●	4–6	88 (2.4)	●	7	95 (1.9)	●	5–7	93 (1.9)
Thailand	●	4–7	96 (1.7)	●	7–8	96 (1.8)	●	4–8	100 (0.0)
Tunisia	●	7–9	96 (1.7)	●	7–9	98 (1.2)	●	7–9	71 (3.6)
Turkey	●	4–7	98 (1.6)	●	7	100 (0.0)	●	6–8	99 (0.6)
Ukraine	●	5–6	100 (0.0)	●	6	100 (0.0)	●	6,9	100 (0.0)
United States	●	6–8	100 (0.1)	●	6–8	100 (0.0)	●	6–8	99 (0.3)
‡ Morocco	●	6	98 (1.1)	●	2	97 (0.2)	●	6	82 (4.8)
International Avg.			96 (0.2)			97 (0.2)			87 (0.3)
<b>Benchmarking Participants</b>									
Basque Country, Spain	●	6	100 (0.0)	●	5	100 (0.0)	●	7	94 (2.3)
British Columbia, Canada	●	7	99 (0.6)	●	7	97 (1.3)	●	7	93 (2.2)
Dubai, UAE	●	6	s 97 (1.6)	●	4	s 97 (1.7)	●	6	s 94 (2.1)
Massachusetts, US	●	3–8	99 (0.9)	●	5–8	100 (0.0)	●	7–8	99 (0.9)
Minnesota, US	●	5–7	100 (0.0)	●	5–8	100 (0.0)	●	6–8	98 (1.6)
Ontario, Canada	●	4–6	95 (1.9)	●	7–8	80 (4.5)	●	6–8	75 (4.1)
Quebec, Canada	●	7–8	100 (0.0)	●	7–8	98 (1.5)	●	7–8	99 (0.7)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 5.9 Intended and Taught\* TIMSS Number Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Number (10 topics)	Conversion of percents to fractions or decimals, and vice versa			
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
	Algeria	●	7–8	93 (2.4)
	Armenia	●	5	67 (3.6)
	Australia	●	7–10	92 (1.9)
	Bahrain	●	7	95 (1.1)
	Bosnia and Herzegovina	●	7–8	99 (0.9)
	Botswana	●	7–12	97 (1.3)
	Bulgaria	●	5	97 (1.3)
	Chinese Taipei	●	7	94 (1.9)
	Colombia	●	6–7	92 (2.3)
	Cyprus	●	6–8	99 (0.8)
	Czech Republic	●	7	97 (1.3)
	Egypt	●	5–9	95 (1.5)
	El Salvador	●	6–7	88 (2.9)
	England	●	6–8	95 (1.7)
	Georgia	●	7–9	99 (0.7)
	Ghana	●	3–10	87 (2.7)
	Hong Kong SAR	●	7	96 (1.7)
	Hungary	●	6–7	100 (0.0)
	Indonesia	●	7	95 (2.0)
	Iran, Islamic Rep. of	●	5–8	93 (2.0)
	Israel	●	6–8	r 95 (1.4)
	Italy	●	6–8	r 97 (0.9)
	Japan	●	5	95 (1.9)
	Jordan	●	5–7	98 (1.0)
	Korea, Rep. of	●	6	97 (1.3)
	Kuwait	●	7	r 95 (2.1)
	Lebanon	●	6	82 (3.7)
	Lithuania	●	6	98 (1.2)
	Malaysia	●	8	99 (0.8)
	Malta	●	6	99 (0.1)
	Mongolia	●	4–8	--
	Norway	●	8–10	94 (1.9)
	Oman	●	6–7	93 (2.0)
	Palestinian Nat'l Auth.	●	6	100 (0.5)
	Qatar	●	6–7	98 (0.0)
	Romania	●	6	97 (1.4)
	Russian Federation	●	5–6	--
	Saudi Arabia	●	8	86 (3.2)
	Scotland	○	9	94 (1.4)
	Serbia	●	5–8	98 (1.2)
	Singapore	●	6–7	100 (0.0)
	Slovenia	●	6–7	100 (0.2)
	Sweden	●	6–9	97 (1.1)
	Syrian Arab Republic	●	6	96 (1.8)
	Thailand	●	4–6	97 (1.4)
	Tunisia	●	7–9	79 (3.3)
	Turkey	●	7	97 (1.8)
	Ukraine	●	5–6	99 (0.9)
	United States	●	6–8	100 (0.2)
	‡ Morocco	●	6	90 (3.0)
	<b>International Avg.</b>			<b>95 (0.3)</b>
<b>Benchmarking Participants</b>				
	Basque Country, Spain	●	7	98 (1.2)
	British Columbia, Canada	●	7	92 (2.0)
	Dubai, UAE	●	5	s 94 (4.0)
	Massachusetts, US	●	6–8	98 (1.3)
	Minnesota, US	●	5–7	99 (0.9)
	Ontario, Canada	●	6–8	89 (2.8)
	Quebec, Canada	●	7–8	97 (1.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ○ Only the more able students    ○ Not included in the curriculum through eighth grade

Exhibit 5.10 Intended and Taught\* TIMSS Algebra Topics

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Algebra (8 topics)	Numeric, algebraic, and geometric patterns or sequences			Sums, products, and powers of expressions containing variables			Evaluating expressions for given numeric value			
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	8	21 (3.3)	●	8	46 (4.9)	●	8	55 (4.7)	
Armenia	●	5	85 (2.9)	●	5	80 (3.3)	●	5	70 (3.2)	
Australia	⊙	7–10	91 (2.1)	●	7–12	81 (2.7)	●	8–9	86 (2.7)	
Bahrain	●	7	38 (1.7)	●	8	88 (1.9)	●	7	85 (2.2)	
Bosnia and Herzegovina	○	12	92 (2.6)	●	8–9	98 (0.9)	●	8–9	100 (0.0)	
Botswana	○	11	71 (4.7)	●	8	48 (3.9)	●	8	71 (3.5)	
Bulgaria	○	11	47 (4.3)	●	6–8	96 (1.6)	●	6–8	99 (0.4)	
Chinese Taipei	●	8	94 (2.0)	●	8	99 (0.7)	●	8	99 (0.7)	
Colombia	●	8–9	89 (3.2)	●	8–9	97 (1.6)	●	8–9	96 (2.2)	
Cyprus	●	7	5 (1.5)	●	8–9	52 (2.6)	●	8–9	95 (1.7)	
Czech Republic	○	–	64 (3.3)	●	8–10	98 (1.0)	●	7–10	99 (0.9)	
Egypt	⊙	3–9	82 (3.2)	●	7–12	89 (2.6)	●	7–12	98 (1.3)	
El Salvador	●	7–10	72 (4.3)	●	8–10	91 (2.6)	●	8–10	96 (1.8)	
England	⊙	6–10	96 (1.4)	⊙	7–10	82 (2.6)	●	5–8	96 (1.2)	
Georgia	●	1–3,7	15 (3.6)	●	5–6	97 (2.2)	●	5–6,10	100 (0.0)	
Ghana	●	6–12	79 (3.4)	●	4–12	94 (1.8)	●	7–10	82 (3.1)	
Hong Kong SAR	●	7	80 (3.4)	●	8	95 (2.0)	●	8	86 (3.5)	
Hungary	●	1–12	76 (3.1)	●	7	96 (1.5)	●	7	99 (0.5)	
Indonesia	●	8	22 (3.6)	●	8	85 (2.7)	●	8	58 (4.6)	
Iran, Islamic Rep. of	●	7	62 (3.7)	●	7	95 (1.5)	●	7	98 (0.6)	
Israel	●	7–8	r 89 (2.3)	●	7–8	r 92 (1.9)	●	7	r 92 (1.8)	
Italy	●	8–9	70 (3.1)	●	8–10	95 (1.2)	●	8–10	97 (1.1)	
Japan	●	7	71 (3.9)	●	7–8	92 (2.3)	●	7	100 (0.0)	
Jordan	●	4–8	97 (1.5)	●	7–8	98 (1.3)	●	4–8	99 (0.9)	
Korea, Rep. of	●	7	53 (3.3)	●	8	98 (1.0)	●	7	100 (0.0)	
Kuwait	●	8	r 36 (4.3)	●	8	r 65 (4.4)	●	8	r 71 (4.6)	
Lebanon	●	4	65 (5.0)	●	7	95 (2.3)	●	7	95 (2.1)	
Lithuania	●	8	36 (4.0)	●	8	99 (0.6)	●	6	100 (0.0)	
Malaysia	●	8	98 (1.1)	●	8	94 (2.2)	●	8	97 (1.5)	
Malta	●	7	54 (0.3)	○	10	86 (0.2)	●	8	95 (0.1)	
Mongolia	●	6–8	–	●	6–8	–	●	6–8	–	
Norway	●	5–10	38 (3.6)	○	8–10	38 (4.1)	●	8–10	50 (3.7)	
Oman	●	1–7	70 (3.4)	●	7–8	98 (1.2)	●	7–8	99 (0.6)	
Palestinian Nat'l Auth.	●	4–7,11–12	61 (4.4)	●	6–7,9	87 (2.6)	●	6–7	97 (1.3)	
Qatar	●	7–8	50 (0.2)	●	7–8	80 (0.1)	●	7–8	73 (0.1)	
Romania	●	6–10	70 (4.3)	●	8–10	94 (1.6)	●	8–10	100 (0.1)	
Russian Federation	○	9	–	●	7–9	–	●	7–9	–	
Saudi Arabia	○	11	21 (3.7)	●	8	78 (3.4)	●	8	79 (3.9)	
Scotland	⊙	9	86 (2.5)	○	10	67 (3.1)	●	8	87 (2.1)	
Serbia	⊙	5–8	83 (3.1)	●	5–8	97 (1.6)	●	5–8	98 (1.2)	
Singapore	●	1–10	97 (0.9)	●	6–10	96 (1.2)	●	7–10	100 (0.4)	
Slovenia	●	4–5	58 (3.2)	●	7–9	90 (2.1)	●	7	94 (1.8)	
Sweden	●	1–5	57 (2.9)	●	6–9	59 (2.8)	●	6–9	76 (2.3)	
Syrian Arab Republic	●	7–9	24 (3.4)	●	8	80 (3.4)	●	7–8	72 (3.9)	
Thailand	●	1–10	60 (3.6)	○	10	57 (4.2)	●	7	47 (4.2)	
Tunisia	○	–	r 31 (4.4)	●	7–8,10	93 (2.0)	●	7–8,10	98 (1.2)	
Turkey	○	10	77 (4.2)	●	7–8	97 (1.3)	●	7	98 (1.2)	
Ukraine	⊙	9	3 (1.3)	●	7–8	100 (0.5)	●	7–8	99 (0.7)	
United States	●	6–8	94 (1.1)	●	6–8	92 (1.5)	●	6–8	99 (0.6)	
‡ Morocco	○	10	r 26 (5.5)	●	7	r 62 (4.2)	●	7	r 53 (4.8)	
International Avg.			62 (0.5)			85 (0.3)			88 (0.3)	
<b>Benchmarking Participants</b>										
Basque Country, Spain	●	8	73 (4.0)	●	8	91 (2.7)	●	8	94 (2.1)	
British Columbia, Canada	●	8	74 (3.8)	○	9–10	74 (3.3)	●	7	82 (3.3)	
Dubai, UAE	●	7	s 50 (4.4)	●	7	s 89 (3.0)	●	6	s 93 (3.0)	
Massachusetts, US	●	5–12	93 (3.1)	●	7–12	91 (3.3)	●	5–12	99 (0.9)	
Minnesota, US	●	K–12	86 (5.6)	●	5–12	89 (4.3)	●	5–12	98 (1.8)	
Ontario, Canada	●	1–8	87 (3.4)	○	9	88 (2.6)	●	7–8	89 (3.0)	
Quebec, Canada	●	7–8	93 (1.7)	●	7–8	83 (3.3)	●	7–8	96 (1.6)	

● All or almost all students ⊙ Only the more able students ○ Not included in the curriculum through the eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.

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Exhibit 5.10 Intended and Taught\* TIMSS Algebra Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Algebra (8 topics)	Simplifying or comparing algebraic expressions			Modeling situations using expressions			Evaluating functions/formulas for given values of the variables		
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught
Algeria	●	9	61 (4.5)	●	9	48 (5.0)	●	7–9	21 (3.7)
Armenia	●	5	72 (3.4)	●	5	75 (3.5)	●	5	81 (2.6)
Australia	●	7–10	81 (2.5)	⊙	8–12	69 (3.3)	●	7–10	77 (2.9)
Bahrain	●	7	93 (1.8)	●	2–8	51 (2.8)	●	7–8	34 (2.5)
Bosnia and Herzegovina	●	8–9	98 (1.2)	●	8–9	94 (1.8)	●	7–9	100 (0.0)
Botswana	○	9	64 (4.2)	●	8	37 (4.3)	●	8	54 (4.1)
Bulgaria	●	6–8	100 (0.2)	●	7–8	90 (2.4)	●	7–8	96 (1.6)
Chinese Taipei	●	8	100 (0.0)	●	8	99 (1.0)	●	8	85 (2.8)
Colombia	●	8–9	90 (2.4)	●	8–9	81 (3.7)	●	8–9	54 (4.6)
Cyprus	○	9	22 (2.2)	○	9	33 (2.1)	○	9	58 (2.9)
Czech Republic	●	8–10	93 (2.1)	●	8–12	87 (2.9)	●	7–12	48 (4.4)
Egypt	●	7–12	97 (1.3)	●	7–12	87 (2.6)	●	7–12	78 (3.0)
El Salvador	●	8–10	96 (1.7)	●	8–10	64 (4.7)	●	8–10	51 (4.6)
England	●	6–8	94 (1.6)	●	6–10	75 (2.8)	⊙	6–10	91 (1.8)
Georgia	●	5–6	97 (2.2)	●	4–5	56 (5.4)	●	7	80 (3.8)
Ghana	●	6–9	94 (1.9)	○	10–12	51 (3.9)	●	7–12	70 (3.9)
Hong Kong SAR	●	7	98 (1.4)	●	7–9	70 (4.5)	●	8	75 (4.0)
Hungary	●	7	98 (0.7)	●	7	83 (2.7)	●	1–12	98 (0.7)
Indonesia	●	8	78 (3.5)	⊙	8	58 (4.7)	⊙	8	91 (2.2)
Iran, Islamic Rep. of	●	7	99 (0.6)	●	7	51 (3.8)	●	8	66 (3.6)
Israel	●	7–8	r 97 (1.1)	●	7–8	r 78 (3.3)	●	8–9	r 57 (4.3)
Italy	●	8–10	94 (1.7)	●	8–10	71 (3.1)	●	8–10	71 (2.9)
Japan	●	7–8	98 (1.1)	●	7–8	94 (1.8)	●	7–8	99 (0.5)
Jordan	●	7–8	96 (1.6)	●	7–8	95 (1.7)	●	7–8	98 (1.1)
Korea, Rep. of	●	8	100 (0.0)	●	8	93 (1.8)	●	7	98 (1.0)
Kuwait	●	8	r 79 (3.9)	●	8	r 45 (4.3)	●	8	r 34 (4.5)
Lebanon	●	7	94 (2.3)	⊙	7	87 (3.7)	●	6	80 (3.7)
Lithuania	●	8	90 (2.4)	⊙	8	65 (3.9)	○	10	83 (2.8)
Malaysia	●	8	98 (1.3)	●	8	85 (3.1)	●	8	79 (3.4)
Malta	●	7	95 (0.1)	●	7–8	79 (0.2)	●	7	84 (0.2)
Mongolia	●	6–8	--	●	6–8	--	●	7–8	--
Norway	○	8–10	60 (3.8)	○	--	26 (3.3)	●	8–10	38 (3.7)
Oman	●	7–9	93 (2.1)	●	7–9	58 (4.3)	●	7–9	68 (4.1)
Palestinian Nat'l Auth.	●	6–7	90 (2.4)	●	6–7,9	83 (3.4)	○	9–12	42 (4.6)
Qatar	●	7–8	88 (0.1)	●	7–8	47 (0.1)	●	7–9	49 (0.2)
Romania	●	8–10	99 (1.1)	○	9–10	84 (3.3)	●	6–10	100 (0.1)
Russian Federation	●	7–9	--	●	6–9	--	●	7–9	--
Saudi Arabia	●	8	83 (3.6)	●	8	33 (3.7)	●	8	22 (3.4)
Scotland	⊙	9	78 (3.1)	●	8	52 (3.5)	●	8	72 (3.0)
Serbia	●	5–8	96 (2.0)	●	5–8	91 (2.5)	●	5–8	92 (2.4)
Singapore	●	7–10	99 (0.5)	●	7–10	92 (1.4)	●	7–10	95 (1.4)
Slovenia	●	7–9	80 (2.5)	●	4–8	96 (1.2)	●	7–8	59 (3.1)
Sweden	●	6–9	70 (3.1)	●	6–9	46 (3.2)	●	6–9	38 (2.8)
Syrian Arab Republic	●	7–9	91 (2.4)	●	7–9	44 (4.1)	●	7–9	65 (4.1)
Thailand	○	10	46 (4.2)	●	7	36 (3.6)	●	7	32 (3.9)
Tunisia	●	7–8,10	95 (1.8)	●	7–8,10	74 (4.0)	●	7–8,10	49 (3.9)
Turkey	●	7–8	100 (0.4)	●	7–8	85 (3.0)	●	7–8	65 (4.6)
Ukraine	●	7–8	99 (0.7)	●	7–9	100 (0.0)	●	7–9	92 (2.2)
United States	●	6–8	93 (1.2)	●	6–8	90 (1.6)	●	6–8	91 (1.5)
‡ Morocco	○	10	94 (2.7)	●	7	r 53 (5.0)	●	7	r 53 (4.7)
International Avg.			88 (0.3)			70 (0.5)			69 (0.5)

**Benchmarking Participants**

Basque Country, Spain	●	8	86 (3.6)	○	9–10	82 (3.5)	●	8	62 (5.1)
British Columbia, Canada	●	8	78 (3.4)	●	7	68 (3.7)	●	8	74 (3.3)
Dubai, UAE	●	8	s 91 (4.1)	●	7	s 65 (4.0)	●	7	s 71 (5.1)
Massachusetts, US	●	5–12	96 (2.2)	●	1–12	98 (1.3)	●	3–12	95 (2.2)
Minnesota, US	●	7–12	83 (5.6)	●	2–12	84 (5.3)	●	7–12	90 (2.7)
Ontario, Canada	○	9	82 (3.5)	●	7–8	73 (3.9)	●	6–8	75 (3.8)
Quebec, Canada	●	7–8	98 (1.3)	●	8	89 (2.9)	○	9	69 (3.3)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through the eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.10 Intended and Taught\* TIMSS Algebra Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Algebra (8 topics)	Simple linear equations and inequalities, and simultaneous (two variables) equations			Equivalent representations of functions as ordered pairs, tables, graphs, words, or equations			
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●		9	37 (4.3)	●	9	26 (3.4)
Armenia	●		4	82 (2.7)	●	7	79 (3.0)
Australia	◉		8–10	40 (3.5)	●	7–10	58 (3.7)
Bahrain	●		9	41 (2.7)	●	9	29 (2.6)
Bosnia and Herzegovina	●		6–9	99 (0.6)	●	7–8	99 (0.7)
Botswana	●		8–9	21 (3.6)	●	7	19 (3.6)
Bulgaria	●		7–8	98 (0.8)	●	8	95 (1.6)
Chinese Taipei	●		7	97 (1.3)	●	7	84 (2.8)
Colombia	●		8–9	47 (5.3)	●	8–9	44 (5.3)
Cyprus	○		10	50 (2.7)	●	8	r 22 (2.1)
Czech Republic	●		8–10	53 (4.2)	○	9–12	19 (3.5)
Egypt	●		7–12	96 (1.3)	◉	8–12	88 (2.1)
El Salvador	○		8–10	44 (4.6)	○	10	30 (4.0)
England	◉		6–10	64 (3.3)	●	6–10	73 (3.2)
Georgia	●		7–8	92 (2.1)	●	7–9	68 (4.7)
Ghana	●		6–10	88 (2.1)	●	4–12	66 (4.2)
Hong Kong SAR	●		8	91 (2.3)	●	7	69 (4.0)
Hungary	●		7,9	97 (0.9)	●	5	93 (1.8)
Indonesia	●		8	96 (2.0)	◉	8	91 (2.5)
Iran, Islamic Rep. of	●		8	64 (3.7)	○	10	25 (3.5)
Israel	●		7–8	r 91 (2.1)	●	9	r 58 (3.8)
Italy	●		8–10	56 (3.5)	●	8–10	59 (3.3)
Japan	●		7–8	94 (1.7)	●	7–8	91 (2.4)
Jordan	●		6–8	96 (1.6)	●	8	98 (0.9)
Korea, Rep. of	●		8	99 (0.6)	●	7	94 (1.6)
Kuwait	●		8–9	r 55 (5.0)	●	8	r 46 (4.8)
Lebanon	●		8–9	48 (4.5)	●	9	48 (4.6)
Lithuania	◉		8	79 (3.1)	◉	10	65 (3.9)
Malaysia	●		8–9	69 (3.3)	○	9	72 (3.7)
Malta	○		10	77 (0.2)	●	7	61 (0.2)
Mongolia	●		5–8	--	●	6–8	--
Norway	○		8–10	12 (1.9)	○	8–10	26 (3.4)
Oman	●		8–9	54 (4.4)	●	6–10	79 (3.2)
Palestinian Nat'l Auth.	○		9–10	36 (4.2)	○	9–12	18 (3.5)
Qatar	●		8–9	53 (0.2)	●	7–9	41 (0.2)
Romania	●		6–9	99 (0.5)	●	8–10	100 (0.3)
Russian Federation	●		6–9	--	●	7–9	--
Saudi Arabia	●		7–8	38 (4.4)	●	8	28 (4.2)
Scotland	○		10	27 (3.1)	○	10	31 (3.4)
Serbia	●		5–8	98 (1.7)	●	5–8	99 (1.1)
Singapore	●		7–10	90 (1.6)	●	8–10	88 (1.6)
Slovenia	●		7–8	14 (1.9)	●	8	55 (2.9)
Sweden	●		6–9	15 (2.3)	●	6–9	22 (2.4)
Syrian Arab Republic	●		7–9	90 (2.3)	○	7–9	47 (4.6)
Thailand	●		7–10	56 (4.0)	●	7–10	68 (3.6)
Tunisia	○		9	18 (3.5)	○	10	20 (3.3)
Turkey	●		7–8	95 (1.3)	●	7–8	52 (4.5)
Ukraine	●		7–8	93 (2.1)	●	7–9	90 (2.5)
United States	◉		6–8	79 (2.2)	●	6–8	85 (1.7)
‡ Morocco	○		9	r 46 (5.1)	○	10	r 42 (4.9)
International Avg.				66 (0.4)			60 (0.5)
<b>Benchmarking Participants</b>							
Basque Country, Spain	●		8	68 (4.8)	●	8	40 (4.1)
British Columbia, Canada	○		10	37 (4.3)	○	9–10	55 (3.9)
Dubai, UAE	●		7	s 53 (3.8)	●	7	s 42 (3.9)
Massachusetts, US	●		7–12	76 (5.4)	●	6–12	89 (3.5)
Minnesota, US	●		5–12	69 (5.7)	●	6–12	81 (4.0)
Ontario, Canada	○		9	52 (4.2)	●	7–8,11	62 (5.1)
Quebec, Canada	○		9	19 (3.4)	○	9	56 (4.7)

● All or almost all students    ◉ Only the more able students    ○ Not included in the curriculum through the eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 5.11 reveals considerable variation across the 14 geometry topics in terms of being included in the countries' curricula. Four topics were included in nearly every curriculum, and, on average, taught to 90 percent or more of the students, including angles, relationships among angles, properties of geometric shapes, and drawing triangles and rectangles. Three topics were in most or almost every curriculum and, on average across countries, taught to 80 to 83 percent of the students, including congruent figures; measuring angle sizes, lengths, areas, and volumes; and measurement formulas for perimeters, areas, and volumes. The Pythagorean theorem was in all except 12 curricula, and taught, on average, to 65 percent of the students. The remaining 6 geometry topics were in the intended curriculum for the majority of countries, and teachers reported the topics had been taught to approximately half the students, including similar triangles (55%), relationship between two- and three-dimensional figures (48%), measures of irregular or compound areas (55%), Cartesian plane (54%), line and rotational symmetry for two-dimensional shapes (56%), and translation, reflection, and rotation (53%).

Exhibit 5.11 Intended and Taught\* TIMSS Geometry Topics

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Geometry (14 topics)	Angles acute, right, straight, obtuse, and reflex			Relationships for angles at a point, angles on a line, vertically opposite angles, angles associated with a transversal cutting parallel lines, and perpendicularity			Properties of geometric shapes: triangles and quadrilaterals, and other common polygons		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7	97 (1.7)	●	8	92 (2.2)	●	7–9	99 (1.0)
Armenia	●	6	70 (3.7)	●	6	69 (3.8)	●	6	71 (3.8)
Australia	●	4–9	93 (2.0)	●	6–9	79 (2.8)	●	6–9	88 (2.6)
Bahrain	●	4–9	99 (0.3)	●	6–9	97 (1.0)	●	4–8	100 (0.0)
Bosnia and Herzegovina	●	4–6	99 (0.9)	●	6–7	99 (0.9)	●	6–7	99 (0.9)
Botswana	●	4–10	55 (4.3)	●	8	41 (4.1)	●	7–8	44 (4.3)
Bulgaria	●	4,6	98 (1.2)	●	7–8	98 (1.2)	●	6–7	99 (0.8)
Chinese Taipei	●	8	99 (0.6)	●	8	95 (1.6)	●	8	97 (1.4)
Colombia	●	6–7	92 (2.4)	●	8–9	82 (3.4)	●	6–7	83 (3.3)
Cyprus	●	7	98 (1.0)	●	7	99 (0.9)	○	9–10	95 (1.5)
Czech Republic	●	6	99 (0.5)	●	6,10	99 (0.5)	●	6–7,10	99 (0.5)
Egypt	●	1–4	98 (1.3)	●	7–8	98 (1.2)	●	4–6	98 (1.3)
El Salvador	●	3–9	66 (4.4)	○	9,11	39 (4.0)	●	6,9	68 (3.9)
England	●	6–8	99 (0.5)	●	6–8	98 (0.8)	●	6–8	99 (0.5)
Georgia	●	5,7	100 (0.0)	●	7	98 (1.9)	⊙	1,7–8	100 (0.0)
Ghana	●	4–9	95 (1.8)	●	6–12	90 (2.4)	●	7–10	85 (3.0)
Hong Kong SAR	●	7	99 (1.0)	●	7	97 (1.7)	●	7–9	85 (3.4)
Hungary	●	5	100 (0.0)	●	7	99 (0.3)	●	3–12	100 (0.0)
Indonesia	●	8	99 (0.9)	⊙	8	95 (2.0)	⊙	8	89 (2.8)
Iran, Islamic Rep. of	●	6	99 (0.5)	●	7	97 (1.4)	●	3	100 (0.5)
Israel	●	5–9	r 98 (0.9)	●	5–9	r 95 (1.4)	●	4–9	r 78 (2.9)
Italy	●	4,6,9	100 (0.4)	●	6–9	99 (0.5)	●	4–10	100 (0.0)
Japan	●	8	98 (1.2)	●	8	100 (0.2)	●	8	100 (0.2)
Jordan	●	5–7	98 (1.4)	●	5–7	99 (1.1)	●	5–7	98 (1.0)
Korea, Rep. of	●	7	99 (0.8)	●	7	98 (1.0)	●	8	100 (0.0)
Kuwait	○	9	r 96 (1.9)	●	8–9	r 81 (3.9)	●	7–8	r 91 (2.7)
Lebanon	●	5	97 (1.5)	●	5–8	98 (1.2)	●	5	99 (0.9)
Lithuania	●	6	98 (1.2)	●	8	95 (1.4)	●	8	98 (1.2)
Malaysia	●	7	96 (1.5)	●	7	90 (2.0)	●	8	96 (1.8)
Malta	●	6	100 (0.0)	●	7–8	100 (0.0)	●	6–7	99 (0.0)
Mongolia	●	7–8	--	●	7–8	--	●	7–8	--
Norway	●	5–10	96 (1.4)	○	--	64 (3.6)	●	5–10	85 (2.4)
Oman	●	4–5	99 (0.6)	●	6–8	96 (1.7)	●	3–7	99 (0.6)
Palestinian Nat'l Auth.	●	3–5	100 (0.4)	●	7	92 (2.4)	●	1–7	100 (0.0)
Qatar	●	5–7	92 (0.1)	●	6–8	88 (0.1)	●	6–8	94 (0.1)
Romania	●	6–7	99 (0.6)	●	6–7	99 (0.8)	●	6–7	99 (0.8)
Russian Federation	●	7,9	--	●	7–9	--	●	7–9	--
Saudi Arabia	●	4–7	95 (2.4)	●	8	85 (3.1)	●	7–8	99 (0.7)
Scotland	●	7	100 (0.0)	⊙	9	94 (1.5)	●	8	94 (1.8)
Serbia	●	4–8	99 (0.6)	●	5–7	99 (0.6)	●	5–7	99 (0.6)
Singapore	●	7–10	93 (1.4)	●	5–10	93 (1.2)	●	7–10	95 (0.9)
Slovenia	●	6	100 (0.3)	●	6	99 (0.7)	●	6–7	98 (0.8)
Sweden	●	6–9	92 (1.4)	●	6–9	58 (2.8)	●	6–9	94 (1.4)
Syrian Arab Republic	●	3	99 (0.8)	●	4–8	92 (2.2)	●	4–8	98 (1.6)
Thailand	●	1–3	87 (2.7)	●	4–6	83 (3.0)	●	4–6	92 (2.4)
Tunisia	●	7–9	99 (0.9)	●	7–9	99 (0.9)	●	7–9	98 (1.1)
Turkey	●	4–7	98 (1.3)	●	4–7	97 (1.3)	●	3–7	90 (2.6)
Ukraine	●	7–9	100 (0.0)	●	7	100 (0.0)	●	7–9	99 (0.7)
United States	●	6–8	90 (1.6)	●	6–8	73 (2.6)	●	6–8	89 (1.7)
‡ Morocco	●	7	97 (0.2)	●	7	82 (3.8)	●	7	94 (1.8)
International Avg.			95 (0.2)			90 (0.3)			93 (0.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Benchmarking Participants

Basque Country, Spain	●	7	90 (2.9)	●	7	82 (3.8)	●	7	88 (3.1)
British Columbia, Canada	●	6	59 (4.2)	●	7	49 (4.0)	●	6	60 (4.6)
Dubai, UAE	●	5	s 95 (3.8)	●	6	s 97 (1.7)	●	8	s 87 (2.7)
Massachusetts, US	●	3–12	92 (3.6)	●	5–12	86 (4.7)	●	PK–8	89 (4.4)
Minnesota, US	●	4–7	85 (3.9)	●	4–12	48 (8.3)	●	2–12	77 (6.0)
Ontario, Canada	●	3–6	89 (3.5)	●	8	81 (3.6)	●	5–8	93 (3.0)
Quebec, Canada	●	7	99 (0.5)	●	7–8	93 (2.2)	●	7–8	98 (0.9)

● All or almost all students   ⊙ Only the more able students   ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.



Exhibit 5.11 Intended and Taught\* TIMSS Geometry Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Geometry (14 topics)	Construct or draw triangles and rectangles of given dimensions			Congruent figures and their corresponding measures			Similar triangles and recall their properties		
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught
Algeria	●	7	99 (1.0)	●	8–9	66 (3.9)	–	–	22 (3.6)
Armenia	●	6	69 (3.8)	●	7	71 (3.7)	●	7	84 (2.1)
Australia	●	7–8	78 (3.1)	●	7–10	48 (3.3)	●	8–9	40 (4.0)
Bahrain	●	4–6	95 (1.7)	●	8	96 (1.5)	●	9	26 (1.9)
Bosnia and Herzegovina	●	6–7	99 (0.9)	●	6–7	100 (0.3)	●	9	83 (2.6)
Botswana	○	9	22 (3.6)	○	11	25 (4.0)	○	11	25 (3.7)
Bulgaria	●	7	98 (0.8)	●	7–8	98 (1.1)	○	9	7 (1.7)
Chinese Taipei	●	8	98 (1.2)	●	8	95 (1.8)	●	9	26 (4.1)
Colombia	●	8–9	88 (2.9)	●	8–9	73 (4.0)	●	8–9	60 (5.0)
Cyprus	○	9–10	89 (2.0)	○	9–10	15 (2.0)	○	9–10	3 (1.3)
Czech Republic	●	6–8,10	97 (1.3)	●	7–10	95 (1.5)	○	9–10	35 (3.7)
Egypt	●	4–6	98 (1.2)	●	7–9	99 (0.8)	●	9–11	98 (1.0)
El Salvador	●	6–9	67 (4.3)	●	6–9	57 (4.3)	○	9–12	42 (3.9)
England	●	6–8	95 (1.6)	●	7–10	68 (3.8)	⊙	8–10	47 (4.0)
Georgia	●	7	94 (2.6)	●	2,8	85 (3.6)	○	9	91 (2.8)
Ghana	●	4–10	84 (3.2)	●	7–9	70 (4.1)	●	5–9	72 (3.7)
Hong Kong SAR	⊙	8	79 (3.6)	●	7	93 (2.4)	●	7–9	88 (3.0)
Hungary	●	7	100 (0.0)	●	7	97 (1.3)	○	10	77 (3.3)
Indonesia	⊙	8	98 (1.2)	⊙	8	63 (4.4)	⊙	8	59 (4.3)
Iran, Islamic Rep. of	●	7	99 (0.7)	●	8	81 (3.3)	●	8	55 (3.8)
Israel	○	–	r 50 (3.4)	●	8	r 77 (3.1)	○	–	r 27 (3.7)
Italy	●	4–6	98 (0.9)	●	7–9	100 (0.3)	●	7–9	85 (2.5)
Japan	●	7–8	93 (2.1)	●	8	99 (0.6)	○	9	7 (1.7)
Jordan	●	4–7	97 (1.2)	●	7	95 (1.9)	●	7	88 (2.8)
Korea, Rep. of	●	7	95 (1.4)	●	8	100 (0.0)	●	8	100 (0.0)
Kuwait	●	6–7	r 89 (3.2)	●	8	r 87 (3.2)	○	9	r 44 (4.3)
Lebanon	●	6–7	98 (1.3)	●	7	99 (0.7)	●	9	50 (4.5)
Lithuania	⊙	8	97 (1.4)	○	9	96 (1.5)	○	9	47 (3.8)
Malaysia	●	8	99 (0.5)	○	9	94 (1.8)	○	9	89 (2.6)
Malta	●	7	91 (0.2)	○	10	16 (0.2)	○	10	14 (0.2)
Mongolia	⊙	6–8	--	●	7–8	--	⊙	9	--
Norway	●	8–10	90 (2.2)	○	8–10	19 (2.5)	○	8–10	18 (2.5)
Oman	●	4–6	95 (1.8)	●	8–9	93 (2.2)	●	8–9	86 (3.4)
Palestinian Nat'l Auth.	●	5–6	93 (2.3)	●	7	98 (1.0)	●	7,9	97 (1.6)
Qatar	●	5–6	87 (0.1)	●	8	77 (0.2)	○	9	57 (0.1)
Romania	●	6–7	99 (0.8)	●	6–7	98 (0.9)	●	6–7	99 (0.8)
Russian Federation	●	7–8	--	●	7–9	--	●	8–9	--
Saudi Arabia	●	5–8	85 (3.1)	●	8	98 (1.2)	○	9–10	55 (4.6)
Scotland	●	8	91 (1.8)	○	10	54 (3.7)	○	10	21 (3.3)
Serbia	●	6	99 (0.6)	●	6	99 (0.6)	●	6–7	99 (0.7)
Singapore	●	7–10	89 (1.4)	●	8–10	84 (2.1)	●	8–10	69 (2.4)
Slovenia	●	7	100 (0.2)	●	7	96 (1.0)	●	7	18 (2.1)
Sweden	●	6–9	95 (1.4)	●	6–9	58 (3.0)	●	6–9	53 (3.1)
Syrian Arab Republic	●	5–8	97 (1.8)	●	7	91 (2.5)	○	9	27 (3.6)
Thailand	●	4–6	88 (2.9)	●	7–9	74 (3.9)	●	7–9	67 (3.9)
Tunisia	●	7–9	99 (0.8)	○	–	98 (1.3)	○	13	60 (4.0)
Turkey	●	3,7–8	91 (2.2)	●	8	98 (1.0)	●	8	99 (0.8)
Ukraine	●	7–9	98 (1.1)	●	7–8	97 (1.2)	○	9	25 (3.7)
United States	●	6–8	69 (2.7)	●	6–8	80 (2.2)	●	6–8	77 (2.2)
‡ Morocco	●	7	93 (1.9)	●	7	r 77 (4.3)	○	9	r 10 (2.2)
International Avg.			90 (0.3)			80 (0.4)			55 (0.4)

**Benchmarking Participants**

Basque Country, Spain	●	7	79 (4.0)	●	7	78 (4.3)	●	8	56 (5.6)
British Columbia, Canada	●	7	50 (4.9)	○	9	30 (3.5)	○	9	26 (3.3)
Dubai, UAE	●	6	s 91 (3.0)	●	6	s 72 (3.7)	●	7	s 43 (4.4)
Massachusetts, US	●	3–10	71 (6.7)	●	2–10	88 (4.5)	●	7–10	85 (4.3)
Minnesota, US	●	5–12	56 (7.2)	●	4–12	75 (4.4)	●	4–12	65 (7.5)
Ontario, Canada	●	5–6	87 (3.6)	●	3,7	83 (4.0)	●	7–8	86 (3.8)
Quebec, Canada	●	7–8	97 (1.4)	●	7–8	92 (2.2)	●	8	77 (3.8)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.11 Intended and Taught\* TIMSS Geometry Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Relationships between two-dimensional and three-dimensional shapes			Pythagorean theorem to find length of a side			Measurement, drawing, and estimation of the size of angles, the lengths of lines, areas and volumes		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	–	–	33 (4.1)	●	8	14 (2.7)	●	7–8	79 (3.3)
Armenia	●	7	78 (2.8)	●	7	72 (3.2)	●	6	71 (3.2)
Australia	●	6–9	57 (3.8)	⊙	8–10	42 (2.4)	●	5–10	87 (2.4)
Bahrain	●	–	48 (2.9)	●	8	98 (0.0)	●	4–6	91 (1.2)
Bosnia and Herzegovina	●	8–9	84 (2.9)	●	7–8	99 (0.7)	●	5–7	96 (1.9)
Botswana	○	9	9 (2.5)	○	10	7 (2.3)	●	4–7	45 (4.5)
Bulgaria	●	5–6	51 (3.9)	○	9	1 (0.6)	●	5–6	91 (2.1)
Chinese Taipei	●	8	69 (3.7)	●	8	99 (0.7)	●	6	87 (2.7)
Colombia	●	8–9	37 (4.4)	●	8–9	82 (3.6)	●	8–9	83 (3.4)
Cyprus	○	11	10 (1.6)	●	7	97 (0.7)	●	6–8	82 (2.1)
Czech Republic	●	6–10, 12	48 (4.4)	●	8, 10	100 (0.3)	●	6–9	99 (0.2)
Egypt	●	3–11	54 (3.9)	●	7–8	93 (1.9)	●	6–9	89 (2.7)
El Salvador	●	6–9	25 (4.1)	●	7–8	59 (4.4)	●	6–9	57 (4.7)
England	○	9–10	69 (3.8)	⊙	9–10	62 (3.6)	●	6–10	98 (0.7)
Georgia	⊙	4–6, 8–9, 11	16 (3.5)	●	8	86 (2.7)	●	5–6, 8	86 (3.8)
Ghana	●	7–10	58 (3.9)	○	10–12	37 (3.8)	●	7–12	77 (3.6)
Hong Kong SAR	●	7	44 (4.8)	●	8	98 (1.3)	●	7	93 (2.3)
Hungary	●	6	65 (3.8)	●	8	98 (1.2)	●	5–8	99 (0.7)
Indonesia	⊙	8	49 (4.9)	●	8	98 (1.3)	●	8	87 (3.0)
Iran, Islamic Rep. of	●	5–8	23 (3.4)	●	8	100 (0.0)	●	3–8	89 (2.3)
Israel	○	–	r 15 (3.0)	●	9	r 27 (3.3)	○	–	r 49 (3.7)
Italy	●	5–13	96 (1.5)	●	7–9	100 (0.0)	●	4–8	98 (1.0)
Japan	●	7	89 (2.3)	○	9	4 (1.2)	●	2–6	95 (1.8)
Jordan	●	8	66 (3.9)	●	8	100 (0.1)	●	6–8	98 (0.9)
Korea, Rep. of	●	7	92 (1.9)	○	9	7 (1.8)	●	7	89 (2.2)
Kuwait	●	8	r 26 (4.1)	○	9	r 30 (4.5)	●	5, 7	r 67 (4.3)
Lebanon	●	7–9	35 (4.4)	●	8	97 (1.1)	●	5–9	87 (3.7)
Lithuania	○	10	45 (4.3)	●	8	99 (0.8)	●	8	86 (2.8)
Malaysia	●	8	84 (2.8)	●	8	100 (0.5)	●	8	92 (1.9)
Malta	○	10	28 (0.2)	⊙	9, 11	87 (0.1)	●	6–7	94 (0.1)
Mongolia	○	10	–	●	8	–	●	8	–
Norway	○	–	15 (2.4)	○	8–10	7 (2.1)	●	3–10	69 (3.5)
Oman	●	11	38 (4.6)	●	7	35 (3.9)	●	3–6	92 (2.2)
Palestinian Nat'l Auth.	●	4–7	64 (3.8)	●	7	100 (0.0)	●	1–7	91 (2.2)
Qatar	●	8–9	30 (0.1)	●	8	12 (0.1)	●	7–8	58 (0.2)
Romania	●	6–8	92 (1.9)	●	7–8	99 (0.6)	●	6–8	99 (0.4)
Russian Federation	●	5–9	–	●	8–11	–	●	7–9, 11	–
Saudi Arabia	○	12	15 (3.4)	○	9	11 (2.7)	●	4–6	37 (4.5)
Scotland	●	8	70 (3.7)	⊙	9	49 (3.6)	●	8	94 (1.7)
Serbia	●	7	94 (1.9)	●	7	99 (0.7)	●	5–6	98 (0.9)
Singapore	●	7–8	52 (2.7)	●	8	71 (2.9)	●	2–10	85 (1.8)
Slovenia	●	1–7	10 (1.9)	○	9	25 (2.6)	●	6–8	84 (2.3)
Sweden	●	6–9	17 (2.3)	○	–	10 (1.7)	●	6–9	78 (2.6)
Syrian Arab Republic	●	5–9	26 (3.9)	●	9	38 (3.9)	●	5–8	81 (3.5)
Thailand	●	4–8	64 (3.5)	●	8	95 (1.6)	●	4–9	77 (3.9)
Tunisia	●	7–9	61 (4.1)	○	9	6 (1.7)	●	7–9	89 (2.7)
Turkey	●	–	36 (4.4)	●	8	96 (2.0)	●	3–8	72 (3.8)
Ukraine	○	10–11	17 (2.7)	●	8–9	100 (0.0)	●	5–11	89 (2.5)
United States	●	6–8	70 (2.4)	●	6–8	84 (1.8)	●	6–8	84 (2.1)
‡ Morocco	○	9	r 33 (4.8)	○	9	95 (1.8)	●	7	r 80 (3.8)
International Avg.			48 (0.5)			65 (0.3)			83 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Benchmarking Participants

Basque Country, Spain	○	9–10	42 (4.7)	●	7	86 (3.2)	●	8	64 (5.2)
British Columbia, Canada	●	2	40 (3.9)	●	8	66 (4.3)	●	7	51 (4.5)
Dubai, UAE	●	5	s 36 (4.0)	●	8	s 89 (3.0)	●	5	s 76 (5.2)
Massachusetts, US	●	K–10	72 (6.2)	●	8–10	84 (5.4)	●	3–8	85 (5.1)
Minnesota, US	●	4–12	54 (5.7)	●	8–12	82 (4.4)	●	4–12	78 (6.8)
Ontario, Canada	●	1–4	76 (4.0)	●	8	64 (4.8)	●	4–8	87 (2.7)
Quebec, Canada	●	7–8	48 (3.8)	○	9	10 (2.5)	●	7–8	61 (4.4)

● All or almost all students   ⊙ Only the more able students   ○ Not included in the curriculum through eighth grade



Exhibit 5.11 Intended and Taught\* TIMSS Geometry Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Geometry (14 topics)	Measurement formulas for perimeters, circumferences, areas of circles, surface areas, and volumes			Measures of irregular or compound areas			Cartesian plane – ordered pairs, equations, intercepts, intersections, and gradient		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7–9	81 (3.5)	●	7	55 (4.4)	○	9	15 (3.1)
Armenia	●	7	82 (3.2)	●	7	80 (3.1)	●	8	78 (3.4)
Australia	●	7–8	81 (3.1)	●	6–12	69 (3.6)	●	7–12	52 (3.4)
Bahrain	●	8	87 (1.7)	●	6	64 (2.8)	●	8	45 (2.0)
Bosnia and Herzegovina	●	6–9	91 (2.4)	⊙	6–7	81 (2.6)	●	7–8	97 (1.2)
Botswana	●	8–10	28 (4.4)	●	4–7	19 (2.9)	●	8–9	9 (2.5)
Bulgaria	●	5–6	89 (2.0)	○	–	28 (3.4)	●	8	41 (3.4)
Chinese Taipei	●	8	84 (3.0)	●	8	48 (4.5)	●	7	66 (4.0)
Colombia	●	8–9	79 (3.7)	●	8–9	38 (4.1)	●	8–9	53 (4.7)
Cyprus	●	8,10–11	69 (2.5)	○	12	40 (2.5)	○	11	1 (0.5)
Czech Republic	●	3–10	88 (2.8)	●	5–7	56 (3.8)	●	7–11	29 (3.9)
Egypt	●	6–9	78 (3.0)	●	5–6	67 (3.7)	○	8–10	94 (2.1)
El Salvador	●	6–9	67 (4.0)	●	6–9	31 (4.2)	○	10	37 (4.3)
England	●	7–10	85 (2.4)	●	6–8	88 (2.5)	●	7–10	60 (3.8)
Georgia	⊙	4,8	48 (5.1)	⊙	4–6	57 (4.7)	●	5,7–11	60 (4.8)
Ghana	●	7–12	70 (3.9)	●	7–10	22 (3.1)	●	8–12	46 (4.1)
Hong Kong SAR	●	8	96 (1.8)	●	7	78 (4.1)	●	7	46 (4.6)
Hungary	●	7	98 (1.0)	●	–	86 (2.4)	●	7	94 (1.6)
Indonesia	●	8	94 (2.3)	⊙	8	50 (4.7)	⊙	8	93 (2.2)
Iran, Islamic Rep. of	●	5–8	91 (1.9)	●	8	48 (3.8)	●	7	76 (3.0)
Israel	●	5–7	r 37 (3.5)	●	5–6	r 24 (2.9)	●	7	r 36 (3.8)
Italy	●	8–10	99 (0.7)	●	7–9	79 (2.6)	●	8–13	69 (3.0)
Japan	●	4–7	96 (1.7)	●	5	56 (4.2)	●	7–8	97 (1.3)
Jordan	●	6–8	97 (1.6)	●	6–8	77 (3.5)	●	8	93 (1.9)
Korea, Rep. of	●	7	93 (1.7)	●	5	61 (3.8)	●	8	98 (1.0)
Kuwait	●	7–8	r 78 (4.3)	●	4	r 33 (3.7)	○	9	r 23 (3.9)
Lebanon	●	5–7	85 (4.1)	⊙	7	47 (4.7)	●	7–9	43 (4.9)
Lithuania	○	10	97 (1.2)	⊙	8	82 (3.3)	●	8	73 (3.3)
Malaysia	●	8	98 (1.2)	○	8	70 (3.8)	●	8,10	72 (3.8)
Malta	⊙	9–10	88 (0.1)	○	10	64 (0.3)	⊙	9–10	77 (0.2)
Mongolia	●	6–8	–	○	10	–	●	6–8	–
Norway	○	8–10	63 (3.5)	●	5–10	27 (3.3)	○	5–10	24 (2.8)
Oman	●	3–9	93 (1.6)	●	2–4	74 (3.6)	●	9	52 (4.6)
Palestinian Nat'l Auth.	●	5–6	96 (2.0)	●	4–6	61 (3.8)	○	9–10	14 (3.3)
Qatar	●	7–8	69 (0.2)	●	6–7	37 (0.2)	●	7–8	44 (0.2)
Romania	●	6–8	99 (1.3)	●	7–8	84 (2.8)	●	8–10	84 (3.1)
Russian Federation	○	9,11	–	○	9	–	●	7–9	–
Saudi Arabia	●	4–6	23 (3.6)	–	–	21 (4.3)	○	9–10	48 (3.9)
Scotland	○	10	70 (3.2)	●	8	77 (3.0)	○	10	26 (3.0)
Serbia	●	5–6	98 (1.1)	●	7	85 (2.8)	●	7	98 (1.0)
Singapore	●	7–10	97 (0.8)	●	3–6	44 (2.7)	●	7–10	78 (2.2)
Slovenia	●	6–7	56 (3.2)	●	6–7	83 (2.1)	●	8	18 (2.2)
Sweden	●	6–9	74 (2.9)	●	6–9	68 (2.9)	○	–	19 (2.5)
Syrian Arab Republic	●	5–8	88 (2.8)	●	4–7	31 (4.1)	●	6–7,9	10 (2.6)
Thailand	●	4–9	55 (4.1)	○	9	18 (3.5)	●	7	14 (2.8)
Tunisia	●	7–9	92 (2.3)	○	12	40 (4.1)	●	10	12 (2.5)
Turkey	●	4–8	57 (4.1)	○	–	31 (4.1)	●	7–8	62 (4.5)
Ukraine	●	5–6,9–11	88 (2.4)	⊙	9	40 (4.2)	●	8	99 (0.6)
United States	●	6–8	93 (1.4)	●	6–8	59 (2.7)	●	6–8	76 (2.3)
‡ Morocco	●	6	79 (3.0)	●	5	53 (4.1)	○	9	r 31 (5.4)
International Avg.			80 (0.4)			55 (0.5)			54 (0.5)
<b>Benchmarking Participants</b>									
Basque Country, Spain	●	8	70 (4.5)	●	8	46 (4.6)	○	8	29 (4.2)
British Columbia, Canada	●	5–7	56 (4.6)	●	5	38 (4.1)	○	9	33 (4.3)
Dubai, UAE	●	6	s 67 (4.6)	●	8	s 41 (4.7)	●	8	s 29 (4.5)
Massachusetts, US	●	5–12	92 (3.2)	●	4–10	64 (6.2)	●	5–12	84 (3.0)
Minnesota, US	●	3–12	85 (5.2)	●	4–12	47 (7.9)	●	6–12	83 (4.3)
Ontario, Canada	●	5–8	94 (2.2)	●	1–5	68 (4.0)	○	9	50 (4.9)
Quebec, Canada	●	7–8	85 (3.5)	●	7–8	59 (4.9)	●	7–8	54 (4.1)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 5.11 Intended and Taught\* TIMSS Geometry Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Line and rotational symmetry for two-dimensional shapes			Translation, reflection, and rotation		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	15 (3.2)	○	9	15 (3.0)
Armenia	●	7	73 (3.6)	●	8	77 (2.8)
Australia	⊙	5–8	56 (3.0)	●	4–8	56 (2.5)
Bahrain	●	7	19 (2.2)	●	7	26 (2.6)
Bosnia and Herzegovina	●	6–7	97 (1.3)	●	6–7	91 (1.8)
Botswana	●	7–12	26 (3.4)	●	7–12	18 (3.0)
Bulgaria	●	8	57 (3.6)	●	8	75 (2.9)
Chinese Taipei	●	8,10	66 (3.9)	●	8	27 (3.6)
Colombia	○	10–11	48 (5.2)	●	6–7	52 (5.0)
Cyprus	○	–	9 (1.6)	○	–	1 (0.7)
Czech Republic	●	6,11	81 (3.0)	⊙	7,11	35 (3.9)
Egypt	○	7–9	61 (3.5)	●	7–9	98 (1.0)
El Salvador	●	6	24 (3.9)	●	6	21 (3.7)
England	●	7–10	97 (1.5)	●	7–10	92 (2.2)
Georgia	●	6–8	81 (4.0)	●	6–8	42 (4.7)
Ghana	●	8–12	37 (3.9)	○	8–12	27 (3.7)
Hong Kong SAR	●	7–9	84 (3.4)	●	7–9	87 (3.1)
Hungary	●	6	90 (2.3)	●	6–9	92 (2.2)
Indonesia	●	8	72 (3.9)	⊙	8	12 (2.9)
Iran, Islamic Rep. of	●	8	76 (3.4)	●	8	84 (2.9)
Israel	●	6	16 (2.8)	●	6	20 (2.9)
Italy	●	5–6,9–13	53 (3.1)	●	5–8,9–13	48 (3.7)
Japan	●	7	99 (0.8)	○	–	79 (3.2)
Jordan	○	–	41 (3.7)	●	7	32 (3.8)
Korea, Rep. of	●	5	62 (3.2)	●	5	45 (4.2)
Kuwait	●	7,10	22 (4.5)	○	9–10	77 (3.6)
Lebanon	⊙	7–9	65 (4.2)	⊙	8–9	43 (4.6)
Lithuania	●	8	99 (0.9)	⊙	8	14 (2.6)
Malaysia	●	8	88 (2.8)	●	8	97 (1.3)
Malta	●	6–7	76 (0.2)	●	6–7	55 (0.2)
Mongolia	○	7–8	–	○	9	–
Norway	●	5–7	15 (2.4)	●	5–7	17 (2.4)
Oman	●	4,9	27 (4.3)	●	4,8–9	79 (3.5)
Palestinian Nat'l Auth.	●	4–5,9	13 (2.9)	○	9	3 (1.5)
Qatar	⊙	7–9	33 (0.2)	●	7–9	80 (0.1)
Romania	○	9–10	69 (3.5)	○	–	65 (3.5)
Russian Federation	●	8–9	–	●	8–9	–
Saudi Arabia	●	8	22 (3.6)	●	5–8	69 (4.2)
Scotland	●	8	93 (1.7)	⊙	9	72 (3.5)
Serbia	○	–	95 (1.8)	○	–	67 (4.0)
Singapore	●	8	34 (2.7)	●	8	9 (1.5)
Slovenia	●	2–3	81 (2.1)	●	7	91 (1.8)
Sweden	○	–	4 (1.0)	○	–	3 (0.8)
Syrian Arab Republic	●	7	14 (2.8)	●	7,9	36 (4.0)
Thailand	●	8	60 (4.0)	●	8	94 (1.9)
Tunisia	●	7–9	95 (1.8)	○	11	22 (3.7)
Turkey	●	7	60 (3.7)	●	7	63 (4.1)
Ukraine	●	8	89 (2.7)	●	8	87 (3.0)
United States	●	6–8	72 (2.4)	●	6–8	74 (2.3)
‡ Morocco	○	11	19 (4.8)	○	11	58 (4.0)
International Avg.			56 (0.4)			53 (0.4)
<b>Benchmarking Participants</b>						
Basque Country, Spain	○	9–10	19 (3.3)	○	9–10	16 (3.3)
British Columbia, Canada	●	6	26 (3.9)	●	5	24 (3.9)
Dubai, UAE	●	8	29 (3.9)	●	7	35 (2.7)
Massachusetts, US	●	5–12	68 (6.9)	●	4–12	74 (5.3)
Minnesota, US	●	2–12	66 (6.9)	●	3–12	65 (7.3)
Ontario, Canada	●	1,2,4,6	67 (4.8)	●	3–8	75 (4.5)
Quebec, Canada	●	7–8	42 (4.5)	●	7–8	89 (3.0)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007





Exhibit 5.12 provides the intended and taught results for the seven data and chance topics at the eighth grade. The two data topics most commonly included in the curriculum—intended curriculum for most countries and implemented curriculum for 72 to 74 percent of the students, on average across countries—were reading data from tables/graphs and displaying data using tables/graphs. The data topic encompassing characteristics of data sets, including mean, median, range, and shape of distribution was in the curricula for the majority of countries, and teachers reported, on average internationally, covering this topic for half the students, whereas the topic of interpreting data sets was in somewhat fewer curricula and taught to 41 percent of the students. The data topic about data displays that could lead to misinterpretation was in the curricula of less than half the countries, and taught to only 27 percent of the students, on average internationally. The two topics about chance also were in less than half the curricula, including using data from experiments to predict future outcomes taught to 29 percent of the students, on average, and using the chances of a particular outcome to solve problems, taught to 34 percent of the students, on average.



Exhibit 5.12 Intended and Taught\* TIMSS Data and Chance Topics

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Data and Chance (7 topics)	Reading data from tables, pictographs, bar graphs, pie charts, and line graphs			Organizing and displaying data using tables, pictographs, bar graphs, pie charts, and line graphs			Characteristics of data sets including mean, median, range, and shape of distribution		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	●	7–9	81 (3.2)	●	7–9	87 (2.7)	●	8–9	28 (3.9)
Armenia	○	–	58 (4.3)	○	–	56 (4.4)	○	–	58 (3.6)
Australia	●	4–8	88 (2.1)	●	3–8	86 (2.0)	○	7–10	67 (3.1)
Bahrain	●	7	87 (2.1)	●	7	87 (2.3)	●	7,10	40 (2.7)
Bosnia and Herzegovina	●	8–9	61 (3.4)	●	8–9	57 (3.5)	●	8–9	54 (3.7)
Botswana	●	4–12	21 (3.8)	●	6–12	20 (3.4)	○	9	13 (3.0)
Bulgaria	○	9	68 (3.6)	○	9	58 (4.0)	○	11	19 (3.4)
Chinese Taipei	●	4	12 (2.9)	●	6	11 (2.8)	●	9	8 (2.3)
Colombia	●	6–7	77 (3.8)	●	6–7	76 (4.0)	●	8–9	65 (4.4)
Cyprus	⊙	12	5 (1.2)	⊙	12	2 (0.8)	⊙	12	1 (0.7)
Czech Republic	●	4–8	38 (3.8)	●	4–8	30 (3.6)	●	8,12	19 (3.2)
Egypt	●	4–10	92 (2.1)	●	4–10	93 (1.9)	●	7–9	95 (1.8)
El Salvador	●	3–10	97 (1.3)	●	4–10	98 (1.3)	●	6–10	88 (2.6)
England	●	5–8	100 (0.3)	●	5–8	99 (0.6)	●	6–10	96 (1.6)
Georgia	●	6–8	68 (5.3)	●	6–8	68 (5.4)	⊙	6–7	54 (5.3)
Ghana	●	4–9	80 (3.6)	●	6–12	83 (3.3)	●	6–10	80 (3.4)
Hong Kong SAR	●	7	93 (2.2)	●	7	91 (2.2)	●	7–9	36 (4.1)
Hungary	●	6	92 (2.7)	●	6	88 (3.0)	●	7–8	52 (3.9)
Indonesia	○	9	23 (3.6)	○	9	23 (3.8)	○	9	22 (3.9)
Iran, Islamic Rep. of	●	8	83 (2.2)	●	8	78 (3.7)	●	8	46 (4.2)
Israel	●	3,7	r 78 (3.0)	●	3,7	r 75 (3.1)	●	7	r 62 (3.8)
Italy	●	3–10	85 (2.3)	●	4–10	82 (2.2)	●	8–10	47 (3.5)
Japan	●	3–5	52 (3.9)	●	3–5	48 (4.0)	○	10–12	13 (2.6)
Jordan	●	4–7	83 (3.3)	●	4–7	81 (3.3)	●	5–7	59 (4.2)
Korea, Rep. of	●	6	90 (2.1)	●	6	88 (2.3)	○	12	52 (3.4)
Kuwait	●	7,10–11	r 87 (3.4)	●	7,10–11	r 85 (3.6)	○	10–11	r 51 (5.0)
Lebanon	●	4–9	64 (4.5)	●	5–9	59 (4.7)	●	8–9	31 (3.7)
Lithuania	●	8	97 (1.2)	○	10	96 (0.9)	○	10	86 (2.6)
Malaysia	●	8	91 (2.4)	●	8	89 (2.7)	○	9–10	31 (3.8)
Malta	●	6–7	91 (0.2)	●	6–7	85 (0.2)	⊙	9–10	84 (0.2)
Mongolia	⊙	6–8	–	⊙	6–8	–	○	9	–
Norway	●	5–7	85 (2.8)	●	5–7	85 (2.7)	●	5–10	76 (3.7)
Oman	●	2	93 (2.2)	●	3–9	91 (2.5)	●	9–12	83 (3.3)
Palestinian Nat'l Auth.	●	2–12	88 (2.9)	●	3–12	88 (2.4)	●	5–7	84 (3.4)
Qatar	●	6–8	77 (0.2)	●	6–8	75 (0.1)	●	6–8	36 (0.2)
Romania	●	5–7,9	85 (2.9)	●	6–7,9	79 (3.5)	○	10–11	34 (3.6)
Russian Federation	●	5–9	–	●	5–9	–	●	5–11	–
Saudi Arabia	●	5–6	39 (4.5)	○	10	40 (4.5)	○	10	21 (3.6)
Scotland	●	7	99 (0.5)	●	8	99 (0.4)	⊙	9	76 (3.1)
Serbia	●	6–8	86 (2.9)	○	–	84 (2.9)	○	–	63 (4.1)
Singapore	●	1–7	94 (1.3)	●	1–7	93 (1.4)	●	7–10	89 (1.9)
Slovenia	●	1–7	86 (1.6)	●	4–7	80 (2.3)	○	9	5 (1.1)
Sweden	●	6–9	89 (2.0)	●	6–9	84 (2.1)	●	6–9	66 (3.1)
Syrian Arab Republic	●	7,9	51 (4.0)	●	7,9	53 (4.1)	○	10–11	64 (4.0)
Thailand	●	4–6	88 (2.8)	●	8	87 (3.1)	○	9	14 (3.1)
Tunisia	●	7–9	52 (4.0)	●	7–9	48 (4.1)	○	10	24 (3.6)
Turkey	●	3–7	71 (4.2)	●	3–7	69 (4.1)	●	7	64 (3.8)
Ukraine	●	6–9	83 (3.0)	●	6–9	77 (3.4)	○	9	16 (3.0)
United States	●	6–8	97 (0.9)	●	6–8	97 (1.0)	●	6–8	96 (1.0)
‡ Morocco	○	9	r 71 (3.9)	○	9	r 68 (5.2)	○	9	r 38 (6.0)
International Avg.			74 (0.4)			72 (0.4)			50 (0.5)

## Benchmarking Participants

Basque Country, Spain	●	8	38 (4.6)	●	8	33 (4.4)	○	9–10	17 (3.6)
British Columbia, Canada	●	3	55 (3.8)	●	3	53 (4.2)	●	7	44 (4.0)
Dubai, UAE	●	4	s 79 (3.0)	●	4	s 77 (5.4)	●	7	s 61 (3.9)
Massachusetts, US	●	2–12	98 (1.5)	●	2–12	97 (2.0)	●	5–10	98 (1.2)
Minnesota, US	●	1–12	98 (2.0)	●	2–12	93 (4.1)	●	5–12	93 (4.3)
Ontario, Canada	●	1–8	96 (1.6)	●	1–8	95 (1.9)	●	5–8	93 (2.2)
Quebec, Canada	●	7–8	82 (3.7)	●	7–8	80 (3.9)	●	7–8	37 (4.7)

● All or almost all students   ⊙ Only the more able students   ○ Not included in the curriculum through eighth grade

Background data on intended curriculum provided by National Research Coordinators, and on implemented curriculum by teachers at the time of testing.

\* Includes the TIMSS topics mostly taught during or before the year of the assessment.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



TIMSS & PIRLS  
International Study Center  
Lynch School of Education, Boston College

Exhibit 5.12 Intended and Taught\* TIMSS Data and Chance Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Data and Chance (7 topics)	Interpreting data sets			Data displays that could lead to misinterpretation			Using data from experiments to predict chances of future outcomes		
	Country	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught
Algeria	○	9	44 (4.4)	○	9	34 (4.4)	○	9	36 (4.3)
Armenia	○	–	47 (3.7)	○	–	45 (4.5)	○	–	48 (3.4)
Australia	●	6–10	49 (4.2)	⊙	7–10	40 (3.6)	●	7–12	40 (3.9)
Bahrain	○	–	58 (3.2)	○	–	35 (3.0)	○	–	37 (2.7)
Bosnia and Herzegovina	○	12	48 (4.2)	○	–	29 (3.8)	○	–	22 (3.4)
Botswana	○	11–12	13 (3.0)	○	11–12	9 (2.2)	○	10	8 (2.3)
Bulgaria	○	11	8 (2.4)	○	–	4 (1.5)	○	–	6 (2.4)
Chinese Taipei	○	11	6 (2.0)	○	–	3 (1.4)	○	11	2 (1.1)
Colombia	●	8–9	54 (5.4)	●	8–9	18 (3.8)	●	8–9	25 (4.2)
Cyprus	⊙	12	8 (1.5)	⊙	12	1 (0.7)	⊙	12	1 (0.7)
Czech Republic	⊙	8,12	11 (2.2)	○	12	3 (1.3)	⊙	8,12	6 (1.8)
Egypt	●	4–10	61 (4.0)	○	–	32 (3.9)	●	7–10	38 (4.3)
El Salvador	●	6,10	72 (4.0)	○	–	45 (4.9)	●	6,11	39 (4.2)
England	●	6–10	72 (3.7)	⊙	9–12	54 (3.7)	⊙	8–12	73 (3.2)
Georgia	○	9	46 (4.9)	⊙	8	18 (4.9)	⊙	8	21 (3.7)
Ghana	●	8–12	53 (3.8)	○	10–12	29 (3.5)	○	10–12	51 (4.3)
Hong Kong SAR	●	7–11	48 (4.8)	○	10–11	57 (4.5)	○	10–11	14 (3.4)
Hungary	●	8	59 (4.4)	○	–	29 (3.6)	○	–	39 (3.5)
Indonesia	⊙	9	16 (3.5)	⊙	9	13 (3.4)	⊙	9	13 (3.3)
Iran, Islamic Rep. of	●	8	35 (3.7)	○	10	21 (3.4)	○	11	13 (2.5)
Israel	○	–	r 45 (3.8)	○	0	r 27 (3.9)	○	–	r 35 (4.0)
Italy	●	8–13	47 (3.5)	●	8–10	20 (3.1)	○	9–10	33 (3.3)
Japan	○	10–12	17 (2.7)	●	4	12 (2.2)	●	8	51 (4.0)
Jordan	○	–	50 (4.5)	○	–	31 (3.6)	●	6–7	41 (3.9)
Korea, Rep. of	○	–	42 (3.7)	○	–	35 (2.9)	○	–	68 (3.5)
Kuwait	○	10–11	r 52 (4.3)	○	11	r 30 (4.1)	○	11	r 32 (4.5)
Lebanon	⊙	9–10	32 (3.6)	○	–	39 (4.6)	○	–	51 (4.6)
Lithuania	⊙	12	59 (3.9)	○	10	29 (3.3)	○	10	14 (2.7)
Malaysia	○	9–10	43 (3.9)	○	9–10	34 (4.4)	○	9–10	32 (3.7)
Malta	⊙	9–10	30 (0.2)	○	10	18 (0.2)	⊙	9	35 (0.2)
Mongolia	○	10	–	○	10	–	○	10	–
Norway	●	5–7	43 (3.7)	○	–	30 (3.8)	○	–	9 (2.1)
Oman	●	9–12	60 (4.0)	○	–	23 (3.7)	○	10–12	33 (4.3)
Palestinian Nat'l Auth.	●	6–7,9–11	42 (4.4)	●	6–7	23 (2.8)	○	10–12	32 (3.5)
Qatar	○	–	37 (0.2)	○	–	22 (0.1)	○	11	19 (0.1)
Romania	●	8–9	32 (3.8)	○	11	33 (4.0)	○	10–11	42 (4.0)
Russian Federation	●	5–11	–	○	–	–	●	5–11	–
Saudi Arabia	○	8–10	20 (3.6)	○	10	14 (3.3)	○	11	15 (3.3)
Scotland	●	8	49 (3.4)	⊙	9	33 (3.1)	⊙	9	29 (3.3)
Serbia	●	6–8	54 (4.0)	○	–	34 (4.2)	○	–	26 (4.1)
Singapore	●	7–10	52 (2.4)	○	–	30 (2.2)	●	8–10	36 (2.5)
Slovenia	○	–	15 (2.2)	○	–	8 (1.7)	○	9	3 (0.9)
Sweden	●	6–9	41 (3.1)	●	6–9	34 (2.9)	●	6–9	20 (2.6)
Syrian Arab Republic	○	10–11	37 (3.7)	○	11–12	22 (3.5)	○	12	26 (3.2)
Thailand	○	9	32 (3.7)	○	10–12	13 (3.0)	○	10–12	13 (2.8)
Tunisia	○	–	33 (3.9)	○	–	18 (3.0)	○	–	14 (2.5)
Turkey	○	–	55 (4.0)	○	–	31 (3.9)	○	–	45 (4.7)
Ukraine	○	11	12 (3.0)	○	11	8 (2.7)	○	11	7 (2.4)
United States	●	6–8	86 (1.7)	●	6–8	73 (2.6)	●	6–8	68 (2.5)
‡ Morocco	○	9	r 44 (4.2)	○	10	r 34 (4.1)	○	12	r 46 (6.4)
International Avg.			41 (0.5)			27 (0.5)			29 (0.5)

**Benchmarking Participants**

Basque Country, Spain	○	9–10	14 (3.5)	○	9–10	6 (2.0)	○	9–10	7 (2.5)
British Columbia, Canada	●	7	40 (4.2)	●	8	24 (3.3)	●	7	31 (3.5)
Dubai, UAE	●	8	s 39 (3.8)	●	8,10	s 22 (3.9)	●	8,11	s 20 (3.6)
Massachusetts, US	●	3–12	93 (2.6)	○	10	84 (4.6)	●	2–12	78 (5.4)
Minnesota, US	●	4–12	80 (5.1)	●	5–12	59 (9.4)	○	3–12	62 (5.2)
Ontario, Canada	●	3–8	92 (2.2)	●	7	73 (4.0)	●	3–8	66 (4.6)
Quebec, Canada	●	7–8	34 (4.6)	●	7–8	27 (4.0)	●	7–8	44 (4.5)

● All or almost all students    ⊙ Only the more able students    ○ Not included in the curriculum through eighth grade

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 5.12 Intended and Taught\* TIMSS Data and Chance Topics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup>  
Grade

Country	Using the chances of a particular outcome to solve problems		
	Student population intended to be taught topic through 8th grade	Grade(s) topic is intended to be taught	Percent of students taught the topic
Algeria	○	9	33 (4.0)
Armenia	○	–	46 (3.5)
Australia	◐	7–10	37 (3.9)
Bahrain	○	–	37 (3.1)
Bosnia and Herzegovina	○	–	26 (3.7)
Botswana	○	10	11 (2.7)
Bulgaria	○	–	8 (2.5)
Chinese Taipei	○	11	1 (1.1)
Colombia	●	8–9	23 (3.8)
Cyprus	◐	12	1 (0.7)
Czech Republic	◐	8,12	7 (2.1)
Egypt	●	7–10	67 (3.7)
El Salvador	○	11	38 (4.3)
England	●	7–12	73 (3.2)
Georgia	◐	8	21 (3.7)
Ghana	○	10–12	48 (4.3)
Hong Kong SAR	○	10–11	9 (2.8)
Hungary	○	–	40 (3.8)
Indonesia	◐	9	19 (3.5)
Iran, Islamic Rep. of	○	11	12 (2.7)
Israel	○	0	r 34 (4.0)
Italy	○	9–10	35 (3.4)
Japan	●	8	58 (3.9)
Jordan	●	6–7	46 (4.1)
Korea, Rep. of	○	–	82 (2.5)
Kuwait	○	12	r 46 (5.1)
Lebanon	○	–	64 (4.4)
Lithuania	○	10	15 (2.9)
Malaysia	○	9–10	33 (4.0)
Malta	◐	9	43 (0.3)
Mongolia	○	10	–
Norway	○	8–10	7 (2.0)
Oman	○	10–12	67 (4.0)
Palestinian Nat'l Auth.	○	10–12	46 (4.0)
Qatar	○	11	31 (0.1)
Romania	○	10–11	64 (3.9)
Russian Federation	○	10–11	–
Saudi Arabia	○	8–10	24 (3.8)
Scotland	◐	9	31 (3.6)
Serbia	◐	7–8	24 (3.9)
Singapore	●	8–12	38 (2.8)
Slovenia	○	9	3 (0.9)
Sweden	○	–	30 (3.4)
Syrian Arab Republic	○	12	38 (4.1)
Thailand	○	10–12	19 (3.4)
Tunisia	○	12	15 (2.8)
Turkey	○	8	49 (4.5)
Ukraine	○	11	4 (1.5)
United States	●	6–8	64 (2.3)
‡ Morocco	○	12	60 (4.5)
International Avg.			34 (0.5)
<b>Benchmarking Participants</b>			
Basque Country, Spain	○	9–10	7 (2.6)
British Columbia, Canada	●	7	26 (3.5)
Dubai, UAE	●	8,11	s 21 (3.8)
Massachusetts, US	●	4–10	83 (4.2)
Minnesota, US	○	5–12	59 (6.1)
Ontario, Canada	●	5–8	64 (4.6)
Quebec, Canada	●	7–8	44 (5.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● All or almost all students    ◐ Only the more able students    ○ Not included in the curriculum through eighth grade







# Chapter 6



## *Teachers of Mathematics*

To help place students' mathematics achievement in the context of their school and classroom situations, the mathematics teachers of the students tested were asked to complete questionnaires about their experience and education. This chapter presents teachers' reports about their background characteristics, education and training in teaching mathematics, and about how well prepared they feel to teach mathematics. It is important to note that the data shown are the percentages of students whose teachers reported on various characteristics. That is, the student is the unit of analysis so that TIMSS can describe the classroom contexts of the students. The exhibits have special notations when relatively large percentages of students did not have teacher questionnaire information. For a country where teacher responses were available for 70 to 84 percent of the students, an "r" is included next to its data.<sup>1</sup> Where teacher responses were available for 50 to 69 percent of students, an "s" is included. Where teacher responses were available for less than 50 percent, an "x" replaces the data.

### **What Are the Background Characteristics of Mathematics Teachers?**

This section presents information about the background characteristics of the teachers of mathematics, including gender, age, and years teaching experience. As shown in Exhibit 6.1, in many countries, most fourth-grade students were taught mathematics by females (international average of 79%). This was less so at the eighth grade (international average of 57%), although the majority of students had female teachers in more than half of the countries.

<sup>1</sup> Although countries worked hard to maximize participation by teachers, sometimes this was affected by external factors. For example, a teacher strike led to somewhat reduced teacher participation in Israel.

Exhibit 6.1 **Mathematics Teachers' Gender, Age, and Number of Years Teaching with Trends**

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

Country	Percentage of Students by Teacher Characteristics						Trends in Average Number of Years Teaching	
	Gender		Age				2007	Difference from 2003
	Female	Male	29 Years or Under	30–39 Years	40–49 Years	50 Years or Older		
Algeria	58 (4.5)	42 (4.5)	6 (1.9)	45 (4.6)	44 (4.4)	5 (1.8)	17 (0.6)	◊ ◊
Armenia	85 (3.3)	15 (3.3)	15 (3.0)	20 (3.2)	26 (3.2)	39 (4.4)	22 (0.8)	2 (1.2)
Australia	80 (3.4)	20 (3.4)	21 (3.9)	18 (3.4)	29 (4.1)	32 (3.4)	17 (1.0)	0 (1.3)
Austria	89 (2.0)	11 (2.0)	8 (2.1)	21 (2.7)	36 (2.8)	34 (2.8)	22 (0.7)	◊ ◊
Chinese Taipei	75 (3.7)	25 (3.7)	21 (3.6)	46 (3.9)	25 (3.2)	8 (2.3)	12 (0.7)	1 (1.0)
Colombia	76 (4.3)	24 (4.3)	13 (3.6)	28 (4.9)	30 (4.0)	29 (4.5)	19 (1.1)	◊ ◊
Czech Republic	91 (2.5)	9 (2.5)	11 (2.5)	24 (3.1)	40 (3.4)	25 (3.2)	17 (1.0)	◊ ◊
Denmark	49 (4.0)	51 (4.0)	9 (1.9)	30 (4.2)	24 (3.9)	37 (4.3)	16 (1.1)	◊ ◊
El Salvador	70 (4.2)	30 (4.2)	14 (2.7)	38 (3.9)	40 (4.0)	8 (2.6)	14 (0.7)	◊ ◊
England	69 (3.5)	31 (3.5)	31 (3.8)	29 (3.4)	23 (3.4)	16 (3.0)	r 11 (0.8)	–2 (1.2)
Georgia	99 (0.8)	1 (0.8)	4 (1.5)	17 (2.6)	29 (3.9)	50 (3.8)	25 (0.9)	◊ ◊
Germany	85 (2.1)	15 (2.1)	9 (1.8)	20 (2.7)	16 (2.5)	56 (3.1)	22 (0.8)	◊ ◊
Hong Kong SAR	59 (4.1)	41 (4.1)	38 (3.8)	37 (4.1)	11 (2.9)	13 (2.7)	12 (0.8)	–1 (1.3)
Hungary	95 (1.7)	5 (1.7)	5 (1.9)	20 (2.7)	45 (3.3)	30 (3.5)	23 (0.7)	3 (1.1) ◀
Iran, Islamic Rep. of	53 (2.7)	47 (2.7)	14 (2.4)	40 (4.1)	40 (3.9)	7 (1.6)	16 (0.6)	0 (0.9)
Italy	97 (0.9)	3 (0.9)	4 (1.4)	20 (2.3)	37 (3.0)	39 (3.1)	21 (0.6)	0 (0.9)
Japan	65 (3.1)	35 (3.1)	13 (2.5)	20 (3.1)	39 (3.5)	28 (3.5)	19 (0.8)	0 (1.1)
Kazakhstan	94 (1.7)	6 (1.7)	11 (3.0)	34 (3.7)	34 (5.2)	22 (4.6)	18 (0.9)	◊ ◊
Kuwait	r 88 (2.7)	12 (2.7)	r 37 (4.3)	56 (4.5)	7 (2.1)	0 (0.0)	r 8 (0.5)	◊ ◊
Latvia	100 (0.3)	0 (0.0)	5 (1.6)	27 (3.1)	39 (3.2)	29 (3.1)	22 (0.7)	2 (1.2) ▶
Lithuania	98 (0.8)	2 (0.8)	1 (0.6)	34 (3.0)	39 (3.5)	26 (3.3)	21 (0.6)	2 (0.9) ▶
Morocco	50 (4.3)	50 (4.3)	21 (3.0)	29 (3.7)	35 (3.6)	15 (2.9)	s 16 (0.6)	1 (1.0)
Netherlands	58 (4.1)	42 (4.1)	24 (3.5)	19 (3.1)	15 (3.0)	42 (3.9)	18 (1.0)	2 (1.5)
New Zealand	75 (2.4)	25 (2.4)	27 (2.6)	29 (2.1)	23 (2.0)	21 (2.2)	11 (0.6)	0 (0.8)
Norway	82 (2.4)	18 (2.4)	10 (2.0)	28 (2.8)	20 (2.6)	42 (2.9)	17 (0.8)	1 (1.3)
Qatar	92 (0.1)	8 (0.1)	39 (0.2)	42 (0.1)	18 (0.1)	1 (0.0)	9 (0.0)	◊ ◊
Russian Federation	99 (0.9)	1 (0.9)	7 (2.3)	34 (3.3)	37 (3.6)	22 (2.4)	21 (0.5)	1 (0.9)
Scotland	92 (1.8)	8 (1.8)	23 (3.6)	21 (3.1)	23 (2.8)	33 (3.4)	r 15 (0.9)	–1 (1.3)
Singapore	67 (2.6)	33 (2.6)	37 (2.8)	36 (3.1)	18 (2.2)	8 (1.7)	10 (0.6)	–1 (1.1)
Slovak Republic	94 (1.7)	6 (1.7)	12 (2.4)	32 (3.5)	28 (3.3)	28 (2.7)	20 (0.7)	◊ ◊
Slovenia	98 (0.7)	2 (0.7)	14 (1.9)	21 (2.4)	48 (3.0)	17 (2.5)	19 (0.6)	1 (1.0)
Sweden	82 (2.9)	18 (2.9)	7 (1.8)	26 (3.1)	26 (2.5)	41 (3.3)	18 (0.9)	◊ ◊
Tunisia	66 (3.4)	34 (3.4)	8 (2.0)	47 (4.2)	35 (3.4)	10 (1.8)	r 17 (0.5)	–1 (0.9)
Ukraine	100 (0.0)	0 (0.0)	8 (1.8)	32 (3.7)	38 (3.9)	22 (2.8)	22 (0.6)	◊ ◊
United States	88 (1.7)	12 (1.7)	18 (2.0)	28 (2.3)	22 (2.1)	31 (2.1)	14 (0.4)	0 (0.7)
Yemen	26 (3.9)	74 (3.9)	29 (4.0)	61 (4.7)	8 (2.3)	2 (1.6)	13 (0.6)	◊ ◊
International Avg.	79 (0.5)	21 (0.5)	16 (0.4)	31 (0.6)	29 (0.5)	24 (0.5)	17 (0.1)	
<b>Benchmarking Participants</b>								
Alberta, Canada	80 (3.1)	20 (3.1)	16 (3.1)	28 (4.0)	29 (4.1)	27 (3.3)	14 (0.8)	◊ ◊
British Columbia, Canada	82 (2.9)	18 (2.9)	r 10 (2.7)	32 (4.0)	23 (3.1)	35 (3.8)	r 15 (0.8)	◊ ◊
Dubai, UAE	r 80 (5.2)	20 (5.2)	r 21 (3.8)	44 (5.1)	24 (4.3)	11 (3.9)	r 13 (0.9)	◊ ◊
Massachusetts, US	93 (2.9)	7 (2.9)	23 (4.2)	28 (5.5)	23 (5.6)	26 (5.7)	13 (0.9)	◊ ◊
Minnesota, US	75 (5.6)	25 (5.6)	8 (3.4)	29 (5.3)	22 (5.4)	41 (7.2)	18 (1.2)	◊ ◊
Ontario, Canada	84 (3.2)	16 (3.2)	12 (2.7)	29 (4.5)	38 (4.9)	21 (3.9)	13 (0.8)	0 (1.2)
Quebec, Canada	87 (3.0)	13 (3.0)	12 (2.5)	30 (3.6)	33 (4.2)	25 (3.8)	16 (0.8)	–2 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 significantly higher ▶  
2007 significantly lower ▼

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.



**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



**Exhibit 6.1 Mathematics Teachers' Gender, Age, and Number of Years Teaching with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Percentage of Students by Teacher Characteristics						Trends in Average Number of Years Teaching	
	Gender		Age				2007	Difference from 2003
	Female	Male	29 Years or Under	30–39 Years	40–49 Years	50 Years or Older		
Algeria	40 (4.2)	60 (4.2)	6 (1.9)	25 (3.8)	63 (4.0)	7 (2.0)	19 (0.8)	0 (0)
Armenia	82 (2.7)	18 (2.7)	9 (2.6)	26 (3.3)	29 (3.4)	36 (3.6)	r 20 (0.7)	1 (1.0)
Australia	49 (4.3)	51 (4.3)	20 (3.2)	29 (3.7)	22 (3.2)	30 (3.2)	15 (0.8)	0 (1.2)
Bahrain	48 (1.1)	52 (1.1)	18 (1.9)	51 (2.7)	27 (2.6)	4 (1.4)	12 (0.5)	1 (0.9)
Bosnia and Herzegovina	57 (4.1)	43 (4.1)	6 (2.1)	22 (3.3)	22 (3.7)	50 (3.5)	23 (0.8)	0 (0)
Botswana	43 (4.5)	57 (4.5)	32 (4.4)	60 (4.5)	8 (2.3)	0 (0.1)	r 8 (0.4)	1 (0.7)
Bulgaria	86 (2.7)	14 (2.7)	1 (0.7)	12 (2.6)	37 (4.1)	50 (4.2)	23 (0.9)	3 (1.1)
Chinese Taipei	57 (4.4)	43 (4.4)	16 (3.2)	45 (4.1)	29 (3.7)	10 (2.4)	12 (0.7)	-2 (1.1)
Colombia	41 (5.8)	59 (5.8)	23 (4.0)	25 (3.8)	22 (4.1)	31 (5.3)	18 (1.4)	0 (0)
Cyprus	69 (2.4)	31 (2.4)	6 (1.5)	32 (2.4)	36 (2.6)	26 (2.5)	13 (0.5)	1 (0.8)
Czech Republic	79 (3.3)	21 (3.3)	13 (2.4)	19 (3.0)	34 (3.6)	35 (3.9)	20 (0.9)	0 (0)
Egypt	22 (3.5)	78 (3.5)	10 (2.5)	52 (3.8)	34 (3.6)	4 (1.4)	14 (0.6)	1 (0.7)
El Salvador	55 (4.6)	45 (4.6)	21 (3.7)	45 (4.9)	27 (3.3)	7 (2.3)	12 (0.6)	0 (0)
England	52 (4.2)	48 (4.2)	18 (3.4)	25 (3.3)	26 (3.3)	31 (2.8)	r 14 (0.9)	-2 (1.7)
Georgia	89 (3.2)	11 (3.2)	3 (1.3)	21 (3.7)	30 (4.1)	46 (4.2)	23 (1.0)	0 (0)
Ghana	8 (2.2)	92 (2.2)	52 (3.9)	28 (4.2)	16 (3.1)	4 (1.1)	7 (0.4)	0 (0.7)
Hong Kong SAR	40 (3.8)	60 (3.8)	26 (4.0)	35 (4.4)	27 (4.3)	12 (2.7)	13 (0.9)	1 (1.2)
Hungary	80 (3.3)	20 (3.3)	9 (2.7)	19 (3.3)	35 (2.9)	37 (3.2)	21 (0.8)	-1 (1.1)
Indonesia	44 (4.3)	56 (4.3)	15 (3.2)	41 (3.9)	37 (4.3)	7 (2.3)	14 (0.7)	0 (0.9)
Iran, Islamic Rep. of	42 (2.0)	58 (2.0)	26 (3.2)	49 (3.5)	20 (3.1)	5 (1.3)	14 (0.5)	0 (0.7)
Israel	76 (3.3)	24 (3.3)	15 (2.7)	33 (3.2)	32 (3.0)	20 (2.4)	r 17 (0.7)	1 (1.0)
Italy	81 (2.8)	19 (2.8)	2 (1.1)	10 (1.9)	22 (2.3)	67 (2.9)	23 (0.7)	0 (0.9)
Japan	43 (3.7)	57 (3.7)	20 (3.1)	28 (3.3)	39 (3.7)	13 (2.7)	16 (0.8)	-1 (1.0)
Jordan	52 (2.6)	48 (2.6)	36 (3.9)	39 (3.8)	18 (3.0)	7 (2.0)	10 (0.6)	-1 (0.9)
Korea, Rep. of	64 (3.2)	36 (3.2)	25 (2.8)	29 (2.9)	34 (3.2)	12 (2.5)	s 14 (0.6)	1 (0.8)
Kuwait	r 51 (2.5)	49 (2.5)	r 19 (3.7)	49 (4.9)	22 (3.6)	10 (2.9)	r 12 (0.7)	0 (0)
Lebanon	42 (4.4)	58 (4.4)	33 (4.0)	27 (3.6)	22 (3.7)	19 (3.8)	r 14 (0.9)	-1 (1.2)
Lithuania	93 (1.7)	7 (1.7)	7 (1.8)	12 (2.7)	47 (4.0)	34 (3.4)	22 (0.7)	2 (1.1)
Malaysia	71 (3.7)	29 (3.7)	22 (3.7)	39 (4.1)	28 (3.8)	10 (2.5)	12 (0.7)	2 (0.9)
Malta	59 (0.2)	41 (0.2)	47 (0.2)	30 (0.2)	13 (0.2)	10 (0.1)	11 (0.0)	0 (0)
Norway	41 (3.6)	59 (3.6)	10 (2.2)	34 (3.0)	17 (2.3)	39 (2.5)	17 (0.7)	-1 (1.2)
Oman	52 (2.4)	48 (2.4)	83 (3.0)	14 (2.9)	3 (1.0)	0 (0.4)	5 (0.4)	0 (0)
Palestinian Nat'l Auth.	49 (3.1)	51 (3.1)	37 (4.4)	29 (3.7)	24 (3.4)	11 (2.4)	12 (0.9)	1 (1.1)
Qatar	51 (0.2)	49 (0.2)	25 (0.1)	40 (0.1)	22 (0.1)	13 (0.1)	14 (0.0)	0 (0)
Romania	60 (3.4)	40 (3.4)	6 (1.8)	21 (3.0)	23 (3.1)	50 (3.2)	23 (1.0)	0 (1.5)
Russian Federation	94 (1.8)	6 (1.8)	5 (1.0)	21 (2.8)	33 (2.9)	41 (3.4)	24 (0.7)	0 (1.1)
Saudi Arabia	47 (1.7)	53 (1.7)	35 (4.3)	46 (4.2)	13 (2.6)	7 (2.6)	11 (0.8)	-
Scotland	58 (3.1)	42 (3.1)	16 (2.1)	25 (3.0)	25 (2.9)	33 (3.6)	r 15 (0.8)	-1 (1.3)
Serbia	61 (4.4)	39 (4.4)	9 (2.4)	20 (3.0)	20 (3.5)	51 (4.0)	20 (1.0)	-2 (1.4)
Singapore	64 (2.7)	36 (2.7)	45 (2.5)	31 (2.3)	12 (1.8)	12 (1.3)	8 (0.4)	-4 (0.8)
Slovenia	82 (2.0)	18 (2.0)	17 (2.1)	23 (2.4)	39 (3.0)	21 (2.5)	18 (0.6)	-2 (1.0)
Sweden	55 (2.9)	45 (2.9)	11 (2.0)	30 (2.7)	22 (2.7)	37 (3.2)	15 (0.8)	1 (1.1)
Syrian Arab Republic	55 (3.8)	45 (3.8)	34 (3.8)	39 (4.0)	17 (3.0)	10 (2.8)	11 (0.7)	0 (0)
Thailand	64 (4.1)	36 (4.1)	19 (3.5)	29 (3.9)	26 (3.9)	25 (3.8)	15 (0.9)	0 (0)
Tunisia	33 (3.8)	67 (3.8)	15 (2.9)	47 (4.1)	25 (3.6)	13 (2.7)	s 13 (0.6)	0 (1.1)
Turkey	45 (4.2)	55 (4.2)	49 (4.0)	16 (2.8)	19 (3.3)	16 (3.4)	11 (0.8)	0 (0)
Ukraine	91 (2.4)	9 (2.4)	8 (2.3)	21 (3.1)	31 (4.1)	40 (4.2)	23 (0.9)	0 (0)
United States	69 (2.6)	31 (2.6)	20 (2.3)	29 (2.8)	26 (2.8)	25 (2.2)	14 (0.6)	-1 (0.9)
‡ Morocco	25 (3.5)	75 (3.5)	9 (2.9)	13 (3.0)	47 (5.4)	31 (5.2)	r 20 (1.3)	-
<b>International Avg.</b>	<b>57 (0.5)</b>	<b>43 (0.5)</b>	<b>21 (0.4)</b>	<b>30 (0.5)</b>	<b>26 (0.5)</b>	<b>23 (0.4)</b>	<b>15 (0.1)</b>	
<b>Benchmarking Participants</b>								
Basque Country, Spain	51 (5.2)	49 (5.2)	2 (1.4)	23 (4.0)	34 (4.3)	41 (4.8)	22 (1.1)	1 (1.4)
British Columbia, Canada	45 (4.3)	55 (4.3)	16 (3.4)	39 (4.7)	24 (3.9)	21 (3.8)	13 (0.8)	0 (0)
Dubai, UAE	s 57 (6.2)	43 (6.2)	s 13 (1.5)	46 (5.6)	24 (4.3)	17 (4.3)	s 15 (0.6)	0 (0)
Massachusetts, US	56 (6.1)	44 (6.1)	23 (5.6)	29 (6.5)	23 (5.3)	25 (5.3)	12 (1.2)	0 (0)
Minnesota, US	50 (8.2)	50 (8.2)	33 (8.6)	32 (7.7)	19 (7.0)	16 (4.6)	12 (1.5)	0 (0)
Ontario, Canada	49 (3.6)	51 (3.6)	20 (3.8)	50 (5.0)	16 (3.6)	14 (3.5)	10 (0.9)	-1 (1.2)
Quebec, Canada	53 (4.3)	47 (4.3)	22 (3.7)	46 (4.6)	19 (3.6)	13 (2.7)	11 (0.8)	-5 (1.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 significantly higher ▲  
2007 significantly lower ▼

Background data provided by teachers.  
‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.  
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.  
A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 6.1 also presents teachers' reports about their age and teaching experience. At both the fourth and eighth grades, the majority of students were taught mathematics by teachers in their 30s and 40s. Relatively few students, 16 to 21 percent on average internationally, were taught by younger teachers. Several countries participating at the eighth grade did have the majority of their students taught by younger teachers (for example, Ghana and Oman). Although about one-fourth of the students internationally (23–24%) were taught by teachers age 50 or older, the teaching force was older in a number of countries. For example, half or more of the students had teachers 50 years or older in Georgia and Germany at the fourth grade, and at the eighth grade in Bosnia and Herzegovina, Bulgaria, Italy, Romania, and Serbia. Older teachers can have more experience and as would be expected from their ages, on average internationally, mathematics teachers at both the fourth and eighth grades were relatively experienced, with 15 to 17 years of teaching. Increases in years teaching experience were noted at the fourth grade in Hungary, Latvia, and Lithuania, and at the eighth grade in Bulgaria and Lithuania. The only decreases were at the eighth grade in Singapore and the benchmarking province of Quebec.

### **What Education and Training Do Teachers Have for Teaching Mathematics?**

Exhibit 6.2 presents teachers' highest level of education. On average internationally, 70 percent of the fourth grade students and 78 percent of the eighth grade students had teachers with a university degree. However, at the fourth grade, there was some variation and the majority of students in Algeria, Italy, Morocco, and Tunisia had teachers that had completed only secondary school.

Exhibit 6.3 contains information about teachers' educational emphasis in mathematics. Most countries have a national or regional mathematics curriculum, and most countries reported that teachers received specific preparation in how to teach the mathematics curriculum as part of pre-service education. However, the teachers of the fourth grade students in a number of countries reported little specific training or specialized education in mathematics. Countries where 80 percent or more of the fourth grade students had teachers who studied primary/elementary education without a major or specialization in mathematics or science, included Australia, Austria, the Czech Republic, Hungary, Lithuania, and the Slovak Republic as well as the benchmarking province of Quebec. At the other end of the continuum, 80 percent or more had teachers with primary/elementary education and a major or specialization in mathematics or science in Germany and Kazakhstan. In Armenia and Kuwait almost all teachers had a mathematics major or specialization (94 to 98%), but few had studied primary/elementary education. At the eighth grade, on average internationally, most students had teachers who had studied mathematics (70%) or mathematics education (54%) or both (since teachers often reported that their study was focused in more than one area).

Exhibit 6.4 contains teachers' reports about their participation in professional development related to teaching mathematics. At the fourth grade, two-fifths or more of the students, on average internationally, had teachers that had participated in some type of professional development during the past two years in the various mathematics areas asked about by TIMSS, including mathematics content (42%), mathematics pedagogy (47%), mathematics curriculum (40%), and/or improving students' critical thinking or problem-solving skills (40%). Somewhat fewer students had teachers

Exhibit 6.2 Highest Educational Level of Mathematics Teachers\*

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percentage of Students by Their Teachers' Educational Level				
	Completed Postgraduate University Degree**	Completed University but Not a Postgraduate Degree	Completed Post-secondary Education but Not University	Completed Upper-secondary School	Did Not Complete Upper-secondary School
Algeria	0 (0.5)	19 (3.3)	5 (2.1)	69 (3.8)	7 (1.9)
Armenia	0 (0.0)	98 (1.2)	2 (1.2)	0 (0.0)	0 (0.0)
Australia	42 (4.0)	51 (4.1)	7 (1.6)	0 (0.0)	0 (0.0)
Austria	3 (1.0)	1 (0.5)	93 (1.7)	3 (1.0)	0 (0.0)
Chinese Taipei	16 (3.0)	69 (3.6)	2 (1.0)	12 (2.7)	1 (0.0)
Colombia	10 (2.6)	75 (4.4)	4 (1.8)	11 (3.1)	1 (0.0)
Czech Republic	84 (2.8)	3 (1.2)	2 (0.8)	11 (2.6)	0 (0.0)
Denmark	2 (1.0)	86 (3.2)	9 (2.7)	3 (1.4)	1 (0.6)
El Salvador	0 (0.0)	20 (3.1)	65 (4.1)	14 (3.2)	2 (1.2)
England	35 (4.1)	56 (4.5)	10 (2.2)	0 (0.0)	0 (0.0)
Georgia	90 (1.9)	9 (1.7)	0 (0.0)	1 (0.8)	0 (0.0)
Germany	0 (0.0)	100 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)
Hong Kong SAR	12 (3.0)	71 (3.8)	16 (3.0)	1 (0.7)	0 (0.0)
Hungary	--	--	--	--	--
Iran, Islamic Rep. of	1 (0.6)	27 (4.1)	44 (4.2)	28 (3.9)	0 (0.0)
Italy	2 (0.7)	19 (2.5)	6 (1.5)	73 (3.0)	0 (0.0)
Japan	3 (1.2)	90 (2.2)	8 (1.8)	0 (0.0)	0 (0.0)
Kazakhstan	24 (3.4)	40 (5.3)	35 (5.3)	0 (0.0)	0 (0.0)
Kuwait	1 (0.9)	95 (1.9)	4 (1.6)	0 (0.0)	0 (0.0)
Latvia	0 (0.0)	98 (0.8)	0 (0.0)	2 (0.8)	0 (0.0)
Lithuania	18 (2.5)	60 (3.1)	22 (2.9)	0 (0.0)	0 (0.0)
Morocco	1 (0.5)	22 (3.7)	4 (1.7)	58 (4.0)	14 (2.6)
Netherlands	2 (1.4)	96 (1.7)	0 (0.0)	1 (1.0)	0 (0.0)
New Zealand	9 (1.3)	66 (2.7)	25 (2.2)	0 (0.0)	0 (0.0)
Norway	1 (0.5)	71 (3.3)	27 (3.2)	1 (0.7)	1 (0.4)
Qatar	7 (0.1)	86 (0.1)	7 (0.1)	0 (0.0)	0 (0.0)
Russian Federation	36 (3.4)	35 (3.5)	29 (3.1)	0 (0.0)	0 (0.0)
Scotland	30 (4.0)	70 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)
Singapore	4 (1.1)	55 (2.5)	38 (2.2)	3 (1.1)	0 (0.4)
Slovak Republic	98 (1.1)	0 (0.0)	0 (0.0)	2 (1.0)	0 (0.0)
Slovenia	0 (0.0)	50 (2.6)	49 (2.6)	0 (0.4)	0 (0.0)
Sweden	11 (2.1)	58 (3.8)	31 (3.2)	0 (0.0)	0 (0.0)
Tunisia	0 (0.0)	9 (2.3)	32 (4.0)	58 (3.5)	0 (0.0)
Ukraine	1 (0.6)	81 (3.1)	18 (3.1)	0 (0.0)	0 (0.0)
United States	52 (2.7)	47 (2.7)	0 (0.2)	0 (0.0)	0 (0.0)
Yemen	0 (0.0)	15 (2.9)	41 (4.4)	39 (4.7)	4 (2.3)
<b>International Avg.</b>	<b>17 (0.3)</b>	<b>53 (0.5)</b>	<b>18 (0.4)</b>	<b>11 (0.3)</b>	<b>1 (0.1)</b>
<b>Benchmarking Participants</b>					
Alberta, Canada	12 (2.4)	86 (2.7)	1 (1.0)	0 (0.0)	0 (0.0)
British Columbia, Canada	19 (2.4)	81 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)
Dubai, UAE	1 (0.8)	91 (2.5)	7 (2.5)	1 (0.7)	0 (0.0)
Massachusetts, US	82 (4.2)	18 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)
Minnesota, US	70 (5.6)	30 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)
Ontario, Canada	21 (3.7)	77 (3.8)	2 (0.9)	1 (0.6)	0 (0.0)
Quebec, Canada	9 (2.4)	90 (2.6)	2 (1.2)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

\* Based on countries' categorizations to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

\*\* For example, doctorate, master's, other postgraduate degree or diploma.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.



Exhibit 6.2 Highest Educational Level of Mathematics Teachers\* (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students by Their Teachers' Educational Level				
	Completed Postgraduate University Degree**	Completed University but Not a Postgraduate Degree	Completed Post-secondary Education but Not University	Completed Upper-secondary School	Did Not Complete Upper-secondary School
Algeria	1 (0.0)	14 (3.0)	63 (3.7)	20 (3.4)	3 (1.5)
Armenia	94 (1.6)	4 (1.0)	2 (1.3)	0 (0.0)	0 (0.0)
Australia	60 (4.1)	38 (3.9)	2 (1.1)	0 (0.0)	0 (0.0)
Bahrain	10 (1.9)	86 (2.3)	4 (1.4)	0 (0.0)	0 (0.0)
Bosnia and Herzegovina	1 (0.6)	8 (2.1)	91 (2.3)	1 (0.8)	0 (0.0)
Botswana	1 (1.0)	9 (2.6)	89 (2.8)	0 (0.0)	0 (0.0)
Bulgaria	77 (3.4)	12 (2.5)	11 (2.5)	0 (0.0)	0 (0.0)
Chinese Taipei	22 (3.5)	72 (3.7)	1 (1.0)	5 (1.8)	0 (0.0)
Colombia	13 (5.7)	84 (5.8)	1 (1.1)	1 (0.1)	1 (0.8)
Cyprus	24 (2.8)	76 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)
Czech Republic	97 (1.2)	1 (0.0)	1 (0.0)	2 (0.8)	0 (0.0)
Egypt	6 (1.7)	91 (2.2)	0 (0.5)	0 (0.0)	2 (1.4)
El Salvador	0 (0.0)	27 (4.5)	67 (4.6)	6 (2.0)	0 (0.0)
England	30 (3.3)	64 (3.4)	6 (1.6)	0 (0.0)	0 (0.0)
Georgia	96 (1.5)	4 (1.5)	0 (0.0)	0 (0.0)	0 (0.0)
Ghana	0 (0.0)	6 (1.8)	75 (3.6)	19 (3.3)	0 (0.0)
Hong Kong SAR	26 (3.7)	62 (3.8)	12 (3.1)	1 (0.9)	0 (0.0)
Hungary	--	--	--	--	--
Indonesia	0 (0.0)	76 (3.6)	20 (3.3)	4 (1.4)	0 (0.0)
Iran, Islamic Rep. of	1 (0.0)	49 (4.0)	51 (4.0)	0 (0.0)	0 (0.0)
Israel	29 (2.6)	67 (3.1)	4 (2.0)	0 (0.0)	0 (0.0)
Italy	14 (2.4)	86 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)
Japan	8 (2.1)	90 (2.5)	2 (1.2)	0 (0.0)	0 (0.0)
Jordan	13 (2.6)	76 (3.4)	11 (2.2)	0 (0.0)	0 (0.0)
Korea, Rep. of	32 (3.1)	68 (3.1)	0 (0.0)	0 (0.0)	0 (0.0)
Kuwait	3 (1.6)	96 (1.8)	1 (0.0)	0 (0.0)	0 (0.0)
Lebanon	9 (2.3)	63 (4.5)	0 (0.0)	28 (4.2)	0 (0.0)
Lithuania	42 (4.1)	39 (4.1)	18 (3.5)	1 (0.5)	0 (0.0)
Malaysia	6 (2.0)	76 (3.4)	15 (2.6)	3 (1.5)	0 (0.0)
Malta	5 (0.1)	83 (0.1)	6 (0.1)	6 (0.1)	0 (0.0)
Norway	9 (2.0)	76 (3.0)	13 (2.4)	0 (0.0)	1 (0.9)
Oman	1 (0.5)	99 (0.9)	1 (0.0)	0 (0.0)	0 (0.0)
Palestinian Nat'l Auth.	4 (1.6)	81 (3.1)	14 (2.9)	0 (0.0)	1 (0.9)
Qatar	16 (0.1)	81 (0.1)	2 (0.0)	0 (0.0)	1 (0.0)
Romania	9 (2.3)	71 (3.7)	19 (3.0)	0 (0.3)	1 (0.5)
Russian Federation	79 (2.7)	20 (2.8)	1 (0.4)	0 (0.0)	0 (0.0)
Saudi Arabia	1 (0.0)	96 (1.5)	3 (1.2)	0 (0.0)	0 (0.0)
Scotland	30 (3.3)	70 (3.3)	0 (0.0)	0 (0.0)	0 (0.0)
Serbia	1 (0.7)	38 (3.7)	59 (3.8)	2 (1.0)	0 (0.0)
Singapore	6 (1.5)	89 (1.8)	4 (1.0)	0 (0.0)	0 (0.0)
Slovenia	1 (0.6)	45 (3.3)	50 (3.1)	4 (1.1)	0 (0.0)
Sweden	50 (2.9)	41 (2.9)	8 (1.6)	1 (0.6)	0 (0.0)
Syrian Arab Republic	2 (1.3)	5 (1.9)	89 (2.6)	3 (1.2)	2 (1.0)
Thailand	11 (2.7)	88 (2.9)	0 (0.0)	1 (0.9)	0 (0.0)
Tunisia	0 (0.0)	71 (3.6)	27 (3.5)	2 (1.1)	0 (0.0)
Turkey	7 (2.4)	66 (4.0)	27 (3.5)	0 (0.0)	0 (0.0)
Ukraine	1 (0.7)	98 (1.1)	1 (0.0)	0 (0.0)	0 (0.0)
United States	56 (2.9)	43 (2.8)	0 (0.4)	0 (0.0)	0 (0.0)
‡ Morocco	2 (1.7)	9 (2.7)	14 (3.1)	58 (5.8)	17 (5.2)
International Avg.	21 (0.3)	57 (0.4)	18 (0.3)	3 (0.2)	1 (0.1)
<b>Benchmarking Participants</b>					
Basque Country, Spain	49 (4.5)	51 (4.5)	0 (0.0)	0 (0.0)	0 (0.0)
British Columbia, Canada	59 (4.3)	40 (4.4)	1 (0.9)	0 (0.0)	0 (0.0)
Dubai, UAE	3 (1.1)	92 (1.4)	6 (1.2)	0 (0.0)	0 (0.0)
Massachusetts, US	64 (6.4)	36 (6.4)	0 (0.0)	0 (0.0)	0 (0.0)
Minnesota, US	49 (7.2)	51 (7.2)	0 (0.0)	0 (0.0)	0 (0.0)
Ontario, Canada	76 (3.8)	22 (3.7)	2 (1.1)	0 (0.0)	0 (0.0)
Quebec, Canada	16 (3.4)	82 (3.6)	1 (1.0)	0 (0.0)	0 (0.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

\* Based on countries' categorizations to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-1997).

\*\* For example, doctorate, master's, other postgraduate degree or diploma.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



Exhibit 6.3 Teachers' Educational Emphasis on Mathematics and Teaching

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Teachers Receive Specific Preparation in How to Teach the Mathematics Curriculum as Part of Pre-service Education	Percentage of Students by Their Teachers' Major Area of Study in Their Post-secondary Education				
		Primary / Elementary Education with a Major or Specialization in Mathematics	Primary / Elementary Education with a Major or Specialization in Science but Not in Mathematics	Mathematics or Science Major or Specialization Without a Major in Primary/Elementary Education	Primary / Elementary Education Without a Major or Specialization in Mathematics or Science	Other
Algeria	–	r 11 (2.9)	6 (2.1)	14 (3.4)	46 (4.9)	22 (3.8)
Armenia	○	8 (2.1)	1 (0.8)	90 (2.4)	1 (0.5)	1 (0.6)
Australia	●	7 (1.7)	5 (1.9)	1 (0.8)	84 (2.7)	2 (0.9)
Austria	●	5 (1.3)	0 (0.0)	0 (0.0)	94 (1.4)	0 (0.2)
Chinese Taipei	●	27 (3.7)	3 (1.5)	7 (1.9)	41 (4.1)	22 (3.5)
Colombia	○	16 (4.0)	6 (2.2)	17 (4.1)	43 (4.0)	19 (4.0)
Czech Republic	●	3 (1.3)	1 (0.9)	4 (1.7)	81 (3.2)	12 (2.3)
Denmark	●	18 (3.3)	2 (1.0)	40 (4.4)	14 (2.8)	27 (3.7)
El Salvador	●	11 (2.4)	3 (1.7)	13 (3.0)	35 (4.3)	38 (4.3)
England	●	11 (2.5)	9 (2.0)	11 (2.5)	50 (3.8)	20 (3.2)
Georgia	○	56 (4.3)	1 (0.0)	13 (3.2)	19 (3.1)	11 (2.4)
Germany	●	71 (2.8)	14 (2.3)	3 (0.9)	9 (1.8)	2 (1.0)
Hong Kong SAR	●	51 (4.2)	2 (1.2)	13 (2.8)	26 (3.4)	8 (2.3)
Hungary	●	4 (2.3)	3 (1.3)	0 (0.0)	93 (2.6)	0 (0.0)
Iran, Islamic Rep. of	●	43 (4.0)	6 (2.2)	10 (2.0)	28 (3.0)	13 (2.9)
Italy	○	0 (0.0)	0 (0.0)	2 (0.7)	4 (1.2)	94 (1.4)
Japan	●	19 (3.0)	6 (1.3)	2 (1.2)	54 (3.8)	19 (2.8)
Kazakhstan	●	89 (2.9)	1 (0.8)	3 (1.3)	6 (2.5)	1 (0.4)
Kuwait	●	r 32 (4.0)	1 (1.0)	62 (4.3)	3 (1.6)	1 (0.9)
Latvia	●	69 (3.4)	2 (0.9)	2 (1.1)	27 (3.2)	0 (0.1)
Lithuania	●	8 (2.1)	1 (0.4)	2 (0.7)	85 (2.3)	5 (1.7)
Morocco	○	14 (2.9)	3 (1.4)	26 (3.7)	30 (3.7)	28 (4.1)
Netherlands	●	22 (3.7)	15 (3.2)	0 (0.0)	61 (4.5)	2 (1.2)
New Zealand	●	12 (1.9)	7 (1.2)	2 (0.7)	73 (2.4)	6 (0.8)
Norway	●	–	–	–	–	–
Qatar	●	18 (0.1)	3 (0.1)	53 (0.2)	3 (0.1)	23 (0.2)
Russian Federation	●	55 (3.0)	3 (1.2)	6 (1.4)	35 (2.8)	2 (1.0)
Scotland	●	7 (2.0)	5 (1.6)	3 (1.2)	74 (3.4)	11 (2.2)
Singapore	●	51 (3.0)	6 (1.4)	13 (2.0)	15 (2.0)	15 (2.0)
Slovak Republic	●	3 (1.1)	0 (0.0)	4 (1.5)	91 (1.8)	3 (0.8)
Slovenia	●	44 (3.0)	14 (2.1)	0 (0.0)	42 (3.1)	0 (0.4)
Sweden	●	42 (3.6)	2 (0.9)	5 (1.6)	45 (3.4)	5 (1.6)
Tunisia	●	r 3 (1.4)	2 (1.0)	13 (2.9)	24 (4.3)	58 (5.0)
Ukraine	●	23 (3.5)	1 (1.0)	2 (1.3)	68 (3.6)	6 (1.7)
United States	●	8 (1.4)	4 (1.1)	2 (0.6)	70 (2.1)	15 (1.6)
Yemen	●	19 (4.1)	0 (0.0)	39 (4.7)	17 (3.7)	25 (4.0)
International Avg.		25 (0.5)	4 (0.2)	14 (0.4)	43 (0.5)	15 (0.4)
<b>Benchmarking Participants</b>						
Alberta, Canada	●	7 (1.9)	6 (1.8)	3 (1.1)	70 (3.5)	14 (3.1)
British Columbia, Canada	○	7 (2.2)	5 (1.8)	2 (0.7)	72 (4.1)	14 (3.1)
Dubai, UAE	●	r 15 (2.5)	5 (3.3)	59 (4.0)	10 (2.1)	10 (4.4)
Massachusetts, US	●	9 (3.1)	4 (2.0)	4 (2.1)	70 (4.2)	13 (3.2)
Minnesota, US	–	10 (3.8)	9 (4.9)	0 (0.0)	77 (6.5)	4 (2.8)
Ontario, Canada	●	7 (2.9)	6 (2.3)	2 (1.2)	64 (4.5)	21 (3.3)
Quebec, Canada	●	4 (1.6)	3 (1.4)	1 (0.3)	84 (3.1)	8 (2.6)

● Yes ○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Exhibit 6.3 Teachers' Educational Emphasis on Mathematics and Teaching (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Teachers Receive Specific Preparation in How to Teach the Mathematics Curriculum as Part of Pre-service Education	Percentage of Students by Their Teachers' Major Area of Study in Their Post-secondary Education <sup>1</sup>					
		Education – Mathematics	Mathematics	Education – Science	Science	Education – General	Other
Algeria	○	r 26 (3.8)	r 85 (3.3)	r 2 (1.5)	r 2 (1.4)	r 8 (2.6)	r 16 (3.4)
Armenia	○	91 (2.3)	98 (1.1)	15 (2.7)	37 (3.8)	54 (4.5)	40 (3.7)
Australia	●	46 (4.0)	49 (3.6)	25 (3.6)	34 (3.4)	32 (3.2)	39 (3.6)
Bahrain	●	73 (2.5)	62 (2.4)	3 (0.1)	9 (1.8)	6 (1.4)	7 (1.2)
Bosnia and Herzegovina	●	36 (4.0)	96 (1.6)	16 (3.2)	19 (3.6)	30 (3.8)	14 (2.8)
Botswana	●	61 (4.7)	73 (4.2)	9 (2.5)	19 (3.2)	24 (3.8)	21 (3.4)
Bulgaria	○	74 (3.7)	96 (1.9)	33 (3.5)	40 (4.0)	68 (3.9)	38 (4.2)
Chinese Taipei	●	50 (4.5)	81 (3.7)	19 (3.5)	17 (3.2)	54 (4.2)	35 (3.9)
Colombia	○	58 (5.2)	79 (3.8)	10 (2.5)	15 (3.2)	32 (3.9)	29 (5.8)
Cyprus	●	27 (2.5)	96 (1.2)	4 (1.2)	8 (1.6)	11 (1.9)	11 (1.4)
Czech Republic	●	85 (2.8)	62 (3.6)	58 (4.2)	47 (4.1)	24 (3.5)	27 (3.1)
Egypt	●	71 (4.3)	63 (4.1)	6 (2.0)	4 (1.3)	25 (3.7)	12 (2.6)
El Salvador	●	46 (4.1)	66 (4.3)	20 (3.5)	29 (4.1)	52 (4.2)	41 (4.4)
England	●	39 (4.1)	72 (3.6)	8 (2.3)	20 (3.2)	27 (3.6)	33 (3.6)
Georgia	●	78 (3.5)	46 (5.2)	1 (0.7)	7 (2.8)	7 (3.0)	17 (3.7)
Ghana	●	57 (4.4)	69 (4.2)	32 (4.2)	42 (4.2)	54 (4.3)	43 (4.5)
Hong Kong SAR	●	58 (4.6)	62 (4.3)	19 (3.6)	30 (4.0)	36 (4.3)	40 (3.8)
Hungary	●	96 (1.7)	97 (1.6)	57 (3.9)	58 (3.9)	5 (2.1)	25 (3.1)
Indonesia	●	75 (3.6)	44 (4.0)	7 (2.2)	8 (2.3)	12 (2.4)	13 (2.8)
Iran, Islamic Rep. of	●	57 (3.7)	58 (3.8)	3 (1.3)	5 (1.9)	7 (2.1)	11 (2.5)
Israel	●	r 57 (3.6)	r 76 (2.8)	r 10 (2.1)	r 19 (2.8)	r 20 (2.6)	r 35 (3.6)
Italy	○	--	16 (2.4)	--	67 (3.1)	--	17 (2.6)
Japan	●	52 (3.8)	76 (3.3)	3 (1.3)	16 (2.7)	30 (3.4)	19 (2.9)
Jordan	●	44 (4.0)	86 (2.9)	3 (1.3)	36 (4.5)	21 (3.8)	18 (3.6)
Korea, Rep. of	●	70 (3.2)	28 (3.2)	1 (0.9)	0 (0.0)	4 (1.2)	4 (1.4)
Kuwait	●	r 61 (4.2)	r 62 (4.7)	r 6 (2.3)	r 7 (2.2)	r 9 (2.5)	r 2 (1.2)
Lebanon	●	40 (4.9)	77 (4.4)	14 (3.9)	26 (4.3)	13 (3.1)	20 (4.2)
Lithuania	●	33 (3.3)	93 (1.9)	1 (0.8)	6 (1.8)	17 (2.7)	11 (2.3)
Malaysia	●	45 (4.2)	46 (3.9)	11 (2.1)	19 (3.4)	31 (3.9)	41 (4.1)
Malta	●	76 (0.2)	71 (0.2)	10 (0.2)	7 (0.1)	44 (0.3)	26 (0.2)
Norway	●	r 8 (2.4)	r 41 (3.9)	r 8 (2.5)	r 38 (3.9)	r 43 (4.1)	r 61 (4.3)
Oman	●	73 (3.8)	71 (3.5)	3 (1.8)	2 (1.6)	6 (1.9)	12 (2.9)
Palestinian Nat'l Auth.	●	47 (3.9)	78 (3.5)	8 (2.5)	9 (2.3)	24 (3.5)	4 (1.4)
Qatar	○	65 (0.1)	70 (0.2)	3 (0.0)	10 (0.1)	10 (0.1)	6 (0.1)
Romania	●	65 (3.8)	97 (1.8)	11 (2.3)	26 (3.7)	68 (3.5)	16 (3.3)
Russian Federation	●	70 (3.2)	99 (0.8)	15 (2.4)	20 (2.6)	55 (3.3)	17 (2.1)
Saudi Arabia	●	43 (4.6)	r 70 (4.3)	r 1 (0.5)	r 0 (0.3)	r 1 (0.5)	r 1 (0.7)
Scotland	●	46 (3.8)	87 (2.3)	3 (1.1)	24 (2.2)	15 (2.4)	22 (2.4)
Serbia	●	41 (3.6)	95 (1.9)	2 (1.3)	11 (2.5)	28 (3.9)	12 (2.9)
Singapore	●	49 (2.9)	69 (2.4)	18 (2.1)	46 (2.5)	34 (3.0)	50 (2.9)
Slovenia	●	94 (1.3)	9 (1.6)	21 (2.2)	3 (0.8)	9 (1.7)	22 (2.4)
Sweden	●	63 (2.5)	50 (3.2)	62 (3.1)	44 (3.5)	30 (2.8)	28 (3.0)
Syrian Arab Republic	●	17 (3.2)	92 (2.1)	2 (1.2)	5 (1.7)	6 (1.3)	11 (2.9)
Thailand	●	4 (1.7)	72 (3.8)	1 (0.0)	4 (1.3)	4 (1.8)	23 (3.6)
Tunisia	●	13 (2.8)	92 (2.0)	4 (1.5)	15 (2.8)	3 (1.5)	13 (2.6)
Turkey	●	69 (3.9)	49 (4.0)	12 (3.0)	14 (2.6)	29 (4.2)	9 (2.5)
Ukraine	●	59 (4.0)	53 (4.2)	3 (1.4)	4 (1.4)	11 (2.7)	12 (2.8)
United States	●	49 (2.9)	42 (3.0)	7 (1.7)	9 (1.9)	56 (2.7)	34 (2.7)
‡ Morocco	●	r 27 (4.9)	r 87 (3.4)	r 6 (2.7)	r 17 (4.0)	r 7 (3.0)	r 11 (3.2)
International Avg.		54 (0.5)	70 (0.5)	12 (0.3)	19 (0.4)	25 (0.4)	22 (0.4)
<b>Benchmarking Participants</b>							
Basque Country, Spain	○	31 (4.9)	36 (5.0)	37 (4.6)	32 (5.1)	15 (3.1)	25 (4.1)
British Columbia, Canada	○	33 (4.0)	25 (3.9)	29 (3.5)	42 (3.9)	39 (4.0)	56 (4.8)
Dubai, UAE	●	s 50 (5.3)	s 88 (2.5)	s 7 (2.9)	s 20 (4.1)	s 22 (3.3)	s 10 (2.8)
Massachusetts, US	●	26 (5.0)	43 (7.2)	3 (1.6)	13 (3.8)	57 (6.7)	39 (7.0)
Minnesota, US	●	72 (5.9)	50 (7.3)	3 (2.3)	4 (2.5)	60 (6.3)	25 (6.5)
Ontario, Canada	●	12 (3.2)	11 (3.1)	18 (3.5)	20 (3.3)	62 (4.6)	72 (3.7)
Quebec, Canada	●	57 (4.1)	33 (4.0)	14 (3.4)	25 (4.0)	19 (3.4)	31 (3.8)

● Yes ○ No

Background data provided by National Research Coordinators and by teachers.

<sup>1</sup> Teachers who responded that they majored in more than one area are reflected in all categories that apply.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Exhibit 6.4 Teachers' Participation in Professional Development in Mathematics

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percentage of Students by Their Teachers' Participation in Professional Development in Mathematics in the Past 2 Years					
	Mathematics Content	Mathematics Pedagogy / Instruction	Mathematics Curriculum	Integrating Information Technology into Mathematics	Improving Students' Critical Thinking or Problem Solving Skills	Mathematics Assessment
Algeria	44 (4.8)	53 (4.4)	50 (4.8)	10 (2.6)	42 (4.3)	45 (4.4)
Armenia	64 (4.0)	77 (3.5)	75 (3.6)	39 (4.1)	51 (3.5)	62 (3.5)
Australia	71 (3.1)	63 (3.7)	73 (3.7)	35 (3.9)	53 (4.3)	52 (3.5)
Austria	56 (3.1)	32 (3.1)	11 (1.9)	6 (1.7)	22 (2.7)	20 (2.6)
Chinese Taipei	67 (3.8)	74 (3.5)	71 (3.9)	42 (4.0)	33 (3.7)	33 (4.0)
Colombia	42 (5.6)	37 (5.3)	46 (6.0)	28 (4.6)	52 (5.0)	37 (5.4)
Czech Republic	20 (3.0)	35 (3.8)	20 (3.3)	33 (3.5)	31 (3.6)	21 (3.5)
Denmark	23 (3.4)	23 (3.4)	9 (2.6)	21 (3.0)	9 (2.2)	5 (2.0)
El Salvador	26 (3.7)	28 (3.9)	12 (2.7)	13 (2.9)	34 (4.2)	26 (3.9)
England	60 (3.6)	70 (3.5)	65 (3.7)	44 (4.1)	59 (3.8)	43 (4.5)
Georgia	21 (3.5)	41 (3.6)	39 (4.3)	18 (3.4)	55 (4.6)	53 (5.1)
Germany	44 (3.3)	37 (3.1)	38 (3.3)	7 (1.5)	28 (3.2)	27 (3.1)
Hong Kong SAR	74 (3.5)	82 (3.5)	70 (3.6)	49 (4.5)	72 (3.7)	58 (4.3)
Hungary	43 (4.1)	47 (4.3)	19 (3.5)	11 (2.7)	26 (3.3)	23 (3.6)
Iran, Islamic Rep. of	30 (3.6)	37 (3.6)	25 (3.2)	18 (3.2)	29 (3.9)	27 (3.6)
Italy	22 (2.7)	25 (2.6)	14 (2.4)	33 (3.2)	22 (2.6)	14 (2.3)
Japan	48 (3.9)	55 (3.6)	16 (2.6)	19 (2.8)	27 (3.4)	21 (2.7)
Kazakhstan	63 (5.6)	72 (5.5)	76 (5.0)	56 (4.2)	72 (5.4)	70 (5.6)
Kuwait	r 27 (4.0)	r 34 (4.2)	r 20 (3.9)	r 25 (4.1)	r 30 (4.3)	r 28 (4.3)
Latvia	43 (3.9)	42 (3.7)	43 (3.8)	17 (3.0)	55 (3.9)	46 (3.5)
Lithuania	17 (2.7)	21 (3.1)	18 (3.1)	56 (3.6)	50 (4.1)	30 (2.8)
Morocco	11 (2.7)	11 (2.6)	10 (2.3)	3 (0.8)	9 (2.3)	13 (2.8)
Netherlands	11 (2.7)	15 (2.5)	6 (1.9)	18 (2.9)	19 (3.0)	10 (2.5)
New Zealand	83 (2.1)	76 (2.4)	78 (2.1)	26 (2.4)	54 (2.7)	64 (2.6)
Norway	26 (3.2)	30 (3.5)	24 (3.3)	12 (2.8)	18 (2.7)	5 (1.3)
Qatar	41 (0.2)	50 (0.2)	40 (0.2)	36 (0.2)	40 (0.2)	38 (0.2)
Russian Federation	66 (3.5)	67 (3.0)	68 (3.0)	51 (3.5)	58 (3.6)	55 (3.2)
Scotland	44 (4.1)	62 (4.0)	43 (4.1)	51 (4.7)	57 (4.8)	33 (4.2)
Singapore	59 (2.6)	70 (2.6)	50 (2.7)	51 (2.9)	66 (2.6)	52 (2.8)
Slovak Republic	13 (2.5)	41 (3.4)	46 (3.8)	55 (3.2)	30 (3.3)	24 (2.9)
Slovenia	43 (3.0)	35 (3.1)	38 (3.4)	25 (2.8)	17 (2.3)	62 (3.4)
Sweden	34 (3.4)	41 (3.3)	35 (3.8)	5 (0.9)	21 (3.1)	25 (3.4)
Tunisia	39 (4.0)	57 (3.9)	33 (3.9)	19 (3.1)	36 (3.9)	61 (4.0)
Ukraine	65 (3.3)	74 (2.8)	73 (3.3)	64 (3.5)	82 (3.0)	81 (2.7)
United States	60 (2.2)	50 (2.6)	63 (2.4)	39 (2.6)	51 (2.5)	47 (2.4)
Yemen	20 (4.4)	47 (5.0)	28 (4.3)	6 (2.6)	37 (4.9)	31 (4.8)
International Avg.	42 (0.6)	47 (0.6)	40 (0.6)	29 (0.5)	40 (0.6)	37 (0.6)
<b>Benchmarking Participants</b>						
Alberta, Canada	57 (4.1)	54 (4.2)	52 (3.9)	33 (3.4)	54 (4.2)	46 (4.1)
British Columbia, Canada	r 73 (3.8)	r 59 (4.5)	r 67 (3.8)	r 17 (3.3)	r 64 (4.2)	r 39 (4.3)
Dubai, UAE	r 55 (4.5)	s 51 (4.2)	s 54 (6.3)	s 36 (4.3)	s 64 (5.2)	r 48 (4.8)
Massachusetts, US	77 (6.4)	77 (5.7)	77 (5.6)	44 (5.6)	65 (6.1)	64 (6.8)
Minnesota, US	59 (5.2)	57 (4.7)	63 (6.7)	33 (4.9)	49 (8.5)	34 (7.6)
Ontario, Canada	68 (4.2)	67 (4.3)	75 (4.3)	30 (4.3)	53 (4.3)	51 (5.9)
Quebec, Canada	36 (4.8)	39 (4.6)	41 (4.2)	11 (2.5)	31 (3.8)	39 (4.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

TIMSS & PIRLS  
International Study Center  
Lynch School of Education, Boston College



**Exhibit 6.4 Teachers' Participation in Professional Development in Mathematics (Continued)**
**TIMSS2007**  
**Mathematics 8<sup>th</sup> Grade**

Country	Percentage of Students by Their Teachers' Participation in Professional Development in Mathematics in the Past 2 Years					
	Mathematics Content	Mathematics Pedagogy / Instruction	Mathematics Curriculum	Integrating Information Technology into Mathematics	Improving Students' Critical Thinking or Problem Solving Skills	Mathematics Assessment
Algeria	51 (4.4)	66 (4.0)	51 (4.4)	27 (3.6)	60 (4.5)	51 (4.5)
Armenia	56 (3.9)	67 (3.7)	69 (4.1)	32 (3.9)	38 (4.2)	45 (3.9)
Australia	69 (3.8)	61 (3.4)	69 (3.3)	57 (3.2)	45 (3.7)	59 (3.6)
Bahrain	33 (2.4)	48 (2.4)	26 (2.2)	69 (2.4)	56 (2.7)	40 (2.5)
Bosnia and Herzegovina	67 (3.9)	60 (3.8)	56 (3.6)	39 (3.6)	43 (3.8)	46 (4.3)
Botswana	20 (3.5)	12 (2.5)	11 (2.7)	13 (3.2)	27 (4.1)	27 (4.0)
Bulgaria	59 (3.6)	42 (3.4)	60 (3.6)	69 (3.5)	25 (3.0)	44 (3.4)
Chinese Taipei	84 (2.9)	79 (3.3)	84 (3.1)	73 (3.6)	40 (4.1)	52 (4.5)
Colombia	70 (4.0)	64 (5.5)	67 (4.3)	51 (4.9)	60 (4.6)	53 (4.6)
Cyprus	69 (2.9)	70 (2.7)	56 (2.3)	59 (3.4)	46 (2.7)	48 (2.9)
Czech Republic	47 (4.2)	45 (4.1)	35 (3.8)	49 (4.6)	28 (3.3)	22 (3.3)
Egypt	46 (4.0)	66 (3.9)	34 (4.1)	54 (4.1)	77 (3.4)	51 (3.7)
El Salvador	49 (4.0)	42 (3.9)	26 (3.9)	26 (3.7)	45 (4.0)	38 (4.4)
England	66 (3.9)	79 (3.3)	61 (4.3)	62 (4.2)	40 (3.7)	58 (3.9)
Georgia	30 (4.3)	49 (4.6)	52 (5.5)	26 (4.3)	59 (5.3)	64 (5.0)
Ghana	60 (3.9)	38 (3.6)	44 (3.8)	13 (2.5)	44 (4.3)	46 (4.2)
Hong Kong SAR	78 (3.5)	71 (4.0)	72 (4.0)	63 (4.3)	60 (4.7)	56 (4.1)
Hungary	51 (3.9)	53 (3.3)	28 (3.9)	26 (3.6)	34 (4.1)	32 (3.7)
Indonesia	71 (3.9)	69 (4.2)	77 (3.8)	29 (4.0)	57 (4.4)	69 (4.0)
Iran, Islamic Rep. of	57 (4.3)	78 (3.1)	47 (3.8)	28 (3.4)	52 (3.9)	44 (3.8)
Israel	r 59 (3.6)	r 63 (3.6)	r 50 (3.7)	r 35 (3.5)	r 45 (3.6)	r 33 (3.6)
Italy	16 (2.1)	34 (3.3)	15 (2.0)	43 (3.1)	9 (1.6)	17 (2.7)
Japan	74 (3.4)	76 (3.4)	31 (3.5)	27 (3.3)	39 (3.7)	39 (3.5)
Jordan	57 (4.2)	78 (3.3)	62 (3.9)	65 (4.4)	67 (3.5)	53 (3.4)
Korea, Rep. of	48 (3.3)	50 (3.5)	41 (3.3)	31 (3.2)	22 (2.8)	33 (3.2)
Kuwait	r 45 (4.4)	r 62 (4.2)	r 30 (3.8)	r 45 (5.1)	r 69 (4.6)	r 43 (4.7)
Lebanon	68 (3.6)	67 (3.6)	54 (4.7)	50 (5.0)	68 (4.2)	70 (3.7)
Lithuania	85 (2.7)	81 (3.1)	71 (3.3)	69 (3.5)	52 (3.8)	65 (3.8)
Malaysia	57 (4.0)	46 (4.2)	52 (4.0)	61 (3.7)	27 (3.8)	38 (3.6)
Malta	47 (0.2)	71 (0.2)	60 (0.2)	83 (0.2)	31 (0.2)	68 (0.2)
Norway	40 (3.9)	39 (3.9)	44 (4.0)	35 (3.7)	18 (3.2)	22 (3.3)
Oman	54 (4.7)	42 (4.0)	58 (4.5)	24 (3.9)	36 (4.1)	48 (4.1)
Palestinian Nat'l Auth.	44 (4.3)	47 (4.5)	34 (4.4)	26 (3.6)	45 (4.4)	35 (4.3)
Qatar	43 (0.1)	56 (0.2)	37 (0.1)	54 (0.2)	50 (0.1)	43 (0.2)
Romania	71 (3.4)	55 (3.4)	53 (3.9)	57 (3.9)	56 (3.8)	69 (3.6)
Russian Federation	84 (2.4)	73 (3.0)	74 (3.1)	67 (3.1)	62 (3.0)	60 (2.8)
Saudi Arabia	26 (4.1)	47 (4.6)	19 (3.2)	24 (4.1)	34 (4.0)	24 (4.1)
Scotland	80 (3.4)	93 (2.0)	74 (3.3)	79 (3.0)	56 (4.1)	71 (3.1)
Serbia	72 (4.1)	50 (4.4)	45 (4.3)	33 (3.8)	37 (4.1)	46 (4.0)
Singapore	81 (1.8)	88 (1.7)	65 (2.3)	74 (2.0)	63 (2.2)	61 (2.4)
Slovenia	70 (2.8)	65 (2.9)	66 (3.2)	62 (3.0)	37 (2.8)	72 (2.8)
Sweden	41 (3.1)	48 (3.3)	38 (3.1)	9 (1.8)	28 (3.2)	46 (3.2)
Syrian Arab Republic	13 (2.5)	20 (3.4)	17 (3.3)	15 (2.6)	49 (4.1)	32 (4.1)
Thailand	82 (3.3)	80 (3.3)	79 (3.6)	73 (3.7)	82 (3.1)	83 (3.1)
Tunisia	24 (3.6)	35 (4.4)	26 (3.8)	22 (3.4)	36 (4.1)	32 (4.1)
Turkey	47 (4.0)	48 (4.5)	69 (4.0)	18 (3.3)	24 (4.0)	27 (3.8)
Ukraine	79 (3.6)	82 (3.1)	81 (3.5)	75 (3.7)	80 (3.3)	83 (3.4)
United States	81 (2.1)	76 (2.4)	80 (1.7)	61 (3.0)	65 (2.8)	69 (2.5)
‡ Morocco	24 (4.2)	37 (4.8)	29 (4.2)	22 (5.0)	21 (3.6)	24 (3.9)
<b>International Avg.</b>	<b>56 (0.5)</b>	<b>59 (0.5)</b>	<b>51 (0.5)</b>	<b>45 (0.5)</b>	<b>46 (0.5)</b>	<b>48 (0.5)</b>
<b>Benchmarking Participants</b>						
Basque Country, Spain	24 (4.0)	26 (4.3)	27 (4.7)	32 (4.5)	19 (3.9)	19 (3.7)
British Columbia, Canada	77 (3.0)	70 (3.6)	69 (3.5)	51 (3.9)	75 (2.8)	58 (4.0)
Dubai, UAE	s 65 (3.6)	s 57 (3.4)	s 60 (4.6)	s 57 (3.8)	s 67 (4.7)	s 62 (4.7)
Massachusetts, US	94 (2.9)	91 (3.6)	75 (4.6)	64 (5.6)	65 (6.3)	61 (4.9)
Minnesota, US	r 78 (6.6)	r 75 (5.4)	r 80 (5.6)	r 57 (7.7)	r 62 (7.5)	r 63 (6.6)
Ontario, Canada	82 (2.9)	73 (3.4)	76 (3.3)	51 (4.5)	67 (4.1)	61 (4.7)
Quebec, Canada	57 (3.9)	74 (3.7)	78 (3.6)	27 (3.8)	35 (4.3)	78 (3.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

with such professional development in mathematics assessment (37%) and integrating information technology into mathematics (29%). At the eighth grade, the participation in professional development in the areas asked about by TIMSS was somewhat higher, but the pattern was similar. Approximately half the eighth grade students, on average internationally, had teachers that had participated in some type of professional development during the past two years in mathematics content (56%), mathematics pedagogy (59%), mathematics curriculum (51%), mathematics assessment (48%), improving students' critical thinking or problem solving skills (46%), and integrating information technology into mathematics (45%).

Teachers also were asked about opportunities for collaboration with other teachers. Exhibit 6.5 contains the results in relation to students' average mathematics achievement and with changes from 2003. Internationally on average, the largest percentages of students at both grades (59 to 61%) had teachers that collaborated with other teachers about 2–3 times a month. Other than that, collaboration tended to be more frequent (at least weekly) rather than less frequent (never or almost never). At the fourth grade, between 2003 and 2007 the frequency of collaboration increased to some extent. In particular, in Armenia, Italy, Morocco, Scotland, Singapore, and Tunisia greater percentages of students had teachers that reported collaborating with other teachers at least weekly (and only Lithuania showed a decrease). At the eighth grade, the percentages of students whose teachers reported at least weekly collaboration increased between 2003 and 2007 in Armenia, Japan, Jordan, Lebanon, Slovenia, and Tunisia as well as the benchmarking province of Quebec. The percentages decreased in Botswana, Egypt, Indonesia, Norway, Serbia, and Sweden.

**Exhibit 6.5 Frequency of Collaboration Among Mathematics Teachers with Trends**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Country	Percentage of Students by Their Teachers' Frequency of Collaboration with Other Teachers								
	Never or Almost Never			2 or 3 Times per Month			At Least Weekly		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	5 (2.0)	378 (21.8)	0 0	55 (4.6)	374 (8.1)	0 0	40 (4.4)	373 (9.0)	0 0
Armenia	2 (1.0)	~ ~	-3 (1.5) ▾	35 (3.2)	498 (6.9)	-30 (5.5) ▾	63 (3.2)	500 (6.0)	34 (5.4) ▲
Australia	9 (2.2)	515 (16.7)	-4 (3.0)	60 (3.2)	515 (4.8)	-1 (5.1)	31 (3.2)	518 (6.5)	5 (4.8)
Austria	23 (2.6)	512 (3.9)	0 0	66 (2.9)	503 (2.7)	0 0	11 (1.9)	509 (5.5)	0 0
Chinese Taipei	20 (3.3)	571 (4.0)	12 (3.9) ▲	70 (4.3)	576 (2.2)	-5 (5.5)	10 (2.7)	577 (9.2)	-7 (4.0)
Colombia	8 (2.2)	350 (13.9)	0 0	42 (4.9)	361 (8.0)	0 0	50 (4.7)	356 (9.2)	0 0
Czech Republic	13 (2.5)	493 (6.9)	0 0	76 (3.3)	486 (3.2)	0 0	10 (2.6)	475 (7.7)	0 0
Denmark	20 (3.4)	519 (6.5)	0 0	70 (4.0)	525 (2.8)	0 0	10 (2.7)	528 (7.1)	0 0
El Salvador	16 (3.5)	344 (10.0)	0 0	55 (4.6)	330 (5.9)	0 0	29 (3.8)	321 (9.2)	0 0
England	11 (2.6)	541 (9.6)	-2 (3.9)	58 (3.9)	544 (4.0)	-2 (6.2)	31 (3.4)	537 (5.3)	5 (5.7)
Georgia	0 (0.0)	~ ~	0 0	37 (4.5)	430 (7.1)	0 0	63 (4.5)	445 (5.3)	0 0
Germany	20 (2.7)	531 (3.8)	0 0	73 (3.0)	526 (2.7)	0 0	8 (1.6)	495 (10.0)	0 0
Hong Kong SAR	4 (1.6)	593 (10.5)	-18 (4.2) ▾	87 (2.8)	609 (3.7)	18 (5.4) ▲	9 (2.3)	602 (9.4)	0 (3.6)
Hungary	3 (1.5)	525 (38.0)	-3 (2.3)	62 (3.8)	513 (5.1)	-1 (4.9)	34 (3.7)	504 (5.9)	3 (5.1)
Iran, Islamic Rep. of	5 (1.7)	387 (17.9)	-1 (2.7)	65 (3.7)	404 (4.9)	11 (6.1)	30 (3.9)	398 (7.9)	-10 (6.3)
Italy	6 (1.5)	504 (10.8)	-6 (2.8) ▾	69 (2.9)	506 (4.1)	-1 (4.2)	26 (2.5)	508 (5.5)	7 (3.5) ▲
Japan	9 (1.9)	575 (4.1)	-2 (3.2)	73 (3.3)	565 (2.4)	5 (4.9)	18 (2.9)	575 (5.0)	-3 (4.3)
Kazakhstan	1 (0.7)	~ ~	0 0	26 (4.2)	531 (14.5)	0 0	73 (4.3)	556 (7.0)	0 0
Kuwait	4 (1.8)	296 (13.2)	0 0	40 (4.9)	311 (8.2)	0 0	57 (5.0)	318 (6.0)	0 0
Latvia	8 (1.7)	545 (7.6)	8 (1.7) ▲	77 (3.1)	538 (2.4)	1 (5.5)	16 (3.0)	534 (5.3)	-8 (5.5)
Lithuania	8 (1.5)	525 (6.6)	5 (2.1) ▲	71 (3.2)	530 (3.2)	13 (4.9) ▲	20 (3.0)	532 (7.4)	-18 (4.8) ▾
Morocco	18 (3.2)	333 (13.6)	-37 (6.7) ▾	60 (3.9)	344 (6.4)	25 (6.5) ▲	22 (3.2)	337 (12.6)	11 (4.6) ▲
Netherlands	32 (3.6)	536 (4.4)	0 (5.5)	62 (4.1)	535 (3.0)	-3 (5.8)	7 (2.3)	530 (4.5)	3 (3.1)
New Zealand	5 (1.2)	493 (7.5)	-3 (2.2)	65 (2.4)	495 (3.2)	4 (3.9)	30 (2.4)	489 (4.4)	-1 (3.8)
Norway	8 (1.7)	465 (9.0)	-2 (3.4)	58 (3.8)	470 (3.5)	-6 (5.7)	34 (3.8)	480 (4.0)	7 (5.0)
Qatar	6 (0.1)	319 (4.9)	0 0	48 (0.2)	296 (1.9)	0 0	46 (0.2)	295 (1.6)	0 0
Russian Federation	0 (0.2)	~ ~	-1 (0.7)	50 (3.6)	542 (4.9)	-3 (4.8)	50 (3.5)	547 (7.5)	4 (4.7)
Scotland	17 (3.1)	494 (8.3)	-2 (4.6)	54 (3.9)	492 (3.4)	-12 (6.0) ▾	29 (3.2)	500 (4.9)	14 (4.8) ▲
Singapore	9 (1.6)	621 (11.1)	-6 (3.2)	77 (2.6)	600 (4.3)	-2 (4.1)	14 (2.0)	583 (8.7)	8 (2.6) ▲
Slovak Republic	2 (0.8)	~ ~	0 0	60 (3.4)	495 (5.8)	0 0	38 (3.4)	499 (7.2)	0 0
Slovenia	11 (1.9)	504 (5.8)	-2 (3.7)	73 (2.9)	501 (2.0)	-3 (4.8)	16 (2.5)	501 (5.1)	5 (3.6)
Sweden	19 (2.9)	506 (4.4)	0 0	62 (3.2)	501 (3.4)	0 0	19 (3.0)	505 (4.5)	0 0
Tunisia	12 (3.0)	312 (19.5)	-20 (5.1) ▾	52 (4.4)	331 (6.5)	3 (6.0)	36 (4.1)	311 (8.3)	16 (5.2) ▲
Ukraine	1 (0.7)	~ ~	0 0	20 (3.2)	476 (6.2)	0 0	79 (3.3)	467 (3.5)	0 0
United States	9 (1.7)	531 (7.4)	-4 (2.5)	65 (2.8)	531 (2.9)	4 (3.9)	25 (2.5)	526 (4.9)	0 (3.6)
Yemen	16 (3.5)	219 (18.8)	0 0	65 (4.3)	226 (7.4)	0 0	19 (3.7)	217 (11.6)	0 0
International Avg.	10 (0.4)	468 (2.3)		59 (0.6)	472 (0.9)		31 (0.5)	471 (1.2)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Alberta, Canada	11 (3.0)	494 (11.5)	0 0	66 (3.9)	506 (3.5)	0 0	23 (3.0)	506 (5.3)	0 0
British Columbia, Canada	23 (3.4)	505 (5.6)	0 0	63 (4.0)	507 (4.1)	0 0	13 (2.5)	493 (7.0)	0 0
Dubai, UAE	3 (0.2)	439 (5.5)	0 0	47 (6.0)	437 (4.8)	0 0	50 (5.9)	436 (8.3)	0 0
Massachusetts, US	10 (3.8)	565 (14.2)	0 0	56 (5.9)	575 (5.1)	0 0	34 (5.2)	573 (7.2)	0 0
Minnesota, US	12 (3.5)	574 (10.5)	0 0	65 (7.3)	552 (5.6)	0 0	23 (6.7)	556 (17.5)	0 0
Ontario, Canada	14 (3.6)	508 (5.7)	-4 (5.0)	62 (4.9)	510 (3.9)	-3 (6.4)	25 (4.2)	517 (8.1)	8 (5.5)
Quebec, Canada	17 (2.8)	523 (6.3)	-1 (4.3)	68 (3.8)	520 (4.0)	-3 (5.6)	15 (3.1)	516 (7.0)	3 (4.1)

▲ 2007 percent significantly higher

▾ 2007 percent significantly lower

Based on teachers' reports on the frequency of four types of interactions with other teachers: 1) Discussions about how to teach a particular concept; 2) Working on preparing instructional materials; 3) Visits to another teacher's classroom to observe his/her teaching; 4) Informal observation of my classroom by another teacher. Frequency is computed by averaging across four items based on a 4-point scale: 1. Never or Almost Never; 2. 2 or 3 times per month; 3. 1-3 times per week; 4. Daily or almost daily.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

**Exhibit 6.5 Frequency of Collaboration Among Mathematics Teachers with Trends (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	Percentage of Students by Their Teachers' Frequency of Collaboration with Other Teachers								
	Never or Almost Never			2 or 3 Times per Month			At Least Weekly		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	9 (2.2)	388 (7.2)	0 (0)	63 (3.9)	388 (2.7)	0 (0)	28 (3.6)	386 (3.3)	0 (0)
Armenia	4 (1.7)	491 (14.1)	0 (2.3)	32 (3.1)	499 (5.3)	-31 (4.5) ▾	64 (3.6)	499 (3.9)	31 (4.8) ▲
Australia	17 (2.9)	482 (9.9)	6 (3.8)	67 (3.9)	507 (5.2)	-10 (5.2)	16 (2.9)	475 (8.8)	4 (4.1)
Bahrain	6 (1.7)	410 (8.7)	-2 (2.9)	61 (2.8)	392 (2.3)	-2 (4.3)	32 (2.3)	402 (3.0)	3 (3.6)
Bosnia and Herzegovina	10 (2.3)	449 (10.0)	0 (0)	61 (4.1)	450 (4.1)	0 (0)	29 (4.1)	471 (4.8)	0 (0)
Botswana	12 (3.2)	366 (10.7)	7 (3.9)	61 (3.8)	366 (3.4)	12 (5.7) ▲	27 (3.7)	358 (4.3)	-18 (5.7) ▾
Bulgaria	14 (2.5)	473 (11.8)	-2 (4.3)	68 (3.6)	466 (5.9)	0 (5.6)	18 (3.5)	453 (17.1)	2 (4.6)
Chinese Taipei	28 (3.7)	575 (8.0)	-3 (5.4)	65 (4.0)	610 (5.4)	3 (5.5)	7 (2.2)	576 (12.0)	0 (3.2)
Colombia	15 (2.8)	371 (10.7)	0 (0)	65 (4.1)	382 (4.8)	0 (0)	21 (3.4)	384 (9.1)	0 (0)
Cyprus	5 (0.8)	475 (7.3)	0 (1.3)	53 (3.1)	466 (2.6)	-3 (4.1)	43 (3.1)	462 (2.8)	2 (4.2)
Czech Republic	34 (4.0)	507 (4.4)	0 (0)	63 (3.9)	503 (3.2)	0 (0)	3 (1.1)	494 (7.2)	0 (0)
Egypt	3 (1.5)	346 (18.6)	2 (1.7)	55 (4.4)	392 (5.5)	14 (5.8) ▲	42 (4.2)	392 (5.4)	-15 (5.7) ▾
El Salvador	39 (4.6)	342 (5.2)	0 (0)	41 (4.2)	338 (5.9)	0 (0)	19 (3.4)	337 (6.6)	0 (0)
England	17 (2.5)	515 (10.5)	0 (4.9)	62 (4.1)	509 (6.4)	-3 (7.3)	21 (3.7)	526 (11.2)	2 (6.2)
Georgia	6 (2.7)	435 (15.2)	0 (0)	55 (4.6)	402 (7.6)	0 (0)	39 (4.4)	416 (8.9)	0 (0)
Ghana	9 (2.1)	295 (13.0)	-2 (3.6)	35 (4.0)	308 (7.2)	-9 (6.1)	56 (4.2)	314 (6.3)	11 (6.4)
Hong Kong SAR	17 (3.3)	604 (11.9)	-7 (4.8)	72 (4.0)	564 (8.1)	0 (5.6)	11 (3.1)	581 (12.6)	6 (3.6)
Hungary	10 (2.4)	537 (18.0)	0 (3.5)	71 (4.0)	513 (3.8)	0 (5.2)	18 (3.2)	519 (8.9)	0 (4.5)
Indonesia	4 (1.9)	402 (25.7)	2 (2.3)	64 (4.4)	402 (5.8)	13 (6.0) ▲	32 (4.6)	414 (10.7)	-15 (6.1) ▾
Iran, Islamic Rep. of	21 (3.1)	395 (6.6)	6 (4.4)	69 (3.1)	401 (5.0)	-7 (4.5)	10 (2.4)	426 (16.0)	2 (3.2)
Israel	16 (3.3)	477 (14.1)	4 (4.0)	76 (3.3)	464 (5.3)	-3 (4.6)	9 (2.1)	442 (19.5)	-1 (3.2)
Italy	35 (3.1)	482 (4.5)	7 (4.5)	58 (3.3)	478 (3.9)	-6 (4.8)	8 (1.7)	483 (7.6)	-1 (2.7)
Japan	14 (3.0)	573 (11.7)	-22 (5.0) ▾	65 (3.9)	574 (3.3)	12 (5.6) ▲	20 (2.9)	554 (6.1)	10 (3.7) ▲
Jordan	7 (1.8)	439 (15.9)	-5 (3.3)	58 (3.8)	423 (6.2)	-6 (5.7)	36 (3.5)	432 (6.7)	10 (5.1) ▲
Korea, Rep. of	13 (2.3)	586 (7.3)	-23 (4.0) ▾	82 (2.3)	599 (3.4)	25 (4.0) ▲	4 (1.3)	592 (12.6)	-2 (2.2)
Kuwait	1 (1.1)	~ ~	0 (0)	42 (5.3)	355 (4.7)	0 (0)	57 (5.3)	359 (3.7)	0 (0)
Lebanon	12 (3.1)	460 (10.1)	-3 (4.5)	56 (4.6)	459 (5.5)	-10 (6.2)	33 (5.0)	428 (7.5)	13 (6.1) ▲
Lithuania	22 (3.2)	493 (5.3)	9 (4.1) ▲	67 (3.3)	509 (3.4)	-4 (4.8)	11 (2.5)	507 (12.1)	-5 (3.7)
Malaysia	10 (2.5)	497 (18.1)	3 (3.4)	77 (3.6)	469 (5.5)	3 (5.1)	13 (2.9)	485 (12.5)	-6 (4.3)
Malta	37 (0.2)	488 (1.7)	0 (0)	58 (0.2)	488 (1.4)	0 (0)	5 (0.1)	478 (2.4)	0 (0)
Norway	19 (2.9)	471 (5.5)	7 (4.0)	68 (3.6)	469 (2.1)	5 (5.3)	13 (2.7)	467 (4.6)	-11 (4.3) ▾
Oman	5 (2.0)	357 (12.1)	0 (0)	63 (4.1)	368 (3.9)	0 (0)	32 (3.8)	385 (8.0)	0 (0)
Palestinian Nat'l Auth.	11 (2.9)	354 (15.7)	7 (3.1) ▲	61 (4.4)	363 (4.7)	-5 (6.2)	29 (4.0)	380 (8.1)	-2 (5.9)
Qatar	6 (0.1)	290 (4.1)	0 (0)	48 (0.1)	306 (1.8)	0 (0)	46 (0.1)	311 (2.0)	0 (0)
Romania	4 (1.6)	446 (15.9)	1 (2.2)	50 (4.2)	472 (6.2)	3 (6.1)	46 (4.1)	453 (7.4)	-4 (5.9)
Russian Federation	4 (1.3)	511 (20.8)	-1 (2.2)	57 (4.5)	507 (5.2)	8 (6.0)	39 (4.5)	518 (5.2)	-6 (6.0)
Saudi Arabia	16 (3.2)	329 (8.4)	--	66 (3.7)	325 (4.0)	--	19 (2.5)	336 (7.6)	--
Scotland	17 (2.6)	491 (10.0)	1 (4.3)	61 (3.5)	496 (4.9)	-8 (5.7)	22 (3.2)	458 (10.9)	7 (4.5)
Serbia	13 (2.7)	489 (8.4)	4 (3.6)	67 (3.8)	483 (4.3)	7 (5.6)	20 (3.3)	492 (6.8)	-11 (5.0) ▾
Singapore	14 (1.9)	561 (13.2)	-5 (2.9)	74 (2.8)	595 (5.0)	6 (3.7)	12 (1.8)	620 (11.6)	-1 (2.5)
Slovenia	14 (1.9)	510 (7.1)	-15 (4.2) ▾	75 (2.2)	500 (2.7)	7 (4.5)	11 (1.7)	495 (5.4)	8 (2.2)
Sweden	25 (2.7)	487 (5.1)	10 (3.9) ▲	64 (2.9)	494 (2.8)	-3 (4.6)	11 (1.8)	487 (3.9)	-7 (3.3) ▾
Syrian Arab Republic	19 (3.4)	399 (7.9)	0 (0)	61 (4.1)	392 (4.8)	0 (0)	20 (3.4)	400 (9.8)	0 (0)
Thailand	5 (1.7)	432 (16.5)	0 (0)	55 (4.2)	441 (7.1)	0 (0)	40 (3.9)	443 (9.8)	0 (0)
Tunisia	26 (3.5)	423 (4.6)	2 (5.3)	62 (3.5)	422 (3.1)	-9 (5.4)	12 (2.6)	411 (5.7)	7 (3.2) ▲
Turkey	18 (2.9)	428 (7.9)	0 (0)	71 (3.5)	433 (6.4)	0 (0)	11 (2.4)	430 (18.3)	0 (0)
Ukraine	1 (0.7)	~ ~	0 (0)	47 (3.7)	451 (5.5)	0 (0)	52 (3.7)	471 (5.1)	0 (0)
United States	28 (2.7)	511 (6.2)	3 (3.7)	57 (2.9)	506 (4.0)	-6 (4.3)	15 (1.8)	514 (6.7)	3 (2.7)
‡ Morocco	52 (5.0)	371 (4.8)	--	38 (5.0)	390 (7.6)	--	10 (4.0)	420 (21.5)	--
International Avg.	15 (0.4)	451 (1.7)		61 (0.5)	451 (0.7)		24 (0.5)	452 (1.4)	

**Benchmarking Participants**

Basque Country, Spain	19 (3.6)	490 (5.7)	0 (5.2)	69 (4.3)	503 (3.4)	0 (6.5)	13 (2.8)	489 (6.8)	0 (4.6)
British Columbia, Canada	31 (4.0)	518 (6.4)	0 (0)	54 (4.2)	504 (4.7)	0 (0)	15 (3.2)	520 (11.5)	0 (0)
Dubai, UAE	7 (2.9)	449 (36.4)	0 (0)	59 (4.6)	465 (6.1)	0 (0)	34 (3.4)	448 (8.6)	0 (0)
Massachusetts, US	25 (5.9)	554 (12.0)	0 (0)	60 (5.8)	544 (7.3)	0 (0)	14 (4.4)	542 (17.9)	0 (0)
Minnesota, US	28 (7.5)	525 (8.8)	0 (0)	61 (6.0)	533 (8.3)	0 (0)	12 (5.4)	536 (11.5)	0 (0)
Ontario, Canada	18 (3.5)	525 (7.5)	-3 (5.4)	68 (4.5)	514 (4.5)	7 (6.6)	13 (3.5)	525 (6.5)	-3 (5.3)
Quebec, Canada	20 (3.7)	530 (12.0)	-4 (5.4)	70 (4.0)	530 (4.8)	-2 (5.9)	10 (2.0)	515 (12.4)	6 (2.7) ▲

▲ 2007 percent significantly higher

▾ 2007 percent significantly lower

Based on teachers' reports on the frequency of four types of interactions with other teachers: 1) Discussions about how to teach a particular concept; 2) Working on preparing instructional materials; 3) Visits to another teacher's classroom to observe his/her teaching; 4) Informal observation of my classroom by another teacher. Frequency is computed by averaging across four items based on a 4-point scale: 1. Never or Almost Never; 2. 2 or 3 times per month; 3. 1-3 times per week; 4. Daily or almost daily.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.



### How Well Prepared Do Teachers Feel They Are to Teach Mathematics?

TIMSS 2007 asked the students' teachers of mathematics how prepared they felt to teach a subset of the mathematics topics included in the TIMSS 2007 mathematics framework. At the fourth grade, teachers were asked about 20 topics in total, including 10 topics in number, 7 topics in geometric shapes and measures, and 3 topics in data display. At the eighth grade, teachers were asked about 18 topics in total, including 5 topics in number, 4 topics in algebra, 6 topics in geometry, and 3 topics in data and chance. The percentages of students with teachers that reported feeling "Very Well" prepared to teach the various topics are presented in Exhibits 6.6 and 6.7. In Exhibit 6.6, the results are summarized across all the mathematics topics and by content domain, and Exhibit 6.7 presents the results for each topic.

At the fourth grade, the average across all mathematics topics was 72 percent. The number content domain had the highest average percent across topics internationally (77 percent), approaching 90 percent for the whole number topics and never falling below 70 percent for any topic. The average across the topics in the geometric shapes and measures content domain was 68 percent, with considerable variation from topic to topic. Most fourth grade students (83%) were taught by teachers who reported feeling very well prepared to teach about finding areas and perimeters, but the percents were lower for other topics—down to as low as about half (51%) for reflections and rotations. The percents for the data display topics were very similar (69–74%).

**Exhibit 6.6 Summary of Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics\***
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics**			
	All Mathematics (20 topics)	Number (10 topics)	Geometric Shapes and Measures (7 topics)	Data Display (3 topics)
Algeria	64 (2.2)	73 (2.5)	67 (2.3)	53 (4.1)
Armenia	47 (3.1)	47 (3.3)	47 (3.4)	45 (3.4)
Australia	81 (1.9)	81 (1.9)	72 (2.5)	88 (2.0)
Austria	64 (1.9)	r 79 (1.5)	r 67 (1.9)	r 46 (3.1)
Chinese Taipei	61 (3.6)	62 (3.6)	56 (3.6)	65 (4.1)
Colombia	75 (2.6)	82 (2.5)	68 (3.3)	74 (3.6)
Czech Republic	73 (2.5)	85 (2.2)	r 70 (3.0)	62 (3.9)
Denmark	92 (1.2)	94 (1.2)	92 (1.2)	91 (1.9)
El Salvador	63 (2.6)	62 (2.7)	56 (2.7)	70 (3.5)
England	89 (1.4)	89 (1.5)	87 (1.7)	91 (2.1)
Georgia	76 (2.8)	88 (1.8)	r 78 (2.5)	67 (4.6)
Germany	62 (1.9)	s 69 (2.3)	r 65 (2.2)	60 (2.8)
Hong Kong SAR	57 (3.0)	55 (3.7)	r 51 (3.7)	67 (3.6)
Hungary	88 (1.3)	94 (1.1)	s 81 (1.8)	r 85 (2.3)
Iran, Islamic Rep. of	56 (2.8)	62 (2.8)	r 55 (2.9)	53 (3.7)
Italy	63 (2.6)	67 (2.7)	59 (2.8)	63 (2.8)
Japan	35 (2.5)	37 (2.7)	r 34 (2.7)	33 (3.1)
Kazakhstan	--	--	--	--
Kuwait	r 79 (2.3)	r 84 (2.1)	r 78 (2.4)	r 75 (3.6)
Latvia	81 (1.4)	87 (1.3)	r 68 (1.9)	87 (2.3)
Lithuania	52 (2.5)	54 (2.8)	50 (2.5)	55 (3.3)
Morocco	75 (2.2)	r 82 (2.3)	r 73 (2.1)	r 70 (3.5)
Netherlands	73 (2.9)	78 (3.1)	r 56 (3.3)	81 (3.2)
New Zealand	77 (1.4)	76 (1.8)	69 (1.9)	86 (1.5)
Norway	84 (1.4)	88 (1.3)	82 (1.8)	83 (2.3)
Qatar	75 (0.1)	85 (0.1)	74 (0.1)	66 (0.2)
Russian Federation	--	--	--	--
Scotland	91 (1.5)	92 (1.4)	85 (2.0)	94 (1.7)
Singapore	85 (1.5)	89 (1.4)	76 (1.8)	89 (1.8)
Slovak Republic	77 (2.5)	r 90 (1.9)	x x	r 65 (3.4)
Slovenia	75 (1.6)	75 (1.8)	s 59 (2.5)	84 (2.1)
Sweden	76 (1.8)	78 (1.9)	69 (2.0)	81 (2.2)
Tunisia	64 (2.7)	r 62 (3.2)	61 (2.7)	66 (3.4)
Ukraine	85 (2.0)	93 (1.4)	s 85 (2.1)	78 (3.6)
United States	90 (0.9)	91 (1.0)	85 (1.3)	94 (1.0)
Yemen	63 (2.3)	77 (2.1)	63 (2.7)	51 (4.0)
<b>International Avg.</b>	<b>72 (0.4)</b>	<b>77 (0.4)</b>	<b>68 (0.4)</b>	<b>71 (0.5)</b>
<b>Benchmarking Participants</b>				
Alberta, Canada	85 (1.6)	87 (1.8)	77 (2.0)	91 (2.0)
British Columbia, Canada	83 (1.8)	85 (1.9)	76 (2.6)	89 (1.7)
Dubai, UAE	r 93 (1.0)	r 97 (0.8)	s 91 (1.6)	s 91 (2.3)
Massachusetts, US	95 (0.9)	96 (1.0)	90 (1.6)	98 (0.8)
Minnesota, US	89 (2.2)	92 (2.1)	84 (3.1)	93 (2.6)
Ontario, Canada	89 (1.4)	86 (2.1)	84 (2.1)	97 (0.8)
Quebec, Canada	85 (1.6)	88 (1.7)	82 (2.1)	85 (2.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

\* See Exhibit 6.7 for data on individual topics.

\*\* The TIMSS topics were summarized to reduce teachers' response burden.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students. An “x” indicates data are available for less than 50% of the students.



**Exhibit 6.6 Summary of Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics\* (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics**				
	All Mathematics (18 topics)	Number (5 topics)	Algebra (4 topics)	Geometry (6 topics)	Data and Chance (3 topics)
Algeria	66 (2.2)	77 (2.8) r	66 (3.1) r	63 (2.6)	54 (3.2)
Armenia	51 (2.2)	54 (3.0)	49 (3.3)	52 (2.9)	45 (3.4)
Australia	91 (1.6)	92 (1.6)	89 (2.2)	88 (2.0)	93 (1.8)
Bahrain	88 (0.8)	94 (0.7)	88 (0.8)	86 (1.0)	83 (1.9)
Bosnia and Herzegovina	67 (2.9)	78 (3.1)	75 (3.3)	72 (3.2) r	43 (3.3)
Botswana	82 (1.6)	89 (1.5)	83 (2.2)	84 (2.1)	73 (3.0)
Bulgaria	89 (1.0)	100 (0.2)	98 (0.6)	95 (1.1)	65 (3.0)
Chinese Taipei	74 (2.7)	83 (2.8)	81 (2.8)	70 (2.7)	65 (3.5)
Colombia	88 (1.7)	97 (1.1)	93 (1.8)	83 (2.2)	80 (3.2)
Cyprus	83 (1.6)	91 (1.4)	91 (1.6)	85 (1.6)	65 (2.7)
Czech Republic	85 (1.3)	98 (0.9)	93 (1.2)	90 (1.4)	60 (3.0)
Egypt	86 (1.3)	90 (1.5)	90 (1.5)	89 (1.2)	74 (2.5)
El Salvador	67 (2.7)	78 (2.9)	70 (3.1)	56 (3.3)	62 (3.5)
England	95 (1.0)	96 (1.1)	96 (1.0)	92 (1.5)	95 (1.3)
Georgia	86 (2.4)	97 (1.3)	89 (3.3)	86 (2.8)	75 (3.5)
Ghana	85 (1.4)	90 (1.6)	88 (1.5)	81 (2.0)	81 (2.4)
Hong Kong SAR	67 (3.1)	67 (3.5)	73 (3.0)	67 (3.2)	61 (4.0)
Hungary	89 (2.2)	95 (2.2)	94 (2.2)	91 (2.3)	76 (3.1)
Indonesia	81 (1.9)	87 (1.9)	79 (2.3)	84 (2.0)	72 (3.2)
Iran, Islamic Rep. of	78 (1.5)	90 (1.1)	77 (1.9)	80 (1.7)	64 (2.8)
Israel	r 84 (2.2)	r 87 (2.3) r	91 (2.2) r	80 (2.4) r	81 (2.5)
Italy	65 (2.1)	77 (2.5)	62 (2.8)	70 (2.2)	51 (2.7)
Japan	51 (2.6)	50 (3.2)	59 (2.8)	62 (3.2)	33 (2.9)
Jordan	89 (1.5)	94 (1.5)	92 (1.5)	85 (2.0)	84 (2.4)
Korea, Rep. of	70 (2.3)	72 (2.7)	75 (2.2)	73 (2.5)	60 (2.8)
Kuwait	r 76 (2.3)	r 89 (2.4) r	74 (3.1) r	73 (2.6) r	69 (3.8)
Lebanon	85 (1.9)	91 (1.8)	90 (1.9)	84 (2.3)	77 (3.0)
Lithuania	70 (2.2)	81 (2.7)	73 (2.3)	69 (2.6)	56 (3.1)
Malaysia	79 (1.9)	83 (2.6)	82 (2.2)	80 (1.9)	69 (2.8)
Malta	91 (0.1)	96 (0.1)	94 (0.1)	90 (0.1)	85 (0.2)
Norway	87 (1.1)	97 (0.8)	91 (1.4)	89 (1.2)	72 (2.3)
Oman	84 (1.4)	92 (1.3)	86 (1.8)	84 (1.8)	76 (2.6)
Palestinian Nat'l Auth.	86 (1.5)	93 (1.5)	89 (1.5)	83 (1.8)	80 (2.8)
Qatar	86 (0.1)	95 (0.1)	86 (0.1)	83 (0.1)	83 (0.1)
Romania	87 (1.3)	96 (1.1)	92 (1.3)	90 (1.3)	70 (2.8)
Russian Federation	--	--	--	--	--
Saudi Arabia	68 (2.4)	82 (2.6)	74 (2.8)	70 (2.8) r	49 (3.7)
Scotland	96 (0.6)	98 (0.6)	97 (0.8)	96 (0.9)	95 (0.9)
Serbia	74 (2.4)	86 (2.4)	79 (3.1)	79 (2.6)	51 (3.7)
Singapore	82 (1.3)	88 (1.4)	84 (1.4)	82 (1.4)	72 (2.1)
Slovenia	79 (1.2)	92 (1.2)	85 (1.3)	82 (1.4)	56 (2.2)
Sweden	79 (1.5)	90 (1.5)	79 (1.7)	73 (1.8)	76 (1.8)
Syrian Arab Republic	74 (1.6)	87 (2.1)	80 (1.8)	73 (1.8)	59 (3.1)
Thailand	47 (2.3)	56 (3.1)	40 (3.1)	47 (2.6)	41 (3.3)
Tunisia	80 (2.1)	89 (2.0)	80 (2.3)	79 (2.3)	71 (3.2)
Turkey	68 (2.7)	78 (3.1)	66 (3.4)	67 (3.1)	62 (3.4)
Ukraine	90 (1.3)	97 (0.9)	96 (1.2)	93 (1.3)	71 (3.0)
United States	93 (0.8)	97 (0.7)	95 (0.8)	88 (1.3)	92 (1.3)
‡ Morocco	73 (2.7)	86 (3.1)	79 (3.3) r	77 (2.1) r	53 (4.9)
<b>International Avg.</b>	<b>79 (0.3)</b>	<b>87 (0.3)</b>	<b>82 (0.3)</b>	<b>79 (0.3)</b>	<b>68 (0.4)</b>
<b>Benchmarking Participants</b>					
Basque Country, Spain	88 (1.7)	98 (1.0)	94 (1.7)	85 (2.6)	77 (3.4)
British Columbia, Canada	91 (1.3)	95 (1.1)	93 (1.4)	86 (2.0)	89 (2.1)
Dubai, UAE	s 88 (1.4)	s 95 (1.3) s	94 (1.5) s	84 (1.6) s	81 (2.5)
Massachusetts, US	96 (0.9)	98 (1.3)	97 (0.8)	93 (1.3)	97 (1.8)
Minnesota, US	r 97 (1.1)	r 99 (0.5) r	98 (1.1) r	91 (3.1) r	98 (1.0)
Ontario, Canada	83 (2.4)	88 (2.3)	80 (2.8)	78 (3.0)	85 (3.0)
Quebec, Canada	87 (1.7)	95 (1.4)	87 (2.3)	89 (1.7)	79 (2.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

\* See Exhibit 6.7 for data on individual topics.

\*\* The TIMSS topics were summarized to reduce teachers' response burden.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (--) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 6.7 Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics*									
	Number (10 topics)									
	Whole Numbers Including Place Value and Ordering	Operations (+, -, ×, ÷) with Whole Numbers	Fractions as Part of Whole and Location on Number Line	Fractions Represented by Words, Numbers, or Models	Comparing and Ordering Fractions	Adding and Subtracting with Fractions	Adding and Subtracting with Decimals	Number Sentences	Number Patterns	Relationships Between Given Pairs of Whole Numbers
Algeria	72 (3.8)	87 (2.5)	74 (4.3)	67 (4.8)	82 (3.3)	80 (3.3)	83 (3.2)	74 (3.8)	60 (5.1)	57 (4.8)
Armenia	49 (4.0)	48 (3.4)	49 (3.6)	49 (3.9)	45 (3.7)	46 (3.7)	46 (3.7)	50 (3.8)	47 (3.3)	49 (4.0)
Australia	92 (1.7)	94 (1.7)	81 (3.1)	77 (2.7)	72 (3.4)	68 (3.9)	76 (3.6)	92 (1.6)	85 (2.7)	77 (2.8)
Austria	94 (1.4)	98 (0.9)	81 (2.3)	76 (2.3)	74 (2.6)	73 (2.4)	70 (2.9)	70 (2.9)	70 (2.7)	73 (2.9)
Chinese Taipei	65 (4.2)	66 (4.4)	60 (4.4)	55 (4.4)	66 (4.2)	69 (3.9)	70 (3.9)	58 (4.1)	60 (3.9)	54 (4.6)
Colombia	85 (3.1)	94 (1.8)	84 (3.3)	82 (3.0)	81 (3.9)	90 (2.8)	88 (3.3)	74 (4.5)	64 (5.5)	74 (4.9)
Czech Republic	94 (2.0)	98 (1.4)	85 (3.3)	83 (3.1)	81 (3.8)	82 (3.5)	83 (3.9)	82 (2.9)	82 (3.5)	83 (2.9)
Denmark	97 (1.9)	98 (1.8)	99 (0.7)	96 (1.7)	96 (1.7)	92 (2.4)	98 (1.2)	94 (1.8)	86 (3.1)	83 (3.6)
El Salvador	67 (3.8)	81 (3.3)	58 (4.1)	57 (4.4)	60 (4.0)	74 (3.7)	76 (3.7)	44 (4.6)	43 (4.5)	57 (3.5)
England	98 (1.0)	95 (1.7)	89 (2.6)	87 (2.8)	83 (2.8)	76 (3.2)	89 (2.5)	94 (1.6)	93 (1.8)	90 (2.2)
Georgia	93 (2.2)	94 (2.1)	84 (3.3)	91 (2.4)	92 (2.3)	88 (2.7)	82 (4.1)	84 (4.5)	92 (1.9)	79 (4.1)
Germany	92 (1.8)	97 (1.1)	55 (4.3)	54 (4.4)	r 47 (5.1)	r 47 (5.0)	81 (2.3)	73 (3.4)	60 (3.1)	66 (3.1)
Hong Kong SAR	61 (4.2)	68 (4.1)	55 (4.4)	53 (4.6)	53 (4.0)	58 (4.3)	67 (4.2)	48 (4.5)	47 (4.6)	45 (4.5)
Hungary	99 (0.6)	99 (0.6)	92 (2.1)	93 (2.0)	93 (2.0)	92 (3.0)	r 90 (5.2)	95 (1.6)	97 (1.1)	86 (2.7)
Iran, Islamic Rep. of	76 (3.3)	84 (2.8)	63 (3.8)	55 (4.3)	73 (3.8)	81 (3.1)	58 (4.8)	44 (4.0)	44 (4.1)	45 (4.3)
Italy	73 (2.7)	78 (2.6)	68 (3.2)	69 (3.0)	63 (3.3)	64 (3.3)	73 (3.1)	56 (3.5)	62 (3.3)	60 (3.2)
Japan	48 (3.8)	55 (4.1)	47 (4.0)	31 (3.3)	40 (3.8)	39 (4.1)	43 (4.0)	28 (3.7)	19 (3.3)	17 (2.9)
Kazakhstan	--	--	--	--	--	--	--	--	--	--
Kuwait	r 96 (1.9)	r 94 (2.2)	r 86 (3.1)	r 83 (3.4)	r 89 (2.5)	r 89 (3.0)	r 76 (4.2)	r 84 (3.4)	r 73 (4.5)	r 72 (4.6)
Latvia	98 (1.1)	99 (0.6)	77 (3.0)	76 (2.8)	76 (3.2)	85 (3.0)	77 (3.6)	91 (2.4)	97 (1.2)	90 (2.6)
Lithuania	59 (3.5)	76 (2.9)	56 (3.6)	45 (3.8)	49 (3.7)	46 (3.9)	50 (3.7)	49 (4.0)	61 (3.3)	47 (3.4)
Morocco	89 (2.5)	94 (1.9)	82 (3.5)	75 (4.0)	87 (2.8)	85 (3.0)	86 (2.9)	84 (2.9)	67 (4.2)	72 (4.2)
Netherlands	83 (3.4)	89 (2.9)	81 (3.4)	80 (3.3)	75 (3.8)	75 (3.9)	76 (3.8)	85 (3.3)	72 (4.0)	64 (4.4)
New Zealand	87 (2.2)	90 (1.7)	77 (2.4)	76 (2.5)	73 (2.4)	62 (2.9)	61 (2.6)	84 (2.1)	81 (2.1)	74 (2.2)
Norway	99 (0.6)	99 (0.8)	91 (1.8)	88 (1.9)	85 (2.5)	92 (1.8)	95 (1.5)	79 (2.9)	74 (3.0)	76 (3.0)
Qatar	95 (0.1)	96 (0.0)	87 (0.1)	86 (0.1)	90 (0.1)	92 (0.1)	77 (0.1)	84 (0.1)	68 (0.2)	74 (0.2)
Russian Federation	--	--	--	--	--	--	--	--	--	--
Scotland	98 (1.1)	99 (0.8)	95 (1.5)	92 (2.1)	93 (1.7)	81 (3.2)	87 (2.5)	94 (1.7)	93 (2.2)	90 (2.6)
Singapore	93 (1.5)	94 (1.3)	90 (1.9)	90 (1.9)	89 (1.8)	91 (1.6)	93 (1.5)	83 (2.2)	82 (2.0)	82 (2.1)
Slovak Republic	96 (1.3)	97 (1.2)	87 (2.7)	87 (2.8)	79 (4.3)	70 (5.7)	81 (4.6)	83 (3.1)	92 (2.1)	99 (0.5)
Slovenia	91 (1.6)	96 (1.1)	75 (2.7)	79 (2.7)	61 (3.2)	55 (3.6)	55 (3.8)	80 (2.5)	65 (3.3)	74 (2.9)
Sweden	93 (2.1)	97 (1.2)	80 (2.9)	71 (3.2)	71 (3.3)	68 (3.2)	80 (3.1)	75 (3.2)	79 (2.9)	67 (3.4)
Tunisia	75 (3.4)	71 (3.3)	58 (4.3)	56 (4.3)	56 (4.7)	56 (4.6)	65 (3.8)	68 (3.6)	62 (3.2)	64 (3.8)
Ukraine	95 (1.7)	98 (0.9)	93 (2.3)	96 (1.7)	93 (2.2)	92 (2.6)	84 (3.8)	95 (1.8)	87 (3.0)	88 (2.8)
United States	97 (0.9)	97 (0.9)	90 (1.6)	91 (1.8)	82 (2.2)	89 (1.8)	92 (1.5)	93 (1.4)	92 (1.3)	92 (1.3)
Yemen	82 (3.1)	92 (2.7)	66 (4.3)	71 (4.4)	88 (2.7)	89 (2.8)	80 (4.1)	60 (4.1)	63 (4.9)	65 (4.2)
International Avg.	85 (0.4)	89 (0.4)	76 (0.5)	74 (0.6)	75 (0.6)	75 (0.6)	76 (0.6)	74 (0.5)	71 (0.6)	70 (0.6)
<b>Benchmarking Participants</b>										
Alberta, Canada	95 (1.6)	96 (1.5)	83 (3.0)	87 (2.4)	75 (3.2)	73 (3.8)	91 (2.3)	90 (2.5)	89 (2.6)	86 (2.9)
British Columbia, Canada	91 (1.8)	95 (1.0)	86 (2.5)	86 (3.0)	r 80 (2.8)	r 80 (3.1)	86 (2.3)	80 (2.8)	83 (3.3)	78 (3.3)
Dubai, UAE	r 100 (0.0)	r 100 (0.0)	r 98 (1.0)	r 96 (2.8)	r 98 (0.1)	r 97 (1.1)	s 97 (1.1)	r 92 (3.6)	s 93 (1.7)	s 94 (1.9)
Massachusetts, US	100 (0.0)	98 (1.2)	97 (1.7)	97 (1.7)	95 (2.2)	90 (3.0)	95 (2.3)	96 (2.2)	95 (2.1)	94 (3.0)
Minnesota, US	98 (1.6)	100 (0.0)	92 (3.5)	88 (4.5)	82 (4.9)	86 (4.3)	94 (3.0)	94 (2.2)	94 (2.1)	90 (3.2)
Ontario, Canada	95 (2.0)	95 (1.9)	84 (3.1)	85 (3.4)	79 (3.9)	76 (4.6)	86 (3.1)	89 (2.6)	89 (2.7)	80 (3.9)
Quebec, Canada	96 (1.7)	97 (1.3)	88 (3.1)	90 (2.7)	84 (3.2)	82 (2.8)	92 (2.5)	86 (2.8)	84 (3.3)	82 (3.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

\* The TIMSS topics were summarized to reduce teachers' response burden.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.





**Exhibit 6.7 Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics*									
	Geometric Shapes and Measures (7 topics)							Data Display (3 topics)		
	Comparing and Drawing Angles	Elementary Properties of Common Geometric Shapes	Relationship Between 2D and 3D Shapes	Finding Areas and Perimeters	Estimating Areas and Volumes	Using Informal Coordinate Systems to Locate Points in a Plane	Reflections and Rotations	Reading Data from Tables, Bar Graphs, or Pie Charts	Drawing Conclusions from Data Displays	Displaying Data Using Tables, Bar Graphs, or Pie Charts
Algeria	84 (2.8)	83 (3.1)	50 (5.0)	89 (2.7)	77 (3.8)	40 (4.4)	39 (4.4)	48 (4.8)	58 (4.3)	52 (4.7)
Armenia	50 (3.7)	46 (3.4)	48 (4.2)	45 (4.0)	44 (4.3)	46 (3.8)	49 (4.3)	50 (4.1)	43 (3.5)	43 (3.7)
Australia	70 (3.1)	75 (3.4)	73 (3.7)	88 (2.3)	65 (3.7)	74 (3.4)	61 (3.9)	92 (2.1)	86 (2.3)	86 (2.5)
Austria	67 (2.9)	81 (2.2)	51 (3.7)	93 (1.3)	48 (3.5)	71 (3.0)	52 (3.8)	49 (3.4)	52 (3.3)	36 (3.7)
Chinese Taipei	63 (4.1)	69 (4.2)	58 (4.3)	65 (4.2)	54 (4.5)	49 (4.4)	31 (4.4)	68 (4.0)	62 (4.5)	65 (4.2)
Colombia	79 (4.1)	72 (4.2)	51 (4.7)	82 (3.7)	73 (4.5)	68 (4.5)	46 (5.0)	77 (4.0)	76 (4.2)	69 (4.0)
Czech Republic	70 (4.6)	93 (2.2)	63 (4.4)	91 (2.3)	62 (4.3)	63 (5.1)	52 (5.0)	64 (4.3)	64 (4.2)	56 (4.2)
Denmark	96 (2.0)	96 (1.1)	70 (4.3)	99 (0.5)	97 (1.5)	98 (1.0)	88 (2.8)	96 (1.5)	88 (2.7)	89 (2.8)
El Salvador	74 (3.6)	67 (4.0)	28 (4.2)	67 (3.8)	55 (4.1)	67 (4.2)	34 (4.5)	80 (3.7)	55 (4.4)	76 (3.7)
England	93 (1.8)	85 (2.7)	84 (2.8)	96 (1.3)	83 (3.2)	90 (2.6)	78 (3.3)	92 (2.1)	90 (2.3)	90 (2.4)
Georgia	88 (2.9)	82 (4.5)	64 (4.8)	95 (2.2)	81 (3.8)	70 (4.5)	53 (5.1)	63 (5.0)	74 (5.0)	65 (5.0)
Germany	67 (4.0)	88 (2.0)	54 (3.3)	70 (3.1)	50 (3.5)	61 (3.3)	62 (3.2)	66 (3.0)	61 (3.1)	54 (3.4)
Hong Kong SAR	60 (4.4)	52 (4.3)	53 (4.7)	59 (4.1)	46 (4.6)	43 (5.5)	40 (5.2)	72 (3.8)	62 (4.4)	68 (3.6)
Hungary	88 (2.5)	95 (1.2)	64 (4.3)	97 (1.2)	76 (4.3)	73 (4.4)	73 (3.5)	88 (2.4)	84 (2.5)	81 (3.1)
Iran, Islamic Rep. of	88 (2.8)	60 (4.4)	34 (4.2)	81 (3.0)	60 (4.2)	27 (4.3)	26 (4.1)	55 (4.1)	51 (4.4)	53 (4.2)
Italy	66 (3.2)	73 (3.0)	61 (3.2)	71 (3.3)	51 (3.8)	47 (3.2)	40 (3.5)	63 (3.0)	66 (2.8)	60 (3.0)
Japan	53 (3.9)	45 (3.8)	25 (3.6)	55 (3.6)	32 (3.6)	19 (3.3)	16 (3.3)	40 (3.6)	23 (3.5)	34 (3.8)
Kazakhstan	--	--	--	--	--	--	--	--	--	--
Kuwait	r 95 (2.1)	r 88 (2.8)	r 67 (4.2)	r 90 (2.9)	r 82 (3.6)	r 56 (4.5)	r 63 (4.7)	r 75 (4.4)	r 76 (4.1)	r 72 (4.1)
Latvia	92 (2.1)	95 (1.8)	37 (4.2)	96 (1.8)	79 (2.9)	28 (4.2)	26 (4.1)	91 (2.1)	86 (2.6)	85 (2.9)
Lithuania	59 (3.2)	61 (3.4)	35 (3.8)	77 (3.1)	37 (3.7)	36 (3.8)	24 (4.2)	61 (3.7)	53 (3.8)	50 (3.6)
Morocco	84 (3.0)	92 (1.9)	66 (3.4)	92 (2.0)	75 (3.5)	56 (4.3)	r 40 (3.8)	69 (4.1)	79 (3.5)	63 (4.3)
Netherlands	46 (4.3)	47 (4.3)	40 (4.3)	80 (3.4)	58 (4.3)	70 (4.0)	51 (4.3)	85 (3.1)	78 (3.9)	81 (3.4)
New Zealand	56 (2.7)	75 (2.5)	73 (2.1)	77 (2.2)	65 (2.6)	60 (3.0)	74 (2.1)	88 (1.6)	85 (1.8)	85 (1.6)
Norway	83 (2.7)	90 (1.9)	70 (3.4)	94 (1.5)	85 (2.4)	82 (2.5)	70 (3.4)	89 (2.3)	83 (2.7)	78 (2.8)
Qatar	91 (0.1)	83 (0.1)	57 (0.2)	91 (0.1)	76 (0.2)	61 (0.2)	59 (0.2)	68 (0.2)	67 (0.2)	64 (0.2)
Russian Federation	--	--	--	--	--	--	--	--	--	--
Scotland	86 (2.7)	86 (2.9)	90 (2.6)	95 (1.9)	81 (3.3)	87 (3.3)	71 (3.5)	96 (1.7)	94 (2.1)	94 (2.0)
Singapore	86 (2.0)	87 (1.9)	68 (3.0)	89 (1.9)	77 (2.4)	55 (3.4)	55 (3.3)	92 (1.7)	88 (2.0)	88 (2.0)
Slovak Republic	77 (5.3)	96 (1.5)	58 (4.8)	93 (2.1)	69 (4.3)	51 (5.4)	43 (5.6)	69 (3.5)	64 (4.1)	61 (4.2)
Slovenia	39 (3.7)	80 (2.2)	89 (1.9)	60 (3.7)	50 (3.5)	35 (3.6)	--	88 (2.0)	81 (2.6)	81 (2.3)
Sweden	84 (2.7)	88 (2.4)	44 (3.9)	91 (1.8)	74 (3.1)	72 (3.3)	29 (3.7)	89 (2.0)	77 (2.6)	76 (3.1)
Tunisia	71 (3.3)	71 (3.0)	56 (3.8)	73 (3.5)	59 (4.1)	55 (4.3)	49 (4.6)	60 (4.0)	70 (3.7)	67 (3.7)
Ukraine	94 (1.9)	98 (1.2)	77 (3.8)	99 (0.8)	80 (3.7)	72 (5.2)	63 (5.9)	79 (3.9)	81 (3.6)	76 (4.1)
United States	86 (1.7)	91 (1.3)	81 (2.0)	95 (1.2)	78 (2.4)	87 (2.0)	79 (1.8)	96 (0.9)	92 (1.4)	92 (1.4)
Yemen	83 (3.0)	75 (4.2)	51 (5.5)	81 (4.0)	74 (3.9)	38 (5.5)	38 (5.5)	58 (4.6)	49 (5.4)	45 (5.3)
<b>International Avg.</b>	<b>76 (0.5)</b>	<b>78 (0.5)</b>	<b>58 (0.7)</b>	<b>83 (0.5)</b>	<b>66 (0.6)</b>	<b>59 (0.7)</b>	<b>51 (0.7)</b>	<b>74 (0.6)</b>	<b>70 (0.6)</b>	<b>69 (0.6)</b>

**Benchmarking Participants**

Alberta, Canada	72 (3.9)	87 (2.5)	83 (3.0)	92 (2.0)	74 (3.5)	71 (3.2)	59 (3.9)	93 (2.1)	88 (2.4)	91 (2.2)
British Columbia, Canada	77 (3.8)	82 (3.3)	74 (4.0)	88 (2.4)	r 76 (3.1)	72 (4.0)	59 (3.6)	91 (1.8)	89 (1.9)	88 (2.1)
Dubai, UAE	s 99 (1.1)	r 95 (1.1)	s 85 (2.6)	r 99 (0.1)	s 94 (2.6)	s 79 (3.6)	s 79 (4.4)	s 93 (2.2)	s 91 (1.7)	s 90 (4.5)
Massachusetts, US	96 (1.9)	96 (2.3)	85 (3.4)	96 (2.2)	85 (4.3)	96 (2.2)	77 (3.7)	100 (0.0)	95 (2.3)	98 (1.5)
Minnesota, US	87 (4.6)	92 (3.2)	77 (6.2)	97 (2.2)	72 (6.6)	85 (3.4)	76 (6.0)	97 (2.0)	93 (3.3)	89 (4.8)
Ontario, Canada	85 (3.4)	90 (2.7)	87 (2.7)	96 (1.5)	79 (3.7)	84 (3.4)	70 (4.0)	99 (0.5)	95 (1.6)	98 (1.2)
Quebec, Canada	85 (3.3)	92 (1.9)	77 (3.8)	92 (2.3)	76 (3.7)	81 (3.7)	68 (3.8)	88 (2.0)	83 (3.0)	84 (2.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Exhibit 6.7 Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics*									
	Number (5 topics)					Algebra (4 topics)				
	Computing, Estimating, or Approximating with Whole Numbers	Representing Decimals and Fractions Using Words, Numbers, or Models	Computing with Fractions and Decimals	Representing, Comparing, Ordering, and Computing with Integers	Problem Solving Involving Percents and Proportions	Numeric, Algebraic, and Geometric Patterns or Sequences	Simplifying and Evaluating the Algebraic Expressions	Simple Linear Equations and Inequalities, and Simultaneous (Two Variable) Equations	Equivalent Representations of Functions as Ordered Pairs, Tables, Graphs, Words, or Equations	
Algeria	71 (4.3)	61 (4.7)	82 (3.4)	89 (2.8)	81 (3.5)	r 28 (4.9)	88 (2.7)	79 (3.7)	56 (4.4)	
Armenia	53 (3.6)	51 (3.7)	54 (3.3)	54 (3.3)	59 (3.2)	49 (3.3)	48 (4.1)	50 (3.8)	47 (3.8)	
Australia	92 (2.5)	95 (1.8)	91 (2.6)	90 (2.7)	94 (2.0)	88 (2.6)	93 (2.2)	87 (2.7)	88 (2.6)	
Bahrain	97 (0.8)	91 (1.0)	95 (1.3)	95 (1.6)	92 (0.9)	72 (2.1)	96 (0.5)	98 (1.1)	88 (1.2)	
Bosnia and Herzegovina	77 (3.7)	78 (3.4)	81 (3.2)	80 (3.4)	73 (3.6)	65 (3.9)	79 (3.3)	81 (3.3)	76 (3.7)	
Botswana	89 (2.8)	86 (3.1)	94 (2.0)	88 (2.9)	85 (3.1)	77 (4.1)	94 (1.8)	92 (2.7)	69 (4.9)	
Bulgaria	98 (0.7)	99 (0.4)	100 (0.0)	100 (0.0)	100 (0.2)	92 (2.1)	100 (0.2)	100 (0.0)	98 (1.0)	
Chinese Taipei	83 (3.1)	83 (3.1)	85 (3.0)	86 (2.9)	76 (3.4)	80 (3.2)	85 (2.9)	85 (2.7)	75 (3.7)	
Colombia	99 (0.8)	97 (1.5)	97 (1.5)	98 (1.1)	95 (2.1)	89 (2.6)	95 (2.0)	94 (2.7)	93 (2.4)	
Cyprus	92 (1.7)	79 (2.9)	94 (1.4)	95 (1.3)	95 (1.3)	83 (2.5)	97 (1.3)	96 (1.6)	88 (2.0)	
Czech Republic	98 (1.1)	96 (1.5)	99 (0.7)	98 (1.2)	98 (0.9)	78 (3.3)	98 (1.1)	98 (1.0)	95 (1.6)	
Egypt	92 (2.1)	83 (3.0)	92 (1.9)	94 (1.9)	87 (2.7)	77 (3.5)	97 (0.8)	97 (1.3)	88 (2.7)	
El Salvador	80 (3.3)	76 (3.8)	85 (3.4)	80 (3.7)	69 (4.1)	51 (4.8)	80 (3.5)	79 (3.5)	72 (4.1)	
England	96 (1.6)	95 (1.8)	97 (1.5)	98 (1.2)	95 (1.4)	98 (0.9)	100 (0.3)	96 (1.4)	92 (2.4)	
Georgia	99 (0.8)	97 (1.6)	98 (1.2)	95 (2.4)	93 (3.4)	89 (4.0)	95 (2.8)	90 (3.8)	84 (4.3)	
Ghana	89 (2.3)	88 (2.7)	91 (2.3)	91 (2.5)	91 (2.5)	80 (3.3)	98 (1.1)	92 (2.2)	83 (3.1)	
Hong Kong SAR	61 (4.4)	65 (4.3)	75 (3.8)	75 (3.9)	60 (4.3)	66 (3.9)	78 (3.7)	80 (3.6)	68 (3.8)	
Hungary	95 (2.2)	94 (2.4)	96 (2.2)	95 (2.2)	95 (2.2)	92 (2.4)	96 (2.2)	94 (2.3)	93 (2.3)	
Indonesia	73 (3.9)	86 (3.2)	96 (1.6)	92 (2.5)	87 (2.8)	67 (4.0)	80 (2.9)	92 (2.2)	77 (3.6)	
Iran, Islamic Rep. of	88 (2.2)	77 (2.9)	96 (1.3)	97 (1.3)	92 (2.1)	53 (3.9)	98 (1.0)	92 (1.9)	63 (3.9)	
Israel	r 85 (2.7)	r 85 (2.5)	r 89 (2.4)	r 89 (2.5)	r 86 (2.4)	r 89 (2.4)	r 92 (2.2)	r 93 (2.1)	r 89 (2.5)	
Italy	74 (2.6)	77 (2.8)	79 (2.8)	82 (2.6)	74 (3.0)	42 (3.4)	76 (2.9)	64 (3.5)	67 (3.1)	
Japan	43 (4.3)	48 (4.2)	54 (3.7)	60 (3.6)	45 (3.5)	44 (3.9)	73 (3.1)	70 (3.4)	49 (4.0)	
Jordan	94 (1.9)	93 (2.1)	97 (1.3)	96 (1.8)	90 (2.4)	78 (3.5)	97 (1.5)	97 (1.3)	94 (1.9)	
Korea, Rep. of	66 (3.4)	68 (3.5)	77 (3.2)	79 (3.0)	70 (3.3)	53 (3.3)	85 (2.6)	87 (2.5)	74 (3.1)	
Kuwait	r 92 (2.7)	r 83 (4.1)	r 91 (2.7)	r 92 (2.7)	r 89 (3.1)	r 51 (5.4)	r 82 (3.9)	r 86 (3.5)	r 75 (3.9)	
Lebanon	93 (1.9)	91 (2.4)	94 (1.9)	92 (2.4)	85 (3.3)	86 (3.1)	95 (1.8)	92 (2.4)	86 (2.7)	
Lithuania	81 (2.7)	80 (3.1)	84 (2.9)	81 (3.3)	79 (3.1)	52 (3.3)	83 (3.0)	82 (2.8)	71 (3.2)	
Malaysia	87 (3.0)	81 (3.4)	85 (3.2)	86 (2.9)	75 (3.5)	82 (3.2)	91 (2.6)	82 (3.4)	73 (3.4)	
Malta	95 (0.1)	93 (0.1)	95 (0.1)	99 (0.1)	97 (0.1)	90 (0.1)	98 (0.1)	97 (0.1)	91 (0.2)	
Norway	97 (1.2)	98 (1.0)	99 (0.8)	97 (1.2)	95 (1.6)	87 (2.2)	95 (1.5)	94 (1.7)	86 (2.2)	
Oman	96 (1.8)	86 (2.8)	89 (2.5)	97 (1.7)	93 (2.0)	62 (4.1)	95 (2.0)	96 (1.8)	89 (3.1)	
Palestinian Nat'l Auth.	95 (1.9)	90 (2.8)	95 (2.3)	94 (2.0)	92 (2.3)	69 (3.6)	96 (1.7)	98 (1.3)	93 (2.2)	
Qatar	95 (0.1)	93 (0.1)	96 (0.1)	98 (0.0)	92 (0.1)	71 (0.2)	94 (0.1)	97 (0.0)	86 (0.1)	
Romania	96 (1.6)	95 (1.8)	98 (0.9)	97 (1.1)	96 (1.7)	81 (3.1)	97 (1.1)	97 (1.0)	92 (2.1)	
Russian Federation	--	--	--	--	--	--	--	--	--	
Saudi Arabia	87 (3.0)	75 (4.1)	83 (3.7)	90 (2.5)	71 (4.0)	47 (4.5)	85 (3.1)	76 (4.1)	84 (3.3)	
Scotland	98 (0.7)	98 (1.0)	98 (0.8)	98 (0.9)	97 (1.1)	97 (1.3)	99 (0.3)	100 (0.3)	91 (2.1)	
Serbia	78 (4.1)	88 (2.7)	92 (2.3)	89 (2.9)	84 (3.3)	63 (4.1)	84 (3.7)	91 (2.8)	76 (4.0)	
Singapore	87 (1.9)	87 (1.8)	91 (1.4)	89 (1.5)	87 (1.8)	70 (2.3)	93 (1.4)	91 (1.5)	83 (2.0)	
Slovenia	95 (1.1)	88 (1.8)	95 (1.2)	95 (1.2)	86 (1.9)	66 (2.6)	92 (1.4)	92 (1.6)	90 (1.7)	
Sweden	93 (1.5)	89 (1.6)	90 (1.8)	90 (1.8)	88 (2.0)	73 (2.5)	89 (1.6)	78 (2.5)	72 (2.5)	
Syrian Arab Republic	87 (3.0)	79 (3.4)	90 (2.7)	92 (2.3)	82 (3.3)	49 (4.3)	92 (2.4)	93 (2.2)	78 (3.5)	
Thailand	55 (4.4)	48 (4.0)	61 (4.4)	64 (4.3)	51 (3.8)	23 (3.8)	29 (4.3)	53 (4.1)	52 (4.5)	
Tunisia	88 (2.9)	88 (2.8)	94 (2.2)	95 (1.7)	78 (3.6)	62 (3.9)	91 (2.3)	87 (3.0)	76 (3.4)	
Turkey	80 (4.0)	70 (3.9)	82 (3.4)	87 (3.3)	73 (4.6)	56 (4.5)	80 (3.9)	75 (4.1)	49 (4.9)	
Ukraine	96 (1.5)	95 (1.7)	99 (0.9)	98 (1.3)	98 (1.0)	94 (1.7)	96 (1.8)	98 (1.3)	95 (1.6)	
United States	97 (0.8)	97 (0.8)	97 (0.8)	98 (0.7)	95 (1.0)	93 (1.1)	98 (0.7)	95 (1.2)	94 (1.2)	
‡ Morocco	86 (4.0)	78 (4.5)	91 (3.4)	91 (3.1)	84 (4.3)	r 56 (4.5)	85 (3.8)	89 (3.5)	79 (4.3)	
International Avg.	86 (0.4)	84 (0.4)	89 (0.3)	90 (0.3)	84 (0.4)	70 (0.5)	89 (0.3)	88 (0.4)	80 (0.4)	

**Benchmarking Participants**

Basque Country, Spain	99 (1.0)	98 (1.4)	98 (1.4)	100 (0.0)	98 (1.3)	92 (2.7)	99 (1.0)	98 (1.3)	87 (3.6)
British Columbia, Canada	96 (1.8)	94 (2.1)	98 (1.2)	95 (1.9)	94 (1.7)	89 (2.3)	99 (0.8)	92 (2.4)	93 (2.2)
Dubai, UAE	s 96 (1.2)	s 95 (2.5)	s 96 (1.3)	s 93 (2.2)	s 95 (1.8)	s 96 (0.7)	s 92 (2.3)	s 94 (2.6)	s 93 (1.5)
Massachusetts, US	99 (1.3)	98 (1.6)	99 (1.3)	100 (0.0)	97 (1.8)	94 (2.1)	100 (0.0)	98 (1.5)	98 (1.6)
Minnesota, US	r 100 (0.3)	r 98 (1.9)	r 100 (0.3)	r 100 (0.3)	r 100 (0.3)	r 93 (4.4)	r 100 (0.3)	r 99 (0.8)	r 99 (0.9)
Ontario, Canada	89 (2.6)	82 (3.5)	90 (2.5)	90 (2.6)	86 (3.3)	83 (3.4)	87 (2.8)	73 (4.4)	80 (3.6)
Quebec, Canada	96 (1.4)	96 (1.8)	96 (1.6)	90 (3.2)	96 (1.9)	88 (3.1)	96 (1.7)	82 (3.8)	82 (3.8)

Background data provided by teachers.

\* The TIMSS topics were summarized to reduce teachers' response burden.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



**Exhibit 6.7 Students Whose Teachers Feel “Very Well” Prepared to Teach the TIMSS Mathematics Topics (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Percentage of Students Whose Teachers Report Feeling Very Well Prepared to Teach the TIMSS Mathematics Topics*									
	Geometry (6 topics)						Data and Chance (3 topics)			
	Geometric Properties of Angles and Geometric Shapes	Congruent Figures and Similar Triangles	Relationship Between 3D Shapes and Their 2D Representation	Measurement Formulas for Perimeters, Surface Areas and Volumes	Cartesian Plane (Ordered Pairs, Equations, Intercepts, Intersections, and Gradient)	Translation, Reflection, and Rotation	Reading and Displaying Data Using Tables and Graphs	Interpreting Data Sets	Judging, Predicting, and Determining Chances of Possible Outcomes	
Algeria	94 (2.0)	76 (4.0)	33 (4.7)	75 (3.9)	r 34 (5.3)	47 (4.5)	80 (3.7)	43 (4.3)	38 (4.5)	
Armenia	55 (3.4)	58 (3.2)	50 (3.4)	50 (3.5)	45 (3.5)	53 (4.1)	45 (4.1)	45 (4.1)	43 (3.7)	
Australia	95 (1.8)	87 (2.6)	86 (3.0)	94 (1.7)	88 (2.3)	79 (3.0)	96 (1.6)	93 (2.2)	91 (2.4)	
Bahrain	98 (0.9)	96 (1.8)	70 (2.2)	91 (1.4)	67 (2.5)	91 (2.1)	88 (2.2)	87 (2.1)	75 (2.7)	
Bosnia and Herzegovina	77 (3.5)	68 (3.8)	58 (4.1)	79 (3.5)	75 (3.7)	72 (3.8)	43 (3.7)	43 (3.4)	41 (3.5)	
Botswana	96 (1.9)	76 (3.5)	71 (4.4)	93 (2.5)	80 (3.9)	80 (3.8)	94 (2.2)	62 (4.7)	63 (4.6)	
Bulgaria	99 (1.0)	99 (1.1)	95 (1.6)	99 (0.9)	82 (3.2)	93 (1.8)	82 (2.9)	57 (3.9)	55 (4.0)	
Chinese Taipei	84 (2.8)	78 (3.2)	61 (3.8)	79 (3.5)	70 (3.8)	47 (4.5)	75 (3.5)	54 (4.5)	64 (4.3)	
Colombia	91 (2.2)	88 (3.2)	64 (4.4)	92 (2.8)	95 (1.7)	71 (4.6)	89 (2.9)	80 (3.5)	72 (4.8)	
Cyprus	95 (1.5)	94 (1.8)	66 (3.2)	97 (1.3)	95 (1.4)	60 (3.4)	79 (2.7)	60 (3.0)	56 (3.3)	
Czech Republic	97 (1.4)	94 (1.9)	88 (2.6)	99 (0.9)	80 (3.0)	82 (2.9)	84 (3.1)	53 (3.7)	42 (4.2)	
Egypt	94 (1.9)	95 (1.9)	60 (4.2)	90 (2.6)	94 (1.7)	97 (1.5)	87 (2.3)	67 (3.7)	68 (3.9)	
El Salvador	71 (4.0)	63 (4.7)	33 (4.3)	67 (4.3)	69 (4.1)	34 (4.6)	85 (3.2)	56 (4.5)	46 (5.0)	
England	97 (1.1)	89 (2.3)	83 (3.3)	98 (1.0)	89 (2.8)	94 (1.7)	96 (1.4)	92 (2.2)	97 (1.1)	
Georgia	98 (1.0)	90 (3.6)	71 (4.3)	91 (3.5)	81 (4.7)	86 (3.9)	83 (3.4)	73 (4.5)	68 (4.4)	
Ghana	90 (2.5)	77 (3.7)	64 (4.0)	87 (3.0)	81 (3.4)	89 (2.5)	93 (2.0)	77 (3.5)	75 (3.8)	
Hong Kong SAR	75 (3.9)	73 (4.0)	57 (4.7)	71 (3.6)	69 (4.0)	54 (4.9)	70 (4.1)	59 (4.9)	52 (4.8)	
Hungary	95 (2.2)	92 (2.4)	74 (3.9)	95 (2.2)	92 (2.5)	92 (2.6)	89 (2.9)	75 (3.7)	63 (4.3)	
Indonesia	92 (2.3)	91 (2.3)	59 (4.7)	95 (1.8)	88 (2.6)	79 (3.9)	87 (3.3)	54 (4.5)	72 (4.2)	
Iran, Islamic Rep. of	95 (1.4)	86 (2.7)	39 (3.9)	90 (2.5)	90 (2.0)	76 (3.6)	80 (3.0)	63 (4.1)	43 (4.1)	
Israel	r 89 (2.5)	r 86 (3.0)	r 66 (3.2)	r 83 (2.9)	r 85 (2.9)	r 66 (3.1)	r 89 (2.7)	r 78 (3.0)	r 76 (3.1)	
Italy	82 (2.7)	75 (3.0)	72 (3.2)	86 (2.4)	67 (3.1)	38 (3.1)	65 (3.1)	46 (3.1)	41 (3.3)	
Japan	69 (3.8)	69 (3.8)	56 (4.4)	65 (3.7)	63 (3.9)	51 (4.2)	31 (4.0)	23 (3.4)	47 (4.0)	
Jordan	89 (2.8)	94 (2.2)	61 (4.1)	93 (2.1)	95 (1.9)	77 (3.2)	93 (2.2)	80 (3.5)	78 (3.7)	
Korea, Rep. of	76 (3.2)	82 (2.9)	55 (3.5)	81 (2.9)	81 (2.9)	60 (3.4)	64 (3.6)	58 (3.2)	56 (3.1)	
Kuwait	r 88 (3.0)	r 88 (3.2)	r 43 (4.9)	r 78 (3.9)	r 40 (5.2)	r 88 (3.2)	r 80 (4.2)	r 66 (4.7)	r 61 (4.8)	
Lebanon	94 (1.9)	90 (2.3)	72 (4.3)	91 (2.3)	89 (2.5)	65 (5.0)	79 (3.2)	76 (4.0)	79 (3.6)	
Lithuania	78 (2.9)	75 (3.4)	56 (3.7)	83 (2.9)	66 (3.6)	49 (4.0)	71 (3.3)	49 (3.9)	45 (3.9)	
Malaysia	84 (2.3)	76 (3.3)	70 (3.3)	85 (2.9)	78 (3.4)	85 (2.2)	82 (2.8)	69 (4.0)	57 (4.0)	
Malta	100 (0.0)	85 (0.2)	74 (0.2)	97 (0.1)	93 (0.1)	86 (0.2)	92 (0.2)	79 (0.2)	87 (0.2)	
Norway	97 (1.1)	92 (1.7)	67 (2.8)	98 (0.9)	94 (1.6)	84 (2.5)	90 (1.7)	65 (3.3)	61 (3.7)	
Oman	91 (2.3)	90 (2.8)	52 (4.3)	91 (2.1)	88 (2.9)	91 (2.5)	90 (2.7)	71 (3.7)	67 (4.0)	
Palestinian Nat'l Auth.	94 (2.3)	94 (2.1)	64 (3.5)	90 (2.5)	82 (3.2)	74 (3.4)	86 (3.0)	75 (3.6)	79 (3.6)	
Qatar	92 (0.1)	93 (0.1)	68 (0.2)	87 (0.1)	64 (0.2)	97 (0.1)	95 (0.1)	80 (0.1)	73 (0.2)	
Romania	95 (1.8)	96 (1.7)	90 (2.2)	97 (1.1)	93 (1.7)	70 (3.4)	86 (2.7)	54 (3.4)	70 (4.1)	
Russian Federation	--	--	--	--	--	--	--	--	--	
Saudi Arabia	85 (3.1)	88 (3.1)	39 (4.9)	62 (4.2)	66 (4.6)	70 (3.8)	63 (4.9)	39 (4.5)	49 (4.4)	
Scotland	97 (1.0)	96 (1.5)	92 (1.9)	100 (0.3)	98 (0.7)	91 (2.1)	98 (0.9)	94 (1.4)	94 (1.5)	
Serbia	89 (2.9)	77 (4.0)	65 (4.2)	90 (2.8)	83 (2.9)	71 (3.7)	62 (4.2)	53 (4.5)	38 (4.0)	
Singapore	87 (1.6)	83 (1.9)	67 (2.8)	94 (1.0)	89 (1.7)	71 (2.6)	89 (1.8)	70 (2.9)	56 (3.0)	
Slovenia	92 (1.5)	86 (1.7)	75 (2.2)	92 (1.4)	73 (2.5)	74 (2.1)	78 (2.0)	51 (3.0)	38 (3.0)	
Sweden	90 (2.0)	82 (2.5)	54 (3.0)	92 (1.8)	81 (2.3)	32 (2.9)	86 (1.9)	72 (2.5)	70 (2.7)	
Syrian Arab Republic	98 (1.2)	95 (1.9)	56 (4.1)	78 (3.4)	36 (4.9)	60 (4.4)	64 (3.9)	56 (3.9)	58 (3.9)	
Thailand	57 (4.0)	59 (4.0)	35 (4.2)	50 (4.0)	23 (4.0)	54 (4.0)	64 (4.0)	29 (4.4)	28 (4.3)	
Tunisia	95 (1.8)	90 (2.7)	73 (3.8)	79 (3.5)	70 (4.0)	67 (4.0)	72 (4.0)	76 (3.5)	65 (3.7)	
Turkey	81 (3.5)	80 (3.8)	41 (4.6)	72 (4.4)	69 (4.6)	58 (4.9)	68 (4.2)	63 (4.5)	56 (3.8)	
Ukraine	98 (1.2)	94 (2.0)	83 (2.9)	98 (1.2)	99 (0.9)	89 (2.4)	86 (2.9)	67 (3.9)	61 (4.2)	
United States	93 (1.5)	93 (1.5)	85 (1.8)	95 (1.2)	85 (1.8)	79 (2.6)	95 (1.1)	92 (1.5)	89 (1.8)	
‡ Morocco	93 (2.4)	94 (2.1)	r 57 (4.8)	86 (3.9)	66 (4.7)	62 (5.0)	64 (6.2)	47 (4.6)	51 (6.6)	
<b>International Avg.</b>	<b>89 (0.3)</b>	<b>85 (0.4)</b>	<b>64 (0.5)</b>	<b>86 (0.4)</b>	<b>77 (0.5)</b>	<b>72 (0.5)</b>	<b>79 (0.5)</b>	<b>64 (0.5)</b>	<b>62 (0.5)</b>	
<b>Benchmarking Participants</b>										
Basque Country, Spain	97 (1.8)	89 (2.8)	74 (4.6)	98 (1.5)	85 (3.8)	64 (5.2)	88 (3.2)	75 (4.3)	66 (4.7)	
British Columbia, Canada	91 (2.4)	91 (2.6)	78 (3.5)	95 (2.0)	84 (3.2)	75 (3.6)	95 (1.9)	88 (2.5)	83 (3.1)	
Dubai, UAE	s 97 (1.1)	s 87 (1.6)	s 71 (2.8)	s 92 (1.7)	s 78 (3.1)	s 80 (4.1)	s 92 (1.6)	s 75 (3.6)	s 77 (3.4)	
Massachusetts, US	97 (1.9)	97 (1.7)	83 (4.2)	98 (1.7)	96 (2.9)	91 (4.4)	96 (2.8)	98 (1.7)	96 (2.9)	
Minnesota, US	r 94 (4.1)	r 96 (3.9)	r 85 (5.8)	r 99 (0.4)	r 91 (4.7)	r 84 (6.1)	r 99 (0.4)	r 99 (0.9)	r 96 (2.7)	
Ontario, Canada	78 (3.6)	82 (3.9)	74 (4.1)	92 (2.8)	64 (4.7)	77 (4.0)	91 (2.7)	86 (3.5)	78 (3.7)	
Quebec, Canada	91 (2.6)	94 (2.2)	73 (3.8)	95 (1.8)	86 (3.1)	92 (2.3)	89 (3.1)	70 (4.0)	76 (3.5)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

At the eighth grade, the average across all topics was 79 percent. Again, number had the highest percent on average across topics, with 87 percent of the students having teachers that reported being very well prepared to teach those topics. The averages for the algebra and geometry topics were similar, 82 and 79 percent, respectively. Within the algebra topics, the highest percents were for working with algebraic expressions and equations (88–89%), next for working with functions (80%), and lowest for patterns and sequences (70%). Again there was quite a range across the geometry topics from 89 percent for properties of angles and shapes to 64 percent for relationships between three-dimensional shapes and their two-dimensional representations. The average for data and chance was 68 percent. Within the three data and chance topics, reading and displaying data in graphs in tables was 79 percent, but the other two topics were lower—interpreting data sets (64%) and chances of possible outcomes (62%).





# Chapter 7



## *Classroom Characteristics and Instruction*

To place students' mathematics achievement results in instructional contexts, this chapter begins by providing information about class size and the characteristics of students in mathematics classes. The focus of the rest of the chapter is on the instructional activities used in teaching and learning mathematics and how these activities are supported with technology use, homework, and assessment.

### **How Do the Characteristics of Mathematics Classrooms Impact Instruction?**

Because having larger or smaller classes can impact instructional choices, TIMSS asked teachers about the size of their mathematics classes. The class size data are shown in Exhibits 7.1 and 7.2. Exhibit 7.1 presents trends in average class sizes back to 1995, and across the distribution of different class sizes. Exhibit 7.2 presents the TIMSS 2007 distribution of students in different sizes of classes in relation to their mathematics achievement.

As presented in Exhibit 7.1, in TIMSS 2007 across participating countries at the fourth grade, the average size of mathematics classes was 26. This represented a decrease in class size in eight of the participating countries. Two of the benchmarking provinces, Ontario and Quebec, also had decreases. At the eighth grade, the average class size of 29 represented a decrease in class size in 19 countries. Also among the benchmarking participants, the Basque country in Spain and the Canadian province of Ontario had smaller average class sizes in TIMSS 2007 than in previous assessments.

Exhibit 7.1 Class Size for Mathematics Instruction with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Overall Average Class Size			1-19 Students			20-32 Students			
	2007	Difference from 2003	Difference from 1995	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1995	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1995	
Algeria	r	28 (0.8)	0 0	0 0	11 (2.8)	0 0	0 0	60 (4.3)	0 0	0 0
Armenia	s	31 (1.6)	2 (2.2)	0 0	24 (3.3)	2 (5.3)	0 0	50 (3.8)	-2 (6.3)	0 0
Australia		24 (0.4)	-1 (0.7)	-1 (0.6) ▼	19 (3.0)	2 (4.3)	6 (3.9)	80 (3.0)	-2 (4.4)	-4 (4.3)
Austria		20 (0.3)	0 0	0 (0.6)	37 (2.9)	0 0	-4 (6.2)	63 (2.9)	0 0	4 (6.2)
Chinese Taipei		31 (0.3)	-1 (0.4)	0 0	3 (1.2)	2 (1.4)	0 0	45 (3.7)	1 (5.3)	0 0
Colombia		32 (1.0)	0 0	0 0	19 (3.3)	0 0	0 0	24 (4.7)	0 0	0 0
Czech Republic		22 (0.4)	0 0	0 (0.7)	31 (3.5)	0 0	7 (5.2)	69 (3.5)	0 0	-6 (5.2)
Denmark		21 (0.3)	0 0	0 0	34 (3.9)	0 0	0 0	66 (3.9)	0 0	0 0
El Salvador		30 (0.7)	0 0	0 0	20 (2.7)	0 0	0 0	37 (4.1)	0 0	0 0
England	r	28 (0.5)	0 (0.9)	-1 (0.7)	8 (1.9)	-3 (3.3)	1 (2.9)	80 (3.0)	12 (5.6) ▲	2 (5.2)
Georgia		22 (0.6)	0 0	0 0	37 (3.8)	0 0	0 0	50 (4.5)	0 0	0 0
Germany		22 (0.2)	0 0	0 0	21 (2.4)	0 0	0 0	79 (2.4)	0 0	0 0
Hong Kong SAR		35 (0.4)	1 (0.6)	-1 (0.7)	1 (0.7)	-1 (1.1)	1 (0.7)	25 (3.3)	-9 (5.4)	5 (6.6)
Hungary		22 (0.4)	-2 (0.6) ▼	0 (0.7)	33 (3.7)	14 (4.7) ▲	1 (6.0)	67 (3.7)	-13 (4.8) ▼	1 (6.0)
Iran, Islamic Rep. of	s	24 (0.5)	-3 (0.8) ▼	-7 (1.4) ▼	25 (2.7)	9 (3.8) ▲	10 (4.6) ▲	59 (3.8)	5 (5.8)	19 (6.8) ▲
Italy		20 (0.2)	0 (0.4)	--	44 (2.6)	-1 (4.3)	--	56 (2.6)	1 (4.3)	--
Japan		31 (0.4)	-1 (0.5) ▼	-2 (0.6) ▼	7 (1.5)	3 (1.7)	6 (1.6) ▲	47 (2.9)	6 (4.2)	-2 (5.4)
Kazakhstan		22 (0.5)	0 0	0 0	30 (4.5)	0 0	0 0	68 (4.6)	0 0	0 0
Kuwait	s	25 (0.5)	0 0	--	7 (2.8)	0 0	--	88 (3.4)	0 0	--
Latvia		22 (0.8)	0 (0.9)	1 (1.1)	44 (2.4)	12 (4.6) ▲	2 (6.3)	49 (3.0)	-12 (5.2) ▼	-8 (6.5)
Lithuania		20 (0.3)	-1 (0.5) ▼	0 0	37 (3.0)	8 (4.2)	0 0	63 (3.0)	-7 (4.2)	0 0
Morocco	r	29 (0.8)	--	0 0	17 (3.3)	--	0 0	42 (4.3)	--	0 0
Netherlands		22 (0.4)	-1 (0.6)	-1 (0.9)	27 (3.3)	3 (4.8)	0 (5.4)	71 (3.5)	-3 (5.1)	10 (5.6)
New Zealand	s	26 (0.4)	-1 (0.5) ▼	-3 (0.7) ▼	13 (2.1)	4 (2.6)	2 (3.5)	81 (2.4)	0 (3.5)	27 (5.0) ▲
Norway		21 (0.5)	0 (0.6)	2 (0.8) ▲	42 (3.3)	4 (4.6)	-9 (6.3)	53 (3.6)	-7 (5.0)	4 (6.5)
Qatar	r	28 (0.0)	0 0	0 0	8 (0.1)	0 0	0 0	75 (0.2)	0 0	0 0
Russian Federation		21 (0.4)	0 (0.5)	0 0	33 (2.7)	0 (4.2)	0 0	67 (2.7)	2 (4.2)	0 0
Scotland	s	25 (0.4)	-1 (0.6)	-1 (0.6)	16 (2.8)	-1 (4.4)	2 (3.6)	79 (3.0)	3 (5.1)	-2 (4.3)
Singapore		38 (0.2)	0 (0.3)	-1 (0.3)	0 (0.0)	0 (0.1)	0 (0.0)	6 (1.3)	1 (1.8)	2 (1.6)
Slovak Republic		21 (0.3)	0 0	0 0	34 (2.5)	0 0	0 0	65 (2.6)	0 0	0 0
Slovenia		19 (0.3)	0 (0.5)	-3 (0.5) ▼	46 (2.9)	1 (5.1)	20 (5.3) ▲	53 (3.0)	-2 (5.1)	-21 (5.3) ▼
Sweden		22 (0.5)	0 0	0 0	36 (3.4)	0 0	0 0	60 (3.6)	0 0	0 0
Tunisia	r	25 (0.4)	-6 (0.6) ▼	0 0	20 (2.8)	15 (3.2) ▲	0 0	69 (3.8)	12 (5.8) ▲	0 0
Ukraine		23 (0.4)	0 0	0 0	30 (3.3)	0 0	0 0	65 (3.5)	0 0	0 0
United States	r	23 (0.4)	0 (0.5)	-1 (0.7)	26 (2.6)	3 (3.6)	8 (4.1)	69 (2.8)	-5 (3.9)	-8 (4.3)
Yemen	r	46 (1.7)	0 0	0 0	9 (2.1)	0 0	0 0	17 (4.0)	0 0	0 0
International Avg.		26 (0.1)			24 (0.5)			58 (0.6)		
<b>Benchmarking Participants</b>										
Alberta, Canada		22 (0.5)	0 0	0 (1.2)	25 (2.9)	0 0	0 (8.7)	70 (3.4)	0 0	-4 (8.9)
British Columbia, Canada	r	22 (0.5)	0 0	0 0	29 (3.7)	0 0	0 0	69 (3.8)	0 0	0 0
Dubai, UAE		--	0 0	0 0	--	0 0	0 0	--	0 0	0 0
Massachusetts, US		21 (0.5)	0 0	0 0	24 (5.6)	0 0	0 0	76 (5.6)	0 0	0 0
Minnesota, US	r	24 (0.7)	0 0	--	16 (4.2)	0 0	--	83 (4.3)	0 0	--
Ontario, Canada		23 (0.4)	-2 (0.6) ▼	-2 (0.7) ▼	18 (3.5)	7 (4.5)	2 (5.2)	78 (3.9)	-8 (5.2)	-2 (5.5)
Quebec, Canada		24 (0.3)	-2 (0.4) ▼	-1 (0.7)	16 (2.5)	11 (2.9) ▲	8 (5.5)	83 (2.5)	-11 (3.0) ▼	-8 (5.5)

▲ 2007 significantly higher

▼ 2007 significantly lower

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s"

indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.


**TIMSS & PIRLS**  
 International Study Center  
 Lynch School of Education, Boston College



Exhibit 7.1 Class Size for Mathematics Instruction with Trends (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	33 or More Students		
	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1995
Algeria	r 29 (4.0)	0 0	0 0
Armenia	s 26 (3.6)	0 (6.0)	0 0
Australia	2 (1.2)	0 (2.0)	-2 (2.3)
Austria	0 (0.0)	0 0	0 (0.0)
Chinese Taipei	51 (3.4)	-3 (5.1)	0 0
Colombia	57 (4.4)	0 0	0 0
Czech Republic	0 (0.0)	0 0	-1 (0.1)
Denmark	0 (0.0)	0 0	0 0
El Salvador	43 (3.8)	0 0	0 0
England	r 12 (2.4)	-8 (5.0)	-3 (4.6)
Georgia	13 (2.2)	0 0	0 0
Germany	0 (0.0)	0 0	0 0
Hong Kong SAR	74 (3.4)	10 (5.5)	-5 (6.6)
Hungary	0 (0.0)	-1 (0.9)	-1 (1.0)
Iran, Islamic Rep. of	s 16 (2.9)	-14 (4.9)	▼ -30 (7.1)
Italy	0 (0.0)	0 (0.0)	--
Japan	45 (3.2)	-10 (4.3)	▼ -3 (5.6)
Kazakhstan	3 (1.2)	0 0	0 0
Kuwait	s 5 (1.9)	0 0	--
Latvia	6 (2.0)	-1 (3.3)	6 (2.0) ▲
Lithuania	0 (0.0)	0 (0.3)	0 0
Morocco	r 41 (3.9)	--	0 0
Netherlands	2 (1.3)	0 (1.9)	-10 (3.5) ▼
New Zealand	s 6 (1.7)	-4 (2.8)	-29 (4.7) ▼
Norway	5 (1.9)	3 (2.3)	5 (1.9) ▲
Qatar	r 17 (0.2)	0 0	0 0
Russian Federation	0 (0.3)	-1 (0.9)	0 0
Scotland	s 5 (1.6)	-2 (3.0)	0 (2.8)
Singapore	94 (1.3)	-1 (1.8)	-2 (1.7)
Slovak Republic	1 (0.6)	0 0	0 0
Slovenia	1 (0.6)	1 (0.6)	1 (0.6)
Sweden	4 (1.6)	0 0	0 0
Tunisia	r 11 (2.7)	-27 (5.1)	▼ 0 0
Ukraine	5 (1.4)	0 0	0 0
United States	r 5 (1.3)	2 (1.7)	0 (2.2)
Yemen	r 74 (4.1)	0 0	0 0
<b>International Avg.</b>	<b>18 (0.4)</b>		
<b>Benchmarking Participants</b>			
Alberta, Canada	4 (1.8)	0 0	4 (1.8) ▲
British Columbia, Canada	r 1 (0.8)	0 0	0 0
Dubai, UAE	--	0 0	0 0
Massachusetts, US	0 (0.0)	0 0	0 0
Minnesota, US	r 1 (1.2)	0 0	--
Ontario, Canada	4 (1.4)	1 (2.1)	0 (2.4)
Quebec, Canada	1 (0.2)	1 (0.2)	1 (0.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- ▲ 2007 significantly higher  
▼ 2007 significantly lower

Exhibit 7.1 Class Size for Mathematics Instruction with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Overall Average Class Size				1-24 Students				
	2007	Difference from 2003	Difference from 1999	Difference from 1995	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1999	Difference in Percent from 1995	
Algeria	r	37 (0.7)	◇◇	◇◇	◇◇	5 (2.1)	◇◇	◇◇	◇◇
Armenia	r	25 (0.4)	-2 (1.0) ▼	◇◇	◇◇	40 (4.0)	0 (6.0)	◇◇	◇◇
Australia	r	26 (0.3)	-1 (0.5)	--	0 (0.5)	30 (2.8)	-1 (5.1)	--	0 (4.5)
Bahrain		31 (0.1)	-1 (0.2) ▼	◇◇	◇◇	6 (0.7)	1 (1.0)	◇◇	◇◇
Bosnia and Herzegovina		24 (0.4)	◇◇	◇◇	◇◇	48 (3.6)	◇◇	◇◇	◇◇
Botswana		38 (0.4)	0 (0.5)	◇◇	◇◇	1 (0.6)	0 (0.9)	◇◇	◇◇
Bulgaria		22 (0.3)	-1 (0.6)	-1 (0.6)	◇◇	59 (3.5)	-5 (5.5)	-2 (6.7)	--
Chinese Taipei		35 (0.5)	-2 (0.7) ▼	-4 (0.7) ▼	◇◇	4 (1.8)	0 (2.3)	3 (2.1)	◇◇
Colombia	s	35 (0.6)	◇◇	◇◇	-4 (1.6) ▼	13 (2.5)	◇◇	◇◇	-5 (5.2)
Cyprus	r	24 (0.2)	-2 (0.2) ▼	-4 (0.3) ▼	-7 (0.5) ▼	54 (2.7)	33 (3.3) ▲	44 (3.7) ▲	51 (3.2) ▲
Czech Republic	r	24 (0.3)	◇◇	0 (0.5)	-1 (0.6)	49 (4.3)	◇◇	-4 (7.1)	10 (6.7)
Egypt		39 (0.6)	1 (0.8)	◇◇	◇◇	4 (1.5)	1 (1.9)	◇◇	◇◇
El Salvador		29 (0.8)	◇◇	◇◇	◇◇	35 (3.7)	◇◇	◇◇	◇◇
England	s	26 (0.6)	0 (0.7)	--	1 (0.8)	30 (3.8)	-4 (6.4)	--	-3 (5.6)
Georgia		23 (0.6)	◇◇	◇◇	◇◇	52 (5.2)	◇◇	◇◇	◇◇
Ghana	r	46 (1.9)	9 (2.1) ▲	◇◇	◇◇	13 (2.4)	-3 (3.6)	◇◇	◇◇
Hong Kong SAR		37 (0.5)	-2 (0.6) ▼	0 (0.8)	-2 (0.8) ▼	10 (1.9)	7 (2.2) ▲	1 (2.9)	4 (3.2)
Hungary		21 (0.5)	-1 (0.6)	0 (0.7)	-1 (0.7)	72 (3.4)	8 (5.2)	1 (5.0)	5 (5.3)
Indonesia		38 (0.9)	-1 (1.0)	-16 (3.2) ▼	◇◇	6 (1.8)	3 (2.5)	5 (1.8) ▲	◇◇
Iran, Islamic Rep. of	r	26 (0.5)	-3 (0.7) ▼	-7 (0.8) ▼	-10 (1.3) ▼	35 (3.2)	13 (4.3) ▲	24 (3.9) ▲	27 (4.1) ▲
Israel	s	33 (0.4)	0 (0.6)	7 (0.8) ▲	--	5 (1.2)	-5 (2.5) ▼	-36 (3.7) ▼	--
Italy		22 (0.2)	0 (0.3)	2 (0.4) ▲	--	73 (2.9)	-5 (4.3)	-14 (4.0) ▼	--
Japan		34 (0.5)	-2 (0.6) ▼	-2 (0.6) ▼	-3 (0.6) ▼	10 (2.1)	7 (2.5) ▲	9 (2.1) ▲	8 (2.3) ▲
Jordan		35 (0.7)	1 (1.0)	-1 (1.0)	◇◇	13 (2.5)	-1 (3.8)	5 (3.2)	◇◇
Korea, Rep. of	s	37 (0.4)	0 (0.5)	-7 (0.9) ▼	-21 (3.0) ▼	4 (1.4)	3 (1.7)	4 (1.4) ▲	2 (1.9)
Kuwait	s	30 (0.5)	◇◇	◇◇	--	12 (3.3)	◇◇	◇◇	--
Lebanon		26 (0.6)	-2 (1.1)	◇◇	◇◇	38 (4.3)	7 (5.8)	◇◇	◇◇
Lithuania	r	25 (0.3)	0 (0.4)	2 (0.5) ▲	4 (0.6) ▲	35 (3.2)	-4 (4.6)	-22 (5.1) ▼	-50 (4.7) ▼
Malaysia		36 (0.4)	-1 (0.5)	-3 (1.0) ▼	◇◇	1 (0.8)	0 (1.0)	0 (1.1)	◇◇
Malta		22 (0.0)	◇◇	◇◇	◇◇	71 (0.2)	◇◇	◇◇	◇◇
Norway	r	25 (0.4)	-1 (0.5)	◇◇	1 (0.7)	47 (3.9)	13 (5.4) ▲	◇◇	6 (6.7)
Oman		32 (0.4)	◇◇	◇◇	◇◇	10 (2.2)	◇◇	◇◇	◇◇
Palestinian Nat'l Auth.		38 (0.5)	-1 (0.7)	◇◇	◇◇	8 (1.6)	1 (2.6)	◇◇	◇◇
Qatar		27 (0.0)	◇◇	◇◇	◇◇	20 (0.1)	◇◇	◇◇	◇◇
Romania		21 (0.3)	-3 (0.6) ▼	-3 (0.6) ▼	-5 (0.9) ▼	76 (2.9)	25 (5.3) ▲	27 (4.9) ▲	36 (5.9) ▲
Russian Federation		21 (0.3)	-2 (0.6) ▼	-3 (0.6) ▼	-4 (0.5) ▼	63 (2.8)	16 (5.0) ▲	23 (4.7) ▲	19 (4.6) ▲
Saudi Arabia		30 (0.8)	--	◇◇	◇◇	28 (3.6)	--	◇◇	◇◇
Scotland	r	25 (0.5)	-2 (0.7) ▼	◇◇	-1 (0.6)	43 (3.2)	10 (5.0) ▲	◇◇	17 (4.9) ▲
Serbia		24 (0.4)	-2 (0.5) ▼	◇◇	◇◇	53 (3.9)	15 (5.3) ▲	◇◇	◇◇
Singapore		38 (0.2)	0 (0.3)	1 (0.4) ▲	2 (0.4) ▲	2 (0.6)	-1 (0.9)	-2 (1.4)	-2 (1.6)
Slovenia	r	16 (0.2)	-5 (0.4) ▼	--	-9 (0.4) ▼	94 (1.0)	25 (4.2) ▲	--	54 (4.5) ▲
Sweden	s	23 (0.5)	2 (0.6) ▲	◇◇	3 (0.8) ▲	63 (3.6)	-8 (5.1)	◇◇	-11 (7.3)
Syrian Arab Republic		31 (0.6)	◇◇	◇◇	◇◇	24 (3.6)	◇◇	◇◇	◇◇
Thailand	r	38 (0.6)	◇◇	-8 (1.8) ▼	--	11 (2.4)	◇◇	5 (2.7)	--
Tunisia		32 (0.4)	-2 (0.4) ▼	-2 (0.5) ▼	◇◇	3 (1.2)	1 (1.6)	-1 (2.0)	◇◇
Turkey		33 (0.7)	◇◇	--	◇◇	18 (3.4)	◇◇	--	◇◇
Ukraine		25 (0.4)	◇◇	◇◇	◇◇	36 (3.2)	◇◇	◇◇	◇◇
United States	s	24 (0.4)	0 (0.6)	-7 (1.5) ▼	-4 (1.1) ▼	57 (2.3)	2 (3.7)	10 (4.2) ▲	11 (5.4) ▲
‡ Morocco	r	34 (0.8)	--	--	--	6 (3.3)	--	--	--
International Avg.		29 (0.1)				30 (0.4)			

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Benchmarking Participants

Basque Country, Spain		22 (0.3)	-2 (0.5) ▼	◇◇	◇◇	68 (2.7)	19 (4.5) ▲	◇◇	◇◇
British Columbia, Canada		26 (0.5)	◇◇	-1 (0.8)	◇◇	30 (4.0)	◇◇	11 (7.5)	◇◇
Dubai, UAE	s	27 (0.7)	◇◇	◇◇	◇◇	34 (3.2)	◇◇	◇◇	◇◇
Massachusetts, US	r	22 (0.6)	◇◇	-2 (1.5)	◇◇	65 (6.0)	◇◇	3 (8.9)	◇◇
Minnesota, US		27 (1.3)	◇◇	◇◇	--	32 (5.6)	◇◇	◇◇	--
Ontario, Canada	r	26 (0.4)	0 (0.6)	-1 (0.7)	-2 (0.9) ▼	36 (4.0)	5 (5.6)	9 (6.2)	13 (6.5) ▲
Quebec, Canada	r	29 (0.4)	0 (0.5)	0 (0.6)	1 (1.1)	20 (3.4)	6 (4.4)	6 (5.7)	6 (6.1)

▲ 2007 significantly higher

▼ 2007 significantly lower

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◇) indicates the country did not participate in the assessment.

TIMSS & PIRLS  
International Study Center  
Lynch School of Education, Boston College

Exhibit 7.1 Class Size for Mathematics Instruction with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country		25-40 Students				41 or More Students			
		2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1999	Difference in Percent from 1995
Algeria	r	64 (4.2)	0 0	0 0	0 0	31 (3.9)	0 0	0 0	0 0
Armenia	r	60 (3.9)	10 (5.9)	0 0	0 0	0 (0.0)	-10 (2.8) ▼	0 0	0 0
Australia	r	70 (2.9)	2 (5.1)	--	-1 (4.6)	0 (0.1)	0 (0.4)	--	0 (0.1)
Bahrain		94 (0.7)	2 (1.0) ▲	0 0	0 0	0 (0.0)	-2 (0.1) ▼	0 0	0 0
Bosnia and Herzegovina		52 (3.6)	0 0	0 0	0 0	0 (0.0)	0 0	0 0	0 0
Botswana		73 (3.8)	-1 (5.6)	0 0	0 0	26 (3.7)	1 (5.5)	0 0	0 0
Bulgaria		41 (3.5)	5 (5.5)	4 (7.1)	--	0 (0.0)	-1 (0.0)	-2 (1.3)	--
Chinese Taipei		85 (3.3)	6 (4.8)	17 (4.9) ▲	0 0	11 (2.7)	-7 (4.2)	-20 (4.6) ▼	0 0
Colombia	s	66 (4.6)	0 0	0 0	29 (7.3) ▲	21 (3.9)	0 0	0 0	-23 (7.2) ▼
Cyprus	r	45 (2.7)	-34 (3.3) ▼	-44 (3.6) ▼	-51 (3.1) ▼	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
Czech Republic	r	51 (4.3)	0 0	4 (7.1)	-10 (6.7)	0 (0.0)	0 0	0 (0.0)	0 (0.0)
Egypt		53 (3.6)	-17 (5.3) ▼	0 0	0 0	43 (3.7)	16 (5.3) ▲	0 0	0 0
El Salvador		51 (4.0)	0 0	0 0	0 0	14 (3.2)	0 0	0 0	0 0
England	s	69 (3.7)	2 (6.3)	--	2 (5.5)	1 (1.0)	1 (1.0)	--	1 (1.0)
Georgia		47 (5.3)	0 0	0 0	0 0	1 (0.6)	0 0	0 0	0 0
Ghana	r	40 (4.2)	-7 (5.9)	0 0	0 0	47 (4.3)	10 (6.4)	0 0	0 0
Hong Kong SAR		44 (4.3)	-10 (5.9)	-8 (5.6)	-13 (7.3)	46 (4.1)	3 (5.8)	7 (5.5)	9 (6.9)
Hungary		27 (3.3)	-9 (5.1)	-2 (5.0)	-6 (5.3)	1 (0.9)	1 (0.9)	1 (0.9)	1 (0.9)
Indonesia		62 (4.7)	13 (6.4) ▲	35 (5.9) ▲	0 0	32 (4.8)	-16 (6.4) ▼	-40 (5.9) ▼	0 0
Iran, Islamic Rep. of	r	64 (3.3)	-11 (4.6) ▼	-19 (4.4) ▼	-9 (6.3)	1 (1.1)	-2 (1.8)	-5 (2.4) ▼	-18 (5.2) ▼
Israel	s	92 (2.2)	5 (3.5)	36 (4.1) ▲	--	3 (1.8)	0 (2.5)	0 (2.5)	--
Italy		27 (2.9)	5 (4.3)	14 (4.0) ▲	--	0 (0.0)	0 (0.0)	0 (0.0)	--
Japan		85 (2.7)	-11 (3.1) ▼	-11 (3.4) ▼	-6 (4.1)	5 (1.6)	5 (1.9) ▲	2 (2.5)	-3 (3.4)
Jordan		58 (4.4)	0 (6.3)	-3 (6.0)	0 0	29 (4.1)	1 (5.5)	-2 (5.6)	0 0
Korea, Rep. of	s	78 (2.6)	1 (4.4)	37 (4.2) ▲	73 (3.2) ▲	18 (2.3)	-4 (4.1)	-40 (3.9) ▼	-75 (3.2) ▼
Kuwait	s	87 (3.2)	0 0	0 0	--	1 (0.0)	0 0	0 0	--
Lebanon		58 (4.5)	-2 (6.3)	0 0	0 0	4 (1.2)	-4 (3.3)	0 0	0 0
Lithuania	r	65 (3.2)	4 (4.6)	22 (5.1) ▲	50 (4.7) ▲	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Malaysia		80 (3.2)	6 (4.8)	15 (5.2) ▲	0 0	19 (3.1)	-6 (4.6)	-15 (5.2) ▼	0 0
Malta		29 (0.2)	0 0	0 0	0 0	0 (0.0)	0 0	0 0	0 0
Norway	r	51 (4.0)	-14 (5.5) ▼	0 0	-6 (6.7)	1 (1.0)	1 (1.2)	0 0	1 (1.0)
Oman		90 (2.2)	0 0	0 0	0 0	0 (0.0)	0 0	0 0	0 0
Palestinian Nat'l Auth.		51 (4.0)	7 (5.6)	0 0	0 0	41 (3.6)	-9 (5.2)	0 0	0 0
Qatar		77 (0.2)	0 0	0 0	0 0	2 (0.0)	0 0	0 0	0 0
Romania		24 (2.9)	-25 (5.4) ▼	-27 (4.9) ▼	-34 (5.8) ▼	0 (0.0)	-1 (0.0)	0 (0.0)	-2 (1.2)
Russian Federation		37 (2.8)	-16 (5.0) ▼	-23 (4.7) ▼	-19 (4.6) ▼	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Saudi Arabia		61 (4.0)	--	0 0	0 0	11 (2.6)	--	0 0	0 0
Scotland	r	56 (3.1)	-11 (5.0) ▼	0 0	-18 (4.9) ▼	1 (0.8)	0 (1.1)	0 0	1 (0.8)
Serbia		47 (3.9)	-15 (5.3) ▼	0 0	0 0	0 (0.0)	0 (0.0)	0 0	0 0
Singapore		76 (2.5)	5 (3.6)	0 (4.7)	-3 (4.6)	22 (2.5)	-4 (3.5)	2 (4.6)	4 (4.3)
Slovenia	r	6 (1.0)	-25 (4.2) ▼	--	-54 (4.5) ▼	0 (0.0)	0 (0.0)	--	0 (0.0)
Sweden	s	35 (3.4)	6 (5.0)	0 0	9 (7.2)	2 (1.1)	2 (1.2)	0 0	2 (1.1) ▲
Syrian Arab Republic		65 (4.2)	0 0	0 0	0 0	11 (2.6)	0 0	0 0	0 0
Thailand	r	47 (3.7)	0 0	9 (5.4)	--	42 (3.1)	0 0	-14 (5.0) ▼	--
Tunisia		96 (1.6)	-1 (2.2)	-1 (2.3)	0 0	1 (1.0)	0 (1.5)	1 (1.0)	0 0
Turkey		61 (3.9)	0 0	--	0 0	20 (2.7)	0 0	--	0 0
Ukraine		63 (3.1)	0 0	0 0	0 0	1 (0.8)	0 0	0 0	0 0
United States	s	41 (2.3)	-2 (3.6)	-4 (4.4)	-9 (5.6)	2 (0.9)	0 (1.2)	-6 (2.1) ▼	-2 (1.9)
‡ Morocco	r	79 (5.3)	--	--	--	15 (4.5)	--	--	--
International Avg.		59 (0.5)				11 (0.3)			
<b>Benchmarking Participants</b>									
Basque Country, Spain		32 (2.7)	-19 (4.5) ▼	0 0	0 0	0 (0.0)	0 (0.0)	0 0	0 0
British Columbia, Canada		68 (4.2)	0 0	-13 (7.6)	0 0	1 (1.3)	0 0	1 (1.3)	0 0
Dubai, UAE	s	64 (3.2)	0 0	0 0	0 0	2 (0.5)	0 0	0 0	0 0
Massachusetts, US	r	34 (5.5)	0 0	-1 (8.4)	0 0	1 (1.3)	0 0	-2 (2.2)	0 0
Minnesota, US		64 (6.8)	0 0	0 0	--	4 (3.6)	0 0	0 0	--
Ontario, Canada	r	63 (4.0)	-6 (5.6)	-6 (6.4)	-13 (6.5)	1 (0.8)	1 (0.8)	-2 (2.3)	-1 (1.4)
Quebec, Canada	r	80 (3.4)	-6 (4.4)	-6 (5.7)	-7 (6.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

▲ 2007 significantly higher  
▼ 2007 significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

However, some countries averaged larger mathematics classes (usually a modest increase, but not always), including Ghana, Israel, Italy, Lithuania, Singapore, and Sweden.

The results in Exhibit 7.2 show that the majority of students are in medium-sized mathematics classes. At the fourth grade, on average internationally, 24 percent of the students were in classes with fewer than 20 students, 58 percent were in classes of 20 to 32 students, and 18 percent were in classes with 33 or more students. Notable exceptions included Singapore with almost all students (94%) in large classes, Hong Kong SAR and Yemen with about three-fourths in large classes, and Chinese Taipei, Colombia, and Japan with approximately half in large classes. In general, class sizes were larger at the eighth grade, 30 percent were in classes of 1 to 24 students, 59 percent in classes of 25 to 40 students, and 11 percent were in classes of 41 or more students. The largest percentages of students in large classes, from 41 to 47 percent, were in Egypt, Ghana, Hong Kong SAR, the Palestinian National Authority, and Thailand. The countries with more than half of their eighth grade students in small classes were Bulgaria (59%), Cyprus (54%), Georgia (52%), Hungary (72%), Italy (73%), Malta (71%), Romania (76%), the Russian Federation (63%), Serbia (53%), Slovenia (94%), Sweden (63%), and the United States (57%), as well as the benchmarking state of Massachusetts (65%) and the Basque country in Spain (68%).

Because countries have a variety of policies, practices, and realities determining class sizes, the relationship between class size and achievement is extremely difficult to disentangle. For example, in some countries the smaller classes tend to be in rural areas with fewer resource and the larger classes in urban areas with more resources. Also, countries and schools cannot always control class size. Because of this, the ability to cap class sizes can indicate the availability of more resources in general. As another complicating factor, smaller classes can be used for advanced or practical classes such as computer laboratories on one hand, and for remedial learning or students with special needs on the other. Finally, TIMSS data repeatedly show, contrary to what might be anticipated, that the high-achieving Asian

countries have some of the largest class sizes. The complexity of this issue is evidenced in the TIMSS 2007 results showing a curvilinear relationship, on average, between class size and mathematics achievement at both the eighth and fourth grades.

Mathematics teachers were asked about the instructional impact of five characteristics of their students—differing academic abilities, a wide range in backgrounds, students with special needs, uninterested students, and disruptive students. Responses were given on a four-point scale; *not at all*, *a little*, *some*, and *a lot*. TIMSS used the teachers' responses to construct an Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction due to Student Factors (MCFL) and the results are presented in Exhibit 7.3. Students were placed in the high category, if, on average, teachers reported their classrooms were impacted only a little (if at all), and in the low category, if, on average, these factors impacted instruction at least somewhat. The remaining students fell in the medium category. The results show that at both grades average mathematics achievement was related to the diversity of the students in the class and the instructional challenges involved. At the fourth and eighth grades, 45 and 38 percent of the students, respectively, were in classes where teachers reported the composition had little, if any impact on instruction, and these students had the highest achievement internationally. At the eighth grade, the 23 percent of students in classes with adversely impacted instruction, had noticeably lower average achievement. In general, between 2003 and 2007, teachers in eight countries and one benchmarking participant reported increases in these more challenging types of classes whereas teachers in only three countries reported decreases.

## Exhibit 7.2 Achievement and Class Size for Mathematics Instruction

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	1–19 Students		20–32 Students		33 or More Students		
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Algeria	r	11 (2.8)	388 (14.2)	60 (4.3)	378 (7.0)	29 (4.0)	383 (9.4)
Armenia	s	24 (3.3)	526 (14.1)	50 (3.8)	499 (7.3)	26 (3.6)	484 (6.0)
Australia		19 (3.0)	510 (9.0)	80 (3.0)	521 (4.3)	2 (1.2)	~ ~
Austria		37 (2.9)	506 (3.1)	63 (2.9)	505 (2.7)	0 (0.0)	~ ~
Chinese Taipei		3 (1.2)	548 (12.8)	45 (3.7)	570 (3.2)	51 (3.4)	583 (2.4)
Colombia		19 (3.3)	342 (13.7)	24 (4.7)	347 (14.0)	57 (4.4)	365 (8.1)
Czech Republic		31 (3.5)	482 (5.9)	69 (3.5)	489 (2.9)	0 (0.0)	~ ~
Denmark		34 (3.9)	529 (4.4)	66 (3.9)	521 (2.9)	0 (0.0)	~ ~
El Salvador		20 (2.7)	307 (10.7)	37 (4.1)	318 (9.1)	43 (3.8)	352 (4.2)
England		8 (1.9)	556 (9.6)	80 (3.0)	539 (3.2)	12 (2.4)	546 (9.0)
Georgia		37 (3.8)	454 (7.3)	50 (4.5)	428 (6.6)	13 (2.2)	454 (6.3)
Germany		21 (2.4)	512 (5.6)	79 (2.4)	528 (2.2)	0 (0.0)	~ ~
Hong Kong SAR		1 (0.7)	~ ~	25 (3.3)	588 (5.5)	74 (3.4)	616 (3.8)
Hungary		33 (3.7)	482 (6.5)	67 (3.7)	525 (4.7)	0 (0.0)	~ ~
Iran, Islamic Rep. of		25 (2.7)	381 (6.5)	59 (3.8)	406 (5.3)	16 (2.9)	421 (11.6)
Italy		44 (2.6)	506 (4.3)	56 (2.6)	507 (4.5)	0 (0.0)	~ ~
Japan		7 (1.5)	558 (8.5)	47 (2.9)	569 (3.4)	45 (3.2)	569 (2.9)
Kazakhstan		30 (4.5)	550 (20.2)	68 (4.6)	548 (5.5)	3 (1.2)	577 (29.4)
Kuwait	s	7 (2.8)	330 (18.1)	88 (3.4)	314 (5.0)	5 (1.9)	302 (11.9)
Latvia		44 (2.4)	525 (3.9)	49 (3.0)	550 (2.6)	6 (2.0)	551 (9.3)
Lithuania		37 (3.0)	511 (4.7)	63 (3.0)	541 (3.1)	0 (0.0)	~ ~
Morocco	r	17 (3.3)	352 (17.7)	42 (4.3)	343 (11.4)	41 (3.9)	338 (7.7)
Netherlands		27 (3.3)	531 (4.3)	71 (3.5)	535 (2.9)	2 (1.3)	~ ~
New Zealand	s	13 (2.1)	489 (8.7)	81 (2.4)	497 (3.0)	6 (1.7)	524 (11.7)
Norway		42 (3.3)	473 (4.4)	53 (3.6)	474 (3.5)	5 (1.9)	467 (10.6)
Qatar	r	8 (0.1)	301 (4.3)	75 (0.2)	296 (1.4)	17 (0.2)	316 (3.4)
Russian Federation		33 (2.7)	531 (10.5)	67 (2.7)	551 (3.8)	0 (0.3)	~ ~
Scotland	r	16 (2.8)	492 (9.4)	79 (3.0)	493 (3.1)	5 (1.6)	506 (14.0)
Singapore		0 (0.0)	~ ~	6 (1.3)	514 (13.5)	94 (1.3)	605 (3.5)
Slovak Republic		34 (2.5)	497 (6.6)	65 (2.6)	496 (5.7)	1 (0.6)	~ ~
Slovenia		46 (2.9)	497 (2.7)	53 (3.0)	506 (2.6)	1 (0.6)	~ ~
Sweden		36 (3.4)	505 (4.5)	60 (3.6)	504 (3.2)	4 (1.6)	512 (12.4)
Tunisia		20 (2.8)	303 (12.2)	69 (3.8)	334 (5.0)	11 (2.7)	354 (21.3)
Ukraine		30 (3.3)	445 (4.9)	65 (3.5)	480 (3.8)	5 (1.4)	472 (13.4)
United States		26 (2.6)	521 (4.1)	69 (2.8)	533 (3.3)	5 (1.3)	522 (8.0)
Yemen	r	9 (2.1)	262 (18.5)	17 (4.0)	227 (16.4)	74 (4.1)	219 (7.7)
<b>International Avg.</b>		<b>24 (0.5)</b>	<b>462 (1.8)</b>	<b>58 (0.6)</b>	<b>471 (1.1)</b>	<b>18 (0.4)</b>	<b>460 (2.3)</b>
<b>Benchmarking Participants</b>							
Alberta, Canada		25 (2.9)	508 (4.6)	70 (3.4)	504 (3.8)	4 (1.8)	498 (16.0)
British Columbia, Canada	r	29 (3.7)	500 (5.6)	69 (3.8)	508 (3.5)	1 (0.8)	~ ~
Dubai, UAE		--	--	--	--	--	--
Massachusetts, US		24 (5.6)	567 (10.0)	76 (5.6)	575 (4.4)	0 (0.0)	~ ~
Minnesota, US	r	16 (4.2)	548 (13.7)	83 (4.3)	557 (7.1)	1 (1.2)	~ ~
Ontario, Canada		18 (3.5)	504 (10.0)	78 (3.9)	512 (3.3)	4 (1.4)	531 (13.1)
Quebec, Canada		16 (2.5)	520 (8.4)	83 (2.5)	520 (3.2)	1 (0.2)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.2 Achievement and Class Size for Mathematics Instruction (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	1–24 Students		25–40 Students		41 or More Students	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	r 5 (2.1)	370 (10.8)	64 (4.2)	388 (2.8)	31 (3.9)	389 (3.2)
Armenia	40 (4.0)	502 (6.2)	60 (3.9)	497 (4.2)	0 (0.0)	~ ~
Australia	30 (2.8)	471 (6.3)	70 (2.9)	511 (5.3)	0 (0.1)	~ ~
Bahrain	6 (0.7)	449 (6.3)	94 (0.7)	393 (1.8)	0 (0.0)	~ ~
Bosnia and Herzegovina	48 (3.6)	454 (3.9)	52 (3.6)	458 (4.4)	0 (0.0)	~ ~
Botswana	1 (0.6)	~ ~	73 (3.8)	367 (3.1)	26 (3.7)	355 (5.3)
Bulgaria	59 (3.5)	441 (7.2)	41 (3.5)	507 (7.1)	0 (0.0)	~ ~
Chinese Taipei	4 (1.8)	549 (29.9)	85 (3.3)	593 (4.6)	11 (2.7)	660 (11.0)
Colombia	13 (2.5)	357 (16.1)	66 (4.6)	386 (5.1)	21 (3.9)	383 (5.9)
Cyprus	54 (2.7)	466 (2.4)	45 (2.7)	462 (2.6)	1 (0.0)	~ ~
Czech Republic	49 (4.3)	494 (3.8)	51 (4.3)	514 (3.8)	0 (0.0)	~ ~
Egypt	4 (1.5)	410 (12.8)	53 (3.6)	395 (4.9)	43 (3.7)	386 (5.6)
El Salvador	35 (3.7)	323 (5.7)	51 (4.0)	348 (3.8)	14 (3.2)	348 (10.0)
England	30 (3.8)	469 (8.6)	69 (3.7)	533 (5.8)	1 (1.0)	~ ~
Georgia	52 (5.2)	412 (7.4)	47 (5.3)	408 (9.2)	1 (0.6)	~ ~
Ghana	13 (2.4)	299 (11.3)	40 (4.2)	299 (7.9)	47 (4.3)	321 (7.7)
Hong Kong SAR	10 (1.9)	513 (23.5)	44 (4.3)	555 (10.1)	46 (4.1)	604 (7.2)
Hungary	72 (3.4)	510 (4.7)	27 (3.3)	533 (8.3)	1 (0.9)	~ ~
Indonesia	6 (1.7)	374 (13.7)	61 (4.2)	400 (5.1)	33 (4.1)	396 (8.6)
Iran, Islamic Rep. of	35 (3.2)	386 (5.5)	64 (3.3)	411 (5.7)	1 (1.1)	~ ~
Israel	s 5 (1.2)	473 (22.6)	92 (2.2)	467 (4.7)	3 (1.8)	496 (42.7)
Italy	73 (2.9)	475 (3.4)	27 (2.9)	493 (5.7)	0 (0.0)	~ ~
Japan	10 (2.1)	555 (5.9)	85 (2.7)	567 (2.9)	5 (1.6)	645 (24.7)
Jordan	13 (2.5)	431 (17.4)	58 (4.4)	427 (6.2)	29 (4.1)	425 (7.8)
Korea, Rep. of	4 (1.4)	558 (15.6)	78 (2.6)	596 (3.1)	18 (2.3)	607 (7.2)
Kuwait	s 12 (3.3)	356 (9.9)	87 (3.2)	357 (2.8)	1 (0.0)	~ ~
Lebanon	38 (4.3)	426 (6.3)	58 (4.5)	464 (7.1)	4 (1.2)	423 (14.4)
Lithuania	35 (3.2)	480 (4.1)	65 (3.2)	520 (3.6)	0 (0.0)	~ ~
Malaysia	1 (0.8)	~ ~	80 (3.2)	470 (5.8)	19 (3.1)	486 (10.9)
Malta	71 (0.2)	472 (1.4)	29 (0.2)	523 (1.9)	0 (0.0)	~ ~
Norway	47 (3.9)	468 (3.4)	51 (4.0)	471 (2.4)	1 (1.0)	~ ~
Oman	10 (2.2)	363 (8.8)	90 (2.2)	373 (3.6)	0 (0.0)	~ ~
Palestinian Nat'l Auth.	8 (1.6)	383 (11.7)	51 (4.0)	367 (5.2)	41 (3.6)	364 (6.0)
Qatar	20 (0.1)	300 (3.5)	77 (0.2)	309 (1.8)	2 (0.0)	~ ~
Romania	76 (2.9)	450 (4.5)	24 (2.9)	500 (8.8)	0 (0.0)	~ ~
Russian Federation	63 (2.8)	499 (4.6)	37 (2.8)	533 (6.0)	0 (0.0)	~ ~
Saudi Arabia	28 (3.6)	330 (5.1)	61 (4.0)	329 (4.2)	11 (2.6)	322 (11.4)
Scotland	43 (3.2)	449 (6.3)	56 (3.1)	517 (4.8)	1 (0.8)	~ ~
Serbia	53 (3.9)	480 (4.8)	47 (3.9)	490 (5.1)	0 (0.0)	~ ~
Singapore	2 (0.6)	~ ~	76 (2.5)	593 (5.2)	22 (2.5)	592 (7.2)
Slovenia	94 (1.0)	500 (2.3)	6 (1.0)	513 (8.2)	0 (0.0)	~ ~
Sweden	63 (3.6)	488 (2.9)	35 (3.4)	499 (3.7)	2 (1.1)	~ ~
Syrian Arab Republic	24 (3.6)	405 (8.7)	65 (4.2)	391 (4.7)	11 (2.6)	392 (11.3)
Thailand	11 (2.4)	406 (11.2)	47 (3.7)	416 (5.7)	42 (3.1)	479 (9.3)
Tunisia	3 (1.2)	398 (6.9)	96 (1.6)	421 (2.4)	1 (1.0)	~ ~
Turkey	18 (3.4)	423 (11.7)	61 (3.9)	434 (6.5)	20 (2.7)	436 (11.3)
Ukraine	36 (3.2)	447 (6.4)	63 (3.1)	471 (4.8)	1 (0.8)	~ ~
United States	57 (2.3)	511 (4.0)	41 (2.3)	506 (5.0)	2 (0.9)	~ ~
‡ Morocco	r 6 (2.6)	404 (17.9)	79 (4.3)	381 (4.3)	14 (3.6)	364 (5.0)
International Avg.	30 (0.4)	439 (1.6)	59 (0.5)	456 (0.9)	11 (0.3)	449 (2.9)
<b>Benchmarking Participants</b>						
Basque Country, Spain	68 (2.7)	498 (3.6)	32 (2.7)	513 (4.0)	0 (0.0)	~ ~
British Columbia, Canada	30 (4.0)	503 (6.3)	68 (4.2)	514 (4.3)	1 (1.3)	~ ~
Dubai, UAE	s 34 (3.2)	466 (9.2)	64 (3.2)	461 (5.6)	2 (0.5)	~ ~
Massachusetts, US	65 (6.0)	531 (7.6)	34 (5.5)	577 (9.3)	1 (1.3)	~ ~
Minnesota, US	32 (5.6)	523 (13.2)	64 (6.8)	536 (6.3)	4 (3.6)	557 (7.1)
Ontario, Canada	36 (4.0)	512 (7.5)	63 (4.0)	520 (4.2)	1 (0.8)	~ ~
Quebec, Canada	20 (3.4)	517 (5.9)	80 (3.4)	531 (4.3)	0 (0.0)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



Exhibit 7.3

### Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction Due to Student Factors (MCFL)

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High MCFL (Few or No Limitations)		Medium MCFL (Some Limitations)		Low MCFL (A Lot of Limitations)	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Netherlands	76 (3.5)	539 (2.8)	18 (3.0)	520 (5.9)	6 (1.8)	498 (9.7)
Kazakhstan	71 (4.3)	554 (8.5)	24 (4.0)	534 (11.7)	5 (1.8)	552 (14.2)
Austria	67 (3.2)	512 (2.3)	27 (3.0)	496 (3.8)	6 (1.5)	487 (9.9)
Germany	67 (3.4)	534 (2.4)	27 (3.1)	515 (3.8)	5 (1.5)	462 (12.7)
New Zealand	64 (2.2)	502 (2.8)	24 (2.2)	480 (5.9)	12 (1.7)	467 (8.0)
Scotland	60 (4.2)	499 (3.3)	32 (4.1)	492 (5.0)	8 (2.1)	469 (10.3)
Armenia	59 (4.2)	502 (6.3)	27 (3.7)	502 (9.2)	14 (2.7)	492 (9.6)
England	58 (3.7)	556 (3.8)	32 (3.7)	523 (4.5)	10 (2.0)	519 (8.8)
Hungary	57 (4.1)	530 (4.4)	35 (3.9)	494 (6.5)	8 (2.9)	435 (18.4)
Georgia	57 (4.6)	445 (5.4)	38 (4.4)	431 (7.5)	5 (1.8)	430 (22.5)
Czech Republic	57 (4.3)	494 (3.3)	32 (3.8)	481 (4.7)	12 (2.7)	466 (9.1)
Norway	55 (4.0)	480 (3.5)	37 (3.9)	465 (4.3)	7 (1.7)	461 (9.2)
Denmark	54 (4.4)	528 (2.7)	33 (4.2)	523 (4.9)	12 (2.9)	510 (7.3)
Slovenia	54 (2.9)	502 (2.4)	35 (2.4)	500 (3.1)	10 (1.7)	499 (3.1)
Japan	52 (4.0)	571 (3.4)	36 (3.4)	562 (2.9)	12 (2.7)	570 (6.1)
Sweden	51 (3.9)	511 (2.8)	34 (3.7)	498 (4.3)	15 (2.5)	490 (5.3)
Russian Federation	49 (4.1)	552 (7.0)	36 (3.5)	543 (5.9)	15 (2.2)	532 (14.5)
Australia	46 (3.7)	535 (4.8)	40 (3.7)	501 (4.6)	15 (2.5)	500 (9.4)
El Salvador	45 (4.5)	341 (7.2)	38 (4.4)	321 (7.7)	17 (3.1)	316 (10.7)
United States	45 (2.9)	540 (3.8)	33 (2.7)	529 (4.0)	22 (2.0)	505 (4.5)
Italy	43 (3.1)	516 (4.6)	44 (3.1)	501 (4.5)	13 (1.7)	497 (8.4)
Lithuania	40 (3.9)	538 (3.4)	43 (3.6)	526 (3.8)	17 (3.1)	516 (6.6)
Qatar	r 39 (0.2)	311 (2.0)	38 (0.2)	288 (1.9)	22 (0.2)	286 (2.7)
Tunisia	r 36 (3.8)	332 (8.3)	39 (3.9)	330 (8.3)	25 (3.7)	333 (10.4)
Ukraine	35 (4.0)	475 (4.8)	46 (4.1)	466 (5.0)	19 (3.5)	465 (8.1)
Colombia	32 (5.2)	364 (11.9)	40 (4.3)	346 (8.6)	28 (4.6)	360 (6.9)
Algeria	31 (4.7)	382 (9.1)	43 (4.9)	369 (10.4)	26 (4.2)	391 (7.7)
Singapore	31 (2.7)	632 (7.1)	37 (2.5)	592 (5.8)	33 (2.7)	585 (6.8)
Latvia	30 (3.7)	537 (5.3)	50 (4.0)	540 (3.0)	20 (3.1)	535 (5.2)
Hong Kong SAR	29 (4.2)	631 (5.3)	47 (4.3)	605 (4.7)	24 (3.9)	578 (4.7)
Slovak Republic	29 (3.4)	508 (5.7)	38 (4.0)	498 (5.5)	33 (3.5)	484 (9.9)
Yemen	r 28 (4.6)	231 (9.2)	59 (5.0)	223 (9.5)	13 (3.3)	226 (15.0)
Kuwait	s 27 (4.2)	334 (9.3)	42 (4.2)	302 (7.4)	31 (3.6)	297 (6.8)
Morocco	r 26 (4.3)	378 (12.5)	39 (4.8)	324 (8.1)	35 (3.7)	344 (9.9)
Iran, Islamic Rep. of	18 (2.9)	398 (10.7)	27 (3.5)	397 (8.2)	55 (4.1)	405 (5.7)
Chinese Taipei	16 (3.3)	578 (4.7)	38 (3.9)	572 (3.2)	46 (4.2)	578 (2.7)
International Avg.	45 (0.6)	483 (1.0)	36 (0.6)	466 (1.0)	18 (0.5)	459 (1.7)
<b>Benchmarking Participants</b>						
Ontario, Canada	52 (4.4)	517 (5.2)	29 (4.1)	512 (3.6)	19 (3.0)	495 (8.1)
Massachusetts, US	45 (3.9)	572 (5.4)	39 (5.2)	574 (5.6)	16 (4.4)	562 (12.5)
Alberta, Canada	42 (3.9)	516 (3.8)	30 (3.6)	503 (4.7)	28 (3.8)	489 (6.2)
Dubai, UAE	s 42 (5.8)	465 (8.3)	45 (5.0)	434 (9.8)	13 (3.2)	438 (11.8)
Minnesota, US	39 (6.7)	565 (11.0)	38 (6.5)	562 (8.8)	23 (6.0)	528 (10.7)
Quebec, Canada	33 (3.8)	535 (4.4)	35 (3.8)	521 (4.9)	31 (4.2)	504 (4.5)
British Columbia, Canada	r 24 (3.3)	510 (5.5)	45 (4.1)	502 (4.5)	31 (3.9)	504 (5.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to five statements about student factors limiting mathematics instruction: 1) Students with different academic abilities; 2) Students who come from a wide range of backgrounds; 3) Students with special needs; 4) Uninterested students; and 5) Disruptive students. Average is computed across the five statements based on a 4-point scale: 1. Not at all/Not applicable; 2. A little; 3. Some; and 4. A lot. High level indicates average is less than or equal to 2. Medium level indicates average is greater than 2 and less than 3. Low level indicates average is greater than or equal to 3.

- (i) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.





**Exhibit 7.3 Index of Teachers' Reports on Teaching Mathematics Classes with Few or No Limitations on Instruction Due to Student Factors (MCFL) (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High MCFL (Few or No Limitations)			Medium MCFL (Some Limitations)			Low MCFL (A Lot of Limitations)		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Scotland	71 (2.9)	505 (4.6)	3 (5.3)	21 (2.3)	451 (6.7)	-5 (4.5)	8 (2.0)	435 (13.8)	2 (2.8)
England	r 64 (3.3)	541 (6.0)	13 (6.6)	31 (3.3)	476 (6.2)	-9 (6.3)	5 (1.5)	398 (10.9)	-4 (3.3)
Armenia	r 62 (3.9)	499 (4.1)	33 (5.7) ▲	25 (3.8)	502 (8.2)	-19 (5.3) ▼	13 (2.2)	492 (6.5)	-14 (4.1) ▼
Hungary	62 (3.9)	529 (4.9)	4 (5.6)	28 (3.4)	502 (6.8)	-11 (5.3) ▼	10 (2.1)	486 (10.0)	7 (2.5) ▲
Japan	55 (4.0)	580 (3.2)	-8 (5.7)	33 (3.7)	563 (3.9)	1 (5.2)	11 (2.4)	544 (9.9)	7 (3.0) ▲
Ukraine	54 (3.7)	473 (5.4)	0	32 (3.8)	452 (6.4)	0	14 (2.9)	439 (9.6)	0
Slovenia	53 (2.8)	506 (3.3)	14 (4.9) ▲	36 (2.6)	499 (3.4)	-4 (4.6)	10 (1.7)	482 (10.1)	-10 (3.7) ▼
Qatar	50 (0.2)	316 (2.0)	0	36 (0.2)	301 (1.9)	0	13 (0.1)	281 (3.5)	0
United States	49 (2.7)	531 (4.0)	0 (4.0)	35 (2.6)	489 (4.3)	3 (4.0)	15 (2.0)	477 (6.3)	-3 (2.8)
Sweden	49 (3.0)	503 (2.8)	-13 (4.5) ▼	37 (2.9)	485 (3.2)	8 (4.3)	14 (2.2)	470 (6.3)	5 (2.9)
Lebanon	48 (4.8)	452 (6.3)	10 (6.4)	35 (4.4)	453 (7.5)	-13 (6.1) ▼	17 (4.0)	427 (11.5)	3 (4.9)
Colombia	46 (5.3)	385 (5.5)	0	26 (4.2)	376 (6.4)	0	27 (3.9)	369 (6.5)	0
Saudi Arabia	45 (4.3)	333 (4.6)	--	37 (3.7)	319 (5.0)	--	18 (3.3)	335 (7.1)	--
Czech Republic	45 (4.1)	521 (4.0)	0	36 (4.2)	493 (5.2)	0	19 (2.9)	482 (3.9)	0
Georgia	43 (5.3)	418 (9.1)	0	45 (5.3)	410 (5.8)	0	12 (4.2)	383 (21.2)	0
Australia	43 (4.4)	529 (6.8)	2 (5.9)	33 (3.7)	480 (5.7)	-9 (5.4)	24 (3.2)	468 (8.0)	6 (4.6)
Egypt	42 (3.9)	403 (6.1)	-39 (4.9) ▼	41 (3.8)	387 (5.2)	23 (4.7) ▲	17 (2.7)	366 (11.1)	16 (2.7) ▲
Malaysia	41 (3.5)	503 (8.0)	-21 (5.2) ▼	37 (3.7)	454 (7.0)	5 (5.3)	22 (3.5)	452 (10.6)	16 (3.9) ▲
Norway	41 (3.6)	469 (3.5)	11 (5.4) ▲	48 (4.0)	470 (2.5)	-10 (5.9)	12 (2.0)	461 (4.3)	-1 (3.5)
Oman	40 (4.5)	383 (5.7)	0	47 (4.3)	369 (5.5)	0	13 (3.1)	350 (11.9)	0
Korea, Rep. of	s 40 (3.5)	603 (4.9)	6 (4.8)	48 (3.6)	599 (4.4)	-2 (5.1)	12 (2.4)	573 (8.0)	-4 (3.7)
Syrian Arab Republic	39 (4.0)	401 (6.0)	0	35 (4.0)	385 (7.0)	0	25 (4.0)	398 (7.5)	0
Jordan	39 (4.0)	445 (8.1)	14 (5.6) ▲	36 (4.5)	422 (7.3)	-12 (6.6)	26 (3.7)	406 (9.5)	-2 (5.4)
Malta	38 (0.2)	525 (1.8)	0	30 (0.2)	465 (1.9)	0	33 (0.2)	465 (2.0)	0
El Salvador	38 (3.8)	349 (6.3)	0	40 (4.3)	329 (5.2)	0	22 (4.1)	337 (4.7)	0
Serbia	37 (4.0)	488 (6.0)	-1 (5.7)	49 (4.1)	488 (4.6)	6 (5.9)	15 (2.6)	477 (4.7)	-5 (4.1)
Bulgaria	36 (3.4)	480 (10.2)	9 (5.0)	46 (3.1)	454 (6.7)	-1 (5.3)	18 (3.3)	454 (11.2)	-8 (5.0)
Lithuania	36 (3.4)	520 (4.9)	-32 (5.0) ▼	48 (3.6)	502 (4.0)	17 (5.1) ▲	15 (2.7)	485 (5.6)	15 (2.7) ▲
Russian Federation	36 (2.6)	524 (6.4)	4 (4.0)	36 (3.5)	513 (6.5)	-7 (5.1)	27 (3.0)	496 (6.0)	3 (4.3)
Indonesia	34 (4.5)	402 (10.1)	-1 (6.0)	40 (4.4)	410 (8.8)	-2 (6.2)	26 (4.0)	404 (8.6)	3 (5.4)
Ghana	33 (4.2)	335 (9.0)	2 (6.1)	41 (4.4)	297 (7.3)	1 (6.4)	25 (3.7)	298 (10.2)	-3 (5.5)
Singapore	33 (2.7)	636 (6.1)	-4 (3.7)	43 (3.0)	591 (6.1)	4 (4.0)	24 (2.0)	535 (11.4)	0 (3.4)
Israel	r 31 (3.5)	493 (6.8)	-9 (5.0)	45 (3.4)	464 (7.8)	10 (5.0)	25 (3.2)	438 (12.1)	0 (4.5)
Romania	30 (3.5)	470 (7.8)	-2 (5.1)	40 (4.1)	458 (7.1)	-2 (5.7)	30 (3.7)	460 (7.1)	4 (5.1)
Bosnia and Herzegovina	30 (3.3)	458 (6.2)	0	41 (3.6)	451 (3.7)	0	29 (3.7)	461 (5.6)	0
Bahrain	30 (1.9)	399 (3.2)	-43 (3.7) ▼	43 (2.6)	398 (3.1)	17 (4.1) ▲	27 (2.3)	387 (3.8)	25 (2.4) ▲
Hong Kong SAR	29 (3.8)	620 (6.7)	-4 (5.9)	39 (3.4)	575 (9.8)	2 (5.6)	32 (4.2)	521 (12.6)	2 (5.7)
Tunisia	29 (3.5)	420 (4.0)	0 (5.2)	44 (4.2)	421 (3.4)	6 (6.1)	27 (4.0)	421 (4.6)	-6 (5.8)
Palestinian Nat'l Auth.	26 (3.6)	372 (7.1)	5 (5.2)	42 (3.8)	365 (5.8)	-8 (5.8)	31 (3.5)	367 (8.2)	3 (5.3)
Kuwait	r 26 (4.1)	357 (7.6)	0	40 (4.5)	356 (4.9)	0	34 (4.3)	352 (4.5)	0
Algeria	23 (3.8)	390 (3.4)	0	48 (4.0)	385 (3.0)	0	30 (4.3)	387 (3.8)	0
Thailand	18 (2.9)	496 (13.9)	0	56 (4.4)	434 (7.3)	0	26 (3.5)	418 (8.0)	0
Cyprus	18 (2.6)	476 (4.5)	0 (3.8)	49 (2.7)	464 (2.9)	15 (3.7) ▲	33 (2.7)	460 (2.6)	-15 (3.6) ▼
Chinese Taipei	18 (3.4)	631 (8.4)	1 (4.6)	42 (3.6)	605 (6.0)	-8 (5.4)	40 (4.1)	577 (6.6)	7 (5.6)
Iran, Islamic Rep. of	16 (2.6)	423 (10.2)	-38 (4.8) ▼	39 (4.1)	412 (7.2)	-5 (5.8)	45 (3.9)	391 (5.4)	43 (4.1) ▲
Italy	14 (2.3)	493 (5.5)	-7 (4.0)	35 (2.9)	481 (4.4)	-14 (5.3) ▼	51 (3.3)	476 (4.2)	21 (4.8) ▲
Botswana	14 (2.8)	379 (7.7)	-5 (4.6)	44 (4.6)	362 (3.4)	5 (6.7)	42 (4.6)	359 (4.9)	0 (6.5)
Turkey	13 (2.4)	478 (15.8)	0	46 (4.3)	428 (7.1)	0	41 (4.3)	424 (7.4)	0
‡ Morocco	31 (6.7)	396 (9.4)	--	47 (4.7)	379 (5.0)	--	22 (6.8)	382 (9.4)	--
<b>International Avg.</b>	<b>38 (0.5)</b>	<b>466 (1.0)</b>		<b>39 (0.5)</b>	<b>445 (0.8)</b>		<b>23 (0.5)</b>	<b>433 (1.2)</b>	
<b>Benchmarking Participants</b>									
Massachusetts, US	64 (3.5)	566 (7.6)	0	22 (3.6)	524 (8.9)	0	14 (2.7)	492 (8.8)	0
Dubai, UAE	s 54 (5.2)	478 (8.8)	0	31 (5.2)	436 (9.8)	0	15 (3.8)	459 (11.9)	0
Ontario, Canada	48 (5.0)	526 (4.7)	-1 (7.0)	38 (4.9)	509 (5.6)	3 (6.7)	15 (2.9)	510 (8.1)	-2 (4.6)
British Columbia, Canada	43 (4.9)	532 (6.0)	0	41 (4.6)	498 (4.4)	0	16 (3.1)	487 (9.0)	0
Basque Country, Spain	36 (4.7)	508 (5.0)	6 (6.8)	33 (4.4)	504 (4.5)	-5 (6.9)	31 (4.3)	483 (4.5)	-1 (6.6)
Quebec, Canada	30 (3.5)	559 (8.5)	-36 (5.4) ▼	48 (3.6)	523 (6.1)	19 (5.5) ▲	23 (3.3)	503 (6.2)	17 (3.8) ▲
Minnesota, US	26 (5.9)	561 (7.7)	0	55 (6.7)	527 (8.6)	0	19 (3.9)	498 (7.5)	0

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to five statements about student factors limiting mathematics instruction: 1) Students with different academic abilities; 2) Students who come from a wide range of backgrounds; 3) Students with special needs; 4) Uninterested students; and 5) Disruptive students. Average is computed across the five statements based on a 4-point scale: 1. Not at all/Not applicable; 2. A little; 3. Some; and 4. A lot. High level indicates average is less than or equal to 2. Medium level indicates average is greater than 2 and less than 3. Low level indicates average is greater than or equal to 3.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

2007 percent significantly higher ▲      2007 percent significantly lower ▼

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

### What Activities Do Students Do in Their Mathematics Lessons?

Exhibits 7.4 and 7.5 present the reports, respectively, by students and by their teachers, about the frequency of five instructional activities related to mathematics topics in the TIMSS content areas. At both grades, the same two activities were related to the number content area—practice adding, subtracting, multiplying, and dividing without using a calculator, and work on fractions and decimals. At the fourth grade, there also were two activities related to the geometric shapes and measures area, studying shapes and measuring things, and one rather encompassing data display activity—making tables, charts, or graphs. Additionally, the teachers of fourth grade students were asked about an algebra activity—writing equations for word problems. At the eighth grade, in addition to the two number activities in common with fourth grade, there was one algebra activity about writing equations and functions, one geometry activity about solving problems about geometric shapes and angles, and one data and chance activity about interpreting data in tables, charts, or graphs. The data in 7.4 are for the percentages of students reporting that these core activities occurred in at least half the lessons in mathematics class, and the data in Exhibit 7.5 are for the percentages of students whose teachers reported the activity occurred in at least half the lessons.

On average internationally, while somewhat more fourth grade students than eighth grade students, 69 compared to 59 percent, reported devoting time in at least half their lessons to practicing operations with whole numbers, there was general agreement between students at the fourth and eighth grades that about half the students spent time in at least half their lessons on fractions and decimals. In contrast, however, especially at the fourth grade, their teachers largely disagreed, reporting more time on operations with whole numbers and less emphasis on fractions and decimals than the students. At the fourth grade, on average internationally, teachers reported 81 percent of the students spent time in at least half the lessons practicing operations with whole numbers, and that only 21 percent spent time on fractions and decimals. At the eighth grade, teachers reported that 65 percent of the students practiced operations with whole numbers in at least half their lessons and that 42 percent spent time on fractions and decimals.

At the fourth grade, on average internationally, 59 percent of students reported spending time in at least half their lessons learning about geometric shapes and 41 percent making tables, charts, or graphs, while their teachers reported only 20 and 15 percent, respectively. This is possibly due to students having these experiences in lessons in other subject areas. There was closer agreement that measuring things in at least half the lessons was relatively rare: only 27 percent according to students' reports and 10 percent according to their teachers. In comparison to the low percent of students having emphasis on fractions, geometry, and data display, teachers reported that 33 percent of the fourth grade students spent time on writing equations for word problems in at least half the lessons.

At the eighth grade, a larger proportion of students than their teachers reported attention to the algebra, geometry, and data topics in at least half the lessons. For writing equations and functions, 57 percent of students reported doing this activity in at least half of their lessons but teachers reported asking only 34 percent; for solving geometry problems, students reported 58 percent and teachers 34 percent; and for interpreting data displays, students reported 45 percent and teachers 17 percent.

Because of the high interest in improving students' ability for mathematics problem-solving, TIMSS asked students and teachers about how often students were asked to do certain activities related to problem-solving. The percentages of students reporting that they did the activity in at least half of the lessons are presented in Exhibit 7.6, whereas Exhibit 7.7 shows the percentages of students whose teachers reported asking them to do the activity. At the fourth grade, the activities queried provided a comparison between an emphasis on memorizing how to work problems versus working problems independently and explaining answers. Students reported much more emphasis than teachers on memorization, with 72 percent reporting that they memorized how to work problems in at least half their mathematics lessons compared to 38 percent reported by teachers. However, students and teachers were in close agreement about students working problems on their own in at least half the lessons, 76 compared to 74 percent, and about students explaining answers, 61 compared to 66 percent.

**Exhibit 7.4 Students' Reports on Mathematics Content-related Emphasis in Classroom Activities**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More									
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator	Work on Fractions and Decimals	Learn About Shapes such as Circles, Triangles, Rectangles, and Cubes	Measure Things in the Classroom and Around the School	Make Tables, Charts, or Graphs					
Algeria	61 (1.9)		60 (2.3)	33 (1.7)	51 (1.8)					
Armenia	62 (1.5)	r	64 (1.5)	r	41 (1.7)					
Australia	76 (1.2)		54 (1.6)	23 (0.9)	34 (1.3)					
Austria	73 (0.9)		64 (0.9)	24 (0.8)	29 (0.9)					
Chinese Taipei	54 (0.9)		54 (1.0)	26 (0.8)	40 (0.9)					
Colombia	60 (1.6)		82 (1.1)	57 (1.5)	72 (1.2)					
Czech Republic	69 (1.1)		54 (1.6)	13 (0.9)	13 (0.8)					
Denmark	57 (2.0)		48 (1.7)	7 (0.7)	28 (2.1)					
El Salvador	65 (1.5)		86 (0.9)	50 (1.5)	73 (1.3)					
England	65 (1.1)		34 (1.4)	9 (0.6)	38 (1.0)					
Georgia	79 (0.9)		79 (1.4)	34 (1.6)	47 (1.9)					
Germany	74 (0.8)	r	61 (1.0)	26 (0.9)	r	36 (1.2)				
Hong Kong SAR	57 (1.2)		52 (1.0)	46 (1.2)	16 (0.7)	29 (1.1)				
Hungary	75 (1.1)		32 (1.5)	53 (1.6)	13 (0.9)	16 (0.9)				
Iran, Islamic Rep. of	52 (2.2)		43 (2.2)	62 (2.3)	43 (2.0)	50 (2.4)				
Italy	57 (1.2)		64 (1.3)	69 (1.2)	19 (1.0)	46 (1.3)				
Japan	85 (0.7)		77 (1.3)	65 (1.4)	33 (1.1)	61 (1.1)				
Kazakhstan	62 (3.0)		47 (2.9)	55 (3.9)	21 (2.6)	35 (2.8)				
Kuwait	66 (1.5)		55 (2.0)	68 (1.7)	43 (1.7)	53 (1.8)				
Latvia	73 (1.0)		43 (1.3)	62 (1.4)	18 (0.9)	28 (1.2)				
Lithuania	83 (0.9)		62 (1.2)	61 (1.2)	13 (0.8)	45 (1.3)				
Morocco	66 (1.9)		63 (2.5)	66 (2.5)	48 (2.2)	57 (2.1)				
Netherlands	77 (1.0)		35 (1.6)	18 (1.0)	10 (0.6)	30 (1.3)				
New Zealand	75 (0.9)		58 (0.9)	53 (1.4)	24 (1.0)	43 (1.0)				
Norway	57 (1.0)		40 (1.5)	46 (1.3)	17 (0.9)	24 (1.0)				
Qatar	70 (0.6)		58 (0.6)	75 (0.5)	50 (0.6)	64 (0.6)				
Russian Federation	79 (1.1)		35 (2.3)	61 (2.2)	20 (1.1)	40 (2.1)				
Scotland	72 (1.1)		37 (1.4)	41 (1.2)	18 (1.0)	37 (1.4)				
Singapore	77 (0.8)		73 (0.7)	69 (0.7)	17 (0.7)	36 (0.8)				
Slovak Republic	78 (1.1)		31 (1.4)	76 (1.4)	17 (1.0)	23 (1.3)				
Slovenia	73 (1.0)		30 (1.7)	53 (1.1)	27 (1.1)	43 (1.3)				
Sweden	75 (0.9)		27 (1.6)	46 (1.6)	19 (1.0)	36 (1.4)				
Tunisia	67 (2.3)		21 (1.9)	57 (2.7)	41 (2.3)	54 (2.5)				
Ukraine	71 (1.2)		65 (1.6)	73 (1.1)	40 (1.2)	36 (1.3)				
United States	72 (0.7)		64 (0.8)	55 (1.0)	25 (0.8)	48 (0.9)				
Yemen	59 (2.9)		51 (2.7)	r	46 (2.4)	r	36 (2.7)	r	34 (2.4)	
International Avg.	69 (0.2)		49 (0.3)	59 (0.3)	27 (0.2)	41 (0.3)				
<b>Benchmarking Participants</b>										
Alberta, Canada	77 (1.0)		50 (2.3)	51 (1.9)	28 (1.5)	51 (1.6)				
British Columbia, Canada	77 (0.8)		47 (2.0)	48 (1.5)	23 (1.4)	47 (1.5)				
Dubai, UAE	71 (1.1)	r	62 (1.5)	r	64 (1.4)	r	26 (1.6)	r	47 (1.6)	
Massachusetts, US	75 (1.3)		64 (1.9)	54 (2.5)	20 (1.3)	51 (1.8)				
Minnesota, US	75 (1.7)		63 (2.1)	57 (2.0)	24 (1.4)	43 (2.0)				
Ontario, Canada	69 (1.1)		38 (2.0)	53 (2.1)	28 (1.8)	53 (1.7)				
Quebec, Canada	79 (1.3)		61 (1.8)	54 (1.7)	24 (1.3)	38 (1.4)				

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.

**Exhibit 7.4 Students' Reports on Mathematics Content-related Emphasis in Classroom Activities (Continued)**
**TIMSS2007**  
**Mathematics 8<sup>th</sup> Grade**

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More				
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator	Work on Fractions and Decimals	Write Equations and Functions to Represent Relationships	Solve Problems About Geometric Shapes, Lines, and Angles	Interpret Data in Tables, Charts, or Graphs
Algeria	47 (1.0)	38 (1.0)	53 (1.0)	58 (0.9)	53 (0.9)
Armenia	59 (1.2)	54 (1.0)	67 (1.1)	77 (0.8)	47 (1.3)
Australia	45 (1.3)	43 (1.1)	45 (1.4)	39 (1.2)	40 (1.3)
Bahrain	70 (0.9)	40 (0.9)	67 (0.9)	63 (1.0)	56 (0.9)
Bosnia and Herzegovina	62 (1.3)	55 (1.1)	57 (1.1)	63 (1.0)	41 (0.9)
Botswana	63 (0.8)	38 (0.8)	37 (0.9)	37 (0.9)	31 (0.9)
Bulgaria	70 (1.0)	54 (1.3)	64 (1.2)	86 (0.9)	43 (1.3)
Chinese Taipei	60 (0.9)	29 (1.0)	36 (0.9)	57 (1.2)	35 (1.0)
Colombia	69 (1.3)	67 (1.3)	70 (1.1)	55 (2.0)	57 (1.2)
Cyprus	65 (0.8)	42 (0.9)	54 (0.9)	54 (1.0)	43 (0.9)
Czech Republic	44 (1.4)	58 (1.2)	61 (1.4)	51 (2.0)	17 (1.0)
Egypt	67 (1.1)	58 (1.3)	70 (1.0)	75 (0.8)	66 (1.2)
El Salvador	64 (1.2)	66 (1.2)	58 (1.2)	49 (1.5)	47 (1.1)
England	46 (1.3)	36 (1.1)	37 (1.3)	29 (1.2)	30 (1.2)
Georgia	54 (1.5)	57 (1.4)	58 (1.3)	76 (1.2)	50 (1.3)
Ghana	61 (1.6)	57 (1.4)	53 (1.5)	51 (1.6)	49 (1.6)
Hong Kong SAR	41 (1.0)	35 (1.0)	40 (1.1)	51 (1.2)	35 (1.0)
Hungary	60 (1.3)	62 (1.5)	60 (1.4)	56 (1.4)	35 (1.4)
Indonesia	61 (1.3)	54 (1.2)	50 (1.3)	65 (1.1)	49 (1.3)
Iran, Islamic Rep. of	54 (1.7)	41 (1.2)	48 (1.3)	46 (1.2)	46 (1.5)
Israel	60 (1.2)	39 (1.2)	63 (1.2)	78 (0.9)	56 (1.4)
Italy	43 (1.4)	43 (1.2)	66 (1.4)	79 (1.0)	35 (1.8)
Japan	--	89 (0.6)	49 (1.0)	45 (1.1)	69 (1.0)
Jordan	69 (1.1)	63 (1.3)	71 (1.2)	73 (1.1)	66 (1.0)
Korea, Rep. of	82 (0.6)	35 (0.8)	44 (1.0)	54 (0.9)	27 (0.8)
Kuwait	69 (0.9)	43 (0.9)	68 (0.9)	63 (0.9)	64 (1.0)
Lebanon	62 (1.4)	59 (1.4)	66 (1.2)	74 (1.2)	48 (1.7)
Lithuania	48 (1.5)	58 (1.2)	68 (1.0)	54 (1.4)	43 (1.3)
Malaysia	60 (1.0)	56 (1.0)	41 (1.0)	54 (0.9)	42 (1.0)
Malta	35 (0.7)	26 (0.6)	41 (0.6)	34 (0.7)	22 (0.5)
Norway	24 (0.7)	26 (1.0)	25 (1.1)	31 (1.2)	27 (1.2)
Oman	53 (1.1)	49 (1.2)	67 (1.1)	57 (1.2)	56 (1.1)
Palestinian Nat'l Auth.	62 (1.3)	48 (1.5)	54 (1.6)	60 (1.4)	44 (1.3)
Qatar	77 (0.5)	60 (0.6)	69 (0.7)	53 (0.6)	57 (0.5)
Romania	74 (1.3)	65 (1.1)	73 (1.2)	82 (1.2)	42 (1.4)
Russian Federation	74 (1.0)	67 (1.1)	70 (1.2)	86 (0.8)	50 (1.1)
Saudi Arabia	57 (1.1)	40 (1.4)	62 (1.1)	62 (1.4)	53 (1.4)
Scotland	59 (1.1)	45 (1.2)	42 (1.2)	34 (1.2)	31 (1.0)
Serbia	66 (1.2)	59 (1.3)	57 (1.2)	62 (1.1)	36 (1.5)
Singapore	51 (0.9)	57 (0.9)	62 (0.9)	47 (0.8)	41 (1.0)
Slovenia	61 (1.0)	68 (1.0)	57 (1.1)	47 (1.2)	47 (1.3)
Sweden	42 (1.2)	39 (1.0)	32 (1.1)	29 (0.9)	25 (0.9)
Syrian Arab Republic	63 (0.9)	46 (1.1)	74 (1.0)	71 (1.0)	53 (1.1)
Thailand	70 (1.1)	65 (1.0)	48 (1.1)	53 (0.9)	48 (1.0)
Tunisia	59 (1.2)	64 (1.1)	61 (1.2)	58 (1.1)	45 (1.2)
Turkey	66 (1.1)	43 (1.0)	59 (1.2)	62 (1.0)	46 (1.2)
Ukraine	73 (1.0)	62 (1.2)	73 (1.0)	80 (1.1)	56 (1.1)
United States	62 (0.8)	63 (0.9)	73 (0.9)	49 (1.0)	57 (1.1)
‡ Morocco	54 (1.2)	49 (1.5)	65 (1.3)	54 (1.6)	46 (1.2)
<b>International Avg.</b>	<b>59 (0.2)</b>	<b>51 (0.2)</b>	<b>57 (0.2)</b>	<b>58 (0.2)</b>	<b>45 (0.2)</b>
<b>Benchmarking Participants</b>					
Basque Country, Spain	81 (1.5)	75 (1.1)	79 (1.2)	62 (2.3)	53 (1.8)
British Columbia, Canada	50 (1.8)	49 (1.5)	52 (1.3)	38 (1.4)	33 (1.2)
Dubai, UAE	63 (1.2)	55 (1.0)	66 (1.1)	57 (1.6)	r 40 (1.7)
Massachusetts, US	59 (2.0)	58 (2.2)	76 (1.8)	46 (2.5)	60 (2.2)
Minnesota, US	53 (1.7)	63 (2.0)	72 (2.2)	47 (2.3)	58 (2.5)
Ontario, Canada	42 (1.5)	43 (1.6)	51 (1.3)	37 (1.3)	45 (1.4)
Quebec, Canada	43 (1.2)	36 (1.2)	56 (1.3)	54 (1.7)	41 (1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.



**Exhibit 7.5 Teachers' Reports on Mathematics Content-related Emphasis  
in Students' Classroom Activities**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More					
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator	Work on Fractions and Decimals	Write Equations for Word Problems	Learn About Shapes such as Circles, Triangles, Rectangles, and Cubes	Measure Things in the Classroom and Around the School	Make Tables, Charts, or Graphs
Algeria	66 (4.3)	35 (4.8)	28 (5.1)	26 (4.9)	17 (4.6)	26 (5.0)
Armenia	56 (3.2)	60 (3.6)	57 (3.5)	50 (3.6)	53 (3.8)	56 (3.6)
Australia	83 (3.1)	19 (2.6)	34 (3.8)	15 (3.2)	8 (2.5)	10 (3.0)
Austria	92 (1.6)	3 (0.8)	25 (2.8)	6 (1.4)	4 (1.3)	1 (0.7)
Chinese Taipei	72 (3.5)	25 (3.6)	68 (3.3)	16 (3.1)	12 (2.9)	12 (2.9)
Colombia	83 (3.6)	36 (3.7)	26 (3.8)	27 (3.7)	26 (4.4)	30 (3.6)
Czech Republic	96 (1.7)	1 (0.4)	40 (4.3)	20 (3.0)	2 (0.7)	2 (1.1)
Denmark	69 (4.2)	17 (3.1)	3 (1.5)	14 (3.2)	3 (1.7)	6 (1.8)
El Salvador	61 (3.9)	22 (3.2)	13 (3.0)	31 (4.2)	20 (3.4)	18 (3.2)
England	81 (2.8)	23 (3.4)	36 (4.3)	2 (0.8)	1 (0.8)	4 (1.5)
Georgia	95 (1.6)	17 (3.3)	38 (4.4)	32 (4.4)	4 (1.6)	13 (3.0)
Germany	95 (1.1)	2 (0.8)	41 (3.2)	7 (1.7)	1 (0.0)	2 (1.1)
Hong Kong SAR	50 (3.6)	24 (3.7)	18 (3.0)	9 (2.3)	8 (2.2)	7 (2.1)
Hungary	96 (1.0)	3 (1.2)	58 (4.0)	2 (1.0)	4 (1.7)	1 (0.6)
Iran, Islamic Rep. of	69 (3.8)	23 (3.3)	22 (3.2)	33 (4.0)	25 (3.0)	24 (3.4)
Italy	78 (2.2)	44 (3.0)	12 (1.9)	24 (2.6)	8 (1.6)	16 (2.3)
Japan	90 (2.3)	50 (3.5)	82 (3.1)	32 (3.4)	13 (2.6)	34 (3.6)
Kazakhstan	97 (1.3)	29 (4.1)	57 (4.4)	45 (5.4)	5 (1.7)	24 (4.8)
Kuwait	r 80 (3.6)	r 26 (3.7)	r 32 (3.8)	r 29 (4.0)	r 17 (3.3)	r 10 (2.6)
Latvia	95 (1.4)	16 (3.2)	35 (3.7)	29 (3.5)	9 (2.4)	20 (3.3)
Lithuania	99 (0.9)	20 (2.9)	19 (2.7)	11 (2.3)	3 (1.1)	17 (2.8)
Morocco	72 (3.7)	16 (3.5)	21 (3.1)	27 (3.5)	18 (3.0)	24 (3.8)
Netherlands	93 (2.3)	21 (3.5)	4 (1.8)	1 (0.4)	1 (0.9)	5 (1.6)
New Zealand	84 (1.8)	21 (2.2)	37 (2.8)	4 (1.3)	3 (0.7)	5 (1.0)
Norway	66 (3.1)	5 (1.6)	3 (1.2)	4 (1.5)	1 (0.8)	1 (0.7)
Qatar	87 (0.1)	25 (0.2)	32 (0.2)	20 (0.2)	18 (0.1)	10 (0.1)
Russian Federation	97 (0.8)	14 (2.1)	17 (2.2)	47 (3.1)	3 (1.2)	45 (3.2)
Scotland	80 (3.2)	8 (2.4)	9 (2.2)	3 (1.6)	1 (0.8)	2 (1.0)
Singapore	73 (2.4)	48 (2.6)	52 (2.9)	13 (1.8)	9 (1.8)	9 (1.6)
Slovak Republic	97 (1.0)	1 (0.6)	62 (3.7)	40 (3.7)	3 (1.0)	4 (1.6)
Slovenia	86 (2.3)	2 (0.9)	16 (2.2)	5 (1.4)	5 (1.0)	6 (1.4)
Sweden	75 (3.4)	3 (1.0)	5 (1.5)	4 (1.3)	5 (1.5)	2 (0.9)
Tunisia	69 (3.5)	r 24 (3.5)	43 (3.7)	27 (3.5)	28 (3.4)	32 (3.7)
Ukraine	95 (1.4)	14 (2.6)	72 (3.7)	43 (3.7)	9 (2.4)	13 (2.8)
United States	83 (1.7)	25 (2.4)	51 (2.4)	11 (1.8)	7 (1.5)	14 (1.9)
Yemen	67 (4.4)	40 (4.5)	16 (3.2)	27 (4.4)	15 (3.2)	16 (3.6)
International Avg.	81 (0.5)	21 (0.5)	33 (0.5)	20 (0.5)	10 (0.4)	15 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Alberta, Canada	78 (3.5)	7 (2.2)	36 (3.9)	7 (2.2)	5 (1.8)	12 (2.7)
British Columbia, Canada	r 74 (3.3)	r 7 (2.9)	r 49 (4.1)	r 3 (1.3)	r 2 (1.0)	r 9 (2.2)
Dubai, UAE	s 88 (2.3)	s 30 (6.1)	s 27 (5.6)	s 11 (2.9)	s 7 (2.4)	s 20 (3.9)
Massachusetts, US	72 (6.0)	23 (6.5)	42 (6.4)	10 (4.7)	5 (3.5)	13 (4.7)
Minnesota, US	92 (3.4)	22 (6.0)	39 (6.3)	10 (5.0)	1 (0.8)	11 (5.6)
Ontario, Canada	61 (4.0)	7 (2.0)	35 (4.1)	7 (2.2)	6 (2.0)	21 (3.8)
Quebec, Canada	77 (3.6)	23 (3.6)	56 (4.3)	10 (2.3)	3 (1.4)	8 (1.9)

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 7.5 Teachers' Reports on Mathematics Content-related Emphasis in Students' Classroom Activities (Continued)**
**TIMSS2007**  
**Mathematics** 8<sup>th</sup> Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More				
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator	Work on Fractions and Decimals	Write Equations and Functions to Represent Relationships	Use Knowledge of the Properties of Shapes, Lines, and Angles to Solve Problems	Interpret Data in Tables, Charts, or Graphs
Algeria	40 (4.5)	24 (3.6)	26 (3.7)	38 (4.6)	25 (3.8)
Armenia	51 (3.9)	53 (3.5)	54 (4.0)	61 (3.6)	58 (3.6)
Australia	45 (3.8)	18 (3.2)	15 (2.6)	6 (1.9)	7 (1.9)
Bahrain	82 (1.5)	32 (3.2)	26 (2.2)	26 (2.4)	17 (1.9)
Bosnia and Herzegovina	63 (4.2)	55 (4.0)	36 (3.5)	33 (3.9)	12 (2.4)
Botswana	85 (3.1)	27 (3.8)	14 (3.0)	11 (3.0)	6 (2.2)
Bulgaria	82 (3.5)	71 (3.8)	38 (3.8)	88 (3.0)	15 (2.7)
Chinese Taipei	70 (3.8)	19 (3.5)	28 (3.4)	38 (4.0)	12 (2.7)
Colombia	78 (4.1)	70 (4.5)	42 (4.9)	31 (4.3)	29 (5.3)
Cyprus	71 (2.7)	34 (2.4)	47 (2.5)	31 (2.6)	10 (1.7)
Czech Republic	68 (3.3)	62 (4.4)	24 (3.5)	25 (3.4)	4 (1.7)
Egypt	44 (3.8)	33 (4.0)	28 (3.5)	40 (4.1)	13 (2.3)
El Salvador	69 (4.0)	44 (4.1)	24 (4.0)	14 (3.1)	23 (3.5)
England	48 (4.0)	17 (3.3)	9 (2.2)	3 (1.5)	3 (1.5)
Georgia	60 (4.8)	47 (4.7)	24 (3.8)	28 (4.2)	10 (2.2)
Ghana	90 (2.5)	41 (4.5)	29 (3.7)	22 (3.4)	20 (3.1)
Hong Kong SAR	22 (3.4)	11 (2.7)	31 (3.8)	18 (3.4)	11 (2.7)
Hungary	72 (3.7)	78 (3.2)	44 (4.0)	31 (3.5)	13 (2.3)
Indonesia	64 (3.3)	31 (4.0)	50 (4.4)	34 (4.3)	26 (4.2)
Iran, Islamic Rep. of	70 (3.8)	41 (3.6)	19 (2.9)	28 (3.1)	21 (3.5)
Israel	r 51 (3.7)	r 31 (3.3)	r 44 (4.1)	r 38 (3.8)	r 12 (2.0)
Italy	58 (3.6)	65 (3.4)	27 (2.9)	74 (2.9)	20 (2.5)
Japan	53 (4.1)	16 (2.7)	63 (3.7)	54 (3.7)	23 (3.4)
Jordan	75 (3.3)	55 (4.1)	51 (4.2)	36 (3.9)	19 (3.4)
Korea, Rep. of	53 (3.5)	31 (3.4)	64 (3.4)	56 (3.8)	30 (3.6)
Kuwait	r 71 (4.5)	r 35 (4.1)	r 27 (4.2)	r 24 (4.2)	r 22 (4.1)
Lebanon	55 (3.7)	48 (4.8)	42 (4.8)	64 (4.3)	30 (3.9)
Lithuania	69 (3.1)	70 (3.4)	22 (3.2)	27 (3.1)	12 (2.4)
Malaysia	75 (3.5)	37 (4.1)	37 (3.9)	26 (3.7)	21 (3.3)
Malta	61 (0.2)	30 (0.2)	24 (0.2)	26 (0.2)	3 (0.1)
Norway	9 (2.0)	11 (2.2)	4 (1.2)	5 (1.4)	3 (1.1)
Oman	73 (3.9)	36 (4.3)	34 (4.3)	28 (3.6)	20 (3.1)
Palestinian Nat'l Auth.	76 (3.5)	44 (4.5)	30 (4.0)	37 (4.4)	11 (2.9)
Qatar	72 (0.2)	33 (0.1)	27 (0.2)	21 (0.1)	19 (0.1)
Romania	93 (1.7)	70 (3.8)	38 (3.8)	79 (2.7)	15 (2.7)
Russian Federation	85 (2.4)	77 (3.2)	56 (3.7)	76 (2.6)	26 (3.2)
Saudi Arabia	r 76 (4.0)	r 27 (3.4)	r 39 (4.7)	r 35 (4.0)	r 27 (4.0)
Scotland	73 (3.8)	37 (3.5)	8 (1.7)	6 (1.6)	5 (1.4)
Serbia	81 (3.2)	65 (3.8)	42 (3.9)	50 (3.9)	2 (0.9)
Singapore	41 (2.8)	24 (2.5)	39 (2.7)	12 (2.1)	9 (1.5)
Slovenia	73 (2.6)	64 (3.0)	13 (1.7)	23 (2.6)	14 (1.9)
Sweden	38 (3.0)	29 (3.0)	9 (1.8)	12 (2.1)	6 (1.5)
Syrian Arab Republic	69 (3.7)	33 (4.0)	53 (4.0)	53 (4.3)	27 (3.8)
Thailand	75 (3.5)	43 (4.1)	41 (4.1)	35 (4.0)	37 (4.1)
Tunisia	75 (3.6)	47 (4.1)	26 (3.8)	45 (4.2)	10 (2.6)
Turkey	72 (4.4)	35 (4.3)	48 (4.5)	26 (3.8)	18 (3.6)
Ukraine	83 (3.2)	85 (3.1)	59 (4.3)	62 (4.1)	11 (2.4)
United States	59 (2.7)	44 (3.0)	46 (2.7)	12 (1.8)	16 (2.0)
‡ Morocco	63 (4.5)	42 (5.4)	30 (5.6)	31 (5.9)	16 (5.0)
<b>International Avg.</b>	<b>65 (0.5)</b>	<b>42 (0.5)</b>	<b>34 (0.5)</b>	<b>34 (0.5)</b>	<b>17 (0.4)</b>
<b>Benchmarking Participants</b>					
Basque Country, Spain	76 (3.9)	62 (4.2)	35 (4.0)	12 (3.1)	12 (3.0)
British Columbia, Canada	59 (4.2)	39 (4.7)	24 (3.4)	6 (2.0)	5 (1.7)
Dubai, UAE	s 71 (5.0)	s 47 (4.0)	s 32 (4.8)	s 34 (4.9)	s 13 (3.5)
Massachusetts, US	56 (6.4)	38 (6.7)	48 (6.0)	12 (3.7)	23 (5.2)
Minnesota, US	41 (7.5)	31 (5.2)	42 (5.3)	13 (3.7)	18 (5.5)
Ontario, Canada	37 (4.0)	23 (4.1)	23 (3.6)	11 (2.2)	19 (3.1)
Quebec, Canada	22 (3.4)	42 (4.1)	48 (4.6)	20 (3.8)	14 (3.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



## Exhibit 7.6 Students' Reports on Learning Activities in Mathematics Lessons

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More		
	Memorize How to Work Problems	Work Problems on Their Own	Explain Answers
Algeria	72 (2.0)	72 (1.7)	72 (1.6)
Armenia	r 78 (1.2)	r 77 (1.1)	r 73 (1.3)
Australia	73 (1.2)	74 (1.2)	53 (1.3)
Austria	67 (1.0)	88 (0.5)	50 (1.0)
Chinese Taipei	71 (0.9)	69 (1.0)	47 (1.1)
Colombia	83 (0.7)	84 (0.9)	74 (1.2)
Czech Republic	57 (1.4)	76 (0.9)	44 (1.3)
Denmark	53 (1.6)	60 (1.5)	44 (1.6)
El Salvador	74 (1.1)	76 (1.0)	71 (1.2)
England	65 (1.0)	69 (1.1)	61 (1.3)
Georgia	85 (0.9)	84 (0.9)	77 (1.2)
Germany	r 74 (0.9)	89 (0.6)	64 (0.9)
Hong Kong SAR	75 (1.0)	70 (0.9)	46 (1.1)
Hungary	68 (1.0)	80 (0.8)	54 (1.3)
Iran, Islamic Rep. of	52 (2.3)	59 (2.0)	73 (1.8)
Italy	61 (1.4)	78 (0.8)	46 (1.1)
Japan	89 (0.7)	92 (0.5)	59 (1.2)
Kazakhstan	87 (1.3)	86 (1.3)	78 (1.8)
Kuwait	82 (1.2)	82 (1.0)	75 (1.6)
Latvia	71 (1.1)	87 (0.8)	60 (1.3)
Lithuania	85 (0.8)	82 (1.0)	57 (1.0)
Morocco	66 (2.4)	72 (1.9)	73 (2.0)
Netherlands	77 (1.1)	58 (1.1)	36 (1.2)
New Zealand	78 (0.9)	74 (0.8)	67 (1.0)
Norway	57 (1.2)	74 (1.0)	42 (1.2)
Qatar	86 (0.4)	82 (0.5)	77 (0.5)
Russian Federation	68 (2.1)	79 (1.4)	75 (1.2)
Scotland	64 (1.1)	78 (1.0)	45 (1.4)
Singapore	76 (0.7)	75 (0.9)	47 (0.8)
Slovak Republic	61 (1.7)	82 (1.2)	55 (1.5)
Slovenia	88 (0.6)	71 (1.0)	63 (1.0)
Sweden	62 (1.1)	77 (0.8)	66 (1.1)
Tunisia	81 (1.9)	73 (1.7)	71 (2.1)
Ukraine	73 (1.5)	82 (1.0)	80 (0.9)
United States	83 (0.5)	78 (0.6)	63 (0.8)
Yemen	r 64 (2.2)	r 60 (2.5)	r 52 (2.7)
<b>International Avg.</b>	<b>72 (0.2)</b>	<b>76 (0.2)</b>	<b>61 (0.2)</b>
<b>Benchmarking Participants</b>			
Alberta, Canada	78 (1.3)	80 (0.9)	69 (1.2)
British Columbia, Canada	75 (1.2)	80 (1.0)	66 (1.3)
Dubai, UAE	r 76 (1.2)	r 79 (1.0)	r 68 (1.6)
Massachusetts, US	80 (0.9)	80 (1.3)	76 (1.2)
Minnesota, US	86 (1.2)	79 (1.4)	68 (2.3)
Ontario, Canada	72 (1.2)	76 (1.3)	76 (1.2)
Quebec, Canada	75 (1.3)	82 (1.4)	67 (1.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.



Exhibit 7.6 Students' Reports on Learning Activities in Mathematics Lessons (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More				
	Memorize Formulas and Procedures	Work Problems on Their Own	Explain Answers	Relate What Is Being Learned in Mathematics to Their Daily Lives	Decide Procedures for Solving Complex Problems
Algeria	57 (1.2)	57 (0.9)	79 (0.8)	57 (1.1)	53 (1.1)
Armenia	80 (1.0)	r 70 (1.0)	r 76 (1.3)	46 (1.1)	58 (1.0)
Australia	51 (1.0)	70 (1.2)	71 (0.9)	42 (1.2)	40 (1.4)
Bahrain	70 (1.1)	68 (0.8)	73 (0.9)	60 (0.9)	61 (1.1)
Bosnia and Herzegovina	68 (1.1)	45 (1.0)	66 (1.1)	55 (1.2)	52 (1.0)
Botswana	39 (1.1)	42 (0.9)	78 (0.7)	62 (1.0)	40 (0.9)
Bulgaria	62 (1.5)	70 (0.9)	69 (1.2)	35 (1.2)	33 (1.2)
Chinese Taipei	48 (1.2)	52 (1.1)	33 (1.1)	31 (0.9)	44 (1.1)
Colombia	70 (1.1)	55 (1.2)	73 (1.1)	58 (1.5)	68 (1.1)
Cyprus	61 (0.9)	63 (0.8)	83 (0.7)	60 (0.9)	43 (0.8)
Czech Republic	60 (1.1)	82 (0.8)	63 (1.2)	43 (1.2)	42 (1.1)
Egypt	69 (1.0)	70 (1.0)	80 (0.7)	70 (0.9)	72 (1.0)
El Salvador	71 (1.0)	71 (0.8)	65 (1.1)	59 (1.0)	52 (1.1)
England	32 (1.1)	68 (1.1)	67 (1.1)	34 (1.1)	35 (1.1)
Georgia	79 (1.0)	27 (1.1)	76 (1.3)	53 (1.6)	43 (1.1)
Ghana	61 (1.5)	57 (1.2)	79 (1.0)	75 (1.0)	56 (1.4)
Hong Kong SAR	47 (1.2)	53 (1.1)	60 (0.9)	41 (1.2)	51 (1.1)
Hungary	50 (1.3)	72 (1.5)	61 (1.3)	47 (1.3)	41 (1.1)
Indonesia	68 (1.3)	66 (1.2)	56 (1.1)	47 (1.2)	37 (1.2)
Iran, Islamic Rep. of	57 (1.5)	54 (1.2)	74 (1.0)	56 (1.3)	38 (1.0)
Israel	76 (1.0)	84 (0.8)	81 (1.0)	52 (1.2)	63 (1.1)
Italy	73 (1.2)	71 (1.0)	52 (1.2)	43 (1.0)	55 (1.0)
Japan	68 (0.9)	92 (0.5)	76 (0.9)	43 (1.5)	30 (0.9)
Jordan	84 (0.8)	82 (0.9)	84 (0.8)	71 (1.2)	70 (1.0)
Korea, Rep. of	48 (0.9)	67 (0.9)	31 (0.9)	21 (0.7)	33 (0.9)
Kuwait	70 (1.0)	72 (0.8)	73 (0.8)	59 (1.0)	63 (0.9)
Lebanon	67 (1.4)	63 (1.5)	80 (1.2)	58 (1.3)	60 (1.4)
Lithuania	50 (1.3)	72 (1.2)	53 (1.4)	34 (1.1)	38 (1.3)
Malaysia	69 (1.4)	48 (1.2)	61 (1.3)	55 (1.0)	36 (1.0)
Malta	45 (0.6)	51 (0.7)	67 (0.7)	37 (0.7)	32 (0.6)
Norway	33 (0.9)	76 (0.9)	49 (1.1)	42 (0.9)	37 (0.9)
Oman	78 (0.8)	66 (1.2)	78 (0.9)	71 (0.8)	61 (1.1)
Palestinian Nat'l Auth.	67 (1.2)	57 (1.4)	79 (1.0)	60 (1.7)	56 (1.4)
Qatar	65 (0.5)	67 (0.6)	74 (0.6)	64 (0.7)	63 (0.6)
Romania	78 (1.4)	52 (1.1)	74 (1.2)	38 (1.3)	45 (1.1)
Russian Federation	83 (0.9)	75 (0.9)	85 (1.0)	48 (1.3)	60 (1.4)
Saudi Arabia	60 (1.0)	58 (1.1)	70 (1.0)	55 (1.3)	55 (1.2)
Scotland	44 (1.1)	69 (0.9)	75 (1.0)	45 (1.1)	40 (1.0)
Serbia	50 (1.5)	41 (1.0)	55 (1.2)	43 (1.3)	51 (1.4)
Singapore	72 (0.8)	60 (0.9)	60 (0.8)	46 (1.0)	50 (0.9)
Slovenia	80 (0.9)	68 (1.0)	70 (0.8)	58 (1.1)	56 (1.1)
Sweden	41 (1.0)	83 (0.6)	63 (1.0)	39 (1.1)	48 (1.0)
Syrian Arab Republic	75 (0.8)	62 (1.0)	80 (0.8)	55 (1.2)	61 (1.0)
Thailand	66 (0.9)	61 (1.1)	57 (1.0)	67 (0.9)	53 (1.0)
Tunisia	68 (1.2)	57 (1.0)	81 (0.9)	54 (1.3)	57 (1.1)
Turkey	56 (1.2)	62 (1.0)	82 (0.9)	59 (1.1)	50 (1.1)
Ukraine	82 (1.0)	72 (1.1)	89 (0.6)	51 (1.2)	54 (1.2)
United States	72 (0.8)	83 (0.6)	79 (0.7)	47 (1.0)	46 (0.8)
‡ Morocco	61 (1.0)	64 (1.5)	79 (0.9)	62 (1.2)	61 (1.1)
International Avg.	63 (0.2)	64 (0.1)	70 (0.1)	51 (0.2)	50 (0.2)
<b>Benchmarking Participants</b>					
Basque Country, Spain	77 (1.4)	73 (1.2)	70 (1.6)	56 (1.8)	56 (1.8)
British Columbia, Canada	62 (1.2)	77 (0.9)	79 (1.0)	42 (1.1)	41 (1.4)
Dubai, UAE	72 (1.1)	72 (0.9)	75 (1.1)	54 (1.2)	r 50 (1.2)
Massachusetts, US	67 (1.9)	80 (1.2)	84 (1.5)	48 (2.4)	48 (1.8)
Minnesota, US	68 (2.0)	82 (1.3)	77 (2.0)	51 (2.0)	43 (1.2)
Ontario, Canada	69 (1.3)	76 (1.0)	87 (1.1)	50 (1.5)	49 (1.4)
Quebec, Canada	53 (1.5)	77 (1.0)	72 (1.3)	40 (1.3)	57 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.



## Exhibit 7.7 Teachers' Reports on Learning Activities in Mathematics Lessons

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More		
	Memorize Formulas and Procedures	Explain Answers	Relate What Is Being Learned in Mathematics to Their Daily Lives
Algeria	72 (4.2)	70 (4.5)	73 (4.9)
Armenia	54 (3.4)	61 (3.5)	53 (4.0)
Australia	16 (3.3)	73 (3.5)	60 (3.6)
Austria	10 (1.9)	43 (3.2)	53 (3.0)
Chinese Taipei	27 (3.7)	63 (3.9)	54 (3.7)
Colombia	47 (4.5)	86 (3.0)	92 (2.3)
Czech Republic	8 (2.1)	77 (3.8)	71 (3.9)
Denmark	12 (2.3)	67 (4.1)	43 (4.3)
El Salvador	43 (4.6)	66 (4.0)	74 (4.1)
England	22 (3.4)	87 (2.6)	68 (3.9)
Georgia	62 (4.8)	84 (3.2)	69 (5.0)
Germany	9 (2.1)	69 (3.2)	47 (3.1)
Hong Kong SAR	26 (3.6)	53 (4.0)	55 (4.0)
Hungary	18 (3.1)	89 (2.3)	77 (3.4)
Iran, Islamic Rep. of	35 (3.7)	76 (3.0)	67 (3.7)
Italy	54 (3.5)	80 (2.2)	72 (2.7)
Japan	72 (3.0)	77 (3.2)	42 (3.9)
Kazakhstan	74 (4.2)	96 (1.3)	82 (4.1)
Kuwait	r 56 (4.3)	r 62 (4.3)	r 64 (4.1)
Latvia	64 (3.8)	86 (2.6)	94 (1.7)
Lithuania	45 (3.9)	93 (1.9)	80 (2.7)
Morocco	70 (3.6)	76 (3.3)	74 (3.5)
Netherlands	28 (4.2)	70 (4.1)	50 (4.4)
New Zealand	13 (2.2)	91 (1.8)	72 (2.5)
Norway	9 (1.9)	46 (3.4)	46 (3.8)
Qatar	61 (0.2)	73 (0.2)	87 (0.1)
Russian Federation	46 (3.2)	100 (0.4)	71 (3.2)
Scotland	22 (3.7)	71 (3.9)	54 (3.9)
Singapore	33 (2.8)	64 (2.7)	49 (3.0)
Slovak Republic	10 (2.1)	77 (3.1)	77 (2.2)
Slovenia	28 (3.1)	78 (2.6)	73 (2.8)
Sweden	7 (1.6)	67 (3.4)	49 (3.7)
Tunisia	74 (3.4)	69 (3.6)	67 (3.6)
Ukraine	69 (3.3)	97 (1.2)	85 (2.4)
United States	35 (2.6)	81 (2.0)	65 (2.5)
Yemen	44 (4.7)	57 (4.5)	61 (4.5)
<b>International Avg.</b>	<b>38 (0.6)</b>	<b>74 (0.5)</b>	<b>66 (0.6)</b>
<b>Benchmarking Participants</b>			
Alberta, Canada	18 (3.5)	64 (4.2)	60 (3.7)
British Columbia, Canada	r 9 (2.0)	r 71 (3.6)	r 49 (4.4)
Dubai, UAE	s 44 (6.3)	s 79 (4.9)	s 73 (5.0)
Massachusetts, US	27 (5.8)	92 (3.2)	70 (5.7)
Minnesota, US	29 (4.9)	70 (6.6)	63 (5.7)
Ontario, Canada	18 (3.5)	81 (4.4)	62 (4.7)
Quebec, Canada	22 (2.8)	73 (3.5)	58 (3.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

- (1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.7 Teachers' Reports on Learning Activities in Mathematics Lessons (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More					
	Memorize Formulas and Procedures	Apply Facts, Concepts, and Procedures to Solve Routine Problems	Explain Answers	Relate What Is Being Learned in Mathematics to Their Daily Lives	Decide Procedures for Solving Complex Problems	Work on Problems for Which There Is No Immediately Obvious Solution
Algeria	64 (4.4)	66 (4.2)	80 (3.8)	70 (4.2)	44 (4.7)	21 (3.7)
Armenia	56 (4.1)	50 (4.2)	51 (3.9)	43 (4.1)	44 (3.4)	47 (3.6)
Australia	31 (4.2)	55 (4.2)	62 (4.0)	47 (3.6)	28 (3.3)	10 (2.5)
Bahrain	48 (3.1)	68 (3.0)	74 (2.7)	59 (2.9)	40 (2.1)	26 (2.8)
Bosnia and Herzegovina	42 (3.8)	59 (4.3)	77 (3.3)	71 (3.7)	43 (3.8)	18 (3.0)
Botswana	37 (3.9)	59 (4.7)	74 (4.0)	71 (4.0)	39 (4.5)	19 (3.1)
Bulgaria	82 (3.0)	81 (3.6)	94 (1.4)	57 (4.4)	43 (4.0)	29 (3.7)
Chinese Taipei	12 (2.8)	60 (4.1)	47 (4.2)	35 (4.2)	25 (3.9)	9 (2.4)
Colombia	31 (5.5)	83 (3.1)	92 (2.5)	88 (2.5)	66 (4.4)	33 (4.9)
Cyprus	60 (3.0)	75 (2.2)	96 (0.6)	76 (2.4)	66 (3.0)	24 (2.0)
Czech Republic	11 (2.6)	68 (3.8)	86 (2.4)	77 (3.0)	55 (3.7)	18 (2.6)
Egypt	55 (3.6)	62 (4.2)	74 (3.9)	63 (3.9)	47 (4.4)	17 (3.0)
El Salvador	56 (4.1)	67 (4.0)	78 (3.4)	73 (4.3)	47 (4.6)	23 (3.4)
England	22 (3.3)	55 (3.9)	81 (3.1)	43 (3.5)	35 (3.4)	13 (3.0)
Georgia	75 (4.2)	67 (5.0)	86 (3.2)	61 (5.8)	30 (4.1)	19 (3.8)
Ghana	58 (4.1)	80 (3.3)	72 (3.9)	67 (4.2)	36 (3.8)	20 (3.0)
Hong Kong SAR	24 (3.7)	44 (4.1)	51 (4.6)	22 (3.2)	23 (3.7)	13 (3.0)
Hungary	40 (4.4)	79 (2.8)	96 (1.3)	81 (2.8)	57 (4.2)	22 (3.6)
Indonesia	51 (4.3)	65 (4.0)	66 (4.1)	54 (3.9)	30 (3.9)	18 (3.4)
Iran, Islamic Rep. of	33 (3.6)	71 (3.8)	90 (2.4)	64 (3.6)	47 (3.9)	30 (3.8)
Israel	r 44 (3.6)	r 59 (3.6)	r 81 (3.0)	r 41 (3.4)	r 52 (3.2)	r 24 (3.5)
Italy	33 (3.2)	75 (2.8)	90 (1.9)	52 (3.4)	59 (3.2)	36 (3.3)
Japan	56 (3.6)	66 (3.8)	54 (3.6)	20 (3.0)	21 (3.2)	23 (3.4)
Jordan	76 (3.8)	82 (3.0)	85 (2.7)	74 (3.7)	46 (4.2)	25 (3.8)
Korea, Rep. of	62 (3.4)	88 (2.5)	78 (3.1)	56 (3.7)	57 (3.8)	27 (3.2)
Kuwait	r 45 (4.8)	r 65 (4.5)	r 73 (4.5)	r 55 (4.7)	r 50 (4.5)	r 22 (4.1)
Lebanon	58 (4.3)	65 (4.6)	88 (3.4)	52 (4.4)	53 (4.6)	35 (4.8)
Lithuania	76 (3.3)	73 (2.9)	87 (2.6)	56 (3.6)	49 (3.5)	11 (2.3)
Malaysia	58 (3.8)	65 (4.1)	75 (3.7)	53 (4.3)	29 (3.4)	25 (3.4)
Malta	25 (0.2)	76 (0.2)	80 (0.2)	56 (0.2)	38 (0.2)	16 (0.2)
Norway	15 (2.6)	39 (3.5)	61 (3.3)	49 (3.9)	25 (2.6)	10 (2.0)
Oman	66 (4.4)	81 (3.3)	86 (2.6)	68 (4.1)	51 (4.4)	32 (4.2)
Palestinian Nat'l Auth.	64 (4.1)	78 (3.5)	80 (3.5)	60 (4.5)	41 (4.0)	23 (3.6)
Qatar	51 (0.2)	76 (0.1)	68 (0.1)	57 (0.2)	44 (0.2)	22 (0.1)
Romania	59 (3.7)	71 (3.5)	87 (2.6)	54 (4.4)	63 (4.1)	23 (3.3)
Russian Federation	72 (3.3)	92 (1.9)	95 (1.5)	38 (3.5)	13 (2.6)	8 (2.0)
Saudi Arabia	r 65 (4.5)	r 65 (4.0)	r 70 (4.1)	r 62 (4.6)	r 45 (4.8)	r 32 (4.8)
Scotland	25 (3.4)	60 (3.4)	76 (2.7)	48 (3.6)	26 (3.3)	13 (2.4)
Serbia	47 (4.2)	67 (3.9)	81 (4.1)	56 (4.3)	40 (3.8)	16 (2.8)
Singapore	27 (2.4)	65 (2.8)	53 (2.5)	34 (2.7)	21 (2.4)	10 (1.7)
Slovenia	39 (2.8)	76 (2.6)	80 (2.2)	70 (2.7)	45 (3.0)	26 (2.2)
Sweden	10 (1.7)	44 (2.6)	73 (2.5)	53 (3.2)	48 (2.2)	14 (2.1)
Syrian Arab Republic	80 (3.2)	81 (3.4)	76 (3.3)	47 (4.1)	44 (4.2)	33 (3.9)
Thailand	65 (4.2)	64 (3.9)	74 (3.4)	69 (3.7)	56 (4.1)	39 (3.9)
Tunisia	61 (4.3)	59 (4.3)	81 (3.4)	41 (3.9)	39 (3.8)	16 (3.3)
Turkey	65 (3.8)	62 (4.3)	87 (3.4)	58 (4.4)	58 (4.5)	37 (4.3)
Ukraine	68 (4.0)	92 (2.3)	95 (1.4)	60 (4.1)	34 (3.8)	10 (2.5)
United States	37 (2.6)	81 (1.9)	77 (2.3)	57 (2.9)	44 (2.6)	25 (2.2)
‡ Morocco	54 (6.2)	58 (6.0)	85 (3.4)	58 (5.6)	36 (4.2)	20 (4.1)
International Avg.	49 (0.5)	68 (0.5)	78 (0.4)	57 (0.5)	42 (0.5)	22 (0.5)
<b>Benchmarking Participants</b>						
Basque Country, Spain	33 (4.2)	75 (4.2)	92 (2.6)	64 (4.1)	45 (4.3)	9 (2.5)
British Columbia, Canada	17 (3.0)	65 (4.1)	73 (3.7)	52 (4.2)	39 (4.4)	18 (3.3)
Dubai, UAE	s 61 (5.8)	s 83 (3.1)	s 84 (5.0)	s 72 (4.7)	s 49 (3.8)	s 19 (4.1)
Massachusetts, US	28 (5.8)	75 (5.7)	83 (4.5)	56 (7.8)	57 (6.5)	28 (5.0)
Minnesota, US	35 (7.2)	69 (6.5)	66 (6.6)	50 (7.0)	31 (6.4)	18 (5.3)
Ontario, Canada	35 (4.4)	71 (4.6)	87 (3.2)	67 (4.3)	57 (4.6)	36 (4.8)
Quebec, Canada	39 (3.8)	85 (3.1)	74 (3.9)	62 (4.3)	44 (4.3)	50 (3.8)

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

At the eighth grade, again students reported more memorization than teachers. Sixty-three percent reported memorizing how to work problems in at least half their mathematics lessons compared to 49 percent reported by teachers. There was closer agreement about doing problem-solving, even though somewhat smaller percentages of students reported doing several of the activities in at least half the lessons than did the teachers. For routine problem-solving, the students reported 64 percent and the teachers reported 68 percent; for explaining answers, the results were 70 and 78 percent; and for relating mathematics to students' daily lives, 51 and 57 percent. Students reported more emphasis on having to decide on procedures for solving complex problems than did teachers, 50 and 42 percent, respectively. Finally, only teachers were asked about the emphasis on asking students to work on problems for which there is no immediately obvious solution, and the teachers reported that only 22 percent of the students were asked to do so in at least half the lessons.

### **What Instructional Strategies Are Used in Mathematics Classes?**

Exhibit 7.8 presents teachers' reports on the extent of their reliance on textbooks in teaching mathematics, and changes in this use since 2003. In most countries in 2007, the textbook remains the primary basis of mathematics instruction at both the fourth and eighth grades. On average internationally, 65 percent of the students at fourth grade and 60 percent at eighth grade had teachers who reported using a textbook as the primary basis of their lessons. For another 30 percent of the fourth grade students and 34 percent of the eighth grade students, teachers reported using textbooks as a supplementary resource.

There are some interesting trends at the fourth grade. For example, Armenia and Iran have textbooks for more students (increases to 83 and 100 percent), whereas England and New Zealand appear to be working towards only supplemental use or no use at all for almost all students (decreases to 15 and 5 percent with textbook as basis for instruction). Among the benchmarking participants, using the textbook as the basis of instruction increased in the Canadian provinces of Ontario and Quebec (29% and 21%, respectively). At the eighth grade, while Botswana, Tunisia, and the Basque Country in Spain increased the percentages of students for whom the textbook was used as the basis for mathematics instruction, six countries decreased the percentage of students—Bahrain, Cyprus, Jordan, Lithuania, the Palestinian National Authority, and Singapore.

Exhibit 7.9 provides a profile of the time spent on activities commonly encountered in mathematics classes around the world, as reported by mathematics teachers. At the fourth grade, internationally on average, the most time was spent on having students work on problems with teacher guidance (21%) and having students work on solving problems independently (22%). According to teachers, considerable time also was spent on listening to lectures (16%), and clarifications of content and procedures (13%). Together, these four activities accounted for 69 to 72 percent of the class time at both the fourth and eighth grades. At the eighth grade, the distribution involved slightly more time listening to lectures (20%) and slightly less on independent problem solving (16%).

## Exhibit 7.8 Textbook Use in Teaching Mathematics with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percentage of Students Taught by Teachers Reporting Textbook Use					
	Use Textbook to Teach Mathematics				Do Not Use Textbook to Teach Mathematics	
	As Primary Basis for Lessons		As Supplementary Resource		Percent in 2007	Difference in Percent from 2003
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003		
Algeria	61 (5.1)	0 0	36 (5.1)	0 0	3 (1.6)	0 0
Armenia	r 83 (2.7)	15 (5.4) ▲	17 (2.7)	-2 (4.6)	0 (0.0)	-13 (3.3) ▼
Australia	17 (2.7)	1 (4.1)	59 (3.7)	3 (5.5)	24 (3.5)	-4 (5.3)
Austria	78 (2.4)	0 0	21 (2.5)	0 0	1 (0.4)	0 0
Chinese Taipei	94 (2.0)	2 (3.1)	4 (1.4)	-3 (2.5)	2 (1.4)	1 (1.8)
Colombia	37 (4.1)	0 0	60 (4.3)	0 0	3 (1.9)	0 0
Czech Republic	65 (3.9)	0 0	33 (3.9)	0 0	2 (0.8)	0 0
Denmark	89 (2.5)	0 0	9 (2.2)	0 0	2 (1.1)	0 0
El Salvador	14 (2.7)	0 0	74 (3.6)	0 0	12 (3.0)	0 0
England	r 15 (3.1)	-12 (5.0) ▼	64 (4.4)	2 (6.3)	21 (3.6)	10 (4.6) ▲
Georgia	77 (3.9)	0 0	18 (3.5)	0 0	6 (2.7)	0 0
Germany	79 (2.4)	0 0	21 (2.5)	0 0	0 (0.3)	0 0
Hong Kong SAR	84 (2.8)	2 (4.5)	15 (2.8)	-4 (4.5)	2 (0.6)	2 (0.6) ▲
Hungary	77 (2.9)	0 (4.8)	22 (2.9)	-1 (4.8)	1 (0.7)	1 (0.7) ▼
Iran, Islamic Rep. of	r 100 (0.0)	32 (4.5) ▲	0 (0.0)	-27 (4.5) ▼	0 (0.0)	-5 (1.7) ▼
Italy	20 (2.5)	9 (3.2) ▲	67 (3.0)	-11 (3.9) ▼	13 (2.1)	2 (2.9) ▼
Japan	83 (3.0)	-2 (4.2)	16 (3.0)	2 (4.2)	1 (0.5)	0 (0.5)
Kazakhstan	97 (1.8)	0 0	3 (1.8)	0 0	0 (0.0)	0 0
Kuwait	r 28 (4.1)	0 0	34 (4.6)	0 0	38 (4.8)	0 0
Latvia	86 (2.4)	-7 (3.6)	14 (2.4)	8 (3.6) ▲	0 (0.0)	-1 (0.6)
Lithuania	82 (2.4)	-18 (2.4) ▼	18 (2.4)	18 (2.4) ▲	0 (0.0)	0 (0.0)
Morocco	76 (3.7)	--	23 (3.7)	--	1 (0.9)	--
Netherlands	98 (1.1)	1 (1.8)	2 (1.1)	1 (1.2)	0 (0.0)	-2 (1.4)
New Zealand	5 (1.0)	-11 (3.0) ▼	91 (1.4)	18 (3.3) ▲	4 (1.0)	-7 (2.5) ▼
Norway	88 (2.2)	2 (3.8)	10 (1.9)	-3 (3.6)	2 (1.2)	1 (1.4)
Qatar	67 (0.2)	0 0	17 (0.1)	0 0	16 (0.1)	0 0
Russian Federation	88 (2.2)	-4 (3.0)	12 (2.2)	4 (3.0)	0 (0.0)	0 (0.0)
Scotland	s 72 (3.8)	-9 (5.7)	28 (3.8)	9 (5.7)	0 (0.0)	0 (0.0)
Singapore	75 (2.9)	9 (4.9)	24 (2.7)	-10 (4.8) ▼	1 (0.7)	1 (0.7)
Slovak Republic	53 (3.8)	0 0	47 (3.8)	0 0	0 (0.0)	0 0
Slovenia	48 (3.3)	4 (5.6)	44 (3.3)	-2 (5.8)	8 (1.5)	-2 (2.9)
Sweden	93 (1.5)	0 0	6 (1.5)	0 0	1 (0.4)	0 0
Tunisia	r 27 (3.7)	-5 (5.5)	71 (3.7)	6 (5.6)	2 (1.0)	-1 (1.7)
Ukraine	77 (3.5)	0 0	21 (3.4)	0 0	1 (0.8)	0 0
United States	59 (2.6)	-1 (4.1)	33 (2.3)	3 (3.6)	8 (1.6)	-3 (2.6)
Yemen	57 (4.3)	0 0	36 (4.5)	0 0	7 (2.2)	0 0
<b>International Avg.</b>	<b>65 (0.5)</b>		<b>30 (0.5)</b>		<b>5 (0.3)</b>	
<b>Benchmarking Participants</b>						
Alberta, Canada	34 (3.9)	0 0	39 (3.7)	0 0	27 (3.3)	0 0
British Columbia, Canada	58 (4.0)	0 0	39 (3.9)	0 0	2 (1.2)	0 0
Dubai, UAE	s 44 (5.7)	0 0	44 (4.4)	0 0	12 (3.7)	0 0
Massachusetts, US	48 (5.8)	0 0	34 (5.4)	0 0	18 (6.1)	0 0
Minnesota, US	75 (5.5)	0 0	17 (4.5)	0 0	8 (4.3)	0 0
Ontario, Canada	68 (4.3)	29 (6.4) ▲	31 (4.3)	-23 (6.3) ▼	1 (0.2)	-6 (2.4) ▼
Quebec, Canada	76 (3.5)	21 (5.7) ▲	22 (3.2)	-19 (5.4) ▼	2 (1.4)	-3 (2.1)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s"

indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.



Exhibit 7.8 Textbook Use in Teaching Mathematics with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students Taught by Teachers Reporting Textbook Use					
	Use Textbook to Teach Mathematics				Do Not Use Textbook to Teach Mathematics	
	As Primary Basis for Lessons		As Supplementary Resource		Percent in 2007	Difference in Percent from 2003
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003		
Algeria	76 (3.8)	0 0	21 (3.8)	0 0	3 (1.4)	0 0
Armenia	73 (4.0)	1 (5.5)	20 (4.0)	0 (5.3)	7 (2.2)	-1 (2.9)
Australia	53 (4.1)	1 (6.0)	41 (4.2)	-2 (5.9)	6 (1.9)	1 (2.7)
Bahrain	50 (2.4)	-25 (3.9) ▼	29 (2.7)	5 (4.1)	21 (2.1)	21 (2.1) ▲
Bosnia and Herzegovina	62 (4.1)	0 0	38 (4.1)	0 0	0 (0.0)	0 0
Botswana	59 (4.1)	15 (5.9) ▲	36 (4.1)	-16 (5.9) ▼	4 (1.9)	1 (2.5)
Bulgaria	82 (3.1)	6 (4.8)	14 (2.7)	-8 (4.4)	4 (1.8)	2 (2.1)
Chinese Taipei	77 (3.1)	-4 (4.7)	17 (3.2)	4 (4.4)	6 (1.7)	0 (2.6)
Colombia	12 (2.5)	0 0	66 (4.2)	0 0	23 (3.5)	0 0
Cyprus	48 (2.7)	-14 (3.7) ▼	42 (3.0)	8 (3.9) ▲	9 (1.9)	6 (2.1) ▲
Czech Republic	56 (3.9)	0 0	43 (3.8)	0 0	1 (0.5)	0 0
Egypt	57 (4.4)	8 (6.1)	41 (4.5)	-10 (6.1)	2 (0.6)	2 (0.6) ▲
El Salvador	7 (2.4)	0 0	82 (3.6)	0 0	11 (2.9)	0 0
England	43 (4.1)	-3 (7.7)	46 (3.8)	5 (7.9)	12 (2.8)	-2 (4.9)
Georgia	87 (3.1)	0 0	13 (3.1)	0 0	0 (0.0)	0 0
Ghana	33 (4.1)	-10 (6.2)	65 (4.1)	11 (6.1)	2 (1.2)	-2 (1.9)
Hong Kong SAR	76 (3.8)	-7 (5.2)	24 (3.7)	7 (5.1)	1 (0.7)	0 (0.7)
Hungary	55 (4.3)	-5 (5.6)	43 (4.2)	4 (5.5)	1 (0.9)	1 (1.0)
Indonesia	57 (5.2)	-6 (6.4)	43 (5.2)	6 (6.4)	0 (0.0)	0 (0.0)
Iran, Islamic Rep. of	83 (3.4)	8 (4.7)	16 (3.1)	6 (3.8)	2 (0.1)	-14 (3.0) ▼
Israel	57 (3.9)	1 (5.3)	42 (4.0)	0 (5.4)	2 (0.7)	0 (1.1)
Italy	38 (2.9)	4 (4.8)	55 (3.0)	-6 (4.9)	6 (1.4)	2 (1.8)
Japan	77 (3.1)	1 (4.8)	21 (2.8)	-2 (4.7)	2 (0.9)	0 (1.5)
Jordan	58 (4.2)	-26 (5.2) ▼	38 (4.1)	22 (5.2) ▲	4 (1.2)	4 (1.2) ▲
Korea, Rep. of	92 (1.7)	3 (2.7)	4 (1.4)	-3 (2.1)	3 (1.0)	0 (1.7)
Kuwait	23 (4.0)	0 0	35 (4.3)	0 0	42 (4.8)	0 0
Lebanon	50 (4.8)	-2 (6.9)	32 (4.6)	-4 (6.5)	18 (3.4)	6 (4.4)
Lithuania	91 (2.0)	-9 (2.0) ▼	9 (2.0)	9 (2.0) ▲	0 (0.0)	0 (0.0)
Malaysia	66 (4.4)	2 (6.1)	28 (4.1)	3 (5.8)	6 (2.0)	-5 (3.3)
Malta	35 (0.3)	0 0	63 (0.3)	0 0	2 (0.1)	0 0
Norway	88 (2.5)	-3 (3.5)	11 (2.4)	2 (3.4)	1 (0.8)	1 (0.8)
Oman	53 (4.3)	0 0	41 (4.3)	0 0	6 (1.4)	0 0
Palestinian Nat'l Auth.	64 (3.9)	-16 (5.5) ▼	29 (4.1)	11 (5.6)	7 (2.4)	5 (2.7)
Qatar	70 (0.2)	0 0	26 (0.2)	0 0	4 (0.0)	0 0
Romania	49 (3.9)	-10 (5.8)	49 (4.0)	10 (5.8)	2 (0.8)	0 (1.6)
Russian Federation	87 (2.1)	1 (3.3)	13 (2.1)	-1 (3.3)	0 (0.0)	0 (0.4)
Saudi Arabia	77 (3.5)	--	19 (3.4)	--	4 (1.5)	--
Scotland	72 (3.2)	-7 (4.9)	27 (3.0)	11 (4.4) ▲	1 (0.0)	-3 (1.8)
Serbia	54 (4.1)	7 (5.9)	43 (4.1)	-9 (5.9)	3 (1.3)	2 (1.3)
Singapore	51 (2.6)	-23 (3.5) ▼	39 (2.7)	14 (3.5) ▲	9 (1.2)	9 (1.2) ▲
Slovenia	55 (2.7)	0 (5.3)	44 (2.7)	0 (5.3)	1 (0.3)	0 (0.4)
Sweden	95 (1.0)	5 (2.4)	4 (0.9)	-6 (2.4) ▼	1 (0.5)	1 (0.6)
Syrian Arab Republic	50 (4.4)	0 0	36 (4.2)	0 0	14 (3.1)	0 0
Thailand	59 (4.1)	0 0	25 (3.7)	0 0	15 (3.1)	0 0
Tunisia	48 (4.1)	25 (5.5) ▲	49 (4.1)	-27 (5.5) ▼	2 (1.4)	2 (1.4)
Turkey	39 (4.3)	0 0	53 (4.3)	0 0	8 (2.7)	0 0
Ukraine	62 (3.7)	0 0	38 (3.7)	0 0	0 (0.0)	0 0
United States	57 (2.7)	-7 (4.0)	36 (2.8)	2 (4.1)	7 (1.3)	5 (1.6) ▲
‡ Morocco	59 (5.0)	--	40 (4.9)	--	1 (1.1)	--
International Avg.	60 (0.5)		34 (0.5)		6 (0.3)	
<b>Benchmarking Participants</b>						
Basque Country, Spain	74 (3.7)	17 (6.5) ▲	22 (3.3)	-12 (6.0)	5 (1.6)	-6 (3.7)
British Columbia, Canada	42 (4.2)	0 0	50 (4.6)	0 0	8 (2.4)	0 0
Dubai, UAE	69 (3.9)	0 0	26 (3.4)	0 0	4 (1.9)	0 0
Massachusetts, US	57 (5.6)	0 0	42 (6.0)	0 0	1 (1.2)	0 0
Minnesota, US	89 (5.5)	0 0	9 (5.2)	0 0	2 (1.1)	0 0
Ontario, Canada	58 (4.3)	3 (6.6)	40 (4.1)	-3 (6.5)	2 (1.1)	0 (1.7)
Quebec, Canada	51 (4.3)	4 (6.1)	45 (4.4)	-5 (6.3)	4 (1.6)	0 (2.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

Exhibit 7.9 **Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week**

TIMSS2007  
Mathematics **4<sup>th</sup>**  
Grade

Country	Reviewing Homework	Listening to Lecture-style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Algeria	r 11 (0.6)	r 15 (1.6)	r 20 (1.5)	r 20 (1.1)
Armenia	r 11 (0.4)	r 22 (0.7)	r 18 (0.7)	r 15 (0.6)
Australia	5 (0.3)	12 (0.6)	29 (0.8)	24 (1.1)
Austria	7 (0.2)	15 (0.5)	20 (0.6)	25 (0.7)
Chinese Taipei	10 (0.4)	35 (1.1)	15 (0.5)	11 (0.6)
Colombia	r 12 (0.9)	r 19 (1.5)	r 15 (0.6)	r 16 (1.0)
Czech Republic	6 (0.3)	17 (0.6)	22 (0.7)	23 (0.8)
Denmark	10 (0.5)	9 (0.7)	23 (1.3)	30 (1.4)
El Salvador	13 (0.6)	11 (0.6)	21 (0.7)	13 (0.7)
England	5 (0.3)	16 (0.9)	24 (1.0)	32 (1.1)
Georgia	11 (0.5)	19 (0.8)	15 (0.6)	16 (0.6)
Germany	10 (0.3)	12 (0.3)	19 (0.5)	26 (0.7)
Hong Kong SAR	8 (0.4)	38 (1.3)	16 (0.7)	13 (0.8)
Hungary	r 9 (0.4)	r 10 (0.7)	r 24 (0.8)	r 28 (1.0)
Iran, Islamic Rep. of	12 (0.4)	12 (0.5)	16 (0.6)	14 (0.5)
Italy	9 (0.3)	23 (0.7)	15 (0.5)	15 (0.5)
Japan	4 (0.3)	19 (0.9)	29 (1.0)	18 (1.1)
Kazakhstan	10 (0.4)	17 (0.7)	17 (0.5)	21 (0.8)
Kuwait	x x	x x	x x	x x
Latvia	6 (0.3)	7 (0.5)	24 (0.8)	30 (1.0)
Lithuania	8 (0.4)	7 (0.4)	24 (0.7)	30 (0.8)
Morocco	r 11 (0.8)	r 14 (1.1)	r 21 (1.0)	r 16 (1.0)
Netherlands	r 3 (0.4)	r 13 (0.9)	r 19 (0.9)	r 39 (1.4)
New Zealand	3 (0.2)	7 (0.4)	31 (0.8)	28 (0.7)
Norway	8 (0.4)	17 (0.6)	21 (0.9)	32 (1.3)
Qatar	s 11 (0.0)	s 18 (0.1)	s 18 (0.0)	s 12 (0.0)
Russian Federation	9 (0.3)	13 (0.9)	22 (0.5)	23 (0.8)
Scotland	r 6 (0.3)	r 22 (0.8)	r 19 (0.8)	r 30 (1.1)
Singapore	14 (0.5)	19 (0.6)	18 (0.5)	17 (0.5)
Slovak Republic	6 (0.2)	16 (0.6)	22 (0.8)	22 (0.6)
Slovenia	9 (0.3)	15 (0.4)	21 (0.5)	29 (0.8)
Sweden	5 (0.4)	11 (0.5)	25 (1.8)	38 (1.9)
Tunisia	r 10 (0.6)	r 9 (0.8)	r 24 (1.0)	r 19 (0.9)
Ukraine	10 (0.4)	10 (0.6)	19 (0.6)	19 (0.7)
United States	9 (0.3)	17 (0.6)	25 (0.7)	20 (0.5)
Yemen	r 13 (0.6)	r 17 (1.1)	r 15 (0.9)	r 11 (0.4)
<b>International Avg.</b>	<b>9 (0.1)</b>	<b>16 (0.1)</b>	<b>21 (0.1)</b>	<b>22 (0.2)</b>
<b>Benchmarking Participants</b>				
Alberta, Canada	9 (0.6)	14 (0.8)	23 (0.9)	24 (1.2)
British Columbia, Canada	r 9 (0.5)	r 15 (0.6)	r 22 (0.8)	r 25 (1.2)
Dubai, UAE	x x	x x	x x	x x
Massachusetts, US	8 (0.4)	15 (1.0)	30 (2.1)	20 (0.9)
Minnesota, US	8 (0.5)	18 (1.4)	25 (1.2)	23 (1.3)
Ontario, Canada	11 (0.8)	17 (1.1)	23 (1.1)	22 (0.9)
Quebec, Canada	7 (0.5)	29 (1.2)	17 (0.8)	14 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.



**Exhibit 7.9 Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

Country	Listening to Teacher Re-teach and Clarify Content/Procedures	Taking Tests or Quizzes	Participating in Classroom Management Tasks Not Related to the Lesson's Content / Purpose	Other Student Activities
Algeria	r 13 (1.0)	r 11 (0.7)	r 4 (0.4)	r 5 (0.5)
Armenia	r 13 (0.5)	r 12 (0.6)	r 5 (0.3)	r 5 (0.3)
Australia	13 (0.5)	7 (0.4)	5 (0.3)	5 (0.6)
Austria	19 (0.5)	8 (0.2)	4 (0.2)	3 (0.2)
Chinese Taipei	11 (0.4)	9 (0.5)	4 (0.3)	3 (0.4)
Colombia	r 14 (0.9)	r 12 (0.8)	r 7 (0.5)	r 5 (0.4)
Czech Republic	10 (0.5)	11 (0.6)	4 (0.2)	6 (0.5)
Denmark	11 (0.6)	5 (0.4)	7 (0.5)	5 (0.6)
El Salvador	17 (0.6)	13 (0.5)	7 (0.4)	7 (0.5)
England	12 (0.5)	4 (0.3)	3 (0.3)	r 4 (0.4)
Georgia	12 (0.5)	15 (0.6)	5 (0.4)	8 (0.4)
Germany	17 (0.7)	8 (0.2)	5 (0.3)	3 (0.4)
Hong Kong SAR	9 (0.5)	6 (0.4)	4 (0.3)	5 (0.5)
Hungary	r 9 (0.5)	r 11 (1.2)	r 3 (0.2)	r 6 (0.7)
Iran, Islamic Rep. of	15 (0.5)	13 (0.5)	8 (0.4)	9 (0.4)
Italy	14 (0.4)	13 (0.4)	6 (0.3)	4 (0.2)
Japan	15 (0.7)	9 (0.4)	2 (0.2)	3 (0.6)
Kazakhstan	10 (0.5)	16 (0.7)	3 (0.4)	5 (0.6)
Kuwait	x x	x x	x x	x x
Latvia	12 (0.4)	12 (0.5)	3 (0.2)	6 (0.4)
Lithuania	10 (0.4)	14 (0.7)	3 (0.3)	4 (0.5)
Morocco	r 16 (0.8)	r 12 (0.5)	r 5 (0.4)	r 5 (0.4)
Netherlands	r 12 (0.7)	r 7 (0.4)	r 4 (0.3)	r 4 (0.4)
New Zealand	13 (0.4)	6 (0.3)	5 (0.3)	7 (0.6)
Norway	11 (0.5)	6 (0.3)	3 (0.3)	3 (0.4)
Qatar	s 14 (0.0)	s 12 (0.0)	s 7 (0.0)	s 8 (0.0)
Russian Federation	9 (0.4)	18 (0.6)	1 (0.2)	5 (0.4)
Scotland	r 10 (0.3)	r 5 (0.3)	r 4 (0.3)	r 6 (0.4)
Singapore	11 (0.3)	8 (0.2)	6 (0.3)	6 (0.4)
Slovak Republic	18 (0.6)	8 (0.4)	3 (0.2)	4 (0.4)
Slovenia	11 (0.4)	7 (0.3)	3 (0.2)	r 4 (0.4)
Sweden	10 (0.4)	5 (0.2)	3 (0.3)	3 (0.5)
Tunisia	r 17 (0.8)	r 13 (0.8)	r 4 (0.3)	r 5 (0.5)
Ukraine	17 (0.7)	16 (0.6)	3 (0.2)	6 (0.5)
United States	11 (0.3)	9 (0.3)	4 (0.3)	4 (0.3)
Yemen	r 14 (0.7)	r 14 (1.0)	r 7 (0.4)	r 8 (0.4)
<b>International Avg.</b>	<b>13 (0.1)</b>	<b>10 (0.1)</b>	<b>4 (0.1)</b>	<b>5 (0.1)</b>
<b>Benchmarking Participants</b>				
Alberta, Canada	10 (0.4)	7 (0.3)	5 (0.3)	6 (0.8)
British Columbia, Canada	r 11 (0.4)	r 7 (0.3)	r 5 (0.4)	r 5 (0.8)
Dubai, UAE	x x	x x	x x	x x
Massachusetts, US	12 (0.7)	7 (0.5)	4 (0.5)	5 (0.7)
Minnesota, US	11 (0.5)	7 (0.4)	5 (0.4)	4 (0.5)
Ontario, Canada	10 (0.5)	7 (0.4)	6 (0.9)	5 (0.6)
Quebec, Canada	11 (0.5)	8 (0.4)	7 (0.5)	6 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit 7.9 **Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week (Continued)**

TIMSS2007  
Mathematics **8<sup>th</sup>** Grade

Country	Reviewing Homework	Listening to Lecture-style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Algeria	s 11 (0.6)	s 15 (1.2)	s 21 (1.2)	s 15 (1.0)
Armenia	10 (0.4)	23 (0.9)	19 (0.6)	16 (0.6)
Australia	7 (0.3)	17 (0.8)	23 (1.0)	24 (1.2)
Bahrain	r 11 (0.3)	r 23 (0.6)	r 18 (0.7)	r 12 (0.3)
Bosnia and Herzegovina	r 7 (0.4)	r 29 (1.5)	r 24 (1.0)	r 15 (0.7)
Botswana	r 13 (0.9)	r 13 (0.8)	r 20 (1.0)	r 21 (1.2)
Bulgaria	8 (0.4)	19 (1.1)	26 (1.0)	17 (0.7)
Chinese Taipei	13 (0.6)	41 (1.3)	13 (0.6)	7 (0.4)
Colombia	10 (0.3)	17 (0.9)	21 (0.8)	17 (0.7)
Cyprus	r 20 (0.6)	r 17 (0.6)	r 23 (0.6)	r 12 (0.4)
Czech Republic	6 (0.3)	20 (0.6)	25 (0.8)	21 (0.7)
Egypt	r 10 (0.4)	r 25 (1.2)	r 17 (0.7)	r 14 (0.8)
El Salvador	10 (0.5)	13 (0.8)	22 (0.8)	20 (0.8)
England	6 (0.3)	17 (0.6)	28 (1.2)	23 (1.2)
Georgia	11 (0.5)	21 (1.0)	19 (0.6)	15 (0.7)
Ghana	r 12 (0.6)	r 16 (1.0)	r 18 (0.7)	r 15 (0.7)
Hong Kong SAR	11 (0.7)	35 (1.6)	16 (0.9)	13 (0.8)
Hungary	11 (0.4)	12 (0.7)	27 (0.9)	22 (0.8)
Indonesia	s 11 (0.5)	s 20 (1.0)	s 19 (0.9)	s 15 (0.8)
Iran, Islamic Rep. of	11 (0.5)	16 (0.8)	19 (0.8)	14 (0.7)
Israel	s 14 (0.5)	s 16 (1.0)	s 22 (0.7)	s 19 (0.8)
Italy	16 (0.6)	22 (0.6)	18 (0.6)	12 (0.4)
Japan	7 (0.4)	30 (0.8)	26 (0.9)	12 (0.9)
Jordan	12 (0.4)	19 (0.7)	18 (0.6)	15 (0.4)
Korea, Rep. of	6 (0.2)	33 (1.1)	18 (0.6)	17 (0.6)
Kuwait	s 11 (0.6)	s 21 (1.6)	s 18 (0.9)	s 14 (0.8)
Lebanon	s 22 (1.2)	s 16 (1.0)	s 20 (1.2)	s 10 (1.0)
Lithuania	9 (0.3)	9 (0.6)	26 (0.8)	25 (0.8)
Malaysia	r 13 (0.8)	r 22 (1.3)	r 18 (0.8)	r 13 (0.7)
Malta	18 (0.0)	19 (0.0)	20 (0.0)	15 (0.0)
Norway	8 (0.4)	22 (0.7)	22 (0.9)	25 (1.0)
Oman	r 11 (0.5)	r 18 (1.1)	r 20 (0.8)	r 14 (0.6)
Palestinian Nat'l Auth.	r 13 (0.7)	r 20 (0.9)	r 18 (0.7)	r 14 (0.8)
Qatar	r 11 (0.0)	r 21 (0.0)	r 20 (0.0)	r 13 (0.0)
Romania	9 (0.4)	18 (0.8)	29 (0.8)	14 (0.5)
Russian Federation	10 (0.2)	18 (0.5)	22 (0.6)	20 (0.5)
Saudi Arabia	r 12 (0.5)	r 22 (1.2)	r 17 (0.9)	r 11 (0.5)
Scotland	8 (0.4)	21 (0.6)	25 (1.2)	24 (1.1)
Serbia	6 (0.3)	24 (1.2)	26 (1.1)	20 (1.0)
Singapore	12 (0.4)	26 (0.8)	19 (0.5)	13 (0.4)
Slovenia	10 (0.3)	21 (0.5)	23 (0.6)	21 (0.6)
Sweden	4 (0.2)	15 (0.6)	33 (1.3)	r 28 (1.6)
Syrian Arab Republic	r 12 (0.6)	r 24 (1.3)	r 16 (0.8)	r 10 (0.5)
Thailand	12 (0.6)	21 (1.0)	15 (0.7)	12 (0.5)
Tunisia	s 15 (1.0)	s 13 (1.2)	s 25 (1.4)	s 16 (1.3)
Turkey	8 (0.6)	20 (1.2)	19 (1.0)	13 (0.7)
Ukraine	11 (0.4)	14 (0.7)	19 (0.6)	18 (0.6)
United States	13 (0.4)	21 (0.6)	19 (0.5)	17 (0.5)
‡ Morocco	r 11 (0.8)	r 13 (1.1)	r 21 (1.3)	r 15 (1.2)
<b>International Avg.</b>	<b>11 (0.1)</b>	<b>20 (0.1)</b>	<b>21 (0.1)</b>	<b>16 (0.1)</b>
<b>Benchmarking Participants</b>				
Basque Country, Spain	21 (1.0)	18 (1.0)	18 (0.7)	18 (1.2)
British Columbia, Canada	11 (0.4)	19 (0.6)	20 (0.8)	23 (1.0)
Dubai, UAE	s 10 (0.7)	s 18 (1.4)	s 22 (1.0)	s 18 (1.0)
Massachusetts, US	13 (0.9)	16 (1.0)	22 (1.3)	18 (0.9)
Minnesota, US	12 (0.9)	21 (1.3)	20 (2.1)	20 (1.5)
Ontario, Canada	14 (0.9)	16 (0.7)	18 (0.8)	22 (1.2)
Quebec, Canada	14 (0.7)	25 (1.3)	19 (1.0)	14 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

**Exhibit 7.9 Percentage of Time in Mathematics Lessons Students Spend on Various Activities in a Typical Week (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Listening to Teacher Re-teach and Clarify Content/Procedures	Taking Tests or Quizzes	Participating in Classroom Management Tasks Not Related to the Lesson's Content / Purpose	Other Student Activities
Algeria	s 18 (1.0)	s 10 (0.8)	s 5 (0.4)	s 5 (0.6)
Armenia	11 (0.4)	10 (0.4)	5 (0.3)	5 (0.7)
Australia	10 (0.5)	7 (0.3)	8 (0.5)	4 (0.4)
Bahrain	r 15 (0.8)	r 11 (0.3)	r 6 (0.2)	r 6 (0.3)
Bosnia and Herzegovina	r 11 (0.6)	r 7 (0.5)	r 3 (0.3)	r 4 (0.5)
Botswana	r 10 (0.6)	r 10 (0.8)	r 6 (0.4)	r 6 (0.7)
Bulgaria	9 (0.4)	14 (0.6)	3 (0.3)	3 (0.3)
Chinese Taipei	10 (0.7)	8 (0.3)	5 (0.5)	3 (0.3)
Colombia	12 (0.7)	12 (0.5)	6 (0.4)	5 (0.5)
Cyprus	r 10 (0.3)	r 9 (0.2)	r 7 (0.2)	r 4 (0.3)
Czech Republic	9 (0.3)	11 (0.4)	4 (0.3)	4 (0.3)
Egypt	r 11 (0.5)	r 9 (0.4)	r 6 (0.4)	r 7 (0.4)
El Salvador	14 (0.6)	10 (0.5)	6 (0.4)	5 (0.3)
England	11 (0.7)	4 (0.3)	7 (0.5)	4 (0.5)
Georgia	11 (0.4)	12 (0.5)	5 (0.4)	6 (0.4)
Ghana	r 11 (0.6)	r 15 (0.7)	r 8 (0.5)	r 6 (0.4)
Hong Kong SAR	10 (0.4)	8 (0.4)	4 (0.4)	3 (0.4)
Hungary	9 (0.5)	11 (0.3)	4 (0.3)	4 (0.4)
Indonesia	s 11 (0.6)	s 14 (0.7)	s 6 (0.3)	s 6 (0.5)
Iran, Islamic Rep. of	16 (0.8)	11 (0.5)	7 (0.5)	7 (0.4)
Israel	s 11 (0.4)	s 10 (0.6)	s 5 (0.3)	s 3 (0.5)
Italy	14 (0.5)	11 (0.5)	5 (0.3)	3 (0.3)
Japan	14 (0.5)	7 (0.4)	2 (0.3)	2 (0.4)
Jordan	14 (0.5)	11 (0.4)	6 (0.3)	6 (0.3)
Korea, Rep. of	11 (0.5)	7 (0.4)	5 (0.3)	4 (0.3)
Kuwait	s 16 (1.1)	s 9 (0.6)	s 7 (0.6)	s 5 (0.5)
Lebanon	s 12 (0.6)	s 11 (0.5)	s 5 (0.5)	s 4 (0.4)
Lithuania	11 (0.4)	14 (0.7)	3 (0.2)	3 (0.3)
Malaysia	r 12 (0.6)	r 9 (0.4)	r 7 (0.5)	r 5 (0.4)
Malta	12 (0.0)	5 (0.0)	8 (0.0)	3 (0.0)
Norway	11 (0.4)	6 (0.2)	4 (0.3)	3 (0.3)
Oman	r 15 (0.9)	r 11 (0.6)	r 6 (0.3)	r 6 (0.4)
Palestinian Nat'l Auth.	r 13 (0.6)	r 9 (0.5)	r 6 (0.4)	r 6 (0.5)
Qatar	r 14 (0.0)	r 10 (0.0)	r 6 (0.0)	r 6 (0.0)
Romania	9 (0.3)	14 (0.7)	3 (0.2)	3 (0.3)
Russian Federation	9 (0.2)	16 (0.4)	1 (0.1)	4 (0.4)
Saudi Arabia	r 15 (0.9)	r 10 (0.5)	r 7 (0.4)	r 7 (0.4)
Scotland	8 (0.3)	3 (0.2)	6 (0.4)	4 (0.5)
Serbia	10 (0.6)	8 (0.5)	3 (0.3)	3 (0.4)
Singapore	10 (0.3)	8 (0.3)	8 (0.4)	5 (0.4)
Slovenia	11 (0.4)	5 (0.3)	4 (0.2)	4 (0.4)
Sweden	r 9 (0.3)	r 6 (0.2)	r 3 (0.2)	r 4 (0.5)
Syrian Arab Republic	r 15 (0.8)	r 12 (0.6)	r 6 (0.4)	r 6 (0.6)
Thailand	15 (0.6)	10 (0.5)	8 (0.4)	7 (0.5)
Tunisia	s 17 (1.0)	s 8 (0.7)	s 4 (0.4)	s 3 (0.3)
Turkey	14 (0.9)	8 (0.6)	10 (1.1)	8 (0.9)
Ukraine	17 (0.9)	14 (0.6)	2 (0.3)	4 (0.4)
United States	10 (0.3)	11 (0.3)	5 (0.3)	5 (0.4)
‡ Morocco	r 19 (1.4)	s 10 (0.7)	r 5 (0.5)	r 6 (0.6)
<b>International Avg.</b>	<b>12 (0.1)</b>	<b>10 (0.1)</b>	<b>5 (0.1)</b>	<b>5 (0.1)</b>
<b>Benchmarking Participants</b>				
Basque Country, Spain	11 (0.6)	7 (0.5)	5 (0.3)	3 (0.4)
British Columbia, Canada	9 (0.4)	11 (0.4)	4 (0.3)	4 (0.5)
Dubai, UAE	s 10 (0.8)	s 11 (1.1)	s 5 (0.3)	x x
Massachusetts, US	12 (0.5)	10 (0.5)	4 (0.8)	4 (0.6)
Minnesota, US	8 (0.5)	10 (0.6)	5 (0.4)	3 (0.5)
Ontario, Canada	10 (0.5)	9 (0.4)	5 (0.5)	5 (0.6)
Quebec, Canada	8 (0.4)	9 (0.4)	8 (0.6)	3 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



### How Are Calculators and Computers Used?

Exhibit 7.10 shows the number of countries with national policies on calculator use, changes in the percentages of students not permitted to use calculators in mathematics class, and the percentages of students using calculators for various activities in about half the lessons or more. At the fourth grade, 17 of the countries had policies about calculator use as part of their curriculum as did most of the benchmarking participants. In some countries calculator use is rare (for less than 10 percent of the students), including Austria, Hungary, Kuwait, Latvia, Singapore, Slovenia, Tunisia, and the Ukraine. In others, 90 percent or more are permitted to use calculators, including Algeria, Australia, England, New Zealand, and Scotland. Although most countries do not permit calculators in mathematics classes at the fourth grade, for at least half the students in four countries, the trend between 2003 and 2007 was for fewer students to be in such classes, including, Hong Kong SAR, Latvia, Lithuania, and the Russian Federation. In New Zealand, there was an increase from 3 to 8 percent of the students not being permitted to use calculators. In general, teachers in even the high use countries reported asking only small percentages of students to do any calculator activities in half the lessons or more. The highest percentages were in Denmark (23%) and Algeria (18%) for solving complex problems, and then Algeria and Yemen (15% each) for exploring number concepts.

At the eighth grade, many of the countries and almost all the benchmarking participants had policies about calculator use as part of their mathematics curriculum. About half the countries permit widespread usage, and almost all countries permit calculators for the majority of eighth grade students. Between 2003 and 2007, three countries had large decreases in the percentages of students not permitted to use calculators, including Jordan, Malaysia, and Slovenia. However, four countries did have modest increases, including Bahrain, Ghana, Serbia, and the United States. On average internationally, teachers asked the greatest percentages of students to use calculators in solving complex problems (31%), checking answers (26%), and

doing routine computations (25%). Only 16 percent, on average, were asked to explore number concepts.

Exhibit 7.11 presents information about whether countries have a policy about the use of computers in mathematics classes, changes in the availability of computers, and the percentages of students being asked to use computers for various activities in half the lessons or more. At the fourth grade, 16 countries and four benchmarking participants had a policy statement about computer use in their curriculum. Seven countries had increases in computer availability between 2003 and 2007, including Armenia, Chinese Taipei, Lithuania, the Russian Federation, Scotland, Slovenia, and Tunisia. In 2007, on average internationally, teachers reported availability of computers for 46 percent of the fourth grade students. However, computer use was relatively infrequent in mathematics classes at the fourth grade. The most use was for practicing skills and procedures in the Netherlands (30%), Scotland (20%), Singapore (13%), Yemen (12%), and the United States (11%) followed by England, New Zealand, and Qatar (all 10%).

At the eighth grade, on average internationally, teachers reported computer availability for about one-third of the students and there was considerable variation among countries. Six countries reported decreased availability between 2003 and 2007 compared to nine and one benchmarking entity reporting increased availability. Using computers for any activity as often as in half the lessons was rare, even in countries with relatively high availability.

Exhibit 7.10 Calculator Use in Mathematics Class with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	National Curriculum Contains Policies / Statements About the Use of Calculators	Trends in Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted		Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Algeria	●	8 (2.1)	∅ ∅	12 (2.9)	10 (3.0)	18 (3.6)	15 (2.9)
Armenia	●	s 18 (4.3)	-56 (5.7) ▼	--	--	--	--
Australia	●	5 (1.5)	-1 (2.8)	14 (2.4)	3 (1.1)	13 (2.4)	10 (2.5)
Austria	○	94 (1.2)	∅ ∅	0 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
Chinese Taipei	○	53 (4.6)	-1 (6.3)	2 (0.0)	2 (0.1)	2 (1.0)	2 (1.6)
Colombia	○	57 (4.6)	∅ ∅	5 (1.8)	3 (1.1)	2 (1.1)	5 (1.6)
Czech Republic	○	33 (3.8)	∅ ∅	5 (1.9)	2 (1.2)	2 (1.1)	3 (1.3)
Denmark	●	11 (2.6)	∅ ∅	8 (2.6)	6 (2.0)	23 (3.9)	11 (2.7)
El Salvador	○	74 (3.9)	∅ ∅	5 (1.8)	6 (2.1)	9 (2.5)	6 (1.9)
England	●	r 2 (1.0)	1 (1.2)	13 (2.9)	2 (0.8)	12 (2.5)	7 (2.1)
Georgia	○	62 (5.2)	∅ ∅	2 (0.8)	1 (0.5)	r 0 (0.3)	1 (1.0)
Germany	○	72 (3.2)	∅ ∅	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
Hong Kong SAR	●	52 (4.3)	-36 (5.2) ▼	2 (1.1)	2 (1.3)	3 (1.4)	3 (0.8)
Hungary	●	94 (2.0)	6 (3.5)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
Iran, Islamic Rep. of	○	87 (2.8)	5 (4.8)	1 (0.7)	2 (1.0)	2 (1.4)	2 (0.9)
Italy	●	89 (0.8)	1 (2.4)	1 (0.7)	1 (0.8)	0 (0.0)	0 (0.0)
Japan	●	35 (3.4)	3 (5.0)	0 (0.0)	0 (0.0)	4 (1.6)	2 (1.0)
Kazakhstan	●	26 (5.0)	∅ ∅	2 (1.0)	2 (1.0)	6 (2.0)	3 (1.3)
Kuwait	○	r 97 (1.5)	∅ ∅	r 6 (2.3)	r 7 (2.4)	r 4 (1.8)	r 6 (2.3)
Latvia	○	91 (2.2)	-7 (2.8) ▼	0 (0.0)	1 (0.8)	0 (0.3)	1 (0.6)
Lithuania	○	55 (3.6)	-14 (5.1) ▼	3 (1.4)	1 (0.0)	2 (1.4)	1 (0.0)
Morocco	○	r 77 (3.6)	--	4 (1.7)	r 4 (1.5)	r 3 (1.3)	r 3 (1.5)
Netherlands	○	49 (4.3)	-12 (6.5)	0 (0.4)	0 (0.4)	1 (0.8)	0 (0.0)
New Zealand	●	8 (1.6)	5 (2.1) ▲	11 (1.8)	3 (1.1)	9 (1.7)	6 (1.4)
Norway	●	14 (2.9)	4 (4.0)	1 (0.5)	0 (0.0)	3 (1.1)	1 (0.5)
Qatar	○	r 78 (0.2)	∅ ∅	4 (0.1)	5 (0.1)	6 (0.1)	3 (0.1)
Russian Federation	○	78 (3.3)	-11 (4.0) ▼	3 (1.2)	1 (0.6)	2 (1.0)	2 (0.8)
Scotland	●	s 9 (2.3)	0 (3.4)	3 (1.5)	1 (0.7)	5 (1.7)	4 (1.1)
Singapore	○	98 (0.9)	0 (1.7)	1 (0.7)	1 (0.7)	1 (0.6)	1 (0.7)
Slovak Republic	●	27 (3.5)	∅ ∅	3 (1.3)	1 (0.9)	2 (1.0)	1 (0.6)
Slovenia	●	94 (1.5)	-1 (2.5)	0 (0.1)	0 (0.2)	0 (0.0)	0 (0.0)
Sweden	●	14 (2.6)	∅ ∅	4 (1.3)	2 (0.7)	7 (1.8)	3 (1.1)
Tunisia	○	r 92 (2.2)	-4 (2.7)	7 (1.6)	8 (1.7)	7 (1.9)	7 (1.9)
Ukraine	○	96 (1.7)	∅ ∅	0 (0.4)	0 (0.0)	1 (0.7)	1 (0.8)
United States	●	r 31 (3.2)	-1 (4.2)	7 (1.3)	3 (0.9)	12 (1.7)	6 (1.2)
Yemen	○	r 68 (4.2)	∅ ∅	7 (2.6)	11 (3.2)	11 (3.1)	15 (3.8)
International Avg.		54 (0.5)		4 (0.3)	3 (0.2)	5 (0.3)	4 (0.2)
<b>Benchmarking Participants</b>							
Alberta, Canada	●	14 (2.4)	∅ ∅	5 (1.6)	4 (1.7)	14 (2.7)	8 (2.1)
British Columbia, Canada	●	r 14 (2.3)	∅ ∅	r 5 (1.4)	r 3 (1.1)	r 14 (2.9)	r 7 (1.9)
Dubai, UAE	●	s 68 (3.3)	∅ ∅	s 5 (2.2)	s 4 (1.4)	s 4 (1.3)	s 5 (0.5)
Massachusetts, US	●	8 (2.7)	∅ ∅	3 (2.2)	0 (0.1)	2 (1.5)	2 (1.5)
Minnesota, US	–	5 (2.7)	∅ ∅	12 (5.2)	r 2 (0.1)	r 12 (5.3)	r 10 (5.0)
Ontario, Canada	●	7 (2.3)	-13 (4.5) ▼	r 5 (1.9)	5 (2.1)	19 (3.9)	14 (3.8)
Quebec, Canada	●	45 (4.5)	8 (6.3)	4 (2.0)	0 (0.2)	5 (1.6)	1 (0.4)

● Yes ○ No

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.

Exhibit 7.10 Calculator Use in Mathematics Class with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	National Curriculum Contains Policies / Statements About the Use of Calculators	Trends in Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted		Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Algeria	●	2 (1.2)	∅ ∅	56 (4.4)	44 (4.2)	47 (4.2)	r 32 (4.0)
Armenia	●	r 11 (2.8)	3 (3.8)	37 (3.7)	50 (3.8)	36 (4.1)	35 (3.5)
Australia	●	1 (0.7)	-3 (2.3)	65 (3.8)	70 (3.6)	59 (3.6)	38 (3.0)
Bahrain	○	r 75 (2.0)	7 (3.3) ●	7 (1.5)	5 (1.2)	8 (0.9)	r 3 (1.1)
Bosnia and Herzegovina	○	41 (4.4)	∅ ∅	18 (3.2)	19 (3.6)	15 (3.0)	r 9 (2.5)
Botswana	●	38 (4.6)	1 (6.4)	3 (1.6)	4 (1.7)	10 (2.7)	7 (2.1)
Bulgaria	○	24 (3.1)	-4 (5.2)	9 (2.3)	17 (3.1)	20 (3.6)	7 (2.0)
Chinese Taipei	●	34 (4.1)	0 (5.8)	0 (0.0)	1 (0.0)	1 (1.0)	2 (1.1)
Colombia	○	17 (3.3)	∅ ∅	18 (3.8)	12 (3.0)	24 (4.6)	12 (2.8)
Cyprus	○	r 70 (2.4)	5 (3.7)	4 (1.1)	r 2 (0.9)	r 6 (1.3)	r 1 (0.6)
Czech Republic	●	5 (2.0)	∅ ∅	36 (4.0)	36 (4.2)	61 (4.1)	12 (2.6)
Egypt	●	2 (1.0)	2 (1.0)	30 (4.0)	31 (3.8)	33 (3.8)	19 (3.2)
El Salvador	○	26 (4.3)	∅ ∅	31 (4.0)	23 (3.5)	32 (4.4)	22 (3.7)
England	●	r 1 (0.8)	1 (0.8)	28 (3.4)	32 (3.6)	43 (3.7)	19 (2.9)
Georgia	○	12 (3.5)	∅ ∅	10 (3.2)	14 (3.1)	7 (2.1)	r 6 (2.3)
Ghana	●	r 79 (3.9)	18 (6.4) ●	3 (1.4)	5 (2.2)	5 (2.3)	4 (1.4)
Hong Kong SAR	●	1 (0.0)	-1 (1.1)	59 (4.4)	72 (4.4)	63 (4.6)	26 (4.1)
Hungary	●	27 (3.4)	8 (4.6)	23 (3.1)	24 (3.2)	32 (3.7)	6 (1.7)
Indonesia	○	22 (4.1)	-6 (5.7)	11 (3.1)	10 (2.9)	21 (3.5)	9 (2.6)
Iran, Islamic Rep. of	○	45 (4.1)	-7 (5.8)	11 (2.2)	10 (2.4)	15 (3.0)	3 (1.2)
Israel	●	r 11 (2.5)	4 (3.3)	r 57 (3.7)	r 60 (3.7)	r 47 (3.5)	r 31 (3.6)
Italy	○	16 (2.1)	0 (3.6)	36 (2.9)	41 (3.0)	53 (3.1)	12 (2.0)
Japan	●	41 (3.9)	4 (5.6)	0 (0.0)	1 (0.5)	2 (1.1)	3 (1.3)
Jordan	●	21 (3.6)	-35 (5.7) ▼	19 (3.2)	12 (2.8)	27 (3.6)	13 (2.9)
Korea, Rep. of	●	s 42 (3.5)	7 (4.8)	1 (0.2)	1 (0.6)	6 (1.3)	0 (0.0)
Kuwait	○	r 80 (4.2)	∅ ∅	r 4 (1.8)	r 7 (2.0)	r 7 (1.8)	r 6 (1.8)
Lebanon	○	6 (1.9)	1 (2.6)	53 (4.7)	34 (3.8)	36 (3.8)	39 (4.3)
Lithuania	●	3 (1.2)	1 (1.4)	61 (3.7)	63 (3.9)	69 (3.6)	23 (3.5)
Malaysia	●	0 (0.0)	-46 (3.9) ▼	68 (3.9)	49 (4.1)	59 (3.8)	40 (4.1)
Malta	●	0 (0.0)	∅ ∅	78 (0.2)	83 (0.2)	77 (0.2)	38 (0.2)
Norway	●	1 (0.8)	1 (0.8)	71 (2.9)	71 (3.1)	73 (2.9)	33 (3.6)
Oman	●	5 (1.6)	∅ ∅	41 (4.4)	20 (3.5)	52 (4.4)	23 (3.9)
Palestinian Nat'l Auth.	●	4 (1.5)	3 (1.7)	25 (3.6)	19 (3.4)	41 (4.4)	17 (3.4)
Qatar	●	r 52 (0.2)	∅ ∅	r 26 (0.1)	r 21 (0.2)	r 28 (0.2)	r 16 (0.1)
Romania	●	48 (3.6)	-3 (5.4)	8 (2.1)	7 (1.7)	3 (1.5)	3 (1.3)
Russian Federation	●	24 (3.3)	4 (4.1)	12 (2.8)	9 (2.5)	15 (2.2)	10 (2.8)
Saudi Arabia	○	r 66 (4.5)	--	10 (3.1)	r 9 (3.1)	r 9 (2.4)	r 6 (2.7)
Scotland	●	2 (1.1)	0 (1.8)	11 (2.4)	21 (3.1)	37 (3.5)	8 (2.0)
Serbia	○	53 (4.6)	17 (6.2) ●	8 (2.6)	10 (2.0)	8 (2.6)	3 (1.3)
Singapore	●	0 (0.0)	0 (0.0)	63 (2.7)	65 (2.6)	67 (2.9)	33 (2.8)
Slovenia	●	8 (1.6)	-32 (4.7) ▼	11 (1.7)	12 (1.9)	24 (2.6)	10 (1.9)
Sweden	●	0 (0.3)	0 (0.5)	r 42 (3.0)	58 (3.5)	r 67 (2.9)	r 23 (2.6)
Syrian Arab Republic	○	r 65 (4.4)	∅ ∅	9 (2.6)	9 (2.5)	7 (2.1)	7 (2.2)
Thailand	○	61 (4.2)	∅ ∅	7 (2.1)	4 (1.6)	11 (2.6)	5 (1.7)
Tunisia	●	r 32 (4.1)	-12 (6.1)	3 (1.3)	0 (0.0)	6 (2.1)	7 (2.2)
Turkey	●	41 (3.9)	∅ ∅	6 (2.1)	3 (1.9)	5 (2.2)	2 (1.5)
Ukraine	○	15 (3.2)	∅ ∅	26 (3.9)	10 (2.2)	37 (3.8)	13 (2.4)
United States	●	11 (1.9)	5 (2.4) ●	45 (2.7)	43 (2.6)	57 (2.8)	43 (2.9)
‡ Morocco	○	5 (3.4)	--	r 28 (5.5)	r 24 (5.4)	r 37 (5.7)	r 23 (5.2)
International Avg.		25 (0.4)		26 (0.4)	25 (0.4)	31 (0.5)	16 (0.4)
<b>Benchmarking Participants</b>							
Basque Country, Spain	●	26 (4.4)	-1 (6.2)	21 (4.3)	14 (2.9)	35 (4.4)	17 (3.9)
British Columbia, Canada	●	9 (2.8)	∅ ∅	56 (4.2)	51 (4.2)	62 (4.4)	39 (4.7)
Dubai, UAE	●	s 36 (2.4)	∅ ∅	s 33 (4.2)	s 32 (4.5)	s 36 (4.7)	s 19 (4.2)
Massachusetts, US	●	2 (2.3)	∅ ∅	48 (7.6)	40 (7.0)	64 (6.3)	33 (6.0)
Minnesota, US	-	1 (1.2)	∅ ∅	70 (5.7)	72 (4.9)	76 (6.8)	59 (5.0)
Ontario, Canada	●	0 (0.0)	-1 (1.0)	66 (4.2)	58 (4.7)	78 (4.1)	55 (4.5)
Quebec, Canada	●	0 (0.0)	0 (0.0)	86 (2.6)	91 (2.4)	95 (2.0)	67 (3.7)

● Yes ○ No

● 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.



Exhibit 7.11 Computer Use in Mathematics Class with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available		Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More		
		2007 Percent of Students	Difference in Percent from 2003	Discovering Principles and Concepts	Practicing Skills and Procedures	Looking Up Ideas and Information
Algeria	●	20 (3.6)	∅ ∅	3 (1.7)	4 (1.8)	4 (1.9)
Armenia	●	r 66 (3.7)	53 (4.6) ▲	--	--	--
Australia	●	78 (3.2)	2 (4.8)	3 (1.4)	8 (2.3)	4 (1.7)
Austria	○	69 (2.8)	∅ ∅	0 (0.4)	3 (1.1)	2 (0.8)
Chinese Taipei	○	41 (4.1)	25 (5.2) ▲	2 (0.1)	2 (1.7)	2 (1.1)
Colombia	○	18 (3.7)	∅ ∅	1 (0.9)	2 (1.0)	3 (1.4)
Czech Republic	○	59 (3.6)	∅ ∅	1 (0.9)	7 (2.5)	2 (0.9)
Denmark	●	95 (1.4)	∅ ∅	2 (1.3)	8 (2.3)	2 (1.3)
El Salvador	○	16 (3.0)	∅ ∅	1 (1.0)	3 (1.3)	3 (1.5)
England	●	r 76 (3.4)	-6 (4.8)	7 (2.0)	10 (2.4)	3 (1.7)
Georgia	○	20 (4.0)	∅ ∅	2 (1.6)	3 (1.6)	3 (1.7)
Germany	○	54 (3.5)	∅ ∅	0 (0.0)	3 (1.0)	0 (0.0)
Hong Kong SAR	●	58 (3.9)	4 (5.9)	7 (2.4)	3 (1.6)	5 (1.9)
Hungary	●	23 (3.5)	9 (4.8)	1 (0.4)	1 (0.4)	1 (0.4)
Iran, Islamic Rep. of	○	3 (1.2)	1 (1.6)	1 (0.5)	0 (0.0)	0 (0.3)
Italy	●	31 (2.7)	6 (4.1)	0 (0.0)	0 (0.0)	2 (0.8)
Japan	●	79 (3.3)	-5 (4.6)	0 (0.0)	1 (0.9)	0 (0.0)
Kazakhstan	○	34 (4.5)	∅ ∅	1 (0.9)	6 (2.9)	6 (2.9)
Kuwait	●	r 23 (4.1)	∅ ∅	r 4 (1.9)	r 6 (2.3)	r 5 (2.0)
Latvia	○	22 (2.8)	9 (4.7)	0 (0.0)	0 (0.0)	0 (0.0)
Lithuania	○	39 (3.7)	26 (4.4) ▲	0 (0.0)	1 (0.7)	2 (0.7)
Morocco	○	14 (3.1)	--	2 (1.2)	2 (1.3)	3 (1.5)
Netherlands	○	84 (2.9)	8 (4.5)	6 (1.9)	30 (4.1)	6 (2.2)
New Zealand	●	77 (2.7)	7 (4.1)	4 (1.1)	10 (1.6)	3 (0.9)
Norway	●	69 (3.3)	10 (5.6)	1 (0.9)	3 (1.3)	1 (0.8)
Qatar	○	42 (0.2)	∅ ∅	7 (0.1)	10 (0.1)	6 (0.1)
Russian Federation	○	14 (2.7)	10 (3.0) ▲	0 (0.0)	2 (1.1)	2 (1.1)
Scotland	●	r 93 (2.4)	12 (4.5) ▲	6 (1.9)	20 (3.7)	4 (1.6)
Singapore	●	81 (2.4)	1 (4.1)	7 (1.3)	13 (1.8)	4 (1.1)
Slovak Republic	○	47 (3.9)	∅ ∅	0 (0.3)	4 (1.4)	2 (0.8)
Slovenia	●	39 (3.1)	15 (4.8) ▲	0 (0.0)	2 (0.9)	1 (0.4)
Sweden	●	67 (3.4)	∅ ∅	2 (1.1)	4 (1.4)	1 (0.5)
Tunisia	○	r 25 (3.5)	13 (4.5) ▲	8 (2.1)	6 (1.8)	7 (1.9)
Ukraine	○	6 (2.0)	∅ ∅	0 (0.4)	0 (0.4)	0 (0.4)
United States	○	65 (2.6)	5 (3.5)	4 (0.9)	11 (1.5)	4 (1.0)
Yemen	○	24 (4.2)	∅ ∅	10 (3.2)	12 (3.5)	9 (3.2)
International Avg.		46 (0.5)		3 (0.2)	6 (0.3)	3 (0.2)
<b>Benchmarking Participants</b>						
Alberta, Canada	●	72 (4.1)	∅ ∅	2 (0.9)	4 (1.3)	3 (1.4)
British Columbia, Canada	●	r 47 (4.2)	∅ ∅	r 0 (0.3)	r 1 (0.9)	r 0 (0.5)
Dubai, UAE	○	s 49 (6.0)	∅ ∅	s 6 (2.0)	s 12 (3.0)	s 17 (4.6)
Massachusetts, US	●	59 (5.7)	∅ ∅	7 (2.8)	9 (2.7)	3 (2.0)
Minnesota, US	-	61 (7.0)	∅ ∅	2 (0.1)	9 (4.9)	1 (0.8)
Ontario, Canada	●	64 (3.9)	7 (6.0)	7 (3.3)	3 (2.1)	3 (1.4)
Quebec, Canada	○	45 (4.2)	-1 (6.3)	0 (0.1)	1 (0.8)	2 (1.1)

● Yes    ○ No    ▲ 2007 percent significantly higher    ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.



Exhibit 7.11 Computer Use in Mathematics Class with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available		Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Discovering Principles and Concepts	Practicing Skills and Procedures	Looking Up Ideas and Information	Processing and Analyzing Data
Algeria	●	r 29 (4.2)	∅ ∅	r 3 (1.5)	r 5 (2.1)	r 4 (1.8)	r 6 (2.1)
Armenia	●	r 17 (3.2)	-3 (4.6)	4 (1.0)	4 (1.1)	5 (1.2)	5 (1.1)
Australia	●	51 (4.3)	-4 (6.0)	0 (0.0)	2 (0.9)	1 (0.0)	0 (0.0)
Bahrain	○	24 (2.8)	-10 (4.5) ▼	2 (1.0)	2 (1.0)	4 (0.6)	1 (0.4)
Bosnia and Herzegovina	○	19 (3.1)	∅ ∅	2 (0.9)	2 (0.9)	3 (1.5)	2 (1.3)
Botswana	●	r 13 (3.2)	7 (4.1)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
Bulgaria	○	46 (3.5)	38 (4.2) ▲	1 (1.1)	1 (0.9)	6 (2.2)	3 (1.5)
Chinese Taipei	●	27 (3.4)	-3 (4.7)	3 (1.2)	2 (1.2)	2 (1.2)	1 (1.0)
Colombia	○	16 (3.1)	∅ ∅	2 (0.7)	1 (0.6)	3 (2.3)	2 (0.9)
Cyprus	○	10 (1.9)	2 (2.7)	0 (0.0)	1 (0.3)	1 (0.0)	0 (0.0)
Czech Republic	○	r 59 (4.5)	∅ ∅	r 1 (0.5)	r 4 (1.7)	r 1 (0.5)	r 1 (0.9)
Egypt	○	--	--	--	--	--	--
El Salvador	○	25 (3.8)	∅ ∅	0 (0.0)	2 (1.2)	3 (1.3)	1 (0.0)
England	●	r 58 (4.0)	-8 (7.7)	3 (1.4)	4 (1.7)	3 (1.6)	2 (1.1)
Georgia	○	30 (4.2)	∅ ∅	1 (0.8)	2 (0.9)	2 (1.2)	3 (1.4)
Ghana	○	7 (2.1)	-8 (4.1) ▼	1 (0.0)	2 (1.2)	2 (1.2)	2 (1.4)
Hong Kong SAR	●	42 (4.9)	3 (6.5)	7 (2.5)	8 (2.7)	6 (2.4)	5 (1.9)
Hungary	●	39 (3.9)	12 (5.2) ▲	0 (0.0)	1 (0.8)	1 (0.8)	2 (1.2)
Indonesia	○	16 (3.4)	5 (4.2)	0 (0.0)	1 (0.6)	3 (1.7)	2 (1.7)
Iran, Islamic Rep. of	○	5 (1.6)	3 (1.8)	0 (0.0)	1 (0.7)	1 (0.7)	0 (0.0)
Israel	●	r 41 (3.6)	-6 (5.3)	r 7 (1.8)	r 8 (1.9)	r 4 (1.5)	r 7 (1.8)
Italy	●	30 (3.2)	-3 (4.9)	1 (0.8)	2 (1.0)	2 (1.1)	2 (1.0)
Japan	●	69 (3.9)	-17 (5.0) ▼	1 (0.7)	1 (0.8)	0 (0.0)	0 (0.0)
Jordan	●	24 (3.5)	14 (4.5) ▲	2 (0.9)	4 (1.3)	5 (1.8)	4 (1.5)
Korea, Rep. of	●	s 56 (3.5)	-17 (4.9) ▼	7 (2.0)	4 (1.5)	3 (1.1)	5 (1.5)
Kuwait	○	r 17 (3.6)	∅ ∅	r 3 (1.7)	r 5 (2.0)	r 5 (2.0)	r 4 (1.9)
Lebanon	○	28 (3.6)	4 (5.2)	8 (2.1)	5 (2.1)	7 (2.4)	6 (1.9)
Lithuania	●	73 (3.2)	3 (4.8)	2 (0.9)	3 (1.3)	4 (1.5)	5 (1.8)
Malaysia	●	44 (4.4)	39 (4.7) ▲	5 (1.7)	6 (1.8)	6 (1.9)	4 (1.6)
Malta	●	81 (0.2)	∅ ∅	7 (0.1)	8 (0.1)	3 (0.1)	1 (0.0)
Norway	●	71 (3.3)	15 (5.3) ▲	2 (0.7)	4 (1.5)	2 (1.1)	4 (1.2)
Oman	●	34 (4.0)	∅ ∅	1 (0.1)	3 (1.5)	6 (2.2)	6 (2.1)
Palestinian Nat'l Auth.	●	31 (4.1)	2 (5.8)	2 (1.4)	2 (1.1)	4 (1.8)	3 (1.6)
Qatar	●	r 22 (0.1)	∅ ∅	r 8 (0.1)	r 8 (0.1)	r 7 (0.1)	r 6 (0.1)
Romania	○	50 (3.9)	37 (4.7) ▲	2 (0.9)	4 (1.5)	3 (0.9)	3 (0.9)
Russian Federation	●	40 (4.0)	28 (4.8) ▲	2 (0.9)	3 (1.6)	3 (1.3)	1 (0.6)
Saudi Arabia	○	24 (3.7)	--	3 (1.5)	6 (2.7)	7 (2.7)	5 (2.5)
Scotland	●	37 (3.6)	-3 (6.0)	1 (0.9)	3 (1.1)	1 (0.4)	0 (0.0)
Serbia	○	17 (3.6)	9 (4.4) ▲	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Singapore	●	54 (2.5)	-12 (3.7) ▼	3 (0.8)	7 (1.4)	4 (1.0)	4 (0.9)
Slovenia	●	52 (2.6)	15 (4.9) ▲	1 (1.0)	1 (1.0)	0 (0.3)	3 (1.1)
Sweden	●	40 (3.2)	-5 (4.9)	1 (0.3)	1 (0.3)	1 (0.4)	1 (0.4)
Syrian Arab Republic	○	18 (3.4)	∅ ∅	4 (1.8)	3 (1.5)	5 (1.9)	3 (1.6)
Thailand	○	20 (3.5)	∅ ∅	3 (1.3)	3 (1.3)	3 (1.4)	3 (1.5)
Tunisia	○	11 (2.1)	-12 (4.0) ▼	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.2)
Turkey	●	30 (4.1)	∅ ∅	4 (1.5)	7 (2.3)	6 (2.0)	5 (1.6)
Ukraine	○	14 (3.0)	∅ ∅	1 (0.6)	1 (0.7)	1 (0.6)	1 (0.6)
United States	○	42 (2.6)	-3 (3.9)	2 (0.8)	6 (1.1)	1 (0.5)	2 (0.7)
‡ Morocco	○	r 33 (8.8)	--	r 3 (1.6)	r 2 (1.2)	r 3 (1.9)	r 1 (0.0)
International Avg.		34 (0.5)		2 (0.2)	3 (0.2)	3 (0.2)	3 (0.2)

**Benchmarking Participants**

Basque Country, Spain	○	40 (5.3)	5 (7.0)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)
British Columbia, Canada	●	38 (4.5)	∅ ∅	2 (1.5)	2 (1.5)	2 (1.4)	1 (0.0)
Dubai, UAE	○	s 50 (6.2)	∅ ∅	s 9 (5.3)	s 11 (5.4)	s 12 (5.6)	s 10 (5.5)
Massachusetts, US	●	57 (7.8)	∅ ∅	1 (0.0)	1 (0.8)	1 (0.8)	1 (0.0)
Minnesota, US	-	28 (7.9)	∅ ∅	1 (0.7)	2 (1.2)	1 (0.7)	1 (0.7)
Ontario, Canada	●	60 (4.9)	14 (7.1)	1 (0.7)	0 (0.2)	2 (1.0)	1 (0.7)
Quebec, Canada	○	27 (4.2)	16 (5.0) ▲	0 (0.0)	1 (0.0)	0 (0.0)	0 (0.0)

● Yes ○ No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.

### What is the Role of Homework?

Exhibit 7.12 contains teachers' reports about their emphasis on homework. For the Index of Teachers' Emphasis on Mathematics Homework (EMH), students in the high category had teachers who reported giving relatively long homework assignments (more than 30 minutes) on a relatively frequent basis (in about half the lessons or more). Students in the low category had teachers who gave short assignments (less than 30 minutes) relatively infrequently (in about half the lessons or less). The medium level includes all other possible combinations of responses. At the fourth grade, on average internationally, homework was not very prevalent even though there was variation from country to country. Only 10 countries had a policy about assigning mathematics homework. Also, there were not many changes between 2003 and 2007, except in Japan and Chinese Taipei where fewer students were in the low category and more were in the medium and high categories. In 2007, internationally on average, more than one third of the students (36%) were in the low category and only 13 percent were in the high category. There was little relationship between teachers' emphasis on homework and mathematics achievement.

At the eighth grade, teachers placed more emphasis on mathematics homework than they did at the fourth grade, but there was still substantial variation. Seventeen countries reported having a policy about assigning mathematics homework. Countries with more than half their students in the high category included Romania (70%), Italy (70%), Georgia (63%), Iran (59%), and Israel (53%). Countries with more than half their students in the low category included England (59%), Korea (56%), Sweden (63%), Japan (59%), Scotland (55%), the Czech Republic (77%), and Kuwait (81%). There was a positive relationship between teachers assigning more homework and mathematics achievement, especially with students in the low category having lower achievement. However, a number of countries were assigning less homework in 2007 than in 2003. The following countries had smaller percentages of students in the high category: Armenia, the Russian Federation, Singapore, Malaysia, Bulgaria, Cyprus, the United States, Jordan,

the Palestinian National Authority, Slovenia, and Bahrain. The two countries with higher percentages of students in the high category were Tunisia and Korea.

For students at the eighth grade, Exhibit 7.13 presents teachers' reports about how they used homework in their mathematics instruction. Internationally on average, the teachers reported always or almost always monitoring whether the homework was completed for 80 percent of the students. Fifty-nine percent of the students, on average, had teachers who reported correcting students' assignments and giving them feedback. For only at most one-third of the students did the teachers have the students correct their own homework in class (32%), use the homework as a basis for class discussion (29%), or use the homework to contribute towards students grades or marks (33%).

For students at the eighth grade, Exhibit 7.14 shows trends in how frequently teachers assign two different types of mathematics homework. Assigning problem or question sets as homework was very common across countries and this type of homework was given to almost all students. On average internationally, 69 percent of the students had teachers who reported always or almost always assigning homework requiring students to do sets of problems and another 27 percent had teachers who sometimes assigned problem/question sets. In contrast, gathering data and reporting the results was rarely assigned on a frequent basis (5%). However, on average internationally, half the students (56%) had teachers who sometimes assigned this type of homework. In general, the tradition of giving problem/question sets as the most popular type of mathematics homework did not change much between 2003 and 2007.

**Exhibit 7.12 Index of Teachers' Emphasis on Mathematics Homework (EMH) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Have Policy to Assign Mathematics Homework	High EMH			Medium EMH			Low EMH		
		2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Armenia	○	r 41 (4.3)	504 (8.6)	-6 (6.1)	49 (3.9)	496 (4.3)	-3 (5.9)	11 (2.4)	507 (8.1)	8 (2.8) ▲
Algeria	●	40 (5.0)	378 (12.3)	○ ○	43 (4.7)	381 (7.3)	○ ○	17 (3.4)	369 (12.4)	○ ○
Italy	○	35 (3.0)	501 (5.1)	3 (4.6)	35 (2.8)	508 (5.3)	2 (4.7)	29 (2.9)	512 (3.4)	-5 (4.6)
Singapore	○	32 (2.8)	590 (6.6)	-3 (5.1)	47 (2.9)	610 (5.3)	-3 (4.8)	21 (2.5)	590 (8.3)	5 (3.7)
Kazakhstan	○	28 (3.9)	559 (9.9)	○ ○	70 (4.0)	545 (8.4)	○ ○	2 (1.0)	~ ~	○ ○
Georgia	●	28 (4.1)	437 (9.5)	○ ○	67 (4.4)	441 (4.9)	○ ○	5 (2.1)	424 (24.1)	○ ○
Hong Kong SAR	○	26 (3.6)	610 (7.2)	-7 (5.9)	63 (4.1)	611 (4.2)	0 (6.3)	11 (2.9)	576 (9.1)	7 (3.4) ▲
Russian Federation	○	24 (3.8)	545 (7.2)	-1 (5.0)	72 (4.0)	542 (6.3)	-1 (5.3)	4 (1.2)	573 (30.2)	2 (1.5)
Iran, Islamic Rep. of	○	23 (2.9)	398 (8.5)	-9 (5.8)	36 (3.8)	411 (5.8)	3 (6.0)	41 (3.8)	397 (7.4)	6 (6.0)
Colombia	○	22 (3.6)	370 (8.5)	○ ○	68 (4.2)	350 (6.9)	○ ○	10 (3.2)	360 (27.3)	○ ○
Morocco	●	19 (3.9)	339 (12.8)	- -	44 (4.3)	353 (6.9)	- -	36 (3.9)	331 (10.3)	- -
Chinese Taipei	○	18 (3.2)	582 (5.5)	7 (4.2)	64 (3.7)	574 (2.2)	12 (5.6) ▲	18 (2.8)	571 (3.3)	-19 (4.8) ▼
Germany	●	14 (2.0)	529 (4.4)	○ ○	79 (2.4)	526 (2.5)	○ ○	7 (1.6)	507 (16.0)	○ ○
Ukraine	●	14 (2.9)	468 (9.9)	○ ○	83 (3.2)	468 (3.8)	○ ○	4 (1.5)	497 (5.8)	○ ○
Norway	○	13 (2.5)	476 (5.9)	6 (3.2)	45 (3.5)	473 (4.4)	-1 (5.8)	42 (3.5)	472 (4.0)	-5 (5.7)
Yemen	●	12 (3.2)	215 (12.1)	○ ○	65 (4.1)	227 (8.4)	○ ○	22 (3.6)	220 (9.8)	○ ○
Austria	●	11 (1.8)	494 (5.6)	○ ○	73 (2.7)	508 (2.5)	○ ○	16 (2.4)	505 (4.3)	○ ○
El Salvador	○	11 (2.9)	334 (12.4)	○ ○	67 (4.1)	329 (5.7)	○ ○	22 (3.6)	329 (7.5)	○ ○
Tunisia	○	11 (2.3)	308 (15.6)	-3 (4.0)	35 (4.0)	328 (7.8)	2 (5.5)	54 (4.4)	327 (6.6)	1 (6.1)
Japan	○	9 (2.2)	574 (7.2)	5 (2.6) ▲	52 (3.8)	569 (2.7)	12 (5.8) ▲	39 (3.9)	566 (3.6)	-18 (5.9) ▼
United States	○	7 (1.4)	525 (10.8)	-1 (1.9)	68 (2.5)	531 (3.3)	0 (3.7)	25 (2.2)	525 (4.3)	0 (3.5)
Denmark	○	5 (1.6)	527 (8.4)	○ ○	61 (4.6)	526 (3.3)	○ ○	35 (4.4)	521 (4.0)	○ ○
Australia	○	5 (2.2)	535 (15.5)	1 (2.5)	18 (3.1)	519 (10.3)	-9 (5.1)	78 (2.6)	516 (4.5)	8 (4.9)
Qatar	●	r 4 (0.0)	312 (4.8)	○ ○	29 (0.2)	301 (3.0)	○ ○	67 (0.1)	293 (1.4)	○ ○
Slovenia	○	3 (1.1)	489 (17.3)	0 (2.0)	87 (2.2)	502 (1.9)	1 (3.3)	10 (1.9)	499 (7.0)	0 (2.9)
Sweden	○	3 (0.9)	515 (12.1)	○ ○	20 (3.3)	503 (5.9)	○ ○	77 (3.4)	503 (2.8)	○ ○
England	○	r 3 (1.2)	591 (20.2)	-2 (2.8)	18 (3.2)	546 (8.9)	5 (4.5)	80 (3.2)	538 (2.9)	-3 (5.1)
Lithuania	●	3 (1.2)	520 (12.7)	0 (1.6)	79 (3.0)	533 (2.6)	5 (3.9)	19 (2.8)	520 (6.3)	-6 (3.7)
Scotland	○	s 1 (0.9)	~ ~	1 (1.1)	11 (2.7)	507 (10.9)	-8 (5.1)	87 (2.8)	493 (2.8)	8 (5.2)
Czech Republic	○	1 (0.7)	~ ~	○ ○	17 (3.0)	489 (4.5)	○ ○	82 (3.0)	486 (3.2)	○ ○
New Zealand	○	1 (0.6)	~ ~	0 (0.7)	15 (2.0)	482 (5.7)	4 (3.1)	84 (2.1)	494 (2.6)	-4 (3.3)
Hungary	○	1 (0.6)	~ ~	-7 (2.4) ▼	93 (1.6)	510 (3.6)	5 (3.2)	6 (1.5)	508 (26.2)	2 (2.3)
Latvia	○	1 (0.4)	~ ~	-6 (2.2) ▼	91 (2.1)	539 (2.3)	3 (3.9)	9 (2.1)	531 (4.5)	3 (3.1)
Netherlands	○	1 (0.4)	~ ~	1 (0.4)	3 (0.5)	511 (19.1)	0 (1.5)	97 (0.8)	535 (2.5)	-1 (1.6)
Kuwait	-	r 0 (0.0)	~ ~	○ ○	18 (3.5)	308 (12.4)	○ ○	82 (3.5)	319 (4.4)	○ ○
Slovak Republic	●	0 (0.0)	~ ~	○ ○	68 (3.3)	498 (4.1)	○ ○	32 (3.3)	492 (10.0)	○ ○
International Avg.		13 (0.4)	472 (2.0)		51 (0.6)	474 (1.1)		36 (0.5)	469 (1.9)	
<b>Benchmarking Participants</b>										
Massachusetts, US	○	17 (4.7)	583 (10.6)	○ ○	71 (6.4)	569 (4.4)	○ ○	12 (4.3)	577 (6.3)	○ ○
Dubai, UAE	○	s 13 (4.8)	420 (19.5)	○ ○	70 (5.0)	437 (4.5)	○ ○	17 (2.5)	463 (11.8)	○ ○
Ontario, Canada	○	6 (1.9)	508 (7.8)	1 (3.2)	43 (4.3)	512 (5.5)	1 (6.2)	50 (4.4)	512 (5.1)	-2 (6.5)
Quebec, Canada	○	r 6 (1.9)	505 (5.1)	-2 (3.2)	15 (2.7)	503 (6.2)	-3 (4.5)	79 (3.0)	523 (3.4)	6 (5.0)
Minnesota, US	○	4 (2.1)	568 (25.9)	○ ○	61 (7.1)	551 (8.3)	○ ○	34 (7.2)	561 (11.9)	○ ○
British Columbia, Canada	○	r 2 (1.1)	~ ~	○ ○	29 (3.6)	507 (5.1)	○ ○	68 (3.6)	505 (3.8)	○ ○
Alberta, Canada	○	2 (0.7)	~ ~	○ ○	19 (3.4)	504 (5.4)	○ ○	80 (3.5)	505 (3.7)	○ ○

● Yes    ○ No    ▲ 2007 percent significantly higher    ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers. Index based on teachers' responses to two questions about how often they usually assign mathematics homework and how many minutes of mathematics homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (○) indicates the country did not participate in the assessment.

**Exhibit 7.12 Index of Teachers' Emphasis on Mathematics Homework (EMH) with Trends (Continued)**

**TIMSS2007**  
**Mathematics** **8<sup>th</sup>** Grade

Country	Have Policy to Assign Mathematics Homework	High EMH			Medium EMH			Low EMH		
		2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Romania	○	70 (4.2)	472 (4.9)	-8 (5.4)	28 (4.2)	440 (9.2)	8 (5.4)	1 (0.8)	~ ~	0 (1.0)
Italy	○	70 (3.3)	481 (3.2)	-2 (4.8)	29 (3.1)	480 (5.3)	4 (4.4)	1 (0.7)	~ ~	-2 (1.7)
Georgia	●	63 (4.4)	413 (7.8)	0 (0)	35 (4.4)	406 (7.9)	0 (0)	2 (1.3)	~ ~	0 (0)
Iran, Islamic Rep. of	○	59 (3.8)	406 (5.0)	-3 (5.8)	27 (3.6)	395 (8.2)	1 (5.4)	13 (2.9)	412 (11.9)	2 (4.0)
Israel	●	r 53 (3.3)	489 (5.4)	3 (5.0)	40 (3.3)	454 (8.5)	-3 (5.3)	7 (1.4)	404 (21.7)	1 (2.2)
Colombia	○	48 (4.9)	382 (5.1)	0 (0)	37 (5.2)	383 (7.3)	0 (0)	16 (3.2)	366 (11.0)	0 (0)
Syrian Arab Republic	●	47 (4.1)	396 (5.5)	0 (0)	30 (3.9)	392 (7.8)	0 (0)	22 (3.8)	397 (8.0)	0 (0)
Armenia	○	r 46 (4.4)	503 (4.7)	-18 (6.4) ▼	43 (3.7)	494 (5.6)	13 (6.0) ▲	10 (2.5)	498 (12.7)	6 (3.3)
Russian Federation	○	46 (2.9)	516 (6.5)	-10 (4.5) ▼	54 (2.9)	509 (4.3)	11 (4.5) ▲	0 (0.0)	~ ~	-1 (0.5)
Lebanon	●	45 (4.4)	440 (6.0)	-4 (6.3)	45 (4.2)	456 (6.8)	1 (6.1)	10 (2.4)	438 (14.5)	3 (3.0)
Thailand	○	43 (4.3)	448 (7.8)	0 (0)	48 (4.2)	436 (9.0)	0 (0)	9 (2.2)	438 (14.1)	0 (0)
Singapore	○	43 (2.8)	612 (5.7)	-17 (3.7) ▼	39 (2.7)	595 (6.5)	6 (3.7)	18 (2.3)	542 (12.8)	11 (2.6) ▲
Ukraine	●	43 (3.2)	466 (5.9)	0 (0)	56 (3.3)	459 (5.6)	0 (0)	1 (0.7)	~ ~	0 (0)
Indonesia	○	41 (4.9)	403 (9.2)	-4 (6.3)	50 (4.9)	409 (7.9)	5 (6.6)	9 (2.5)	386 (13.7)	-1 (3.6)
Chinese Taipei	○	38 (4.2)	613 (8.0)	9 (5.7)	37 (4.6)	608 (5.0)	-1 (6.1)	25 (3.5)	562 (7.4)	-8 (5.3)
Ghana	●	36 (4.3)	309 (9.2)	-11 (6.7)	42 (4.3)	309 (7.8)	5 (6.6)	21 (3.4)	312 (7.6)	6 (4.5)
Turkey	●	35 (4.1)	432 (9.6)	0 (0)	37 (4.2)	427 (8.8)	0 (0)	28 (3.3)	433 (10.5)	0 (0)
Norway	○	34 (3.9)	467 (3.5)	9 (5.2)	48 (3.6)	474 (3.0)	2 (5.6)	18 (3.1)	465 (5.0)	-11 (5.3) ▼
Malaysia	○	34 (4.0)	478 (8.6)	-26 (6.0) ▼	54 (4.2)	475 (6.7)	20 (5.9) ▲	11 (2.3)	458 (15.7)	6 (3.0) ▲
Tunisia	●	34 (4.1)	418 (3.3)	22 (4.8) ▲	60 (4.2)	424 (3.3)	-24 (5.2) ▼	6 (2.0)	421 (10.7)	3 (2.6)
Botswana	○	33 (3.8)	370 (4.5)	-11 (5.9)	57 (4.1)	361 (3.6)	9 (6.1)	10 (2.6)	352 (8.0)	2 (3.6)
Serbia	●	33 (3.8)	484 (6.9)	-1 (5.6)	40 (4.3)	488 (4.7)	-5 (6.1)	27 (3.9)	484 (7.0)	6 (5.3)
Hong Kong SAR	○	31 (4.5)	586 (10.9)	6 (5.9)	52 (4.6)	582 (9.0)	2 (6.5)	17 (3.5)	532 (16.1)	-8 (5.3)
Algeria	●	31 (4.0)	389 (3.3)	0 (0)	55 (4.4)	385 (3.0)	0 (0)	14 (2.7)	388 (4.1)	0 (0)
Bulgaria	○	28 (3.3)	499 (8.9)	-25 (5.3) ▼	66 (3.7)	451 (6.5)	28 (5.6) ▲	6 (1.8)	452 (10.6)	-3 (3.1)
El Salvador	○	26 (4.1)	335 (7.4)	0 (0)	50 (4.1)	345 (3.9)	0 (0)	24 (3.9)	333 (6.6)	0 (0)
Cyprus	○	23 (2.7)	472 (3.9)	-12 (4.1) ▼	77 (2.7)	462 (2.0)	12 (4.1) ▲	1 (0.0)	~ ~	1 (0.0)
Malta	●	20 (0.2)	510 (2.2)	0 (0)	73 (0.2)	488 (1.3)	0 (0)	6 (0.2)	407 (3.6)	0 (0)
United States	○	20 (2.1)	533 (6.0)	-7 (3.2) ▼	67 (2.6)	507 (3.9)	5 (3.9)	14 (2.2)	475 (5.8)	2 (3.2)
Bosnia and Herzegovina	○	19 (3.1)	449 (8.0)	0 (0)	56 (4.0)	463 (3.7)	0 (0)	25 (3.4)	444 (5.3)	0 (0)
England	○	r 18 (3.1)	552 (11.7)	-6 (6.8)	23 (3.3)	520 (11.0)	2 (5.5)	59 (4.2)	499 (6.5)	3 (7.2)
Korea, Rep. of	●	s 17 (2.8)	609 (7.7)	8 (3.5) ▲	28 (2.8)	591 (5.8)	-3 (4.6)	56 (3.3)	597 (4.0)	-4 (4.9)
Egypt	○	16 (2.8)	391 (8.5)	-7 (4.5)	52 (4.4)	390 (5.3)	-6 (5.8)	32 (4.1)	395 (6.9)	12 (5.3) ▲
Jordan	○	14 (2.7)	426 (12.0)	-16 (4.6) ▼	58 (4.2)	431 (5.8)	2 (6.1)	28 (3.9)	415 (9.0)	14 (4.8) ▲
Sweden	○	11 (1.8)	492 (8.1)	-6 (3.4)	26 (2.8)	499 (3.9)	2 (4.2)	63 (3.1)	488 (2.5)	4 (4.8)
Palestinian Nat'l Auth.	○	10 (2.7)	356 (12.7)	-21 (4.8) ▼	63 (4.0)	375 (4.8)	5 (5.8)	28 (3.6)	351 (6.5)	16 (4.4) ▲
Lithuania	●	8 (2.1)	499 (6.3)	-5 (3.4)	86 (2.7)	508 (2.6)	10 (4.5) ▲	6 (1.8)	481 (6.5)	-4 (3.2)
Japan	○	8 (2.0)	564 (7.7)	1 (3.0)	33 (3.8)	575 (4.7)	4 (5.3)	59 (3.8)	568 (3.9)	-5 (5.4)
Hungary	○	8 (2.1)	526 (13.6)	0 (2.9)	87 (2.5)	517 (3.9)	-3 (4.4)	5 (1.5)	481 (19.9)	3 (1.8)
Scotland	○	7 (1.8)	534 (15.2)	4 (2.5)	38 (3.5)	511 (6.3)	-7 (5.8)	55 (3.6)	465 (5.5)	3 (5.8)
Slovenia	○	6 (1.3)	506 (8.5)	-7 (3.2) ▼	89 (1.9)	503 (2.4)	4 (3.6)	6 (1.4)	478 (10.8)	3 (1.7)
Oman	●	6 (2.1)	382 (11.7)	0 (0)	67 (3.7)	377 (4.4)	0 (0)	27 (3.3)	360 (6.3)	0 (0)
Qatar	●	5 (0.1)	290 (4.3)	0 (0)	57 (0.2)	318 (1.7)	0 (0)	38 (0.2)	296 (2.4)	0 (0)
Australia	○	5 (2.0)	497 (30.8)	-5 (3.6)	46 (4.0)	520 (5.4)	-10 (5.8)	49 (4.0)	477 (5.9)	16 (5.5) ▲
Bahrain	○	5 (1.5)	373 (5.4)	-10 (2.9) ▼	49 (2.7)	402 (2.5)	-23 (4.5) ▼	47 (2.9)	391 (3.4)	33 (4.2) ▲
Czech Republic	○	4 (1.5)	578 (27.3)	0 (0)	19 (3.2)	504 (7.8)	0 (0)	77 (3.3)	500 (3.0)	0 (0)
Saudi Arabia	●	3 (1.4)	321 (14.2)	--	50 (3.9)	334 (4.0)	--	48 (3.8)	323 (4.4)	--
Kuwait	-	r 2 (1.4)	~ ~	0 (0)	16 (3.4)	360 (8.5)	0 (0)	81 (3.7)	356 (2.9)	0 (0)
‡ Morocco	●	r 24 (6.2)	394 (12.2)	--	59 (6.8)	387 (6.5)	--	17 (4.1)	374 (9.9)	--
<b>International Avg.</b>		<b>28 (0.5)</b>	<b>460 (1.4)</b>		<b>49 (0.5)</b>	<b>453 (0.9)</b>		<b>24 (0.4)</b>	<b>435 (1.5)</b>	

**Benchmarking Participants**

Massachusetts, US	○	32 (5.8)	576 (10.1)	0 (0)	59 (5.9)	537 (6.7)	0 (0)	9 (2.7)	494 (13.3)	0 (0)
Minnesota, US	-	23 (6.3)	563 (12.9)	0 (0)	67 (7.1)	529 (5.0)	0 (0)	10 (3.6)	489 (12.5)	0 (0)
Ontario, Canada	○	21 (3.5)	519 (5.2)	-9 (5.6)	51 (5.2)	523 (4.7)	-12 (6.8)	28 (4.4)	506 (9.5)	21 (5.0) ▲
Basque Country, Spain	○	21 (4.4)	504 (6.0)	6 (6.0)	68 (4.8)	500 (3.8)	-3 (7.0)	12 (2.6)	487 (9.9)	-3 (4.2)
Quebec, Canada	○	17 (3.1)	550 (12.8)	-5 (5.1)	58 (4.1)	534 (5.7)	-3 (6.6)	24 (3.6)	506 (5.1)	8 (5.4)
British Columbia, Canada	○	17 (3.1)	521 (9.1)	0 (0)	64 (4.0)	512 (4.1)	0 (0)	19 (2.7)	497 (7.9)	0 (0)
Dubai, UAE	○	s 8 (2.2)	456 (16.9)	0 (0)	68 (3.9)	468 (5.5)	0 (0)	24 (3.6)	451 (12.4)	0 (0)

● Yes ○ No

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

Index based on teachers' responses to two questions about how often they usually assign mathematics homework and how many minutes of mathematics homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 7.13 Use of Mathematics Homework

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students Whose Teachers Always or Almost Always				
	Monitor Whether or Not the Homework Was Completed	Correct Assignments and Then Give Feedback to Students	Have Students Correct Their Own Homework in Class	Use the Homework as a Basis for Class Discussion	Use the Homework to Contribute Towards Students' Grades/Marks
Algeria	81 (3.4)	74 (3.8)	42 (4.4)	45 (4.7)	57 (4.3)
Armenia	52 (3.4)	37 (3.5)	29 (3.1)	23 (2.7)	25 (3.1)
Australia	63 (3.3)	59 (3.9)	28 (3.8)	15 (3.3)	21 (3.2)
Bahrain	81 (2.9)	76 (2.5)	17 (1.7)	43 (3.0)	54 (3.3)
Bosnia and Herzegovina	73 (3.8)	37 (3.6)	15 (3.0)	25 (3.9)	15 (3.1)
Botswana	94 (2.2)	94 (2.2)	37 (4.4)	33 (3.9)	12 (3.2)
Bulgaria	85 (2.7)	28 (3.6)	13 (2.4)	24 (3.6)	10 (2.3)
Chinese Taipei	66 (4.3)	50 (4.4)	58 (4.2)	53 (4.3)	59 (4.2)
Colombia	81 (4.1)	80 (3.5)	11 (3.0)	33 (4.9)	54 (4.7)
Cyprus	89 (1.8)	82 (2.4)	19 (2.4)	43 (3.2)	47 (3.4)
Czech Republic	93 (2.1)	67 (3.5)	19 (3.0)	13 (2.9)	15 (2.9)
Egypt	82 (3.3)	73 (3.6)	7 (2.1)	20 (3.0)	61 (3.8)
El Salvador	97 (1.4)	84 (3.0)	50 (3.9)	43 (4.5)	66 (4.3)
England	88 (2.5)	70 (4.0)	13 (2.2)	13 (2.8)	32 (3.5)
Georgia	93 (2.6)	46 (5.5)	40 (3.8)	17 (4.4)	38 (4.6)
Ghana	97 (1.4)	93 (2.1)	53 (4.2)	40 (4.3)	56 (3.9)
Hong Kong SAR	82 (3.5)	77 (3.2)	18 (3.5)	24 (4.0)	29 (4.0)
Hungary	92 (2.1)	36 (3.3)	72 (3.8)	8 (2.0)	9 (2.3)
Indonesia	90 (2.4)	84 (2.9)	48 (4.4)	23 (3.4)	47 (3.4)
Iran, Islamic Rep. of	74 (3.4)	49 (3.5)	46 (3.5)	41 (4.2)	38 (3.5)
Israel	r 73 (3.5)	r 40 (3.3)	r 29 (3.5)	r 31 (3.5)	r 50 (3.7)
Italy	77 (3.0)	52 (3.3)	57 (3.3)	51 (3.1)	11 (2.0)
Japan	65 (3.6)	25 (2.9)	48 (4.2)	5 (1.7)	17 (2.6)
Jordan	86 (2.9)	72 (3.4)	17 (3.3)	70 (3.5)	43 (4.3)
Korea, Rep. of	80 (2.1)	12 (2.0)	37 (3.0)	5 (1.6)	28 (3.1)
Kuwait	r 57 (5.2)	r 54 (4.8)	r 13 (3.0)	r 29 (4.1)	r 32 (4.4)
Lebanon	75 (3.2)	76 (3.7)	65 (4.8)	40 (4.4)	17 (2.9)
Lithuania	73 (3.4)	28 (3.2)	19 (3.0)	10 (2.5)	9 (2.2)
Malaysia	81 (3.2)	68 (3.2)	33 (3.9)	38 (4.0)	13 (2.9)
Malta	89 (0.2)	49 (0.3)	75 (0.2)	30 (0.2)	48 (0.2)
Norway	44 (3.2)	8 (2.0)	13 (2.9)	9 (1.9)	15 (2.9)
Oman	87 (3.2)	83 (3.1)	20 (3.6)	33 (4.0)	46 (4.7)
Palestinian Nat'l Auth.	85 (2.9)	64 (3.9)	20 (3.2)	46 (3.8)	40 (4.4)
Qatar	88 (0.1)	85 (0.1)	13 (0.1)	22 (0.1)	56 (0.2)
Romania	79 (2.7)	43 (4.2)	29 (3.5)	31 (3.6)	19 (3.4)
Russian Federation	90 (2.1)	58 (3.7)	19 (2.6)	7 (2.1)	5 (1.5)
Saudi Arabia	89 (3.0)	80 (3.5)	31 (4.1)	33 (4.6)	56 (3.9)
Scotland	89 (2.8)	64 (3.4)	19 (3.0)	20 (3.1)	7 (1.4)
Serbia	71 (3.9)	38 (3.9)	17 (3.1)	24 (3.6)	13 (3.2)
Singapore	85 (1.9)	80 (2.2)	26 (2.2)	28 (2.3)	20 (1.9)
Slovenia	82 (2.1)	12 (2.1)	53 (2.6)	19 (2.3)	3 (0.9)
Sweden	66 (3.2)	48 (2.9)	8 (1.7)	15 (2.1)	13 (2.1)
Syrian Arab Republic	82 (3.4)	76 (3.9)	40 (4.4)	49 (4.0)	72 (4.0)
Thailand	90 (2.5)	75 (3.8)	19 (3.1)	30 (3.8)	24 (3.8)
Tunisia	70 (3.5)	77 (3.5)	82 (3.2)	52 (4.4)	25 (3.8)
Turkey	44 (4.4)	38 (4.2)	25 (4.1)	11 (2.6)	40 (4.5)
Ukraine	88 (2.8)	65 (3.7)	19 (3.0)	7 (2.1)	27 (3.7)
United States	93 (1.6)	44 (2.7)	55 (3.0)	52 (2.7)	77 (2.8)
‡ Morocco	81 (3.7)	71 (5.3)	28 (4.3)	46 (5.8)	46 (6.0)
International Avg.	80 (0.4)	59 (0.5)	32 (0.5)	29 (0.5)	33 (0.5)
<b>Benchmarking Participants</b>					
Basque Country, Spain	80 (3.8)	62 (3.8)	83 (3.9)	35 (4.7)	79 (4.0)
British Columbia, Canada	72 (4.0)	30 (3.4)	40 (3.9)	37 (3.6)	55 (4.1)
Dubai, UAE	s 90 (1.8)	s 86 (2.8)	s 24 (5.1)	s 40 (6.9)	s 33 (4.2)
Massachusetts, US	96 (2.0)	26 (5.6)	59 (5.8)	51 (5.6)	80 (5.9)
Minnesota, US	99 (0.6)	46 (6.6)	64 (5.8)	45 (7.4)	87 (5.9)
Ontario, Canada	72 (4.5)	49 (3.8)	55 (5.3)	46 (4.5)	19 (3.8)
Quebec, Canada	66 (3.6)	70 (4.4)	48 (4.1)	19 (3.4)	9 (2.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 7.14 Types of Mathematics Homework with Trends

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students by Types of Homework Assigned by Their Teachers									
	Doing Problem / Question Sets				Gathering Data and Reporting					
	Always or Almost Always		Sometimes		Always or Almost Always		Sometimes			
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003		
Algeria	58 (4.3)	0 0	41 (4.3)	0 0	14 (3.1)	0 0	52 (4.6)	0 0		
Armenia	r 52 (3.1)	-37 (4.0) ▼	22 (2.8)	12 (3.6) ▲	r 17 (2.6)	5 (4.0)	64 (3.8)	-8 (5.1)		
Australia	66 (3.6)	3 (5.8)	27 (3.3)	-9 (5.7)	1 (0.8)	0 (0.9)	53 (4.0)	-1 (6.3)		
Bahrain	60 (3.2)	-25 (4.5) ▼	36 (3.2)	22 (4.4) ▲	6 (1.2)	4 (1.8) ▲	58 (2.3)	10 (4.2) ▲		
Bosnia and Herzegovina	33 (3.7)	0 0	62 (3.7)	0 0	5 (1.9)	0 0	65 (4.0)	0 0		
Botswana	60 (5.0)	-3 (7.1)	33 (4.7)	1 (6.7)	5 (2.0)	5 (2.0) ▲	55 (4.3)	-13 (5.9) ▼		
Bulgaria	69 (3.8)	-26 (4.2) ▼	27 (3.7)	23 (4.1) ▲	1 (0.0)	-1 (1.0)	51 (3.9)	15 (5.6) ▲		
Chinese Taipei	79 (3.6)	-3 (4.8)	19 (3.5)	4 (4.6)	0 (0.0)	-1 (0.8)	35 (4.3)	-22 (6.0) ▼		
Colombia	56 (4.7)	0 0	37 (4.4)	0 0	8 (3.0)	0 0	62 (4.8)	0 0		
Cyprus	95 (1.4)	3 (2.1)	5 (1.4)	-3 (2.1)	1 (0.5)	-14 (2.1) ▼	29 (2.8)	4 (3.6)		
Czech Republic	52 (4.5)	0 0	35 (3.8)	0 0	1 (0.0)	0 0	40 (3.7)	0 0		
Egypt	40 (4.3)	-29 (5.8) ▼	55 (4.3)	28 (5.8) ▲	11 (2.6)	5 (3.2)	67 (3.9)	1 (5.7)		
El Salvador	63 (4.3)	0 0	35 (4.3)	0 0	24 (3.7)	0 0	66 (4.2)	0 0		
England	r 70 (3.7)	-7 (6.2)	26 (3.6)	3 (6.1) s	0 (0.3)	0 (0.3)	55 (4.0)	-6 (7.6)		
Georgia	88 (3.3)	0 0	12 (3.3)	0 0	1 (0.5)	0 0	89 (2.8)	0 0		
Ghana	42 (3.8)	-10 (6.1)	57 (3.7)	9 (6.2)	12 (2.6)	4 (3.5)	78 (3.5)	2 (4.9)		
Hong Kong SAR	64 (3.9)	-5 (5.5)	34 (3.8)	3 (5.4)	0 (0.0)	-1 (0.8)	40 (4.8)	2 (6.5)		
Hungary	92 (2.0)	12 (3.9) ▲	7 (1.9)	-11 (3.7) ▼	1 (0.8)	0 (1.1)	66 (3.8)	-7 (5.1)		
Indonesia	84 (3.6)	6 (5.1)	16 (3.6)	-5 (5.2)	17 (4.2)	6 (4.9)	63 (4.5)	-3 (5.9)		
Iran, Islamic Rep. of	60 (3.8)	-10 (5.1) ▼	34 (3.6)	7 (4.9)	5 (1.9)	-2 (2.8)	68 (4.2)	0 (5.6)		
Israel	r 64 (3.0)	-5 (4.3)	34 (3.0)	5 (4.2) r	4 (1.5)	0 (2.1)	47 (3.7)	-4 (5.6)		
Italy	97 (1.2)	-1 (1.7)	2 (1.0)	1 (1.4)	1 (0.6)	-1 (1.3)	66 (2.7)	-4 (4.4)		
Japan	51 (3.9)	14 (5.4) ▲	47 (3.9)	-6 (5.8)	0 (0.0)	0 (0.0)	11 (2.7)	1 (3.5)		
Jordan	75 (3.3)	-8 (4.9)	22 (3.1)	7 (4.6)	12 (2.8)	10 (3.1) ▲	50 (4.5)	-18 (6.0) ▼		
Korea, Rep. of	s 59 (3.8)	5 (5.0)	36 (3.4)	-6 (4.7) s	1 (0.7)	0 (0.7)	46 (3.7)	-7 (5.3)		
Kuwait	r 31 (3.9)	0 0	42 (4.6)	0 0	r 7 (2.6)	0 0	39 (4.7)	0 0		
Lebanon	71 (3.9)	-1 (5.8)	27 (3.8)	2 (5.4)	16 (3.4)	1 (4.5)	73 (3.6)	9 (5.9)		
Lithuania	91 (2.0)	-1 (3.0)	8 (2.0)	1 (2.9)	0 (0.0)	0 (0.0)	87 (2.8)	-4 (3.5)		
Malaysia	67 (4.2)	-6 (5.4)	33 (4.2)	6 (5.4)	7 (2.1)	3 (2.7)	63 (3.8)	4 (5.4)		
Malta	72 (0.2)	0 0	25 (0.2)	0 0	0 (0.0)	0 0	46 (0.2)	0 0		
Norway	94 (1.7)	8 (3.2) ▲	5 (1.5)	-3 (2.8)	0 (0.0)	0 (0.0)	53 (3.9)	-8 (5.6)		
Oman	69 (4.1)	0 0	30 (4.2)	0 0	4 (1.6)	0 0	78 (3.8)	0 0		
Palestinian Nat'l Auth.	73 (3.2)	-11 (4.6) ▼	26 (3.1)	12 (4.4) ▲	5 (2.0)	4 (2.2)	65 (4.3)	-12 (5.5) ▼		
Qatar	74 (0.1)	0 0	25 (0.1)	0 0	3 (0.1)	0 0	67 (0.1)	0 0		
Romania	84 (2.9)	3 (4.4)	13 (2.5)	-6 (4.1)	7 (2.1)	2 (2.7)	56 (4.2)	-11 (5.7) ▼		
Russian Federation	98 (1.2)	0 (1.5)	1 (0.9)	0 (1.5)	1 (0.8)	0 (1.2)	85 (2.1)	6 (4.1)		
Saudi Arabia	59 (4.3)	--	38 (4.2)	--	6 (2.1)	--	48 (4.8)	--		
Scotland	79 (2.5)	6 (4.7)	15 (2.2)	-9 (4.4) ▼	r 0 (0.0)	0 (0.0)	32 (3.5)	5 (5.5)		
Serbia	36 (4.2)	6 (5.8)	54 (4.2)	-2 (5.8)	1 (0.4)	-1 (1.3)	46 (4.5)	12 (5.7) ▲		
Singapore	75 (2.4)	-6 (3.4)	21 (2.3)	3 (3.3)	0 (0.0)	0 (0.0)	49 (3.1)	8 (4.1)		
Slovenia	75 (2.6)	-2 (4.4)	23 (2.5)	2 (4.3)	1 (0.7)	1 (0.7)	67 (2.8)	-3 (5.0)		
Sweden	64 (3.2)	-4 (4.7)	16 (2.1)	-3 (3.8)	0 (0.4)	0 (0.4)	34 (3.1)	-1 (4.8)		
Syrian Arab Republic	75 (4.0)	0 0	20 (3.8)	0 0	16 (3.1)	0 0	47 (3.7)	0 0		
Thailand	73 (4.1)	0 0	22 (3.9)	0 0	9 (2.4)	0 0	79 (3.6)	0 0		
Tunisia	68 (4.0)	12 (6.1) ▲	29 (3.8)	-13 (6.0) ▼	r 3 (1.3)	-1 (1.9)	43 (4.0)	14 (6.0) ▲		
Turkey	72 (3.8)	0 0	26 (3.8)	0 0	5 (2.0)	0 0	64 (4.6)	0 0		
Ukraine	99 (1.0)	0 0	1 (1.0)	0 0	1 (1.0)	0 0	75 (3.1)	0 0		
United States	81 (2.4)	-1 (3.3)	16 (2.2)	-1 (3.1)	3 (1.2)	1 (1.5)	45 (2.7)	-10 (3.9) ▼		
‡ Morocco	66 (4.0)	--	32 (4.3)	--	r 1 (0.1)	--	52 (5.4)	--		
International Avg.	69 (0.5)		27 (0.5)		5 (0.3)		56 (0.5)			
<b>Benchmarking Participants</b>										
Basque Country, Spain	79 (4.2)	4 (6.0)	18 (4.2)	-4 (6.0)	1 (0.9)	-1 (1.8)	40 (5.4)	-3 (7.6)		
British Columbia, Canada	75 (3.7)	0 0	23 (3.8)	0 0	0 (0.0)	0 0	48 (4.4)	0 0		
Dubai, UAE	s 76 (4.3)	0 0	23 (4.4)	0 0	s 15 (2.3)	0 0	70 (3.9)	0 0		
Massachusetts, US	81 (3.1)	0 0	17 (2.9)	0 0	1 (0.7)	0 0	54 (6.2)	0 0		
Minnesota, US	95 (2.3)	0 0	4 (2.4)	0 0	0 (0.0)	0 0	43 (7.6)	0 0		
Ontario, Canada	65 (4.5)	-13 (5.8) ▼	33 (4.4)	12 (5.7) ▲	5 (1.5)	4 (1.5) ▲	74 (3.4)	-5 (5.0)		
Quebec, Canada	84 (3.1)	0 (4.7)	15 (3.1)	2 (4.4)	2 (1.2)	0 (1.6)	33 (4.5)	4 (6.3)		

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

### What Types of Assessments Are Used in Mathematics Classes?

This section describes assessment practices in mathematics classes at the eighth grade. As shown in Exhibit 7.15, teachers reported giving the most emphasis to classroom tests as a way of monitoring students' progress in mathematics. Teachers used classroom tests to some extent for nearly all of the students. Internationally on average, teachers reported giving major emphasis to classroom tests for 66 percent of the students and some emphasis for another 30 percent. Teachers also reported using their professional judgment to some extent for most students. Internationally on average, teachers reported giving major emphasis to their own judgment for 45 percent of the students, and some emphasis for another 42 percent. Typically, only moderate emphasis was given to national or regional achievement tests—with little or no emphasis on this source of information for 35 percent of students.

Information about trends in the frequency of mathematics testing at the eighth grade is presented in Exhibit 7.16. According to teachers' reports, 85 percent of eighth grade students were given mathematics tests at least monthly, on average internationally. Nearly half (46%) were given a mathematics test or examination every 2 weeks (or more frequently) and another 39 percent were tested about once a month. However, this varies considerably by country. For example, the majority of students were given mathematics tests or examinations a few times a year (or less frequently) in several countries, including England (53%), Scotland (62%), Slovenia (80%), and Sweden (61%). Countries with increases since 2003 in testing at least every two weeks included Jordan, Malaysia, the Russian Federation, and Serbia. Countries with changes toward testing a few times a year or less often included Armenia, Bahrain, Jordan, Korea, Singapore, Slovenia, and Tunisia.



Exhibit 7.15 Emphasis on Sources to Monitor Students' Progress in Mathematics

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students by Their Teachers' Emphasis on Various Sources to Monitor Students' Progress											
	Teacher's Own Professional Judgement			Classroom Tests			National or Regional Achievement Tests					
	Major Emphasis	Some Emphasis	Little or No Emphasis	Major Emphasis	Some Emphasis	Little or No Emphasis	Major Emphasis	Some Emphasis	Little or No Emphasis			
Algeria	r	43 (4.0)	36 (4.3)	21 (3.8)	61 (4.3)	26 (4.2)	13 (3.0)	r	38 (4.0)	25 (3.6)	37 (4.5)	
Armenia		23 (2.9)	41 (3.8)	36 (3.3)	37 (3.9)	29 (2.9)	34 (3.0)		10 (1.8)	41 (3.0)	49 (3.3)	
Australia		33 (3.7)	57 (4.2)	10 (2.0)	78 (3.2)	19 (3.3)	3 (1.1)		3 (1.3)	24 (3.3)	73 (3.6)	
Bahrain		43 (2.0)	40 (2.8)	17 (2.6)	63 (2.3)	30 (2.1)	7 (1.3)		27 (3.0)	48 (3.1)	25 (2.2)	
Bosnia and Herzegovina		54 (4.2)	41 (4.0)	4 (1.8)	59 (4.5)	40 (4.4)	2 (0.9)		17 (2.9)	44 (3.6)	39 (3.7)	
Botswana		54 (4.4)	39 (4.4)	7 (1.8)	80 (3.8)	18 (3.6)	3 (1.3)		44 (4.6)	37 (4.1)	20 (3.5)	
Bulgaria		70 (3.7)	28 (3.9)	2 (0.9)	54 (3.9)	35 (3.4)	11 (2.6)		33 (3.9)	49 (4.0)	17 (3.1)	
Chinese Taipei		17 (3.3)	54 (4.2)	29 (3.9)	44 (4.2)	48 (4.3)	7 (2.2)		6 (1.8)	24 (3.9)	70 (4.3)	
Colombia		64 (5.5)	30 (5.3)	6 (2.4)	73 (5.5)	26 (5.5)	1 (0.5)		30 (4.2)	39 (5.9)	31 (4.8)	
Cyprus		41 (2.7)	54 (2.6)	5 (1.4)	56 (2.8)	43 (2.9)	1 (0.0)		10 (1.6)	21 (2.2)	69 (2.2)	
Czech Republic		32 (4.2)	61 (4.3)	7 (2.0)	47 (4.2)	49 (4.1)	4 (1.7)		1 (0.0)	20 (3.2)	79 (3.3)	
Egypt		60 (4.1)	35 (4.0)	5 (1.9)	66 (3.8)	30 (3.9)	4 (1.5)		29 (3.3)	59 (3.5)	12 (2.6)	
El Salvador		52 (4.7)	40 (4.7)	7 (2.4)	60 (3.9)	36 (3.8)	4 (1.8)		34 (4.3)	44 (4.1)	22 (3.7)	
England		55 (3.7)	45 (3.7)	1 (0.6)	42 (3.7)	49 (3.8)	10 (2.4)		44 (3.8)	46 (3.9)	10 (1.9)	
Georgia		67 (5.0)	32 (5.0)	0 (0.3)	58 (5.8)	42 (5.8)	0 (0.0)		30 (4.5)	54 (5.4)	16 (5.2)	
Ghana		51 (4.7)	34 (4.3)	15 (3.4)	88 (2.5)	11 (2.4)	1 (0.7)		30 (4.0)	38 (3.5)	33 (4.3)	
Hong Kong SAR		34 (4.2)	46 (4.6)	19 (3.5)	81 (3.7)	18 (3.6)	1 (0.7)		6 (2.3)	21 (3.7)	74 (4.0)	
Hungary		60 (3.3)	29 (3.2)	11 (2.3)	89 (2.8)	10 (2.8)	0 (0.0)		17 (2.9)	48 (4.1)	35 (3.9)	
Indonesia		36 (4.4)	59 (4.4)	6 (2.1)	67 (4.7)	33 (4.7)	0 (0.0)		45 (4.5)	43 (4.3)	12 (3.0)	
Iran, Islamic Rep. of		39 (3.4)	46 (3.4)	15 (2.7)	66 (3.7)	32 (3.6)	2 (1.5)		30 (3.9)	43 (4.2)	27 (3.7)	
Israel	r	44 (3.9)	50 (3.8)	7 (2.0)	r	79 (2.8)	19 (2.9)	2 (1.2)	r	10 (2.5)	53 (3.7)	37 (3.6)
Italy		56 (3.2)	40 (3.3)	4 (1.1)	79 (2.6)	20 (2.6)	0 (0.3)		9 (1.8)	41 (3.1)	50 (3.2)	
Japan		7 (2.0)	32 (3.7)	61 (3.8)	71 (3.4)	28 (3.3)	1 (0.0)		5 (1.4)	16 (2.7)	80 (2.9)	
Jordan		67 (3.8)	28 (3.7)	5 (1.8)	76 (3.4)	22 (3.4)	1 (0.9)		44 (4.4)	38 (4.4)	18 (3.5)	
Korea, Rep. of	r	19 (3.2)	64 (3.7)	16 (2.8)	r	55 (3.5)	39 (3.6)	6 (1.9)	r	17 (2.8)	59 (3.8)	25 (2.9)
Kuwait	r	38 (4.7)	41 (4.7)	21 (3.9)	r	44 (4.8)	37 (4.7)	19 (3.5)	r	28 (4.0)	33 (4.3)	38 (4.2)
Lebanon		53 (5.0)	39 (5.0)	8 (2.5)	73 (4.2)	22 (3.7)	5 (2.0)		14 (3.2)	56 (4.6)	29 (4.1)	
Lithuania		31 (3.8)	51 (4.1)	18 (2.8)	54 (4.3)	41 (4.3)	5 (1.7)		18 (3.2)	51 (3.6)	31 (3.3)	
Malaysia		19 (3.7)	58 (4.4)	23 (3.4)	49 (4.4)	42 (4.6)	9 (2.4)		38 (4.2)	35 (4.1)	27 (3.9)	
Malta		43 (0.2)	46 (0.2)	11 (0.1)	63 (0.2)	33 (0.2)	4 (0.2)		34 (0.2)	35 (0.2)	31 (0.2)	
Norway		61 (3.6)	36 (3.5)	3 (1.1)	82 (2.6)	18 (2.6)	0 (0.0)		15 (2.8)	43 (4.0)	42 (3.8)	
Oman		52 (4.3)	37 (4.6)	11 (2.6)	74 (4.2)	25 (4.2)	1 (0.8)		29 (4.5)	34 (4.0)	37 (4.2)	
Palestinian Nat'l Auth.		50 (5.0)	37 (4.6)	12 (3.1)	81 (3.6)	17 (3.4)	2 (1.3)		24 (3.4)	43 (4.4)	34 (4.0)	
Qatar		39 (0.2)	41 (0.1)	21 (0.1)	61 (0.2)	32 (0.1)	7 (0.1)		31 (0.2)	29 (0.1)	40 (0.1)	
Romania		65 (3.4)	28 (3.3)	7 (1.9)	85 (3.1)	14 (3.1)	1 (0.7)		73 (3.4)	21 (2.9)	6 (1.7)	
Russian Federation		50 (3.1)	42 (2.8)	8 (1.9)	92 (2.4)	6 (2.1)	2 (1.0)		49 (3.6)	41 (3.7)	10 (2.2)	
Saudi Arabia	r	31 (4.0)	45 (4.2)	25 (4.0)	60 (4.3)	28 (3.8)	12 (3.3)		26 (3.6)	25 (3.5)	49 (3.9)	
Scotland		47 (3.4)	51 (3.6)	2 (1.1)	66 (3.1)	31 (2.9)	3 (1.1)		17 (2.9)	49 (3.5)	34 (3.0)	
Serbia		40 (4.1)	53 (4.0)	7 (2.1)	54 (3.9)	41 (4.2)	4 (1.5)		12 (2.6)	32 (4.4)	56 (4.7)	
Singapore		23 (2.3)	58 (2.6)	18 (1.9)	77 (2.4)	21 (2.3)	2 (0.8)		37 (2.5)	24 (2.3)	39 (2.9)	
Slovenia		58 (2.5)	37 (2.5)	5 (0.9)	60 (3.2)	34 (3.1)	7 (1.2)		83 (2.2)	17 (2.1)	1 (0.3)	
Sweden		73 (2.7)	27 (2.7)	1 (0.3)	57 (3.3)	41 (3.1)	2 (1.1)		--	--	--	
Syrian Arab Republic		41 (4.3)	40 (4.2)	19 (3.7)	62 (3.9)	33 (4.0)	5 (1.7)		24 (3.7)	37 (4.4)	40 (4.3)	
Thailand		6 (1.9)	37 (3.8)	56 (3.7)	67 (4.2)	27 (3.8)	6 (1.8)		15 (2.4)	40 (4.2)	45 (4.0)	
Tunisia		63 (3.6)	27 (3.7)	10 (2.5)	76 (3.6)	21 (3.5)	4 (1.6)		43 (3.7)	38 (3.8)	19 (3.2)	
Turkey		75 (3.9)	21 (3.6)	4 (2.0)	69 (3.6)	27 (3.2)	5 (1.8)		45 (4.3)	39 (4.3)	16 (3.0)	
Ukraine		23 (3.6)	65 (3.9)	11 (2.9)	51 (4.5)	47 (4.6)	2 (0.9)		15 (3.2)	53 (4.0)	33 (4.0)	
United States		49 (2.6)	42 (2.2)	9 (1.7)	77 (2.3)	21 (2.2)	1 (0.5)		21 (2.4)	45 (3.1)	34 (2.6)	
‡ Morocco	r	54 (5.2)	32 (4.6)	13 (4.5)	54 (5.7)	37 (5.5)	8 (2.5)	r	37 (4.8)	33 (5.2)	30 (4.8)	
International Avg.		45 (0.5)	42 (0.6)	13 (0.4)	66 (0.5)	30 (0.5)	5 (0.2)		27 (0.5)	38 (0.5)	35 (0.5)	
<b>Benchmarking Participants</b>												
Basque Country, Spain		53 (5.0)	42 (4.7)	6 (2.4)	87 (3.1)	12 (3.1)	0 (0.3)	r	4 (1.8)	21 (4.3)	75 (4.8)	
British Columbia, Canada		39 (4.2)	46 (4.4)	15 (3.2)	80 (3.4)	20 (3.4)	0 (0.0)		3 (1.0)	17 (3.3)	80 (3.5)	
Dubai, UAE	s	46 (3.9)	47 (4.0)	7 (1.3)	s	76 (3.8)	18 (3.5)	6 (2.1)	s	19 (3.2)	37 (5.1)	44 (4.9)
Massachusetts, US		39 (5.9)	50 (6.0)	11 (4.7)	71 (4.7)	26 (4.1)	3 (2.4)		17 (5.4)	36 (6.8)	47 (7.0)	
Minnesota, US		35 (7.4)	45 (7.5)	20 (4.8)	72 (5.5)	27 (5.4)	1 (1.1)		7 (3.2)	37 (6.2)	56 (6.1)	
Ontario, Canada		39 (4.7)	46 (5.0)	15 (2.7)	61 (4.6)	37 (4.5)	2 (1.3)		3 (1.5)	10 (2.6)	86 (3.0)	
Quebec, Canada		65 (3.1)	28 (3.0)	7 (1.9)	76 (3.4)	21 (3.3)	3 (1.9)		26 (3.9)	57 (4.9)	17 (3.2)	

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



Exhibit 7.16 Frequency of Teachers Giving Mathematics Tests with Trends

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students Whose Teachers Give a Mathematics Test or Examination					
	Every 2 Weeks or More		About Once a Month		A Few Times a Year or Less	
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003
Algeria	35 (4.4)	0 (0)	48 (4.3)	0 (0)	17 (3.4)	0 (0)
Armenia	34 (3.6)	-5 (5.1)	29 (3.1)	-24 (5.0) ▼	37 (4.0)	29 (4.4) ▲
Australia	25 (3.2)	6 (4.8)	61 (4.1)	-3 (6.2)	14 (2.8)	-2 (4.4)
Bahrain	77 (1.9)	-7 (2.5) ▼	17 (1.4)	1 (2.2)	6 (1.4)	6 (1.4) ▲
Bosnia and Herzegovina	13 (2.5)	0 (0)	50 (3.8)	0 (0)	37 (4.2)	0 (0)
Botswana	10 (2.1)	-8 (4.2)	90 (2.1)	9 (4.4) ▲	0 (0.0)	-1 (1.3)
Bulgaria	32 (3.9)	1 (5.8)	46 (4.5)	0 (6.1)	22 (3.4)	-1 (4.6)
Chinese Taipei	99 (1.2)	0 (1.5)	1 (1.2)	0 (1.3)	0 (0.2)	0 (0.2)
Colombia	93 (1.8)	0 (0)	6 (1.6)	0 (0)	1 (0.8)	0 (0)
Cyprus	8 (1.6)	-1 (2.6)	80 (1.8)	1 (3.3)	11 (0.8)	0 (1.9)
Czech Republic	97 (1.5)	0 (0)	1 (0.8)	0 (0)	2 (1.3)	0 (0)
Egypt	60 (4.7)	--	37 (4.5)	--	3 (1.4)	--
El Salvador	63 (4.1)	0 (0)	32 (3.9)	0 (0)	5 (2.0)	0 (0)
England	9 (2.2)	1 (3.4)	38 (3.3)	0 (7.0)	53 (3.7)	0 (7.4)
Georgia	50 (5.5)	0 (0)	34 (4.9)	0 (0)	16 (4.9)	0 (0)
Ghana	79 (3.5)	5 (5.2)	18 (3.4)	-6 (5.1)	2 (1.1)	2 (1.1)
Hong Kong SAR	56 (4.3)	13 (6.5)	34 (4.0)	-5 (6.2)	10 (2.7)	-8 (4.5)
Hungary	73 (3.8)	6 (5.6)	25 (3.7)	-5 (5.4)	2 (1.1)	0 (1.6)
Indonesia	54 (4.8)	10 (6.3)	41 (4.4)	-6 (6.2)	5 (2.2)	-4 (3.4)
Iran, Islamic Rep. of	29 (3.6)	-5 (5.1)	61 (3.9)	27 (5.5) ▲	10 (1.8)	-22 (4.8) ▼
Israel	50 (4.0)	-7 (5.7)	42 (3.9)	7 (5.3)	8 (2.0)	-1 (2.8)
Italy	27 (2.9)	-3 (4.5)	71 (2.9)	4 (4.5)	2 (0.8)	-1 (1.5)
Japan	24 (3.3)	7 (4.7)	37 (3.7)	-1 (5.7)	38 (3.8)	-6 (5.7)
Jordan	70 (4.1)	40 (5.5) ▲	27 (3.9)	-43 (5.4) ▼	3 (1.3)	3 (1.3) ▲
Korea, Rep. of	54 (3.6)	-8 (4.9)	31 (3.3)	-1 (4.5)	14 (2.2)	10 (2.6) ▲
Kuwait	53 (4.7)	0 (0)	22 (3.5)	0 (0)	25 (4.0)	0 (0)
Lebanon	89 (3.5)	6 (4.9)	11 (3.5)	-6 (4.9)	0 (0.4)	0 (0.4)
Lithuania	73 (3.6)	-7 (4.8)	27 (3.6)	8 (4.8)	0 (0.0)	0 (0.0)
Malaysia	13 (2.8)	8 (3.1) ▲	39 (4.2)	-9 (5.7)	48 (3.8)	1 (5.5)
Malta	14 (0.2)	0 (0)	46 (0.2)	0 (0)	40 (0.2)	0 (0)
Norway	6 (1.8)	0 (3.1)	72 (3.6)	8 (5.7)	21 (3.2)	-8 (5.2)
Oman	57 (3.8)	0 (0)	41 (3.7)	0 (0)	1 (0.8)	0 (0)
Palestinian Nat'l Auth.	52 (3.9)	-10 (4.7) ▼	46 (3.8)	8 (4.7)	2 (1.2)	2 (1.2)
Qatar	82 (0.1)	0 (0)	15 (0.1)	0 (0)	3 (0.1)	0 (0)
Romania	70 (3.6)	-3 (5.3)	27 (3.4)	2 (5.0)	2 (1.2)	0 (1.7)
Russian Federation	95 (1.6)	7 (2.9) ▲	5 (1.6)	-6 (2.8) ▼	1 (0.5)	-1 (1.0)
Saudi Arabia	45 (4.0)	--	47 (4.3)	--	9 (3.0)	--
Scotland	7 (1.6)	-7 (3.6)	31 (3.4)	0 (5.6)	62 (3.7)	7 (5.9)
Serbia	25 (4.0)	10 (4.9) ▲	57 (4.4)	-9 (6.0)	18 (3.3)	-1 (4.6)
Singapore	35 (2.5)	4 (3.1)	47 (2.6)	-10 (3.5) ▼	18 (1.7)	6 (2.3) ▲
Slovenia	3 (0.9)	1 (1.4)	17 (2.3)	-30 (4.4) ▼	80 (2.5)	28 (4.6) ▲
Sweden	0 (0.3)	-1 (1.0)	39 (3.1)	11 (4.7) ▲	61 (3.1)	-10 (4.6) ▼
Syrian Arab Republic	39 (4.4)	0 (0)	41 (4.2)	0 (0)	19 (3.4)	0 (0)
Thailand	66 (4.0)	0 (0)	29 (3.9)	0 (0)	4 (1.6)	0 (0)
Tunisia	12 (2.9)	-9 (5.3)	71 (3.8)	-2 (6.3)	17 (3.0)	11 (3.9) ▲
Turkey	19 (3.8)	0 (0)	79 (3.8)	0 (0)	2 (1.3)	0 (0)
Ukraine	80 (3.0)	0 (0)	18 (2.9)	0 (0)	2 (1.0)	0 (0)
United States	69 (2.4)	-5 (3.6)	28 (2.6)	4 (3.7)	3 (0.9)	0 (1.4)
‡ Morocco	21 (5.3)	--	76 (5.6)	--	3 (1.7)	--
International Avg.	46 (0.5)		39 (0.5)		16 (0.3)	

## Benchmarking Participants

Basque Country, Spain	37 (4.8)	-14 (6.7) ▼	56 (5.0)	9 (6.8)	6 (2.3)	5 (2.7)
British Columbia, Canada	68 (3.9)	0 (0)	32 (3.9)	0 (0)	0 (0.0)	0 (0)
Dubai, UAE	71 (5.3)	0 (0)	27 (5.4)	0 (0)	3 (1.1)	0 (0)
Massachusetts, US	60 (7.0)	0 (0)	38 (6.6)	0 (0)	2 (1.3)	0 (0)
Minnesota, US	74 (6.2)	0 (0)	25 (6.1)	0 (0)	0 (0.2)	0 (0)
Ontario, Canada	85 (3.5)	0 (4.8)	14 (3.4)	0 (4.5)	1 (1.0)	0 (1.4)
Quebec, Canada	54 (3.9)	-7 (5.8)	43 (4.0)	10 (5.8)	3 (1.7)	-3 (2.9)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 7.17 provides information about the item formats eighth grade students are most likely to see in their mathematics tests. In general, mostly constructed-response and about half constructed-response and half multiple-choice were reported to be about equally common test formats, with mostly multiple-choice the least common. On average internationally, 44 percent of the students were taught by teachers who reported testing them with only or mostly constructed-response items, another 41 percent by teachers who reported using about half constructed-response and half multiple-choice items, and only 15 percent by teachers who reported using only or mostly multiple-choice items. Between 2003 and 2007 there were increases and decreases in each testing approach. Teachers in six countries and one benchmarking entity reported using less constructed-response testing and in four countries they reported more. Teachers in six countries and one benchmarking entity reported increased use of the half and half format, while teachers in three countries reported decreased use. Four countries reported more use of multiple-choice testing and two reported less. The biggest shift was in Armenia, from primarily using constructed-response items to primarily multiple-choice testing.

**Exhibit 7.17 Item Formats Used by Teachers in Mathematics Tests or Examinations with Trends**

**TIMSS2007**  
**Mathematics** **8<sup>th</sup>** Grade

Country	Only or Mostly Constructed-response			About Half Constructed-response and Half Multiple-choice			Only or Mostly Multiple-choice		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	16 (2.8)	394 (5.5)	∅ ∅	51 (4.2)	388 (3.0)	∅ ∅	33 (4.2)	383 (3.0)	∅ ∅
Armenia	r 3 (1.3)	493 (10.2)	-73 (4.0) ▼	30 (4.0)	500 (7.4)	12 (5.2) ▲	68 (4.0)	499 (3.8)	61 (4.7) ▲
Australia	61 (3.9)	498 (5.0)	-8 (5.5)	30 (3.4)	501 (8.0)	8 (4.3)	9 (2.3)	489 (20.0)	0 (3.8)
Bahrain	42 (2.7)	405 (2.6)	1 (4.0)	50 (2.9)	390 (3.0)	-2 (4.3)	8 (1.6)	386 (5.8)	1 (2.5)
Bosnia and Herzegovina	17 (2.8)	463 (6.0)	∅ ∅	26 (3.2)	445 (5.8)	∅ ∅	57 (3.9)	461 (3.7)	∅ ∅
Botswana	27 (4.7)	370 (5.7)	5 (6.3)	48 (4.6)	360 (3.8)	0 (6.4)	24 (3.8)	362 (5.8)	-5 (5.3)
Bulgaria	44 (3.9)	467 (6.1)	-8 (6.2)	39 (3.7)	458 (10.6)	12 (5.2) ▲	17 (3.0)	470 (15.8)	-4 (5.0)
Chinese Taipei	22 (3.5)	607 (10.4)	-3 (5.0)	72 (4.0)	598 (4.9)	2 (5.4)	6 (1.9)	568 (13.3)	1 (2.7)
Colombia	29 (4.3)	385 (7.8)	∅ ∅	52 (5.2)	379 (5.6)	∅ ∅	19 (3.7)	375 (12.1)	∅ ∅
Cyprus	39 (2.9)	470 (3.3)	1 (3.8)	30 (2.8)	461 (3.4)	7 (3.7)	31 (2.4)	462 (2.8)	-8 (3.1) ▼
Czech Republic	78 (2.9)	507 (2.9)	∅ ∅	10 (2.4)	486 (8.3)	∅ ∅	12 (2.5)	499 (6.6)	∅ ∅
Egypt	7 (2.3)	389 (14.4)	--	79 (3.8)	389 (4.3)	--	15 (3.3)	402 (10.7)	--
El Salvador	18 (3.4)	343 (6.8)	∅ ∅	65 (4.1)	336 (3.8)	∅ ∅	17 (3.3)	350 (4.9)	∅ ∅
England	s 94 (1.8)	515 (4.9)	-3 (2.7)	5 (1.7)	507 (27.5)	3 (2.6)	1 (0.6)	~ ~	1 (0.6)
Georgia	11 (2.9)	439 (8.1)	∅ ∅	60 (5.4)	416 (7.7)	∅ ∅	29 (4.9)	389 (13.2)	∅ ∅
Ghana	30 (3.8)	311 (8.5)	6 (5.4)	66 (4.1)	307 (5.7)	-9 (5.7)	4 (1.7)	344 (68.6)	3 (1.8)
Hong Kong SAR	65 (4.1)	570 (8.1)	-7 (5.4)	34 (4.1)	580 (10.5)	7 (5.4)	0 (0.0)	~ ~	0 (0.8)
Hungary	84 (2.3)	518 (3.9)	-2 (3.4)	15 (2.4)	509 (11.5)	3 (3.6)	1 (0.6)	~ ~	-1 (1.1)
Indonesia	65 (4.5)	399 (6.7)	13 (6.2) ▲	27 (3.8)	424 (9.5)	-13 (5.9) ▼	8 (2.8)	405 (23.9)	0 (3.4)
Iran, Islamic Rep. of	s 45 (4.1)	400 (5.5)	-2 (6.7)	49 (3.8)	404 (6.0)	3 (6.2)	6 (2.0)	392 (20.7)	-1 (3.3)
Israel	r 76 (2.9)	476 (5.7)	18 (4.6) ▲	19 (2.6)	440 (10.1)	-15 (4.5) ▼	5 (1.6)	451 (25.4)	-3 (2.7)
Italy	40 (3.1)	481 (3.4)	-8 (5.2)	45 (3.4)	475 (5.2)	2 (5.4)	15 (2.6)	498 (5.4)	5 (3.2)
Japan	83 (3.0)	570 (2.7)	-6 (3.7)	13 (2.7)	563 (8.7)	4 (3.5)	4 (1.2)	614 (26.2)	2 (1.5)
Jordan	21 (3.4)	420 (9.6)	-17 (5.6) ▼	75 (3.6)	431 (5.4)	16 (6.0) ▲	5 (1.7)	403 (19.0)	1 (2.4)
Korea, Rep. of	s 16 (2.6)	601 (8.5)	-12 (4.2) ▼	35 (2.7)	596 (5.5)	1 (4.8)	49 (3.1)	598 (3.7)	12 (4.7) ▲
Kuwait	s 6 (2.0)	352 (15.2)	∅ ∅	79 (3.9)	356 (2.8)	∅ ∅	15 (3.5)	352 (10.3)	∅ ∅
Lebanon	31 (4.3)	457 (9.4)	6 (6.0)	41 (5.1)	448 (6.8)	-4 (6.9)	28 (4.5)	438 (9.8)	-2 (6.3)
Lithuania	96 (1.5)	505 (2.4)	11 (3.4) ▲	4 (1.5)	522 (9.2)	-11 (3.4) ▼	0 (0.0)	~ ~	0 (0.0)
Malaysia	13 (2.9)	478 (16.4)	5 (3.7)	83 (3.1)	473 (5.0)	-6 (4.2)	4 (1.6)	477 (33.3)	1 (2.2)
Malta	77 (0.2)	489 (1.3)	∅ ∅	10 (0.1)	471 (2.4)	∅ ∅	13 (0.2)	496 (2.6)	∅ ∅
Norway	80 (2.9)	469 (2.4)	9 (4.8)	17 (2.6)	470 (4.0)	-8 (4.7)	3 (1.2)	472 (4.8)	-1 (2.2)
Oman	8 (2.2)	364 (13.9)	∅ ∅	81 (3.2)	375 (3.8)	∅ ∅	11 (2.3)	359 (13.2)	∅ ∅
Palestinian Nat'l Auth.	14 (3.0)	350 (13.6)	-10 (4.5) ▼	72 (3.9)	373 (3.4)	3 (5.5)	14 (2.6)	361 (10.9)	7 (3.3) ▲
Qatar	14 (0.1)	302 (2.7)	∅ ∅	78 (0.1)	312 (1.6)	∅ ∅	8 (0.1)	286 (4.0)	∅ ∅
Romania	37 (3.5)	466 (6.4)	2 (5.3)	46 (3.9)	451 (6.2)	0 (5.6)	17 (2.8)	485 (10.4)	-2 (4.0)
Russian Federation	61 (3.6)	516 (4.5)	-17 (6.3) ▼	34 (3.0)	510 (6.8)	13 (6.0) ▲	4 (2.0)	479 (13.4)	4 (2.1)
Saudi Arabia	4 (1.4)	295 (17.0)	--	76 (3.7)	330 (3.6)	--	20 (3.6)	327 (7.3)	--
Scotland	100 (0.1)	488 (3.9)	1 (1.1)	0 (0.1)	~ ~	-1 (1.1)	0 (0.0)	~ ~	0 (0.0)
Serbia	60 (4.2)	493 (4.7)	-28 (5.1) ▼	29 (4.0)	476 (6.5)	18 (4.9) ▲	11 (2.3)	477 (6.9)	9 (2.5) ▲
Singapore	83 (1.7)	594 (4.4)	-3 (2.6)	3 (0.8)	587 (18.1)	-1 (1.4)	14 (1.6)	585 (11.5)	4 (2.2)
Slovenia	81 (2.5)	502 (2.4)	-6 (3.4)	17 (2.3)	501 (5.3)	5 (3.4)	1 (0.8)	~ ~	1 (0.8)
Sweden	86 (2.1)	492 (2.5)	2 (3.5)	8 (1.8)	475 (6.6)	-3 (3.1)	6 (1.3)	511 (7.4)	1 (2.1)
Syrian Arab Republic	12 (2.5)	418 (9.5)	∅ ∅	68 (4.0)	390 (4.5)	∅ ∅	20 (3.6)	397 (9.2)	∅ ∅
Thailand	39 (4.0)	448 (7.6)	∅ ∅	49 (3.9)	438 (8.8)	∅ ∅	12 (2.8)	436 (16.4)	∅ ∅
Tunisia	s 18 (3.3)	416 (4.2)	10 (4.4) ▲	44 (4.0)	428 (4.8)	24 (5.9) ▲	38 (3.8)	417 (3.8)	-34 (5.9) ▼
Turkey	58 (4.3)	428 (6.4)	∅ ∅	27 (3.6)	439 (9.3)	∅ ∅	15 (2.9)	433 (15.1)	∅ ∅
Ukraine	62 (4.3)	464 (4.5)	∅ ∅	38 (4.3)	458 (6.8)	∅ ∅	0 (0.0)	~ ~	∅ ∅
United States	50 (2.5)	521 (4.5)	-5 (4.2)	34 (2.6)	497 (4.7)	2 (4.0)	16 (2.0)	495 (8.2)	2 (2.8)
‡ Morocco	25 (4.1)	381 (8.0)	--	39 (7.2)	384 (8.8)	--	36 (7.7)	389 (9.8)	--
International Avg.	44 (0.4)	453 (1.1)		41 (0.5)	448 (1.2)		15 (0.4)	440 (2.6)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Basque Country, Spain	34 (4.8)	506 (5.0)	2 (6.6)	8 (2.9)	513 (12.8)	-9 (4.9)	57 (4.4)	494 (3.4)	7 (7.0)
British Columbia, Canada	66 (3.5)	511 (4.5)	∅ ∅	26 (3.0)	509 (6.2)	∅ ∅	8 (2.5)	515 (12.1)	∅ ∅
Dubai, UAE	s 43 (4.9)	479 (8.0)	∅ ∅	45 (4.8)	443 (7.9)	∅ ∅	12 (3.0)	475 (19.2)	∅ ∅
Massachusetts, US	57 (5.7)	554 (8.3)	∅ ∅	30 (5.8)	536 (8.9)	∅ ∅	13 (3.9)	536 (18.1)	∅ ∅
Minnesota, US	60 (9.2)	541 (7.0)	∅ ∅	24 (7.5)	522 (8.0)	∅ ∅	16 (5.7)	509 (12.6)	∅ ∅
Ontario, Canada	r 67 (4.8)	520 (3.9)	-15 (6.2) ▼	29 (4.4)	514 (7.9)	13 (5.9) ▲	4 (1.9)	510 (14.4)	3 (1.9)
Quebec, Canada	91 (1.9)	529 (4.2)	--	9 (1.9)	535 (11.1)	--	0 (0.3)	~ ~	--

▲ 2007 percent significantly higher      ▼ 2007 percent significantly lower

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.

Exhibit 7.18 presents information about the cognitive demands teachers emphasize in the mathematics tests given to eighth grade students. Teachers were asked how often they gave students each of four different types of questions: recall of facts and procedures, application of procedures, searching for patterns and relationships, and providing explanations/justifications. On average internationally, most eighth grade students were tested at least sometimes with each type of question, with application questions the most prevalent. Nearly three-fourths (74%) had teachers that gave application questions almost always, and the remaining one-fourth (24%) had teachers that gave them sometimes. About half (52%) the students had teachers that almost always gave recall questions, and 42 percent had teachers that sometimes did. Only 22 percent of the students were almost always asked to search for patterns and relationships in their mathematics tests, but 68 percent were asked to do so sometimes. Similarly, although only one-third of the students (32%) were almost always given questions requiring explanations or justification, 57 percent were given such questions at least sometimes.

Exhibit 7.18 Types of Questions on Mathematics Tests

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students by Types of Questions on Mathematics Tests Given by Their Teachers											
	Questions Based on Recall of Facts and Procedures			Questions Involving Application of Mathematical Procedures			Questions Involving Searching for Patterns and Relationships					
	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never	Always or Almost Always	Sometimes	Never or Almost Never			
Algeria	r	41 (4.5)	56 (4.6)	4 (1.8)	75 (4.2)	23 (3.9)	2 (1.3)	r	22 (3.4)	67 (4.0)	11 (2.7)	
Armenia		39 (3.7)	42 (3.6)	20 (2.9)	46 (3.9)	25 (3.9)	29 (3.3)		15 (3.1)	74 (3.9)	11 (2.2)	
Australia		59 (4.5)	38 (4.4)	3 (1.0)	72 (2.9)	28 (2.9)	0 (0.1)		21 (3.5)	73 (3.8)	6 (2.0)	
Bahrain		46 (2.4)	49 (2.5)	5 (0.7)	76 (2.3)	23 (2.2)	2 (0.4)		17 (1.9)	72 (2.5)	11 (1.8)	
Bosnia and Herzegovina		22 (3.7)	66 (4.4)	12 (3.1)	84 (3.1)	16 (3.1)	0 (0.0)		26 (3.9)	67 (4.4)	6 (2.1)	
Botswana		60 (4.4)	38 (4.4)	3 (1.5)	77 (3.4)	23 (3.4)	0 (0.0)		33 (4.0)	62 (4.2)	5 (2.0)	
Bulgaria		45 (3.9)	49 (4.0)	6 (2.0)	75 (3.6)	24 (3.5)	1 (0.9)		26 (3.5)	62 (3.9)	12 (2.1)	
Chinese Taipei		25 (3.7)	68 (4.1)	7 (2.1)	59 (4.0)	40 (4.1)	1 (1.0)		31 (3.6)	68 (3.7)	1 (1.0)	
Colombia		7 (2.6)	53 (5.3)	40 (5.1)	79 (4.8)	21 (4.8)	0 (0.0)		27 (3.9)	67 (4.4)	6 (2.1)	
Cyprus		82 (1.9)	17 (1.9)	1 (0.6)	85 (2.2)	15 (2.2)	0 (0.0)		8 (1.9)	58 (2.5)	33 (2.2)	
Czech Republic		66 (3.3)	32 (3.2)	2 (1.0)	70 (4.0)	29 (4.0)	2 (0.9)		24 (3.6)	63 (3.7)	13 (2.5)	
Egypt		55 (4.2)	44 (4.1)	1 (0.9)	72 (3.6)	28 (3.5)	1 (0.4)		22 (3.2)	70 (3.7)	8 (2.5)	
El Salvador		53 (4.8)	39 (4.8)	8 (2.6)	81 (3.6)	17 (3.4)	1 (0.8)		24 (3.9)	64 (4.3)	12 (2.8)	
England		54 (3.8)	43 (4.0)	3 (1.3)	67 (3.5)	33 (3.5)	1 (0.4)		25 (3.5)	72 (3.7)	3 (1.4)	
Georgia		43 (5.3)	56 (5.3)	1 (0.4)	76 (4.8)	24 (4.8)	0 (0.0)		21 (4.0)	74 (4.1)	5 (2.4)	
Ghana		55 (4.1)	44 (4.1)	1 (0.8)	68 (3.9)	32 (3.9)	0 (0.0)		17 (3.0)	76 (3.5)	7 (2.1)	
Hong Kong SAR		39 (4.4)	51 (4.5)	10 (2.5)	68 (4.3)	32 (4.3)	0 (0.2)		12 (3.1)	65 (4.3)	23 (4.3)	
Hungary		51 (3.9)	45 (4.0)	4 (1.4)	82 (2.7)	16 (2.5)	2 (0.9)		49 (3.9)	47 (4.0)	4 (1.5)	
Indonesia		57 (3.9)	42 (4.0)	1 (0.0)	67 (3.8)	33 (3.8)	1 (0.5)		28 (3.7)	69 (3.9)	3 (1.4)	
Iran, Islamic Rep. of		61 (4.1)	38 (4.0)	2 (1.1)	68 (4.1)	30 (4.0)	2 (1.1)		28 (3.2)	60 (3.5)	12 (2.4)	
Israel	r	47 (4.3)	43 (4.0)	10 (2.3)	r	67 (3.4)	31 (3.4)	2 (1.0)	r	25 (3.2)	62 (3.3)	12 (2.2)
Italy		48 (3.5)	46 (3.3)	6 (1.8)	90 (1.9)	8 (1.7)	2 (0.9)		35 (2.9)	55 (2.8)	11 (1.8)	
Japan		56 (4.1)	41 (4.1)	3 (1.1)	63 (4.0)	35 (3.9)	2 (1.2)		30 (3.7)	62 (3.9)	9 (2.3)	
Jordan		52 (4.2)	45 (4.2)	3 (1.5)	87 (2.5)	12 (2.5)	1 (0.8)		24 (3.3)	71 (3.4)	5 (1.8)	
Korea, Rep. of		58 (4.2)	41 (4.1)	1 (0.4)	66 (3.6)	33 (3.6)	1 (0.6)		35 (3.2)	61 (3.2)	4 (1.2)	
Kuwait	r	47 (4.7)	39 (4.8)	14 (3.4)	r	52 (4.7)	34 (4.4)	14 (3.3)	r	14 (3.3)	59 (4.3)	27 (3.6)
Lebanon		38 (5.0)	57 (5.1)	6 (1.6)	75 (4.2)	25 (4.2)	1 (0.5)		23 (4.1)	71 (4.4)	7 (2.1)	
Lithuania		81 (3.0)	19 (3.0)	0 (0.0)	80 (3.4)	18 (3.3)	1 (0.9)		21 (3.2)	72 (3.3)	7 (2.2)	
Malaysia		59 (4.4)	39 (4.3)	2 (1.2)	59 (4.0)	39 (4.1)	1 (1.0)		15 (2.9)	82 (3.2)	2 (1.4)	
Malta		57 (0.2)	41 (0.2)	2 (0.1)	80 (0.2)	19 (0.2)	1 (0.1)		9 (0.2)	76 (0.2)	15 (0.2)	
Norway		39 (3.7)	55 (3.7)	7 (1.7)	61 (2.7)	39 (2.7)	0 (0.0)		8 (1.8)	81 (2.5)	11 (1.9)	
Oman		68 (3.5)	32 (3.5)	0 (0.0)	80 (3.6)	20 (3.6)	0 (0.0)		16 (3.3)	74 (4.1)	10 (3.0)	
Palestinian Nat'l Auth.		66 (4.1)	33 (4.0)	1 (0.9)	84 (3.1)	15 (3.0)	1 (0.0)		18 (3.3)	76 (3.6)	6 (2.1)	
Qatar		58 (0.2)	40 (0.2)	3 (0.1)	85 (0.1)	15 (0.1)	0 (0.0)		19 (0.1)	62 (0.1)	19 (0.1)	
Romania		61 (3.6)	37 (3.6)	2 (1.0)	87 (2.5)	11 (2.4)	2 (0.9)		35 (4.3)	60 (4.3)	5 (1.2)	
Russian Federation		64 (3.1)	33 (3.1)	2 (1.0)	79 (2.9)	20 (2.9)	1 (0.5)		29 (3.1)	68 (3.2)	3 (1.2)	
Saudi Arabia		54 (4.5)	45 (4.6)	1 (0.8)	67 (3.7)	32 (4.0)	1 (1.1)		12 (3.2)	62 (3.8)	27 (3.8)	
Scotland		78 (3.0)	21 (2.9)	1 (0.7)	73 (2.9)	27 (2.9)	0 (0.1)		21 (3.0)	74 (3.1)	4 (1.4)	
Serbia		16 (3.2)	59 (4.4)	25 (4.0)	92 (2.1)	8 (2.1)	0 (0.0)		20 (3.4)	73 (3.8)	8 (1.9)	
Singapore		37 (2.5)	56 (2.8)	8 (1.1)	75 (2.4)	25 (2.4)	0 (0.4)		12 (1.9)	81 (2.3)	7 (1.4)	
Slovenia		65 (2.8)	33 (2.8)	2 (0.5)	85 (2.1)	15 (2.1)	0 (0.3)		15 (2.0)	73 (2.6)	12 (1.8)	
Sweden		26 (2.9)	52 (2.9)	22 (2.3)	73 (2.4)	26 (2.4)	1 (0.7)		16 (2.3)	74 (2.7)	10 (1.7)	
Syrian Arab Republic		56 (4.0)	41 (4.1)	2 (1.2)	81 (3.3)	19 (3.3)	0 (0.4)		30 (3.8)	56 (4.0)	15 (2.7)	
Thailand		62 (4.4)	37 (4.3)	1 (0.0)	30 (3.8)	70 (3.8)	0 (0.0)		13 (2.8)	78 (3.5)	9 (2.6)	
Tunisia		59 (3.8)	35 (3.5)	7 (1.9)	73 (3.8)	26 (3.7)	1 (0.8)		21 (3.5)	62 (3.8)	17 (2.8)	
Turkey		76 (3.9)	22 (4.0)	2 (1.1)	91 (2.7)	6 (2.1)	3 (1.7)		28 (4.1)	62 (4.4)	9 (2.1)	
Ukraine		78 (3.4)	20 (3.4)	2 (1.3)	82 (3.0)	18 (3.0)	0 (0.0)		32 (3.5)	66 (3.6)	1 (0.6)	
United States		52 (2.8)	41 (2.7)	7 (1.3)	76 (2.4)	24 (2.4)	1 (0.4)		20 (2.0)	70 (2.2)	10 (1.8)	
‡ Morocco		45 (6.2)	50 (6.1)	5 (2.0)	77 (5.8)	18 (4.5)	4 (3.8)		21 (4.4)	60 (6.1)	20 (5.4)	
International Avg.		52 (0.5)	42 (0.6)	6 (0.3)	74 (0.5)	24 (0.5)	2 (0.2)		22 (0.5)	68 (0.5)	10 (0.3)	
<b>Benchmarking Participants</b>												
Basque Country, Spain		48 (5.3)	47 (5.3)	5 (2.0)	88 (3.1)	11 (3.1)	0 (0.0)		12 (3.5)	68 (4.9)	20 (4.1)	
British Columbia, Canada		47 (4.1)	43 (4.2)	10 (2.1)	79 (3.8)	21 (3.8)	0 (0.0)		22 (3.5)	72 (3.9)	7 (1.7)	
Dubai, UAE	s	49 (5.1)	51 (5.1)	0 (0.0)	s	70 (4.8)	28 (4.6)	1 (0.0)	s	11 (2.4)	81 (4.1)	9 (3.4)
Massachusetts, US		56 (6.5)	41 (5.9)	4 (2.1)	79 (4.9)	21 (4.9)	0 (0.1)		27 (6.0)	69 (6.8)	5 (3.5)	
Minnesota, US		44 (6.4)	51 (4.9)	5 (3.5)	81 (6.5)	19 (6.5)	0 (0.2)		13 (5.4)	79 (5.7)	8 (2.8)	
Ontario, Canada		56 (4.7)	38 (5.0)	6 (2.3)	86 (3.3)	13 (3.1)	1 (1.1)		31 (3.8)	65 (3.7)	4 (2.2)	
Quebec, Canada		25 (4.0)	52 (4.2)	23 (3.6)	94 (1.8)	6 (1.8)	0 (0.0)		18 (3.9)	64 (3.9)	18 (2.8)	

Background data provided by teachers.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



Exhibit 7.18 Types of Questions on Mathematics Tests (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students by Types of Questions on Mathematics Tests Given by Their Teachers		
	Questions Requiring Explanations or Justifications		
	Always or Almost Always	Sometimes	Never or Almost Never
Algeria	45 (4.7)	48 (4.5)	8 (2.4)
Armenia	23 (2.4)	54 (3.3)	22 (3.0)
Australia	29 (3.9)	58 (4.3)	13 (3.1)
Bahrain	32 (2.5)	60 (2.7)	9 (1.2)
Bosnia and Herzegovina	22 (3.4)	70 (3.8)	8 (1.8)
Botswana	15 (3.0)	67 (4.2)	18 (3.2)
Bulgaria	56 (3.8)	38 (3.8)	6 (2.1)
Chinese Taipei	17 (3.1)	72 (4.0)	11 (2.6)
Colombia	62 (4.9)	36 (4.9)	2 (0.9)
Cyprus	35 (2.5)	59 (2.7)	5 (1.1)
Czech Republic	29 (4.0)	59 (4.2)	12 (2.6)
Egypt	20 (3.2)	63 (4.2)	17 (3.8)
El Salvador	36 (3.6)	55 (4.1)	9 (2.5)
England	30 (3.5)	64 (3.6)	6 (1.4)
Georgia	38 (4.9)	57 (5.1)	6 (1.8)
Ghana	33 (4.0)	62 (4.2)	5 (1.8)
Hong Kong SAR	21 (3.8)	69 (3.8)	11 (2.9)
Hungary	13 (2.9)	72 (3.6)	15 (2.6)
Indonesia	37 (4.0)	55 (4.0)	7 (2.4)
Iran, Islamic Rep. of	21 (3.2)	69 (3.7)	10 (2.1)
Israel	r 39 (3.3)	55 (3.0)	6 (1.4)
Italy	35 (2.8)	57 (2.9)	8 (1.5)
Japan	27 (3.5)	71 (3.6)	2 (0.9)
Jordan	20 (2.9)	58 (3.7)	22 (3.0)
Korea, Rep. of	20 (2.9)	61 (3.3)	19 (2.8)
Kuwait	r 15 (2.8)	56 (4.8)	30 (4.2)
Lebanon	77 (3.8)	23 (3.7)	0 (0.5)
Lithuania	36 (3.9)	59 (4.0)	5 (1.6)
Malaysia	9 (2.4)	67 (3.9)	25 (3.6)
Malta	9 (0.1)	72 (0.2)	20 (0.2)
Norway	37 (3.0)	59 (3.4)	5 (1.5)
Oman	20 (3.3)	67 (4.1)	13 (3.0)
Palestinian Nat'l Auth.	19 (3.3)	71 (3.5)	10 (2.4)
Qatar	15 (0.1)	69 (0.2)	16 (0.1)
Romania	70 (3.7)	28 (3.6)	2 (1.0)
Russian Federation	61 (3.1)	37 (3.1)	2 (0.8)
Saudi Arabia	13 (2.5)	68 (4.3)	19 (3.7)
Scotland	19 (3.2)	68 (3.4)	12 (2.4)
Serbia	23 (3.9)	67 (4.2)	10 (2.4)
Singapore	8 (1.6)	70 (2.7)	22 (2.3)
Slovenia	13 (1.8)	65 (2.6)	22 (2.3)
Sweden	76 (2.6)	23 (2.6)	1 (0.4)
Syrian Arab Republic	40 (4.0)	50 (4.0)	10 (2.4)
Thailand	37 (4.0)	60 (3.9)	2 (0.8)
Tunisia	62 (4.3)	35 (4.3)	2 (1.4)
Turkey	9 (2.7)	46 (4.9)	45 (4.7)
Ukraine	72 (3.9)	28 (3.9)	0 (0.5)
United States	30 (2.7)	54 (2.9)	16 (2.0)
‡ Morocco	47 (4.1)	41 (4.1)	12 (1.8)
<b>International Avg.</b>	<b>32 (0.5)</b>	<b>57 (0.5)</b>	<b>11 (0.3)</b>
<b>Benchmarking Participants</b>			
Basque Country, Spain	42 (5.5)	52 (5.4)	7 (2.4)
British Columbia, Canada	23 (3.3)	57 (3.9)	21 (3.3)
Dubai, UAE	s 33 (4.2)	59 (3.7)	8 (2.7)
Massachusetts, US	41 (6.5)	59 (6.5)	0 (0.1)
Minnesota, US	25 (6.8)	52 (8.2)	24 (5.9)
Ontario, Canada	61 (5.1)	37 (5.0)	2 (1.4)
Quebec, Canada	51 (4.3)	44 (4.3)	5 (2.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007





# Chapter 8



## *School Contexts for Mathematics Learning and Instruction*

Chapter 8 presents information about school contexts for mathematics learning and instruction among TIMSS 2007 countries and benchmarking participants, including characteristics of the student population, the role of the school principal, encouragement of parental involvement, school resources to support mathematics learning, the climate of the school, and school safety.

### **What Are the Characteristics of the Schools' Student Population?**

To provide information about the student populations in schools, TIMSS asked school principals about the percentage of students in their schools from economically disadvantaged homes, the percentage of students having the language of the TIMSS test as their native language, and the incidence of school attendance problems.

Exhibit 8.1 presents principals' reports about the economic background of students in their schools. At fourth grade, according to school principals, about one-third of students (34%), on average across countries, attended schools with few (less than 10%) economically disadvantaged students, 26 percent attended schools with between 11 and 25 percent disadvantaged students, 17 percent attended schools with 26 to 50 percent economically disadvantaged students, and 23 percent attended schools where the majority were economically disadvantaged students. There was considerable variation

across countries, however. In eight countries, Austria, Chinese Taipei, Japan, Kazakhstan, Kuwait, the Netherlands, Singapore, and the Ukraine, the majority of students (52 to 64%) attended schools with few disadvantaged students, whereas at the other extreme, more than half the students in Algeria, Colombia, El Salvador, Iran, Morocco, and Yemen attended school where the majority of students came from disadvantaged homes. The percentage of students in schools with few disadvantaged students increased since 2003 in Armenia, Latvia, Lithuania, and the Russian Federation, and decreased in Chinese Taipei.

At fourth grade, on average, there was a positive association between attending schools with fewer students from economically disadvantaged homes and mathematics achievement. In most countries, average achievement was highest among students attending schools with few disadvantaged students (490 points, on average) and lowest among those attending schools where the majority of students were from disadvantaged homes (443 points)—almost a 50 point gap.

At eighth grade, 22 percent of students, on average across countries, attended schools with few economically disadvantaged students, although in Chinese Taipei, Japan, Kuwait, Malta, Singapore, the Ukraine, and the Basque Country of Spain, more than half the students were in such schools. The percentage of students in these schools increased since 2003 in Armenia, Lithuania, Malaysia, and the Russian Federation, and decreased in Bahrain, Japan, Korea, Singapore, the United States, and the benchmarking participant, Quebec. In contrast to the situation of schools with few disadvantaged students, 33 percent of students, on average, attended schools where the majority of students were from disadvantaged homes. Countries where more than half the students attended schools where the majority of students were from disadvantaged backgrounds included Algeria, Colombia, Egypt, El Salvador, Ghana, Indonesia, Lebanon, Morocco, the Palestinian Authority, Thailand, Tunisia, and Turkey. Average mathematics achievement was highest among students attending schools with few disadvantaged students (476 points, on average), and lowest among students in schools with a majority of disadvantaged students (427 points).

Schools with large percentages of students not having the language of instruction as their native language face additional challenges. As shown in Exhibit 8.2, most students attend schools where most of their schoolmates are native speakers of the language of the test. On average across countries at the fourth grade, 73 percent of students attended schools where almost all students (more than 90%) had the language of the test as their native language. Almost all of the students (at least 90%) in a number of countries—Armenia, Colombia, the Czech Republic, El Salvador, Georgia, Hong Kong SAR, Hungary, Japan, Kuwait, Lithuania, and Yemen—attended such schools. The countries with nearly half or more of students in schools where less than half the students were native speakers of the language of the test included Iran (46%) and, most notably, Singapore (75%) and the benchmarking participant Dubai (77%). In Singapore, students were tested in English because they learn English as their first language in school. However, their mother-tongue language often would be Mandarin, Malay, or Tamil. The benchmarking participant Dubai in the United Arab Emirates tested in both English and Arabic.

At the eighth grade, and similar to the fourth grade, almost three-quarters of students, on average, attended schools where almost all students had the language of the test as their native language. Seventeen countries had 90 percent or more of students in this category, including Hungary, Japan, and Korea, with 100 percent of students in such schools. In contrast, countries with more than half their students in schools where the language of the test was the native language of less than half the students included Botswana, Ghana, Lebanon, Malta, Singapore, and the benchmarking participant Dubai. Botswana, Ghana, Malta, and Singapore tested in English. Lebanon tested in French and English, and the benchmarking participant Dubai tested in English and Arabic.

At both fourth and eighth grades, average mathematics achievement was highest among students attending schools with more than 90% of students having the language of the test as their native language and lowest among students attending schools with less than half the students who were native speakers of the language of the test (476 vs. 461 points, on average at fourth grade and 460 vs. 441 points at eighth grade).

**Exhibit 8.1 Principals' Reports on the Percentages of Students in Their Schools Coming from Economically Disadvantaged Homes with Trends**

**TIMSS2007**  
Mathematics **4<sup>th</sup>**  
Grade

Country	Schools with Few (0–10%) Economically Disadvantaged Students			Schools with 11–25% Economically Disadvantaged Students			Schools with 26–50% Economically Disadvantaged Students		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	4 (1.8)	368 (14.7)	∅ ∅	14 (2.8)	396 (15.0)	∅ ∅	24 (3.6)	385 (7.3)	∅ ∅
Armenia	r 17 (3.0)	490 (7.4)	14 (3.4) ▲	32 (4.2)	499 (7.5)	11 (5.5) ▲	25 (4.0)	510 (8.8)	–3 (5.7)
Australia	34 (4.5)	536 (6.1)	0 (6.3)	30 (3.0)	513 (7.1)	1 (5.0)	22 (4.4)	510 (8.6)	1 (5.7)
Austria	54 (3.6)	512 (3.1)	∅ ∅	29 (3.4)	508 (3.4)	∅ ∅	11 (2.4)	495 (6.1)	∅ ∅
Chinese Taipei	63 (3.9)	584 (2.4)	–17 (5.2) ▼	27 (3.6)	563 (3.8)	12 (4.7) ●	7 (2.3)	566 (6.0)	4 (2.7)
Colombia	5 (2.2)	384 (27.8)	∅ ∅	6 (2.1)	378 (12.8)	∅ ∅	8 (2.3)	393 (17.2)	∅ ∅
Czech Republic	19 (3.9)	497 (5.6)	∅ ∅	41 (4.8)	495 (4.1)	∅ ∅	27 (3.6)	471 (5.1)	∅ ∅
Denmark	r 49 (5.5)	533 (3.8)	∅ ∅	36 (4.8)	516 (3.4)	∅ ∅	8 (2.8)	507 (11.4)	∅ ∅
El Salvador	7 (1.6)	379 (23.9)	∅ ∅	11 (2.2)	341 (14.5)	∅ ∅	13 (2.9)	321 (6.9)	∅ ∅
England	r 38 (4.0)	564 (5.0)	0 (5.9)	31 (3.5)	544 (4.4)	6 (5.7)	15 (3.3)	520 (5.7)	4 (4.5)
Georgia	12 (2.7)	449 (10.8)	∅ ∅	26 (4.2)	440 (6.0)	∅ ∅	25 (3.8)	433 (9.9)	∅ ∅
Germany	29 (3.2)	539 (2.7)	∅ ∅	38 (3.1)	536 (2.9)	∅ ∅	19 (2.2)	522 (4.3)	∅ ∅
Hong Kong SAR	26 (4.1)	610 (5.4)	3 (6.0)	23 (4.3)	608 (7.9)	–3 (5.5)	30 (4.5)	610 (6.7)	5 (6.7)
Hungary	12 (2.8)	549 (12.5)	–3 (4.4)	29 (3.9)	525 (7.2)	5 (5.7)	28 (3.7)	519 (6.0)	–3 (5.4)
Iran, Islamic Rep. of	15 (2.7)	447 (10.9)	–2 (4.4)	15 (3.0)	435 (10.1)	4 (4.4)	18 (2.7)	394 (7.0)	–5 (5.1)
Italy	38 (3.7)	511 (4.3)	–7 (5.5)	37 (3.4)	514 (4.6)	0 (5.1)	14 (2.5)	499 (7.7)	4 (3.5)
Japan	64 (3.8)	573 (2.4)	–10 (5.4)	24 (3.5)	561 (4.5)	3 (5.0)	10 (2.4)	556 (5.5)	6 (2.8) ●
Kazakhstan	52 (4.2)	540 (9.2)	∅ ∅	26 (4.6)	553 (11.2)	∅ ∅	18 (4.4)	563 (18.0)	∅ ∅
Kuwait	60 (4.3)	314 (5.2)	∅ ∅	20 (3.3)	318 (10.5)	∅ ∅	16 (3.2)	316 (12.5)	∅ ∅
Latvia	38 (3.4)	551 (3.5)	13 (5.5) ●	38 (4.1)	530 (3.3)	–2 (7.0)	16 (3.1)	534 (5.7)	–4 (5.7)
Lithuania	37 (3.2)	552 (4.0)	11 (5.0) ▲	37 (3.9)	523 (4.0)	4 (6.0)	22 (3.0)	512 (4.9)	–9 (4.8)
Morocco	r 7 (2.9)	436 (18.3)	4 (3.2)	4 (1.7)	348 (22.3)	0 (2.3)	13 (2.8)	330 (10.9)	–5 (4.5)
Netherlands	r 61 (4.0)	544 (2.7)	–2 (5.6)	16 (3.5)	524 (4.8)	–1 (5.0)	15 (3.8)	515 (5.2)	7 (4.5)
New Zealand	44 (2.6)	521 (2.8)	0 (4.1)	20 (2.6)	503 (4.7)	–3 (4.4)	13 (1.6)	477 (7.4)	1 (2.8)
Norway	--	--	--	--	--	--	--	--	--
Qatar	41 (0.2)	311 (1.6)	∅ ∅	28 (0.2)	294 (2.0)	∅ ∅	13 (0.1)	285 (3.2)	∅ ∅
Russian Federation	28 (3.6)	567 (8.7)	10 (4.4) ●	33 (3.0)	549 (7.3)	1 (4.7)	20 (2.6)	535 (9.0)	–6 (4.0)
Scotland	r 44 (4.3)	510 (4.0)	8 (6.2)	26 (4.4)	495 (5.4)	–5 (6.4)	16 (3.8)	476 (4.9)	–2 (5.7)
Singapore	60 (0.0)	611 (5.2)	–4 (3.7)	30 (0.0)	586 (6.3)	4 (3.2)	9 (0.0)	564 (12.8)	3 (1.7)
Slovak Republic	41 (3.7)	511 (4.4)	∅ ∅	34 (3.8)	499 (5.6)	∅ ∅	13 (2.7)	465 (19.0)	∅ ∅
Slovenia	22 (3.6)	510 (5.0)	–2 (5.3)	43 (4.7)	503 (2.9)	0 (6.6)	25 (3.7)	498 (3.0)	2 (5.5)
Sweden	r 49 (4.5)	512 (3.0)	∅ ∅	30 (4.3)	498 (5.0)	∅ ∅	15 (4.0)	485 (8.8)	∅ ∅
Tunisia	20 (3.5)	352 (11.8)	0 (4.7)	14 (2.9)	354 (11.0)	–2 (4.1)	23 (3.9)	340 (8.0)	7 (4.9)
Ukraine	64 (4.2)	478 (3.5)	∅ ∅	25 (3.6)	453 (7.2)	∅ ∅	6 (2.1)	444 (16.6)	∅ ∅
United States	19 (2.2)	569 (5.9)	0 (3.6)	21 (2.5)	549 (3.6)	–2 (3.6)	18 (2.9)	532 (4.1)	–2 (4.1)
Yemen	5 (1.9)	242 (20.7)	∅ ∅	10 (2.2)	229 (16.8)	∅ ∅	22 (3.7)	223 (11.5)	∅ ∅
International Avg.	34 (0.6)	490 (1.7)		26 (0.6)	477 (1.4)		17 (0.5)	466 (1.6)	
<b>Benchmarking Participants</b>									
Alberta, Canada	45 (4.5)	522 (3.9)	∅ ∅	32 (4.4)	497 (2.7)	∅ ∅	13 (3.2)	496 (4.1)	∅ ∅
British Columbia, Canada	46 (4.7)	517 (4.3)	∅ ∅	34 (4.0)	502 (4.6)	∅ ∅	15 (3.2)	490 (5.9)	∅ ∅
Dubai, UAE	s 45 (0.4)	471 (3.1)	∅ ∅	21 (0.2)	437 (4.6)	∅ ∅	16 (0.2)	406 (3.6)	∅ ∅
Massachusetts, US	46 (7.2)	586 (3.7)	∅ ∅	23 (7.5)	575 (6.2)	∅ ∅	14 (5.0)	571 (10.4)	∅ ∅
Minnesota, US	14 (6.5)	591 (3.0)	∅ ∅	36 (8.5)	570 (10.3)	∅ ∅	29 (8.5)	550 (5.6)	∅ ∅
Ontario, Canada	42 (5.1)	526 (4.4)	–7 (7.5)	29 (4.7)	507 (3.7)	9 (6.2)	10 (2.9)	489 (10.7)	–5 (4.8)
Quebec, Canada	47 (4.9)	525 (4.2)	7 (6.6)	26 (3.8)	521 (6.7)	–3 (5.3)	14 (2.9)	511 (9.6)	1 (4.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- ▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

Background data provided by schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.



**Exhibit 8.1 Principals' Reports on the Percentages of Students in Their Schools Coming from Economically Disadvantaged Homes with Trends (Continued)**

TIMSS2007  
Mathematics **4**<sup>th</sup>  
Grade

Country	Schools with More than 50% Economically Disadvantaged Students		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	58 (4.5)	367 (9.0)	0 0
Armenia	r 25 (3.6)	497 (8.6)	-22 (5.8) ▼
Australia	14 (3.1)	475 (11.1)	-2 (5.1)
Austria	6 (1.8)	465 (9.9)	0 0
Chinese Taipei	3 (1.7)	553 (12.6)	2 (1.9)
Colombia	82 (3.2)	345 (5.6)	0 0
Czech Republic	13 (3.2)	471 (7.6)	0 0
Denmark	r 7 (2.7)	500 (15.0)	0 0
El Salvador	70 (3.2)	325 (5.2)	0 0
England	r 16 (3.0)	499 (4.4)	-9 (5.2)
Georgia	36 (4.4)	440 (8.3)	0 0
Germany	14 (2.4)	468 (6.6)	0 0
Hong Kong SAR	21 (3.7)	588 (6.3)	-4 (5.7)
Hungary	31 (3.8)	468 (6.6)	2 (5.3)
Iran, Islamic Rep. of	52 (3.7)	382 (5.8)	2 (6.0)
Italy	11 (2.4)	482 (15.2)	3 (2.8)
Japan	1 (1.0)	~ ~	1 (1.0)
Kazakhstan	3 (1.3)	588 (16.2)	0 0
Kuwait	4 (1.8)	302 (30.7)	0 0
Latvia	9 (2.0)	517 (8.7)	-7 (4.7)
Lithuania	5 (1.5)	505 (14.3)	-6 (3.3)
Morocco	r 76 (3.6)	324 (5.8)	1 (5.3)
Netherlands	r 7 (2.1)	481 (10.9)	-3 (2.9)
New Zealand	23 (1.7)	437 (5.1)	2 (3.1)
Norway	--	--	--
Qatar	18 (0.1)	278 (2.7)	0 0
Russian Federation	19 (2.3)	524 (12.1)	-4 (4.3)
Scotland	r 14 (2.7)	450 (6.7)	-1 (4.4)
Singapore	1 (0.0)	~ ~	-3 (1.6) ▼
Slovak Republic	12 (2.1)	460 (15.2)	0 0
Slovenia	10 (2.7)	491 (4.4)	-1 (3.8)
Sweden	r 6 (2.4)	461 (8.7)	0 0
Tunisia	43 (3.9)	299 (7.3)	-5 (5.3)
Ukraine	4 (1.8)	466 (18.6)	0 0
United States	42 (2.8)	499 (3.5)	5 (3.8)
Yemen	63 (4.3)	220 (8.2)	0 0
<b>International Avg.</b>	<b>23 (0.5)</b>	<b>443 (1.9)</b>	
<b>Benchmarking Participants</b>			
Alberta, Canada	10 (2.7)	454 (12.0)	0 0
British Columbia, Canada	6 (2.0)	469 (12.9)	0 0
Dubai, UAE	s 19 (0.4)	400 (13.1)	0 0
Massachusetts, US	17 (4.4)	534 (7.9)	0 0
Minnesota, US	21 (7.0)	514 (15.4)	0 0
Ontario, Canada	19 (4.1)	487 (11.8)	2 (5.8)
Quebec, Canada	12 (3.1)	485 (4.7)	-4 (4.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

- 2007 percent significantly higher
- ▼ 2007 percent significantly lower

Exhibit 8.1 Principals' Reports on the Percentages of Students in Their Schools Coming from Economically Disadvantaged Homes with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Schools with Few (0–10%) Economically Disadvantaged Students			Schools with 11–25% Economically Disadvantaged Students			Schools with 26–50% Economically Disadvantaged Students		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	6 (1.9)	379 (6.3)	0 0	22 (3.4)	388 (4.4)	0 0	20 (3.2)	389 (5.6)	0 0
Armenia	r 17 (3.3)	490 (8.7)	14 (3.6) ▲	31 (4.3)	496 (6.1)	10 (5.6)	26 (4.2)	508 (6.6)	-3 (6.0)
Australia	31 (3.3)	532 (9.1)	-1 (5.6)	33 (4.0)	491 (4.8)	-2 (5.8)	23 (4.3)	483 (7.4)	0 (5.4)
Bahrain	11 (0.2)	455 (5.0)	-5 (0.2) ▼	33 (0.3)	405 (2.9)	13 (0.3) ▲	31 (0.2)	386 (2.5)	-2 (0.3) ▼
Bosnia and Herzegovina	8 (2.2)	457 (10.3)	0 0	18 (3.4)	456 (6.2)	0 0	28 (4.1)	458 (6.7)	0 0
Botswana	9 (2.2)	402 (11.8)	-7 (4.2)	22 (3.9)	380 (5.7)	1 (5.3)	21 (4.2)	354 (5.7)	-4 (5.7)
Bulgaria	25 (3.0)	505 (9.5)	6 (4.4)	27 (3.4)	468 (7.2)	1 (5.5)	19 (3.6)	436 (13.2)	-6 (5.1)
Chinese Taipei	59 (4.1)	611 (4.9)	-8 (5.4)	29 (3.8)	584 (7.2)	4 (5.2)	5 (1.9)	586 (14.7)	0 (2.6)
Colombia	6 (1.8)	386 (30.9)	0 0	7 (3.0)	408 (12.0)	0 0	14 (3.4)	391 (8.3)	0 0
Cyprus	37 (0.2)	464 (2.3)	-1 (0.3)	32 (0.2)	467 (3.2)	-3 (0.4) ▼	22 (0.2)	460 (3.3)	7 (0.3) ▲
Czech Republic	24 (4.2)	520 (8.7)	0 0	39 (4.7)	511 (6.0)	0 0	27 (4.3)	490 (6.3)	0 0
Egypt	10 (2.0)	417 (17.4)	-1 (3.2)	11 (2.7)	399 (11.3)	-13 (4.6) ▼	24 (3.4)	391 (5.5)	1 (4.9)
El Salvador	6 (1.5)	385 (12.4)	0 0	8 (2.5)	343 (18.1)	0 0	16 (3.2)	334 (6.0)	0 0
England	s 38 (3.5)	540 (8.6)	5 (6.3)	27 (4.0)	492 (7.8)	-6 (7.2)	23 (3.8)	503 (11.6)	1 (7.3)
Georgia	11 (2.9)	422 (8.4)	0 0	22 (4.3)	423 (11.0)	0 0	30 (5.0)	398 (11.9)	0 0
Ghana	8 (2.4)	332 (16.4)	4 (2.8)	7 (2.1)	313 (17.7)	-1 (3.3)	15 (2.9)	322 (14.5)	-3 (4.5)
Hong Kong SAR	12 (2.6)	627 (10.1)	-2 (4.3)	24 (3.6)	602 (10.0)	-3 (5.4)	24 (3.8)	553 (11.2)	0 (5.5)
Hungary	13 (2.9)	556 (11.2)	-2 (4.2)	26 (4.1)	526 (7.6)	3 (5.3)	31 (4.3)	511 (6.9)	-4 (6.1)
Indonesia	6 (1.9)	434 (29.3)	2 (2.7)	16 (2.8)	444 (14.5)	-1 (4.4)	22 (4.2)	425 (11.8)	-3 (5.4)
Iran, Islamic Rep. of	11 (2.4)	462 (11.1)	-4 (3.5)	16 (3.3)	402 (11.6)	4 (4.0)	23 (3.5)	412 (8.2)	-2 (4.9)
Israel	14 (2.8)	513 (8.1)	-1 (4.2)	25 (3.4)	494 (8.6)	-10 (5.1) ▼	32 (4.0)	455 (7.7)	6 (5.8)
Italy	40 (4.2)	493 (4.8)	-5 (5.4)	32 (4.0)	484 (4.6)	-1 (5.5)	19 (3.4)	465 (5.4)	7 (4.2)
Japan	57 (4.0)	580 (2.8)	-15 (5.4) ▼	33 (3.9)	564 (4.8)	10 (5.1) ▲	7 (2.4)	532 (9.8)	3 (2.9)
Jordan	11 (2.5)	451 (12.6)	-3 (4.0)	19 (3.5)	450 (10.0)	-3 (5.5)	28 (3.6)	423 (9.4)	4 (5.0)
Korea, Rep. of	24 (3.3)	622 (4.2)	-10 (4.9) ▼	34 (3.7)	596 (4.1)	-6 (5.5)	26 (3.5)	583 (4.7)	10 (4.6) ▲
Kuwait	r 52 (4.7)	357 (4.2)	0 0	21 (3.6)	354 (6.0)	0 0	17 (3.7)	356 (7.4)	0 0
Lebanon	14 (3.0)	481 (11.7)	6 (4.0)	16 (3.2)	470 (10.1)	-1 (4.5)	15 (3.4)	446 (9.2)	0 (4.3)
Lithuania	r 33 (3.6)	531 (4.9)	13 (5.4) ▲	40 (3.6)	498 (3.5)	-1 (6.1)	22 (3.5)	487 (6.7)	-8 (5.6)
Malaysia	17 (3.5)	493 (10.0)	10 (4.2) ▲	25 (3.6)	488 (9.5)	13 (4.5) ▲	20 (3.1)	483 (12.9)	3 (4.6)
Malta	56 (0.2)	520 (1.5)	0 0	20 (0.2)	466 (2.5)	0 0	19 (0.2)	460 (2.0)	0 0
Norway	--	--	--	--	--	--	--	--	--
Oman	12 (2.7)	372 (13.8)	0 0	30 (3.8)	365 (8.2)	0 0	28 (3.7)	381 (7.2)	0 0
Palestinian Nat'l Auth.	6 (1.9)	388 (26.1)	-1 (2.8)	20 (3.4)	383 (7.6)	9 (4.3) ▲	20 (3.2)	374 (9.9)	-9 (4.9)
Qatar	r 31 (0.2)	323 (2.1)	0 0	41 (0.2)	297 (1.9)	0 0	24 (0.1)	299 (2.8)	0 0
Romania	14 (3.0)	500 (8.9)	2 (4.2)	16 (3.1)	486 (12.4)	-2 (4.5)	22 (3.9)	463 (8.4)	1 (4.9)
Russian Federation	30 (3.4)	532 (6.0)	11 (4.5) ▲	36 (3.5)	515 (6.3)	-1 (4.7)	22 (3.2)	496 (7.3)	-2 (4.2)
Saudi Arabia	27 (3.9)	343 (5.1)	--	31 (4.2)	327 (4.6)	--	25 (4.1)	320 (7.2)	--
Scotland	s 36 (3.7)	510 (7.0)	8 (6.0)	38 (4.1)	479 (6.9)	-5 (7.0)	17 (3.6)	470 (10.2)	-6 (5.9)
Serbia	5 (1.9)	531 (9.3)	-5 (2.9)	22 (3.2)	501 (7.8)	-6 (5.1)	28 (4.2)	477 (7.6)	5 (5.8)
Singapore	52 (0.0)	614 (5.4)	-5 (0.0) ▼	30 (0.0)	572 (7.3)	3 (0.0) ▲	9 (0.0)	556 (14.7)	-1 (0.0)
Slovenia	22 (3.4)	510 (5.7)	-1 (5.2)	41 (4.5)	502 (3.3)	-1 (6.4)	25 (3.8)	498 (4.9)	2 (5.6)
Sweden	r 43 (4.7)	495 (3.9)	-3 (6.2)	41 (4.6)	485 (3.2)	9 (6.1)	11 (3.0)	487 (6.7)	-8 (4.8)
Syrian Arab Republic	12 (2.9)	387 (10.7)	0 0	15 (2.7)	409 (11.5)	0 0	25 (3.8)	413 (7.0)	0 0
Thailand	5 (1.9)	482 (23.5)	0 0	15 (2.8)	509 (17.3)	0 0	20 (3.1)	452 (10.8)	0 0
Tunisia	9 (2.6)	444 (9.4)	0 (3.7)	18 (3.1)	428 (5.8)	3 (4.1)	21 (3.5)	432 (5.4)	5 (4.6)
Turkey	6 (1.9)	523 (28.0)	0 0	10 (2.5)	506 (15.5)	0 0	18 (3.4)	449 (13.5)	0 0
Ukraine	60 (4.1)	471 (4.6)	0 0	28 (3.5)	451 (8.3)	0 0	7 (2.1)	436 (8.7)	0 0
United States	r 16 (2.5)	550 (3.9)	-11 (3.8) ▼	23 (2.8)	534 (5.0)	-1 (4.1)	26 (3.4)	509 (4.8)	1 (4.6)
‡ Morocco	0 (0.0)	--	--	6 (1.4)	426 (22.4)	--	15 (4.6)	383 (8.5)	--
International Avg.	22 (0.4)	476 (1.8)		24 (0.5)	459 (1.4)		21 (0.5)	445 (1.3)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

#### Benchmarking Participants

Basque Country, Spain	63 (5.3)	507 (3.5)	-1 (7.2)	15 (4.0)	491 (7.2)	-5 (5.5)	15 (3.9)	490 (7.2)	6 (5.0)
British Columbia, Canada	40 (4.4)	521 (5.2)	0 0	33 (4.5)	505 (4.7)	0 0	23 (4.0)	494 (8.2)	0 0
Dubai, UAE	s 43 (0.9)	489 (4.9)	0 0	19 (0.5)	447 (8.0)	0 0	13 (0.4)	435 (11.2)	0 0
Massachusetts, US	32 (3.5)	577 (6.5)	0 0	37 (5.0)	553 (6.9)	0 0	12 (5.1)	513 (19.0)	0 0
Minnesota, US	15 (5.9)	561 (13.5)	0 0	38 (7.9)	535 (7.0)	0 0	29 (8.0)	524 (6.2)	0 0
Ontario, Canada	42 (4.2)	534 (5.1)	1 (6.3)	36 (4.6)	508 (4.8)	7 (6.4)	17 (3.4)	510 (7.6)	4 (4.9)
Quebec, Canada	28 (3.7)	561 (6.1)	-15 (6.0) ▼	33 (3.8)	519 (7.8)	2 (6.2)	24 (3.9)	517 (6.3)	9 (4.9)

Background data provided by schools.

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.



TIMSS & PIRLS  
International Study Center  
Lynch School of Education, Boston College

**Exhibit 8.1 Principals' Reports on the Percentages of Students in Their Schools Coming from Economically Disadvantaged Homes with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Schools with More than 50% Economically Disadvantaged Students		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	52 (4.2)	387 (2.4)	0 0
Armenia	r 27 (3.9)	499 (6.8)	-20 (6.2) ▼
Australia	13 (2.6)	446 (12.0)	3 (3.5)
Bahrain	24 (0.2)	378 (3.7)	-7 (0.3) ▼
Bosnia and Herzegovina	46 (4.6)	452 (4.0)	0 0
Botswana	47 (4.6)	346 (3.1)	10 (6.5)
Bulgaria	29 (3.4)	428 (11.6)	-1 (5.2)
Chinese Taipei	7 (2.8)	564 (26.1)	4 (3.2)
Colombia	73 (3.8)	367 (4.6)	0 0
Cyprus	9 (0.2)	472 (8.1)	-3 (0.3) ▼
Czech Republic	11 (2.6)	475 (6.7)	0 0
Egypt	55 (4.0)	380 (4.8)	13 (5.6) ▲
El Salvador	70 (3.7)	338 (3.7)	0 0
England	s 12 (2.6)	485 (15.7)	-1 (5.0)
Georgia	37 (5.3)	410 (9.4)	0 0
Ghana	71 (3.8)	303 (6.0)	0 (5.7)
Hong Kong SAR	40 (4.2)	542 (10.2)	5 (6.2)
Hungary	30 (3.8)	490 (7.3)	3 (5.4)
Indonesia	56 (3.9)	383 (5.7)	2 (5.7)
Iran, Islamic Rep. of	50 (3.8)	382 (4.7)	2 (5.6)
Israel	30 (3.8)	427 (10.1)	5 (5.0)
Italy	9 (2.2)	422 (10.9)	-1 (3.1)
Japan	2 (1.0)	~ ~	2 (1.0)
Jordan	42 (4.2)	412 (7.3)	2 (6.2)
Korea, Rep. of	16 (2.7)	584 (6.2)	6 (3.7)
Kuwait	r 11 (2.8)	331 (12.7)	0 0
Lebanon	56 (4.6)	429 (6.0)	-5 (6.1)
Lithuania	r 5 (1.9)	483 (14.7)	-3 (3.1)
Malaysia	38 (3.9)	451 (7.8)	-26 (5.6) ▼
Malta	6 (0.1)	366 (4.5)	0 0
Norway	--	--	--
Oman	30 (3.7)	371 (5.4)	0 0
Palestinian Nat'l Auth.	55 (4.0)	357 (4.9)	0 (5.5)
Qatar	r 4 (0.1)	292 (6.6)	0 0
Romania	49 (4.2)	440 (6.1)	-2 (6.0)
Russian Federation	12 (3.2)	483 (10.4)	-8 (4.3)
Saudi Arabia	18 (3.4)	316 (6.5)	--
Scotland	s 9 (2.2)	451 (9.5)	3 (3.5)
Serbia	45 (4.7)	476 (5.3)	6 (6.4)
Singapore	9 (0.0)	565 (13.1)	4 (0.0) ▲
Slovenia	11 (3.1)	491 (6.2)	0 (4.1)
Sweden	r 5 (1.8)	474 (8.7)	2 (2.1)
Syrian Arab Republic	48 (4.5)	381 (5.7)	0 0
Thailand	59 (3.6)	416 (6.1)	0 0
Tunisia	52 (4.0)	408 (2.8)	-7 (5.8)
Turkey	66 (3.9)	406 (4.8)	0 0
Ukraine	6 (1.8)	453 (24.7)	0 0
United States	r 35 (2.8)	471 (4.7)	11 (4.0) ▲
‡ Morocco	78 (4.8)	369 (3.9)	--
<b>International Avg.</b>	<b>33 (0.5)</b>	<b>427 (1.4)</b>	
<b>Benchmarking Participants</b>			
Basque Country, Spain	7 (2.1)	449 (11.9)	0 (3.2)
British Columbia, Canada	4 (1.9)	542 (42.5)	0 0
Dubai, UAE	s 24 (0.6)	431 (3.4)	0 0
Massachusetts, US	19 (3.3)	493 (17.4)	0 0
Minnesota, US	18 (5.6)	497 (13.3)	0 0
Ontario, Canada	5 (2.2)	499 (13.9)	-11 (4.0) ▼
Quebec, Canada	15 (3.2)	495 (10.8)	4 (4.1)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher  
▼ 2007 percent significantly lower

**Exhibit 8.2 Principals' Reports on the Percentages of Students Having the Language of the Test as Their Native Language with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Schools with More than 90% of Students Having the Language of the Test as Native Language			Schools with 50–90% of Students Having the Language of the Test as Native Language			Schools with Less than 50% of Students Having the Language of the Test as Native Language		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	77 (4.5)	384 (4.8)	∅ ∅	12 (2.3)	369 (9.6)	∅ ∅	12 (4.4)	348 (35.6)	∅ ∅
Armenia	r 96 (1.3)	500 (4.5)	–1 (1.8)	3 (0.9)	486 (9.3)	2 (1.3)	1 (0.8)	~ ~	–1 (1.3)
Australia	62 (4.1)	513 (3.9)	–1 (6.0)	23 (4.2)	527 (8.0)	–5 (5.9)	15 (3.3)	510 (12.5)	6 (4.0)
Austria	44 (3.0)	509 (2.6)	∅ ∅	41 (3.6)	508 (2.9)	∅ ∅	15 (2.7)	486 (6.8)	∅ ∅
Chinese Taipei	39 (4.2)	579 (3.1)	5 (5.7)	34 (3.9)	578 (3.5)	–6 (5.3)	27 (3.9)	569 (3.2)	0 (5.1)
Colombia	96 (1.9)	358 (5.5)	∅ ∅	3 (1.8)	312 (36.3)	∅ ∅	1 (0.8)	~ ~	∅ ∅
Czech Republic	97 (1.4)	486 (2.7)	∅ ∅	2 (1.3)	~ ~	∅ ∅	1 (0.0)	~ ~	∅ ∅
Denmark	71 (4.3)	528 (2.8)	∅ ∅	25 (3.9)	518 (5.3)	∅ ∅	5 (1.9)	504 (17.9)	∅ ∅
El Salvador	98 (1.1)	330 (4.2)	∅ ∅	1 (0.9)	~ ~	∅ ∅	1 (0.6)	~ ~	∅ ∅
England	r 68 (3.9)	548 (3.6)	–6 (6.0)	17 (3.4)	533 (7.9)	4 (4.5)	15 (2.9)	521 (8.0)	2 (4.9)
Georgia	90 (2.5)	438 (4.6)	∅ ∅	10 (2.5)	437 (11.9)	∅ ∅	0 (0.0)	~ ~	∅ ∅
Germany	44 (2.9)	536 (3.1)	∅ ∅	45 (3.0)	528 (2.8)	∅ ∅	11 (1.8)	478 (7.5)	∅ ∅
Hong Kong SAR	96 (1.6)	606 (3.8)	–1 (2.6)	3 (1.3)	629 (11.3)	0 (2.4)	1 (0.0)	~ ~	1 (0.0)
Hungary	99 (0.8)	511 (3.6)	1 (1.3)	0 (0.0)	~ ~	–2 (1.1)	1 (0.0)	~ ~	1 (0.0)
Iran, Islamic Rep. of	43 (4.0)	429 (6.5)	–4 (6.7)	10 (2.5)	424 (8.0)	–4 (4.1)	46 (3.6)	373 (4.9)	8 (6.1)
Italy	66 (3.2)	507 (3.4)	–14 (4.4) ▼	33 (3.1)	510 (5.4)	17 (4.1) ▲	1 (0.8)	~ ~	–3 (1.8)
Japan	99 (0.7)	569 (2.1)	1 (1.4)	1 (0.0)	~ ~	1 (0.0)	0 (0.0)	~ ~	–2 (1.1)
Kazakhstan	53 (5.0)	546 (9.8)	∅ ∅	34 (4.9)	560 (9.4)	∅ ∅	12 (2.4)	535 (10.3)	∅ ∅
Kuwait	92 (2.1)	318 (3.8)	∅ ∅	7 (2.0)	288 (17.1)	∅ ∅	1 (0.0)	~ ~	∅ ∅
Latvia	72 (4.0)	540 (2.6)	–3 (6.1)	24 (3.9)	539 (3.9)	3 (6.0)	4 (1.5)	508 (18.3)	0 (2.2)
Lithuania	93 (2.0)	529 (2.4)	2 (3.2)	6 (1.8)	557 (13.4)	0 (2.8)	1 (0.7)	~ ~	–2 (1.9)
Morocco	r 68 (3.4)	338 (6.5)	6 (5.4)	16 (3.0)	359 (18.0)	8 (3.6) ▲	16 (3.0)	319 (11.5)	–13 (5.0) ▼
Netherlands	r 62 (4.1)	545 (2.9)	–4 (5.5)	28 (3.7)	521 (4.0)	7 (5.0)	11 (3.0)	506 (7.3)	–3 (4.0)
New Zealand	65 (3.0)	503 (2.7)	–2 (4.4)	26 (3.1)	483 (7.3)	–1 (4.4)	10 (1.6)	457 (8.5)	3 (2.5)
Norway	80 (3.8)	473 (3.0)	–1 (5.3)	17 (3.7)	473 (8.5)	–1 (5.2)	3 (1.6)	465 (12.8)	2 (1.8)
Qatar	76 (0.1)	296 (1.2)	∅ ∅	14 (0.1)	303 (2.8)	∅ ∅	10 (0.1)	285 (4.3)	∅ ∅
Russian Federation	70 (2.7)	547 (5.9)	–2 (4.7)	19 (2.7)	542 (9.5)	2 (3.8)	11 (1.6)	529 (17.4)	0 (3.0)
Scotland	87 (3.3)	495 (2.7)	–4 (4.4)	11 (3.0)	488 (11.0)	3 (3.9)	2 (1.3)	~ ~	0 (2.0)
Singapore	3 (0.0)	620 (23.2)	– –	22 (0.0)	624 (6.1)	– –	75 (0.0)	592 (4.6)	– –
Slovak Republic	89 (2.7)	504 (3.2)	∅ ∅	5 (1.8)	463 (24.8)	∅ ∅	5 (2.0)	404 (37.7)	∅ ∅
Slovenia	78 (3.7)	503 (2.2)	6 (5.2)	21 (3.6)	500 (3.1)	–6 (5.1)	1 (0.8)	~ ~	0 (1.1)
Sweden	61 (4.4)	506 (3.1)	∅ ∅	31 (4.0)	505 (3.3)	∅ ∅	8 (2.5)	470 (7.2)	∅ ∅
Tunisia	62 (4.1)	327 (6.8)	8 (6.0)	28 (4.1)	328 (8.4)	11 (5.3) ▲	10 (2.6)	307 (16.4)	–19 (4.6) ▼
Ukraine	58 (3.3)	464 (4.0)	∅ ∅	18 (3.1)	467 (7.4)	∅ ∅	23 (3.0)	483 (5.3)	∅ ∅
United States	62 (3.0)	536 (3.1)	–5 (4.3)	26 (2.9)	524 (6.5)	6 (3.9)	12 (2.0)	502 (8.7)	–1 (3.0)
Yemen	93 (2.3)	225 (6.3)	∅ ∅	5 (1.9)	244 (19.3)	∅ ∅	1 (0.1)	~ ~	∅ ∅
International Avg.	73 (0.5)	476 (1.0)		17 (0.5)	473 (2.1)		10 (0.3)	461 (3.2)	
<b>Benchmarking Participants</b>									
Alberta, Canada	62 (4.4)	506 (3.3)	∅ ∅	30 (4.1)	505 (5.7)	∅ ∅	7 (2.2)	492 (6.9)	∅ ∅
British Columbia, Canada	48 (4.8)	506 (3.7)	∅ ∅	31 (4.7)	506 (5.6)	∅ ∅	20 (3.6)	502 (7.8)	∅ ∅
Dubai, UAE	r 13 (0.2)	427 (3.2)	∅ ∅	10 (0.1)	489 (5.8)	∅ ∅	77 (0.2)	440 (2.9)	∅ ∅
Massachusetts, US	71 (4.6)	578 (3.3)	∅ ∅	22 (4.8)	568 (13.0)	∅ ∅	7 (3.8)	527 (2.6)	∅ ∅
Minnesota, US	62 (9.5)	569 (5.8)	∅ ∅	30 (8.7)	544 (11.3)	∅ ∅	8 (5.6)	504 (44.7)	∅ ∅
Ontario, Canada	58 (4.5)	508 (4.1)	6 (6.7)	31 (4.4)	515 (8.2)	–1 (6.4)	11 (2.7)	513 (7.5)	–5 (4.6)
Quebec, Canada	75 (3.6)	524 (3.4)	–10 (4.6) ▼	19 (3.0)	509 (6.6)	8 (4.1)	6 (1.9)	482 (7.4)	2 (2.3)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (∅) indicates the country did not participate in the assessment.


**TIMSS & PIRLS**  
 International Study Center  
 Lynch School of Education, Boston College



**Exhibit 8.2 Principals' Reports on the Percentages of Students Having the Language of the Test as Their Native Language with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Schools with More than 90% of Students Having the Language of the Test as Native Language			Schools with 50–90% of Students Having the Language of the Test as Native Language			Schools with Less than 50% of Students Having the Language of the Test as Native Language		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	87 (2.5)	386 (2.3)	0 0	8 (2.1)	394 (5.2)	0 0	5 (1.7)	384 (7.6)	0 0
Armenia	r 97 (0.8)	499 (3.6)	-1 (1.4)	3 (0.8)	490 (10.9)	2 (0.9) ▲	0 (0.0)	~ ~	-2 (1.1)
Australia	68 (3.1)	498 (5.0)	6 (5.8)	25 (3.4)	498 (8.4)	-1 (5.5)	7 (2.4)	464 (30.5)	-6 (4.6)
Bahrain	88 (0.1)	392 (1.6)	7 (0.2) ▲	7 (0.1)	418 (8.7)	-9 (0.2) ▼	5 (0.1)	483 (3.0)	2 (0.1) ▲
Bosnia and Herzegovina	97 (1.5)	455 (2.7)	0 0	3 (1.5)	475 (20.6)	0 0	0 (0.0)	~ ~	0 0
Botswana	r 2 (1.2)	~ ~	0 (1.9)	3 (1.4)	407 (35.9)	2 (1.8)	95 (1.8)	360 (2.5)	-2 (2.6)
Bulgaria	65 (3.8)	481 (6.0)	-4 (5.4)	18 (3.3)	444 (12.9)	-1 (4.8)	17 (3.1)	421 (11.7)	5 (4.1)
Chinese Taipei	40 (4.3)	603 (5.9)	-3 (6.1)	37 (4.5)	612 (6.4)	3 (6.1)	23 (3.9)	566 (9.4)	0 (5.2)
Colombia	99 (0.9)	381 (3.8)	0 0	1 (0.0)	~ ~	0 0	0 (0.0)	~ ~	0 0
Cyprus	89 (0.1)	465 (1.7)	-10 (0.1) ▼	10 (0.1)	463 (6.8)	10 (0.1) ▲	0 (0.0)	~ ~	-1 (0.1)
Czech Republic	98 (1.0)	504 (2.6)	0 0	2 (1.0)	~ ~	0 0	0 (0.0)	~ ~	0 0
Egypt	96 (1.2)	391 (3.7)	-4 (1.2) ▼	4 (1.2)	386 (16.4)	4 (1.2) ▲	0 (0.0)	~ ~	0 (0.0)
El Salvador	99 (0.6)	341 (2.8)	0 0	1 (0.7)	~ ~	0 0	0 (0.0)	~ ~	0 0
England	s 72 (4.1)	519 (6.3)	-10 (6.2)	22 (3.7)	506 (8.7)	7 (6.3)	6 (1.8)	491 (26.3)	3 (3.0)
Georgia	87 (4.2)	413 (5.7)	0 0	13 (4.2)	388 (20.0)	0 0	0 (0.0)	~ ~	0 0
Ghana	r 1 (1.0)	~ ~	1 (1.0)	1 (0.7)	~ ~	-1 (1.7)	98 (1.2)	309 (4.5)	0 (2.0)
Hong Kong SAR	89 (2.9)	576 (6.1)	-4 (3.7)	9 (2.6)	540 (24.7)	3 (3.4)	2 (1.3)	~ ~	1 (1.4)
Hungary	100 (0.0)	516 (3.7)	1 (0.8)	0 (0.0)	~ ~	-1 (0.8)	0 (0.0)	~ ~	0 (0.0)
Indonesia	31 (4.5)	417 (10.3)	15 (5.3) ▲	34 (4.4)	399 (10.0)	0 (6.1)	35 (4.8)	401 (8.7)	-16 (6.6) ▼
Iran, Islamic Rep. of	49 (3.7)	421 (6.1)	-3 (5.5)	12 (2.6)	414 (12.0)	0 (3.4)	38 (3.4)	379 (5.1)	4 (5.2)
Israel	77 (3.4)	466 (4.8)	1 (4.7)	20 (3.4)	470 (10.6)	-1 (4.7)	3 (1.5)	446 (42.5)	0 (2.0)
Italy	69 (3.0)	478 (3.9)	-8 (4.6)	27 (3.0)	487 (4.2)	10 (4.1) ▲	4 (1.6)	465 (20.0)	-2 (2.6)
Japan	100 (0.0)	570 (2.4)	0 (0.0)	0 (0.0)	~ ~	0 (0.0)	0 (0.0)	~ ~	0 (0.0)
Jordan	99 (0.7)	426 (4.2)	3 (1.4) ▲	1 (0.7)	~ ~	-2 (1.6)	0 (0.0)	~ ~	-1 (0.0)
Korea, Rep. of	100 (0.0)	597 (2.7)	1 (0.8)	0 (0.0)	~ ~	-1 (0.8)	0 (0.0)	~ ~	0 (0.0)
Kuwait	92 (2.2)	354 (2.5)	0 0	7 (2.0)	357 (9.7)	0 0	1 (0.8)	~ ~	0 0
Lebanon	r 12 (2.6)	467 (14.7)	0 (4.2)	5 (2.2)	442 (18.9)	-1 (3.2)	83 (3.3)	448 (5.2)	0 (5.0)
Lithuania	92 (1.8)	505 (2.5)	1 (3.0)	6 (1.8)	514 (7.8)	1 (2.6)	1 (1.1)	~ ~	-2 (1.8)
Malaysia	38 (3.2)	459 (10.1)	-6 (5.3)	34 (3.8)	488 (7.7)	5 (5.3)	28 (3.7)	478 (9.4)	1 (4.8)
Malta	11 (0.2)	495 (3.1)	0 0	5 (0.2)	463 (4.7)	0 0	84 (0.2)	490 (1.3)	0 0
Norway	82 (3.4)	470 (2.3)	-7 (4.2)	16 (3.4)	471 (4.7)	6 (4.2)	1 (0.9)	~ ~	1 (1.1)
Oman	96 (1.7)	372 (3.5)	0 0	4 (1.7)	375 (22.3)	0 0	0 (0.0)	~ ~	0 0
Palestinian Nat'l Auth.	99 (1.1)	367 (3.6)	-1 (1.1)	1 (1.1)	~ ~	1 (1.1)	0 (0.0)	~ ~	0 (0.0)
Qatar	88 (0.1)	310 (1.4)	0 0	5 (0.1)	311 (5.2)	0 0	7 (0.1)	311 (5.0)	0 0
Romania	86 (2.6)	463 (4.3)	-1 (3.6)	7 (1.8)	477 (15.4)	-1 (2.7)	7 (2.5)	435 (15.3)	2 (3.0)
Russian Federation	78 (3.6)	511 (4.7)	5 (5.8)	15 (2.7)	526 (9.4)	-3 (5.7)	7 (2.6)	493 (11.2)	-2 (3.7)
Saudi Arabia	90 (2.3)	329 (3.0)	--	9 (2.3)	328 (6.7)	--	1 (0.5)	~ ~	--
Scotland	s 95 (2.1)	488 (4.0)	3 (3.5)	5 (2.1)	463 (22.4)	-3 (3.5)	0 (0.0)	~ ~	0 (0.0)
Serbia	88 (2.9)	488 (3.2)	-5 (3.5)	10 (2.4)	476 (11.6)	3 (3.1)	2 (1.7)	~ ~	1 (1.8)
Singapore	7 (0.0)	649 (8.5)	--	18 (0.0)	623 (9.0)	--	74 (0.0)	579 (4.6)	--
Slovenia	76 (3.7)	503 (2.6)	7 (5.4)	23 (3.7)	498 (3.8)	-7 (5.3)	0 (0.0)	~ ~	0 (0.8)
Sweden	61 (4.3)	496 (2.7)	-1 (5.9)	33 (4.1)	487 (3.8)	0 (5.7)	6 (1.9)	468 (8.4)	1 (2.7)
Syrian Arab Republic	97 (1.1)	396 (3.9)	0 0	2 (1.1)	~ ~	0 0	1 (0.1)	~ ~	0 0
Thailand	85 (2.7)	446 (5.7)	0 0	6 (1.9)	403 (14.9)	0 0	9 (2.4)	423 (11.8)	0 0
Tunisia	85 (2.9)	421 (2.6)	4 (4.3)	12 (2.7)	422 (8.6)	5 (3.4)	3 (1.4)	404 (9.9)	-9 (2.8) ▼
Turkey	--	--	0 0	--	--	0 0	--	--	0 0
Ukraine	60 (2.9)	458 (5.1)	0 0	17 (2.8)	463 (8.8)	0 0	23 (2.9)	472 (5.8)	0 0
United States	68 (3.0)	516 (3.5)	-9 (4.3) ▼	22 (2.8)	494 (6.7)	6 (3.9)	9 (1.9)	483 (8.8)	4 (2.5)
‡ Morocco	65 (5.0)	380 (5.2)	--	18 (4.9)	395 (13.0)	--	16 (4.9)	373 (15.3)	--
<b>International Avg.</b>	<b>74 (0.4)</b>	<b>460 (0.7)</b>		<b>11 (0.4)</b>	<b>454 (2.2)</b>		<b>15 (0.3)</b>	<b>441 (2.9)</b>	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Basque Country, Spain	39 (4.2)	498 (4.8)	-9 (5.6)	37 (5.2)	497 (4.9)	7 (6.9)	24 (4.3)	500 (5.5)	2 (5.4)
British Columbia, Canada	50 (4.2)	496 (3.8)	0 0	35 (4.1)	531 (6.0)	0 0	15 (3.2)	516 (11.8)	0 0
Dubai, UAE	s 21 (0.5)	386 (8.4)	0 0	11 (0.3)	496 (4.5)	0 0	68 (0.6)	481 (3.5)	0 0
Massachusetts, US	76 (5.3)	561 (5.0)	0 0	16 (5.6)	516 (17.9)	0 0	8 (2.7)	479 (22.3)	0 0
Minnesota, US	79 (7.2)	540 (4.7)	0 0	17 (7.2)	510 (9.8)	0 0	5 (1.1)	470 (23.7)	0 0
Ontario, Canada	62 (4.3)	518 (4.1)	5 (6.6)	26 (3.8)	524 (5.9)	-6 (6.2)	12 (2.9)	518 (10.4)	2 (4.1)
Quebec, Canada	71 (4.1)	530 (3.6)	-4 (5.5)	24 (4.0)	530 (13.4)	4 (5.3)	5 (1.7)	516 (9.7)	0 (2.5)

Background data provided by schools.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

In many countries, there are schools that have high rates of absenteeism, which can disrupt continuity in the classroom and reduce time for learning. As previously shown in TIMSS, absenteeism is related to lower student achievement. To examine this issue, TIMSS developed an Index of Good Attendance at School (GAS) based on schools' responses to three questions about the seriousness of students' absenteeism, arriving late at school, and skipping class. As shown in Exhibit 8.3, schools at the high level of the index reported that all three behaviors never occur or are not a problem, while schools at the low level indicated that two or more of the behaviors were a serious problem or that one was a serious problem and the other two were minor problems. The medium category includes all other combinations of responses.

Exhibit 8.3 presents, for each TIMSS participant at the fourth and eighth grades, the percentage of students at each of the three levels of the good attendance at school index, together with average mathematics achievement. At the fourth grade, on average across countries, 43 percent of students were at the high level of the index, 50 at the medium level, and 7 percent at the low level. The countries with the highest percentages of students at the high index level (i.e., in schools with few attendance problems) included Chinese Taipei, Slovenia, the Czech Republic, Austria, the Netherlands, and Germany, with more than 60 percent of students at this level. Countries where absenteeism was reported to be more of a problem at the fourth grade included Morocco, Colombia, the United States, Yemen, El Salvador, Kuwait, and Qatar, with less than 30 percent of students at the high index level. Average mathematics achievement was highest among students at the high index level (478 points), next among those at the medium level (471 points), and lowest among those at the low level (432 points).

Attendance problems appear to be more serious at the eighth grade than at the fourth, with an average of 21 percent of students at the high index level compared with 43 percent at fourth grade, and 20 percent at the low level compared with just 7 percent at fourth grade. Countries with the greatest percentages of students (40% or more) in schools with few attendance

problems included Lebanon, Chinese Taipei, Oman, Korea, and Malta, while those with less than 10 percent of students in such schools included Norway, Indonesia, Kuwait, Morocco, Lithuania, Ghana, and Sweden. Similar to fourth grade, average mathematics achievement was highest (464 points) among students attending schools with few attendance problems (the high level of the index), next among students at the medium level (450 points), and lowest among students at the low level of the attendance index (436 points), i.e., those attending schools where students arriving late, absenteeism, and skipping class may be serious problems.

Exhibit 8.4 presents trends in the Index of Good Attendance at School (GAS), with changes since 2003 in the percentages of students at the high level of the index for fourth grade and changes since 1999 and 2003 at the eighth grade. At fourth grade, only one country, the Russian Federation, showed an increase in the percentage of students at the high level since 2003, with three countries, Hong Kong SAR, Italy, and Hungary, with a decrease. At eighth grade, seven countries showed an increase in the percentage of students at the high level of the attendance index since 1999 or 2003, or both. These were: Chinese Taipei, Korea, Israel, the Russian Federation, Bulgaria, Malaysia, and Botswana. Eight countries had a decrease over that period, including Lebanon, Egypt, Singapore, Italy, Iran, Bahrain, Cyprus, and Norway.

## Exhibit 8.3 Index of Good Attendance at School (GAS)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	High GAS		Medium GAS		Low GAS	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Chinese Taipei	77 (3.9)	577 (2.2)	23 (3.9)	574 (5.0)	0 (0.0)	~ ~
Slovenia	72 (3.7)	501 (2.2)	28 (3.6)	503 (3.7)	1 (0.7)	~ ~
Czech Republic	71 (3.9)	489 (2.8)	28 (3.8)	481 (6.7)	1 (0.8)	~ ~
Austria	71 (3.0)	507 (2.2)	29 (3.0)	500 (3.8)	0 (0.0)	~ ~
Netherlands	r 66 (4.1)	540 (2.2)	33 (4.0)	521 (5.9)	1 (0.0)	~ ~
Germany	63 (3.5)	537 (2.1)	33 (3.5)	509 (4.6)	4 (1.2)	487 (13.3)
Singapore	57 (0.0)	602 (5.2)	42 (0.0)	597 (5.0)	0 (0.0)	~ ~
Sweden	56 (4.4)	506 (3.0)	42 (4.4)	498 (4.0)	1 (0.8)	~ ~
Latvia	53 (4.5)	540 (3.1)	46 (4.4)	535 (3.6)	1 (1.0)	~ ~
Scotland	51 (4.0)	508 (3.7)	45 (4.2)	485 (3.8)	4 (1.8)	435 (9.6)
Norway	51 (4.5)	476 (3.6)	48 (4.5)	469 (3.9)	1 (0.0)	~ ~
Hong Kong SAR	50 (4.5)	607 (4.3)	49 (4.4)	606 (5.2)	1 (0.0)	~ ~
Lithuania	49 (4.0)	524 (3.8)	46 (4.1)	533 (4.2)	4 (1.6)	562 (11.2)
Algeria	49 (4.6)	362 (9.0)	47 (4.5)	388 (6.8)	4 (1.7)	414 (17.8)
Japan	48 (3.6)	567 (2.7)	42 (3.6)	570 (3.4)	10 (2.1)	565 (6.6)
Denmark	47 (5.2)	529 (4.1)	45 (5.1)	520 (3.1)	7 (2.3)	505 (9.2)
Ukraine	46 (4.1)	476 (4.2)	51 (4.2)	462 (5.1)	3 (1.5)	470 (15.6)
Italy	42 (3.7)	509 (3.9)	48 (4.0)	505 (5.1)	9 (2.3)	505 (11.9)
Tunisia	42 (4.3)	325 (7.6)	47 (4.7)	336 (8.3)	11 (2.5)	274 (17.3)
Iran, Islamic Rep. of	39 (4.0)	413 (6.7)	60 (3.9)	396 (5.4)	1 (1.0)	~ ~
Russian Federation	39 (3.6)	550 (6.6)	58 (3.0)	540 (5.6)	3 (2.1)	541 (12.8)
Armenia	37 (3.9)	497 (6.1)	50 (4.0)	504 (7.4)	12 (2.4)	490 (10.4)
New Zealand	37 (3.4)	518 (3.5)	58 (3.5)	482 (3.3)	5 (1.4)	443 (11.5)
England	34 (4.4)	556 (5.1)	61 (4.4)	536 (3.6)	4 (1.8)	503 (9.4)
Kazakhstan	34 (4.4)	561 (8.9)	65 (4.4)	544 (10.1)	1 (0.8)	~ ~
Hungary	33 (4.1)	524 (6.8)	55 (4.7)	512 (5.9)	12 (3.3)	464 (10.5)
Slovak Republic	32 (3.6)	503 (4.7)	54 (4.3)	493 (7.3)	14 (2.7)	493 (9.6)
Australia	31 (4.3)	521 (6.5)	65 (4.1)	517 (4.3)	4 (1.4)	457 (14.2)
Georgia	30 (4.0)	441 (8.2)	62 (4.2)	438 (5.9)	8 (2.7)	441 (15.3)
Morocco	r 29 (4.1)	349 (11.6)	55 (4.4)	331 (5.9)	16 (3.0)	343 (16.1)
Colombia	28 (4.8)	372 (11.3)	40 (5.6)	356 (8.5)	33 (4.8)	345 (8.9)
United States	21 (3.0)	549 (5.3)	71 (3.4)	527 (3.4)	8 (1.8)	497 (5.8)
Yemen	21 (4.2)	214 (13.8)	64 (5.2)	228 (7.5)	15 (3.7)	211 (18.0)
El Salvador	11 (2.7)	354 (23.1)	67 (3.9)	332 (5.1)	22 (3.8)	317 (8.5)
Kuwait	11 (2.8)	308 (13.8)	63 (4.0)	325 (5.4)	26 (3.4)	297 (9.8)
Qatar	9 (0.1)	297 (3.5)	84 (0.1)	296 (1.4)	7 (0.1)	300 (4.8)
International Avg.	43 (0.6)	478 (1.2)	50 (0.7)	471 (1.0)	7 (0.3)	432 (2.5)
<b>Benchmarking Participants</b>						
Dubai, UAE	r 47 (0.4)	451 (1.9)	48 (0.4)	426 (4.7)	6 (0.2)	504 (6.7)
Minnesota, US	46 (8.9)	567 (13.1)	54 (8.9)	546 (5.8)	0 (0.0)	~ ~
Alberta, Canada	42 (4.5)	509 (3.0)	53 (4.4)	503 (4.9)	5 (1.8)	487 (11.2)
Ontario, Canada	42 (5.1)	517 (4.6)	51 (5.2)	513 (5.3)	8 (2.9)	473 (15.7)
Quebec, Canada	37 (4.1)	525 (4.4)	60 (4.1)	514 (4.4)	3 (1.3)	495 (9.1)
Massachusetts, US	37 (8.8)	575 (8.0)	61 (8.9)	573 (4.5)	3 (0.2)	525 (4.6)
British Columbia, Canada	27 (4.3)	520 (5.6)	67 (4.5)	501 (3.3)	6 (2.2)	476 (13.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' responses to three questions about the seriousness of attendance problems in the school: arriving late at school; absenteeism (i.e., unjustified absences); and skipping class. High level indicates that all three behaviors either never occur or are reported not to be a problem. Low level indicates that two or more behaviors are reported to be a serious problem, or two behaviors are reported to be minor problems and the third is reported to be a serious problem. Medium level includes all other possible combinations of responses.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

## Exhibit 8.3 Index of Good Attendance at School (GAS) (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High GAS		Medium GAS		Low GAS	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Lebanon	52 (5.1)	454 (6.4)	42 (5.2)	447 (8.5)	5 (1.6)	434 (15.4)
Chinese Taipei	52 (4.0)	603 (6.5)	42 (4.0)	596 (6.1)	5 (1.9)	577 (9.6)
Oman	50 (4.3)	374 (5.1)	42 (4.8)	379 (6.2)	9 (2.6)	350 (17.8)
Korea, Rep. of	49 (4.3)	599 (3.7)	42 (4.4)	594 (3.9)	9 (1.8)	598 (8.4)
Malta	43 (0.2)	528 (1.6)	47 (0.2)	458 (1.5)	10 (0.2)	440 (3.8)
Czech Republic	36 (4.2)	520 (5.9)	53 (4.4)	497 (3.4)	11 (2.9)	483 (5.4)
Egypt	34 (4.0)	402 (6.0)	53 (4.1)	386 (6.1)	13 (2.7)	372 (8.9)
Armenia	30 (3.7)	495 (5.0)	56 (4.1)	501 (5.8)	14 (2.6)	498 (5.5)
Hong Kong SAR	30 (4.1)	611 (8.2)	60 (4.7)	560 (7.5)	10 (3.0)	500 (24.2)
Jordan	30 (3.8)	433 (9.3)	52 (4.3)	429 (6.3)	18 (3.3)	408 (11.8)
Singapore	30 (0.0)	629 (6.4)	66 (0.0)	580 (5.0)	4 (0.0)	535 (28.4)
Italy	28 (3.5)	483 (4.9)	56 (4.0)	479 (4.1)	15 (2.7)	474 (8.4)
Slovenia	28 (3.7)	498 (4.9)	54 (4.1)	506 (2.9)	19 (3.2)	497 (4.5)
Bosnia and Herzegovina	28 (3.6)	455 (4.2)	61 (4.2)	457 (3.8)	11 (2.7)	449 (11.0)
Hungary	26 (3.6)	527 (9.2)	55 (4.6)	520 (5.3)	19 (3.7)	493 (8.1)
Iran, Islamic Rep. of	25 (3.3)	410 (7.1)	72 (3.4)	401 (5.4)	3 (1.3)	403 (8.3)
Turkey	25 (3.8)	447 (11.3)	53 (5.1)	435 (7.8)	22 (3.5)	408 (11.6)
Algeria	23 (3.4)	389 (4.4)	56 (4.5)	385 (2.8)	21 (3.9)	391 (3.7)
England	23 (3.1)	555 (10.2)	65 (4.0)	507 (6.1)	12 (2.8)	481 (13.0)
Ukraine	23 (3.5)	470 (7.3)	65 (4.1)	464 (4.5)	12 (3.0)	437 (8.9)
Israel	21 (3.2)	467 (9.7)	55 (4.8)	469 (6.2)	24 (4.0)	458 (10.4)
Palestinian Nat'l Auth.	21 (3.3)	380 (7.9)	65 (4.0)	372 (4.9)	14 (2.5)	331 (11.0)
Romania	18 (2.7)	476 (11.3)	52 (3.8)	471 (5.8)	30 (4.1)	440 (8.9)
Australia	18 (2.8)	547 (10.1)	65 (3.7)	495 (5.2)	16 (2.7)	448 (7.5)
Syrian Arab Republic	17 (3.6)	384 (10.4)	64 (4.9)	396 (5.4)	19 (3.3)	399 (7.6)
Russian Federation	17 (2.8)	530 (8.9)	63 (3.1)	512 (4.9)	20 (3.0)	495 (6.7)
Bulgaria	17 (3.0)	492 (10.3)	44 (3.9)	470 (7.7)	39 (4.0)	445 (9.3)
Malaysia	17 (2.8)	503 (12.2)	68 (3.2)	471 (5.7)	15 (2.8)	455 (12.8)
Bahrain	17 (0.2)	412 (3.8)	64 (0.3)	398 (2.1)	20 (0.2)	384 (2.6)
Serbia	16 (3.6)	496 (6.4)	55 (4.4)	483 (4.4)	29 (3.6)	485 (7.4)
Colombia	15 (3.2)	400 (10.3)	38 (4.8)	384 (5.8)	47 (4.2)	369 (6.2)
United States	15 (2.5)	519 (5.9)	66 (3.6)	514 (4.2)	19 (2.8)	481 (6.4)
Scotland	15 (2.9)	514 (15.9)	78 (3.3)	485 (4.9)	7 (1.8)	461 (20.0)
Saudi Arabia	14 (3.1)	315 (8.2)	65 (3.8)	330 (3.8)	21 (3.1)	336 (6.5)
Thailand	14 (2.7)	459 (14.9)	68 (3.7)	438 (6.5)	18 (3.5)	441 (12.9)
Tunisia	14 (2.9)	421 (6.1)	63 (4.0)	422 (3.1)	23 (3.7)	415 (4.6)
Qatar	13 (0.1)	326 (3.9)	64 (0.2)	290 (1.7)	23 (0.2)	323 (2.5)
Botswana	13 (2.7)	381 (7.6)	61 (3.9)	367 (3.2)	27 (3.5)	346 (4.4)
Japan	11 (2.5)	572 (8.2)	49 (4.5)	581 (4.1)	40 (3.9)	556 (4.4)
El Salvador	11 (2.3)	357 (9.0)	67 (4.1)	341 (3.7)	22 (3.8)	331 (7.0)
Cyprus	11 (0.1)	462 (3.8)	73 (0.2)	466 (1.9)	16 (0.2)	462 (5.2)
Georgia	10 (3.1)	391 (24.4)	69 (4.9)	408 (7.0)	21 (4.2)	417 (8.9)
Norway	8 (2.1)	478 (6.5)	73 (4.0)	470 (2.3)	19 (3.6)	465 (4.6)
Indonesia	7 (2.2)	432 (17.2)	57 (4.8)	405 (6.2)	36 (4.3)	376 (8.8)
Kuwait	7 (2.7)	366 (9.4)	57 (4.8)	351 (3.9)	36 (4.3)	355 (5.1)
Lithuania	6 (2.0)	493 (10.1)	44 (4.3)	507 (4.2)	50 (4.4)	506 (4.0)
Ghana	5 (2.0)	354 (45.8)	71 (4.2)	313 (5.2)	24 (4.0)	290 (11.1)
Sweden	4 (1.6)	519 (13.9)	58 (4.0)	492 (2.8)	38 (3.9)	487 (3.6)
‡ Morocco	7 (2.5)	432 (20.3)	50 (6.5)	373 (5.4)	43 (6.3)	377 (5.6)
International Avg.	21 (0.4)	464 (1.7)	58 (0.6)	450 (0.8)	20 (0.5)	436 (1.6)
<b>Benchmarking Participants</b>						
Basque Country, Spain	28 (4.7)	505 (7.0)	63 (5.3)	499 (3.8)	9 (2.6)	482 (10.1)
Minnesota, US	27 (7.7)	526 (5.9)	71 (7.7)	537 (5.1)	2 (1.2)	~ ~
Dubai, UAE	24 (0.6)	480 (3.7)	65 (0.7)	452 (4.2)	11 (0.3)	502 (5.2)
Ontario, Canada	18 (3.7)	526 (8.0)	72 (4.3)	521 (3.4)	10 (2.9)	500 (12.4)
Quebec, Canada	17 (3.3)	567 (10.8)	75 (4.5)	527 (5.2)	25 (3.8)	506 (7.2)
Massachusetts, US	16 (5.5)	557 (18.6)	75 (6.6)	549 (6.4)	9 (4.5)	502 (16.3)
British Columbia, Canada	13 (3.6)	525 (10.8)	68 (4.4)	517 (4.0)	19 (3.4)	482 (8.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' responses to three questions about the seriousness of attendance problems in the school: arriving late at school; absenteeism (i.e., unjustified absences); and skipping class. High level indicates that all three behaviors either never occur or are reported not to be a problem. Low level indicates that two or more behaviors are reported to be a serious problem, or two behaviors are reported to be minor problems and the third is reported to be a serious problem. Medium level includes all other possible combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

(~) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

## Exhibit 8.4 High Index of Good Attendance at School (GAS) with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	High GAS	
	2007 Percent of Students	Difference in Percent from 2003
Chinese Taipei	77 (3.9)	-3 (5.2)
Slovenia	72 (3.7)	-9 (5.3)
Netherlands	r 66 (4.1)	-4 (5.8)
Singapore	57 (0.0)	-8 (4.3)
Latvia	53 (4.5)	7 (6.9)
Scotland	51 (4.0)	-2 (6.7)
Norway	51 (4.5)	-1 (6.2)
Hong Kong SAR	50 (4.5)	-14 (6.8) ▼
Lithuania	49 (4.0)	4 (5.8)
Japan	48 (3.6)	-4 (5.2) ▼
Italy	42 (3.7)	-30 (5.0) ▼
Tunisia	41 (4.3)	-5 (5.6)
Iran, Islamic Rep. of	39 (4.0)	-6 (6.1)
Russian Federation	39 (3.6)	10 (5.0) ▲
Armenia	r 37 (3.9)	4 (5.7)
New Zealand	37 (3.4)	2 (4.6)
England	r 34 (4.4)	-4 (6.6)
Hungary	33 (4.1)	-13 (5.8) ▼
Australia	31 (4.3)	-10 (6.1)
Morocco	r 29 (4.1)	-11 (6.3)
United States	21 (3.0)	0 (4.1)
International Avg.	46 (0.9)	
<b>Benchmarking Participants</b>		
Ontario, Canada	42 (5.1)	6 (6.7)
Quebec, Canada	37 (4.1)	-6 (5.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 percent significantly higher ▲

2007 percent significantly lower ▼

For a detailed definition of the GAS index, refer to Exhibit 8.3.  
Trend notes: Data for Tunisia do not include private schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Exhibit 8.4 High Index of Good Attendance at School (GAS) with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High GAS		
	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1999
Lebanon	52 (5.1)	-14 (6.6) ▼	0 0
Chinese Taipei	52 (4.0)	1 (5.6)	24 (5.4) ▲
Korea, Rep. of	49 (4.3)	-2 (5.7)	18 (5.7) ▲
Czech Republic	36 (4.2)	0 0	-2 (7.1)
Egypt	34 (4.0)	-12 (5.9) ▼	0 0
Armenia	r 30 (3.7)	10 (5.2)	0 0
Hong Kong SAR	30 (4.1)	3 (5.8)	5 (5.6)
Jordan	30 (3.8)	-5 (5.6)	-10 (5.7)
Singapore	30 (0.0)	-12 (0.0) ▼	-2 (4.1)
Italy	28 (3.5)	-28 (5.0) ▼	-6 (4.7)
Slovenia	28 (3.7)	-3 (5.5)	--
Hungary	26 (3.6)	-4 (5.3)	3 (5.1)
Iran, Islamic Rep. of	25 (3.3)	-12 (5.1) ▼	-15 (5.7) ▼
England	s 23 (3.1)	7 (5.2)	--
Israel	r 21 (3.2)	9 (4.4) ▲	15 (3.9) ▲
Palestinian Nat'l Auth.	21 (3.3)	-9 (4.9)	0 0
Romania	18 (2.7)	-3 (4.6)	4 (4.2)
Australia	18 (2.8)	-8 (5.3)	--
Russian Federation	17 (2.8)	8 (3.8) ▲	7 (3.3) ▲
Bulgaria	17 (3.0)	13 (3.3) ▲	-6 (6.4)
Malaysia	17 (2.8)	-1 (4.5)	11 (3.7) ▲
Bahrain	17 (0.2)	-9 (0.3) ▼	0 0
Serbia	16 (3.6)	0 (4.8)	0 0
United States	r 15 (2.5)	-3 (3.7)	-4 (3.9)
Scotland	s 15 (2.9)	0 (4.7)	0 0
Thailand	14 (2.7)	0 0	-4 (4.2)
Tunisia	14 (2.9)	-3 (4.3)	-2 (4.3)
Botswana	13 (2.7)	7 (3.3) ▲	0 0
Japan	11 (2.5)	-1 (3.4)	2 (3.3)
Cyprus	r 11 (0.1)	-11 (0.3) ▼	-8 (0.2) ▼
Indonesia	8 (2.7)	-1 (3.6)	-1 (3.7)
Norway	8 (2.1)	-12 (4.6) ▼	0 0
Lithuania	6 (2.0)	0 (2.9)	-6 (3.2)
Ghana	5 (2.0)	-3 (3.1)	0 0
Sweden	4 (1.6)	-3 (2.7)	0 0
<b>International Avg.</b>	<b>22 (0.5)</b>		
<b>Benchmarking Participants</b>			
Basque Country, Spain	28 (4.7)	3 (6.4)	0 0
Ontario, Canada	18 (3.7)	-5 (5.1)	-6 (5.6)
Quebec, Canada	17 (3.3)	0 (4.6)	10 (5.0)
Massachusetts, US	s 16 (5.5)	0 0	2 (7.5)
British Columbia, Canada	13 (3.6)	0 0	3 (5.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 percent significantly higher ▲  
2007 percent significantly lower ▼

For a detailed definition of the GAS index, refer to Exhibit 8.3.

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

### What Is the Role of the School Principal?

To provide information about roles and responsibilities of school principals, TIMSS asked principals how they shared their time across the competing demands of school-related activities. More specifically, principals were asked what percentage of their time they devote to administrative duties (hiring, budgeting, scheduling, meetings, etc.), instructional leadership (developing curriculum and pedagogy), supervising and evaluating teachers and other staff, public relations and fundraising, teaching, and other activities. Exhibit 8.5 presents principals' reports of the percentage of their time they spend on these activities, together with changes in the percentages since 2003, for both fourth and eighth grades.

As shown in the exhibit, school principals at both grades reported spending most time, on average across countries, on administrative duties (about 30% of time), instructional leadership (about 20%), and staff supervision and evaluation (about 20%). They reported spending about 10 percent of time on public relations and fundraising, and on teaching, and less than 10 percent on other activities. At fourth grade, there appears to be a growth in the administrative burden, with principals reporting an increase in the percentage of time spent on such duties in 11 countries and one benchmarking entity. Several of these countries showed a corresponding decrease in the percentage of time devoted to instructional leadership. Also, in six countries and one benchmarking entity, principals reported a decrease in the percentage of time spent teaching. Principals in Germany (39%) and Austria (26%) reported the highest percentage of time spent on teaching, and the lowest on teacher supervision and evaluation (7% and 8%, respectively).

At eighth grade, the increase in time spent on administrative duties is even more evident, with increased percentages since 2003 in 18 countries and 3 benchmarking entities, and decreases in just 4 countries. Similar to the fourth grade, several of these countries had a decrease in percentage of time spent on instructional leadership: in total, 9 countries and one



benchmarking entity had decreases, and just two countries showed increases. There also were increased percentages of time spent on teacher supervision and evaluation in 11 countries, with decreases in 6 countries.

Exhibit 8.5 Principals' Time Spent on Various School-related Activities with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Percent of Time					
	Administrative Duties (e.g., Hiring, Budgeting, Scheduling, Meetings)		Instructional Leadership (e.g., Developing Curriculum and Pedagogy)		Supervising and Evaluating Teachers and Other Staff	
	2007	Difference from 2003	2007	Difference from 2003	2007	Difference from 2003
Algeria	28 (1.9)	0 0	21 (1.0)	0 0	25 (1.1)	0 0
Armenia	r 25 (1.1)	-3 (1.7)	r 23 (0.8)	3 (1.1) ▲	r 22 (1.0)	-1 (1.6)
Australia	47 (1.2)	2 (2.2)	19 (0.8)	1 (1.2)	13 (0.5)	2 (0.8) ▲
Austria	40 (1.3)	0 0	13 (0.6)	0 0	8 (0.4)	0 0
Chinese Taipei	32 (1.5)	4 (1.8) ▲	25 (0.9)	-3 (1.3) ▼	15 (0.6)	-2 (1.0) ▼
Colombia	32 (1.5)	0 0	28 (1.3)	0 0	16 (0.8)	0 0
Czech Republic	41 (1.2)	0 0	18 (0.7)	0 0	10 (0.5)	0 0
Denmark	45 (1.7)	0 0	15 (0.9)	0 0	17 (0.8)	0 0
El Salvador	28 (1.1)	0 0	23 (0.8)	0 0	18 (0.7)	0 0
England	r 39 (1.3)	-2 (2.2)	r 20 (0.8)	2 (1.4)	r 16 (0.7)	4 (1.0) ▲
Georgia	23 (0.9)	0 0	25 (0.9)	0 0	19 (0.7)	0 0
Germany	28 (1.0)	0 0	13 (0.5)	0 0	7 (0.3)	0 0
Hong Kong SAR	41 (1.4)	3 (1.9)	24 (1.0)	0 (1.3)	18 (0.7)	0 (1.0)
Hungary	30 (1.1)	4 (1.8) ▲	19 (0.6)	-2 (1.0) ▼	17 (0.7)	-1 (1.1)
Iran, Islamic Rep. of	20 (1.1)	2 (1.4)	25 (1.0)	-1 (1.6)	19 (0.7)	0 (0.9)
Italy	38 (1.1)	6 (1.5) ▲	27 (0.8)	-3 (1.1) ▼	16 (0.5)	-1 (0.8)
Japan	28 (1.0)	7 (1.3) ▲	23 (0.9)	-3 (1.2) ▼	22 (0.8)	2 (1.1)
Kazakhstan	21 (0.9)	0 0	23 (0.7)	0 0	26 (1.6)	0 0
Kuwait	s 19 (1.0)	0 0	s 12 (1.0)	0 0	s 42 (1.8)	0 0
Latvia	30 (1.1)	5 (1.7) ▲	22 (0.8)	-1 (1.1)	16 (0.6)	0 (0.9)
Lithuania	32 (1.1)	7 (1.6) ▲	22 (0.7)	-2 (1.1)	17 (0.6)	0 (0.9)
Morocco	r 27 (1.4)	1 (2.4)	r 17 (0.7)	-1 (1.2)	r 25 (1.0)	1 (1.7)
Netherlands	r 29 (1.4)	-2 (2.0)	r 28 (1.0)	3 (1.5) ▲	r 19 (0.8)	2 (1.4)
New Zealand	47 (1.1)	3 (1.8)	22 (0.7)	1 (1.2)	11 (0.5)	1 (0.7)
Norway	48 (1.3)	5 (2.0) ▲	26 (0.8)	1 (1.3)	10 (0.5)	0 (0.8)
Qatar	r 20 (0.0)	0 0	r 16 (0.0)	0 0	r 33 (0.1)	0 0
Russian Federation	21 (0.7)	-1 (1.1)	21 (0.6)	-1 (0.8)	25 (0.7)	4 (1.0) ▲
Scotland	38 (1.5)	5 (2.1) ▲	23 (1.1)	-1 (1.5)	13 (0.7)	-1 (1.1)
Singapore	37 (0.0)	10 (1.2) ▲	21 (0.0)	-2 (1.0) ▼	22 (0.0)	-3 (0.7) ▼
Slovak Republic	33 (1.1)	0 0	15 (0.5)	0 0	17 (0.6)	0 0
Slovenia	39 (1.3)	6 (1.7) ▲	28 (1.0)	-2 (1.4)	15 (0.5)	0 (0.8)
Sweden	41 (1.5)	0 0	25 (0.9)	0 0	23 (0.8)	0 0
Tunisia	26 (1.3)	-2 (1.9)	15 (0.9)	0 (1.2)	26 (1.3)	6 (1.6) ▲
Ukraine	18 (0.9)	0 0	21 (0.7)	0 0	25 (0.9)	0 0
United States	36 (1.3)	6 (1.8) ▲	26 (1.0)	0 (1.3)	23 (0.7)	-1 (1.1)
Yemen	19 (0.9)	0 0	13 (0.8)	0 0	31 (1.4)	0 0
International Avg.	32 (0.2)		21 (0.1)		19 (0.1)	
<b>Benchmarking Participants</b>						
Alberta, Canada	42 (1.6)	0 0	20 (1.0)	0 0	14 (0.7)	0 0
British Columbia, Canada	45 (1.4)	0 0	18 (0.9)	0 0	13 (0.7)	0 0
Dubai, UAE	r 30 (0.1)	0 0	r 25 (0.1)	0 0	r 24 (0.0)	0 0
Massachusetts, US	43 (3.1)	0 0	21 (1.4)	0 0	23 (2.0)	0 0
Minnesota, US	37 (2.4)	0 0	24 (2.0)	0 0	19 (1.5)	0 0
Ontario, Canada	41 (1.9)	4 (2.5)	23 (1.2)	1 (2.0)	16 (1.0)	-1 (1.3)
Quebec, Canada	51 (1.2)	11 (2.1) ▲	21 (0.9)	-3 (1.5)	14 (0.8)	0 (1.0)

▲ 2007 significantly higher

▼ 2007 significantly lower

Background data provided by schools.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

**Exhibit 8.5 Principals' Time Spent on Various School-related Activities with Trends (Continued)**

**TIMSS2007**  
**Mathematics 4<sup>th</sup> Grade**

Country	Percent of Time					
	Public Relations and Fundraising		Teaching		Other	
	2007	Difference from 2003	2007	Difference from 2003	2007	Difference from 2003
Algeria	9 (0.7)	0 0	7 (1.0)	0 0	10 (0.8)	0 0
Armenia	r 12 (0.6)	0 (1.0)	r 10 (0.7)	0 (1.0)	r 7 (0.8)	1 (1.0)
Australia	9 (0.6)	0 (0.9)	6 (0.6)	-1 (1.3)	r 7 (0.9)	-4 (1.5)
Austria	8 (0.4)	0 0	26 (1.9)	0 0	5 (0.5)	0 0
Chinese Taipei	12 (0.7)	3 (0.9) ▲	8 (0.8)	-1 (1.0)	8 (0.7)	0 (1.0)
Colombia	10 (0.8)	0 0	8 (0.8)	0 0	6 (0.6)	0 0
Czech Republic	9 (0.5)	0 0	15 (0.7)	0 0	7 (0.5)	0 0
Denmark	13 (0.6)	0 0	5 (0.7)	0 0	6 (0.9)	0 0
El Salvador	8 (0.5)	0 0	20 (1.1)	0 0	4 (0.3)	0 0
England	r 9 (0.5)	0 (1.3)	r 10 (0.9)	-2 (1.6)	r 7 (0.7)	-1 (1.2)
Georgia	13 (0.6)	0 0	15 (0.9)	0 0	5 (0.4)	0 0
Germany	7 (0.4)	0 0	39 (1.1)	0 0	6 (0.5)	0 0
Hong Kong SAR	8 (0.5)	-1 (0.8)	4 (0.7)	1 (0.9)	6 (0.5)	-2 (0.9)
Hungary	14 (0.7)	-1 (1.0)	14 (0.6)	0 (0.9)	7 (0.7)	0 (0.9)
Iran, Islamic Rep. of	13 (0.6)	0 (0.9)	12 (1.1)	-1 (1.8)	11 (0.6)	1 (0.9)
Italy	15 (0.7)	-1 (0.9)	2 (0.5)	0 (0.6)	2 (0.3)	-1 (0.6)
Japan	12 (0.6)	-3 (0.9) ▼	8 (0.7)	-2 (1.0)	7 (0.6)	-1 (0.8)
Kazakhstan	11 (0.6)	0 0	12 (0.7)	0 0	8 (0.4)	0 0
Kuwait	s 10 (0.7)	0 0	s 8 (1.2)	0 0	s 10 (0.8)	0 0
Latvia	15 (0.8)	1 (1.4)	12 (0.8)	-2 (1.3)	5 (0.6)	-3 (1.2)
Lithuania	11 (0.5)	-1 (0.8)	11 (0.5)	-4 (1.6) ▼	7 (0.6)	-1 (0.9)
Morocco	r 15 (0.7)	1 (1.1)	r 7 (0.6)	-1 (0.9)	r 10 (0.5)	0 (0.9)
Netherlands	r 8 (0.7)	2 (0.8) ▲	r 5 (1.1)	-7 (1.8) ▼	r 12 (0.9)	3 (1.2) ▲
New Zealand	8 (0.4)	-1 (0.7)	7 (0.5)	-4 (0.8) ▼	5 (0.6)	0 (0.8)
Norway	3 (0.4)	-3 (0.8) ▼	7 (1.0)	-3 (1.3) ▼	7 (0.8)	0 (1.0)
Qatar	r 10 (0.0)	0 0	r 11 (0.0)	0 0	r 10 (0.0)	0 0
Russian Federation	12 (0.4)	-1 (0.7) ▼	12 (0.6)	-2 (1.0) ▼	9 (0.5)	0 (0.7)
Scotland	10 (0.5)	-2 (0.9)	11 (1.1)	-1 (2.2)	r 6 (0.8)	-1 (1.1)
Singapore	11 (0.0)	-1 (0.6)	2 (0.0)	-2 (0.3) ▼	7 (0.0)	-2 (0.8) ▼
Slovak Republic	13 (0.5)	0 0	16 (0.8)	0 0	6 (0.4)	0 0
Slovenia	8 (0.4)	-2 (0.7) ▼	4 (0.4)	-1 (0.6)	5 (0.5)	-2 (1.0) ▼
Sweden	1 (0.3)	0 0	2 (0.5)	0 0	s 11 (1.3)	0 0
Tunisia	10 (0.5)	-2 (0.7) ▼	15 (1.0)	-2 (1.9)	9 (0.6)	0 (0.8)
Ukraine	12 (0.7)	0 0	15 (0.7)	0 0	8 (0.6)	0 0
United States	7 (0.3)	-2 (0.5) ▼	4 (0.4)	0 (0.6)	r 5 (0.7)	-2 (1.0) ▼
Yemen	10 (0.6)	0 0	16 (0.9)	0 0	11 (0.6)	0 0
<b>International Avg.</b>	<b>10 (0.1)</b>		<b>11 (0.1)</b>		<b>7 (0.1)</b>	
<b>Benchmarking Participants</b>						
Alberta, Canada	6 (0.4)	0 0	14 (1.3)	0 0	4 (0.6)	0 0
British Columbia, Canada	8 (0.5)	0 0	11 (1.0)	0 0	5 (0.8)	0 0
Dubai, UAE	r 8 (0.0)	0 0	r 4 (0.0)	0 0	s 11 (0.1)	0 0
Massachusetts, US	6 (0.6)	0 0	2 (0.5)	0 0	5 (2.3)	0 0
Minnesota, US	10 (1.6)	0 0	5 (1.1)	0 0	r 6 (1.3)	0 0
Ontario, Canada	9 (0.6)	-1 (1.0)	2 (0.4)	-3 (1.2) ▼	8 (1.6)	0 (2.1)
Quebec, Canada	7 (0.5)	0 (0.7)	2 (0.6)	-2 (1.1)	6 (0.7)	-6 (1.5) ▼

▲ 2007 significantly higher

▼ 2007 significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Exhibit 8.5 Principals' Time Spent on Various School-related Activities with Trends**  
**(Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	Percent of Time					
	Administrative Duties (e.g., Hiring, Budgeting, Scheduling, Meetings)		Instructional Leadership (e.g., Developing Curriculum and Pedagogy)		Supervising and Evaluating Teachers and Other Staff	
	2007	Difference from 2003	2007	Difference from 2003	2007	Difference from 2003
Algeria	30 (1.3)	∅ ∅	22 (1.1)	∅ ∅	23 (1.0)	∅ ∅
Armenia	r 24 (1.2)	-4 (1.8) ▼	r 24 (0.8)	3 (1.1) ▲	r 23 (1.0)	1 (1.7)
Australia	51 (1.3)	8 (2.1) ▲	16 (0.8)	-2 (1.2)	13 (0.7)	-2 (1.3)
Bahrain	29 (0.1)	8 (0.1) ▲	14 (0.0)	-10 (0.1) ▼	31 (0.1)	2 (0.1) ▲
Bosnia and Herzegovina	22 (1.0)	∅ ∅	24 (0.8)	∅ ∅	20 (0.8)	∅ ∅
Botswana	r 32 (1.4)	1 (2.0) r	r 20 (1.0)	-1 (1.4) r	r 26 (1.2)	0 (1.7)
Bulgaria	33 (1.4)	1 (1.9)	19 (0.8)	0 (1.2)	22 (1.1)	2 (1.3)
Chinese Taipei	34 (1.4)	6 (1.9) ▲	25 (1.0)	0 (1.4)	17 (0.8)	-2 (1.1) ▼
Colombia	35 (1.3)	∅ ∅	28 (0.9)	∅ ∅	17 (0.7)	∅ ∅
Cyprus	35 (0.1)	-7 (0.1) ▼	17 (0.1)	0 (0.1)	16 (0.0)	2 (0.1) ▲
Czech Republic	42 (1.3)	∅ ∅	19 (0.8)	∅ ∅	10 (0.5)	∅ ∅
Egypt	19 (0.8)	-1 (1.4)	14 (0.8)	-3 (1.0) ▼	32 (1.1)	7 (1.7) ▲
El Salvador	32 (1.1)	∅ ∅	23 (0.7)	∅ ∅	19 (0.7)	∅ ∅
England	s 36 (1.5)	3 (2.9) s	s 18 (0.9)	-2 (2.5) s	s 17 (0.8)	1 (1.7)
Georgia	23 (1.2)	∅ ∅	25 (1.0)	∅ ∅	19 (0.7)	∅ ∅
Ghana	24 (1.0)	4 (1.4) ▲	16 (0.6)	-1 (0.9)	27 (1.1)	-2 (2.0)
Hong Kong SAR	43 (1.3)	3 (1.8)	20 (0.6)	0 (1.0)	18 (0.7)	-3 (1.1) ▼
Hungary	31 (1.2)	4 (1.9) ▲	20 (0.7)	-1 (1.0)	16 (0.8)	-2 (1.1)
Indonesia	21 (0.9)	0 (1.2)	25 (0.9)	-2 (1.3)	25 (1.2)	4 (1.5) ▲
Iran, Islamic Rep. of	22 (0.9)	4 (1.1) ▲	25 (0.9)	-2 (1.4)	19 (0.6)	-4 (1.1) ▼
Israel	29 (1.2)	5 (1.6) ▲	23 (0.8)	-1 (1.3)	18 (0.6)	-1 (0.9)
Italy	35 (1.1)	6 (1.5) ▲	28 (0.7)	-2 (1.1) ▼	16 (0.6)	-1 (0.8)
Japan	29 (1.1)	6 (1.4) ▲	23 (0.7)	-3 (1.1) ▼	22 (0.7)	2 (1.0)
Jordan	21 (0.9)	-4 (1.4) ▼	17 (0.7)	-5 (1.1) ▼	30 (0.9)	7 (1.3) ▲
Korea, Rep. of	26 (1.2)	5 (1.7) ▲	26 (0.9)	-1 (1.5)	17 (0.8)	3 (1.0) ▲
Kuwait	r 23 (1.1)	∅ ∅ r	r 12 (0.9)	∅ ∅ r	r 38 (1.6)	∅ ∅
Lebanon	29 (1.7)	3 (2.2)	24 (0.9)	-1 (1.4)	23 (1.1)	0 (1.5)
Lithuania	31 (1.1)	4 (1.7) ▲	22 (0.7)	-3 (1.1) ▼	17 (0.7)	0 (0.8)
Malaysia	36 (1.1)	2 (1.6)	25 (1.0)	-1 (1.4)	17 (0.6)	0 (0.9)
Malta	45 (0.1)	∅ ∅	19 (0.0)	∅ ∅	18 (0.0)	∅ ∅
Norway	52 (1.3)	9 (2.0) ▲	25 (0.9)	0 (1.3)	10 (0.6)	0 (0.7)
Oman	19 (0.9)	∅ ∅	17 (0.7)	∅ ∅	33 (1.0)	∅ ∅
Palestinian Nat'l Auth.	22 (0.9)	-3 (1.6)	20 (0.7)	2 (0.9) ▲	29 (1.0)	4 (1.4) ▲
Qatar	r 19 (0.0)	∅ ∅ r	r 16 (0.0)	∅ ∅ r	r 32 (0.1)	∅ ∅
Romania	23 (1.0)	4 (1.4) ▲	19 (0.8)	-3 (1.2) ▼	20 (0.9)	3 (1.2) ▲
Russian Federation	22 (0.8)	-3 (1.1) ▼	22 (0.6)	1 (0.8)	24 (0.7)	5 (0.9) ▲
Saudi Arabia	21 (1.0)	--	11 (0.7)	--	35 (1.3)	--
Scotland	s 39 (1.6)	6 (2.5) ▲ s	s 21 (1.0)	-1 (1.7) s	s 14 (0.7)	-3 (1.2) ▼
Serbia	24 (1.0)	8 (1.3) ▲	23 (0.9)	-3 (1.3) ▼	19 (0.6)	5 (0.8) ▲
Singapore	38 (0.0)	11 (0.0) ▲	21 (0.0)	0 (0.0)	22 (0.0)	-6 (0.0) ▼
Slovenia	40 (1.3)	7 (1.7) ▲	27 (1.1)	-2 (1.5)	15 (0.5)	0 (0.7)
Sweden	42 (1.4)	3 (2.0)	23 (0.9)	2 (1.2)	21 (0.7)	-1 (1.3)
Syrian Arab Republic	23 (0.9)	∅ ∅	13 (0.9)	∅ ∅	30 (1.5)	∅ ∅
Thailand	34 (1.2)	∅ ∅	26 (1.0)	∅ ∅	15 (0.7)	∅ ∅
Tunisia	34 (1.2)	2 (1.7)	10 (0.7)	-2 (1.0) ▼	33 (1.2)	11 (1.4) ▲
Turkey	27 (1.4)	∅ ∅	17 (0.8)	∅ ∅	20 (0.9)	∅ ∅
Ukraine	19 (0.9)	∅ ∅	21 (0.7)	∅ ∅	25 (1.0)	∅ ∅
United States	r 39 (1.3)	8 (1.7) ▲ r	r 24 (1.0)	0 (1.2) r	r 21 (0.7)	-2 (1.0) ▼
‡ Morocco	34 (2.2)	--	12 (1.1)	--	19 (1.2)	--
International Avg.	30 (0.2)		20 (0.1)		22 (0.1)	
<b>Benchmarking Participants</b>						
Basque Country, Spain	32 (1.5)	5 (2.1) ▲	23 (0.8)	-3 (1.4) ▼	12 (0.9)	0 (1.1)
British Columbia, Canada	50 (1.6)	∅ ∅	19 (0.8)	∅ ∅	14 (0.9)	∅ ∅
Dubai, UAE	s 29 (0.2)	∅ ∅ s	s 22 (0.1)	∅ ∅ s	s 25 (0.1)	∅ ∅
Massachusetts, US	43 (2.3)	∅ ∅	22 (1.3)	∅ ∅	23 (1.5)	∅ ∅
Minnesota, US	50 (3.0)	∅ ∅	18 (1.8)	∅ ∅	16 (1.8)	∅ ∅
Ontario, Canada	42 (1.5)	5 (2.3) ▲	22 (1.3)	2 (1.7)	17 (1.1)	-1 (1.5)
Quebec, Canada	45 (1.7)	7 (2.8) ▲	22 (1.0)	-1 (1.6)	15 (0.7)	0 (1.2)

Background data provided by schools.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

▲ 2007 significantly higher

▼ 2007 significantly lower

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (∅) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Exhibit 8.5 Principals' Time Spent on Various School-related Activities with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	Percent of Time					
	Public Relations and Fundraising		Teaching		Other	
	2007	Difference from 2003	2007	Difference from 2003	2007	Difference from 2003
Algeria	9 (0.5)	0 (0)	10 (0.9)	0 (0)	8 (0.4)	0 (0)
Armenia	r 12 (0.6)	-1 (1.1)	r 10 (0.7)	0 (1.0)	r 7 (0.6)	1 (0.9)
Australia	11 (0.6)	-1 (0.9)	4 (0.6)	0 (0.8)	s 9 (0.9)	0 (1.3)
Bahrain	8 (0.0)	-2 (0.0) ▼	5 (0.0)	1 (0.0) ▲	12 (0.0)	1 (0.0) ▲
Bosnia and Herzegovina	14 (0.6)	0 (0)	11 (0.5)	0 (0)	8 (0.6)	0 (0)
Botswana	r 11 (0.5)	0 (0.7)	r 5 (0.7)	1 (0.9)	r 7 (0.8)	-1 (1.1)
Bulgaria	10 (0.4)	-2 (0.7) ▼	9 (0.5)	-1 (0.7)	7 (0.6)	1 (0.8)
Chinese Taipei	9 (0.6)	0 (0.8)	8 (1.0)	-4 (1.5) ▼	7 (0.6)	1 (0.7)
Colombia	9 (0.6)	0 (0)	6 (0.6)	0 (0)	6 (0.8)	0 (0)
Cyprus	13 (0.0)	3 (0.1) ▲	8 (0.0)	-1 (0.0) ▼	11 (0.0)	3 (0.1) ▲
Czech Republic	10 (0.6)	0 (0)	13 (0.6)	0 (0)	7 (0.6)	0 (0)
Egypt	12 (0.5)	-2 (0.7) ▼	13 (1.1)	0 (1.4)	10 (0.7)	-1 (0.9)
El Salvador	9 (0.5)	0 (0)	13 (1.1)	0 (0)	4 (0.4)	0 (0)
England	s 11 (0.5)	-2 (1.5)	s 7 (0.6)	-1 (1.9)	s 13 (1.1)	1 (2.4)
Georgia	13 (0.6)	0 (0)	15 (1.3)	0 (0)	5 (0.5)	0 (0)
Ghana	8 (0.4)	0 (0.5)	20 (1.7)	-1 (2.4)	5 (0.3)	0 (0.5)
Hong Kong SAR	10 (0.5)	0 (0.7)	4 (0.8)	1 (1.1)	r 7 (1.1)	0 (1.3)
Hungary	13 (0.8)	-1 (1.0)	14 (0.6)	0 (0.8)	7 (0.6)	0 (0.8)
Indonesia	11 (0.5)	0 (0.7)	11 (0.8)	-1 (1.0)	6 (0.4)	-1 (0.6)
Iran, Islamic Rep. of	15 (0.7)	0 (0.9)	6 (0.6)	0 (0.8)	13 (0.8)	2 (1.0)
Israel	10 (0.6)	0 (0.8)	14 (0.6)	0 (0.8)	7 (0.7)	-4 (1.3) ▼
Italy	15 (0.7)	-2 (1.0)	6 (0.7)	4 (0.7) ▲	0 (0.1)	-4 (0.7) ▼
Japan	12 (0.6)	-2 (0.9) ▼	7 (0.7)	-1 (1.0)	7 (0.6)	-2 (0.8) ▼
Jordan	11 (0.5)	-2 (0.8) ▼	11 (0.9)	3 (1.3) ▲	10 (0.5)	0 (0.7)
Korea, Rep. of	10 (0.5)	1 (0.9)	12 (1.0)	-9 (1.7) ▼	8 (0.5)	1 (0.7)
Kuwait	r 8 (0.6)	0 (0)	r 7 (1.1)	0 (0)	r 11 (0.6)	0 (0)
Lebanon	r 15 (1.0)	1 (1.2)	r 5 (1.0)	-1 (1.4)	r 5 (0.7)	-1 (1.0)
Lithuania	11 (0.5)	0 (0.7)	12 (0.5)	-1 (0.7)	8 (0.8)	0 (1.1)
Malaysia	7 (0.3)	-1 (0.5) ▼	11 (0.7)	1 (1.0)	5 (0.4)	-1 (0.7)
Malta	10 (0.0)	0 (0)	1 (0.0)	0 (0)	r 8 (0.0)	0 (0)
Norway	3 (0.4)	-3 (0.8) ▼	4 (0.6)	-3 (1.0) ▼	6 (0.7)	-3 (1.1) ▼
Oman	11 (0.5)	0 (0)	7 (0.9)	0 (0)	13 (0.7)	0 (0)
Palestinian Nat'l Auth.	11 (0.5)	-2 (0.7) ▼	6 (0.7)	-1 (1.0)	11 (0.6)	0 (0.8)
Qatar	r 9 (0.0)	0 (0)	r 13 (0.0)	0 (0)	r 11 (0.0)	0 (0)
Romania	10 (0.5)	-1 (0.7)	22 (1.7)	-3 (2.3)	6 (0.5)	0 (0.7)
Russian Federation	13 (0.6)	-1 (0.9)	12 (0.5)	-1 (0.8)	8 (0.4)	-1 (0.6)
Saudi Arabia	13 (0.7)	--	9 (1.3)	--	11 (0.9)	--
Scotland	s 11 (0.6)	-1 (1.0)	s 4 (0.7)	0 (0.8)	s 12 (1.3)	-2 (2.2)
Serbia	19 (0.8)	1 (1.3)	6 (0.6)	-11 (1.2) ▼	9 (0.6)	0 (0.8)
Singapore	10 (0.0)	-1 (0.0) ▼	2 (0.0)	-1 (0.0) ▼	6 (0.0)	-3 (0.0) ▼
Slovenia	8 (0.4)	-2 (0.6) ▼	4 (0.4)	0 (0.6)	5 (0.4)	-2 (0.8) ▼
Sweden	1 (0.2)	-1 (0.3) ▼	2 (0.4)	-1 (0.6)	s 15 (1.2)	-5 (2.0) ▼
Syrian Arab Republic	9 (0.5)	0 (0)	17 (1.0)	0 (0)	8 (0.5)	0 (0)
Thailand	10 (0.5)	0 (0)	10 (1.2)	0 (0)	5 (0.5)	0 (0)
Tunisia	9 (0.5)	-8 (0.9) ▼	5 (0.8)	-2 (1.1)	10 (0.5)	0 (0.7)
Turkey	18 (1.0)	0 (0)	12 (0.6)	0 (0)	7 (0.7)	0 (0)
Ukraine	12 (0.5)	0 (0)	14 (0.5)	0 (0)	8 (0.5)	0 (0)
United States	r 7 (0.4)	-2 (0.7) ▼	r 3 (0.4)	-1 (0.7)	s 8 (1.0)	-2 (1.5)
‡ Morocco	15 (1.2)	--	7 (1.8)	--	13 (2.0)	--
International Avg.	11 (0.1)		9 (0.1)		8 (0.1)	
<b>Benchmarking Participants</b>						
Basque Country, Spain	11 (0.8)	-2 (1.2)	16 (1.1)	-1 (1.6)	7 (0.9)	1 (1.1)
British Columbia, Canada	7 (0.5)	0 (0)	4 (0.7)	0 (0)	6 (0.9)	0 (0)
Dubai, UAE	s 8 (0.0)	0 (0)	s 6 (0.1)	0 (0)	s 10 (0.1)	0 (0)
Massachusetts, US	7 (0.7)	0 (0)	2 (0.6)	0 (0)	r 5 (1.0)	0 (0)
Minnesota, US	7 (0.8)	0 (0)	2 (0.6)	0 (0)	r 10 (2.6)	0 (0)
Ontario, Canada	10 (0.8)	-1 (1.0)	3 (0.5)	-2 (1.0) ▼	7 (1.4)	-2 (2.2)
Quebec, Canada	8 (0.6)	2 (0.8) ▲	1 (0.4)	0 (0.5)	10 (1.5)	-8 (2.7) ▼

▲ 2007 significantly higher

▼ 2007 significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

### **Do Schools Encourage Home Involvement?**

Parental support for and involvement in school activities is an essential aspect of school life in many countries, and is often seen as an important way to strengthen the link between home and school, and ultimately foster an enhanced educational experience. Exhibit 8.6 presents information supplied by TIMSS National Research Coordinators on whether there is a national policy on parental involvement in schools. It also shows the percentages of students, according to principals' reports, that their school does ask parents to be involved in school-related activities. Five specific activities are shown: attend special events (such as science fairs, concerts, sporting events), raise funds for the school, volunteer for school projects, programs, and trips, ensure that students complete their homework, and serve on school committees.

As shown in Exhibit 8.6, the majority of TIMSS participants at both grade levels have established policies of encouraging parental involvement in schools. Even where no written policy exists, there sometimes was an informal understanding that parental involvement should be encouraged. Almost universally, schools ask parents to ensure that their child completes his or her homework and to attend special events. At both grades, almost all students (90 percent or more) were in schools where these were the expectations. In almost every country and benchmarking entity also, most students attended schools that expected parents to volunteer for school projects, 84 percent at fourth grade and 75 percent at eighth grade, and serve on school committees, 71 and 67 percent, respectively. There was more variability among participants in expectations for parental involvement in fundraising for schools. For example, at fourth grade, more than 90 percent of students in Australia, England, New Zealand, Scotland, the Ukraine, the United States, and the states of Massachusetts and Minnesota were in schools where parents were asked to raise funds, but 10 percent or less in Japan, Kuwait, Norway, and Sweden. Similar variability was shown at eighth grade.



## Exhibit 8.6 Schools' Encouragement of Parental Involvement

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Have Policy to Encourage Parental Involvement in Schools	Percentages of Students Whose Schools Reported That They Ask Parents to Be Involved in the School-related Activity				
		Attend Special Events (e.g., Science Fair, Concert, Sporting Events)	Raise Funds for the School	Volunteer for School Projects, Programs, and Trips	Ensure That Their Child Completes His/Her Homework	Serve on School Committees (e.g., Select School Personnel, Review School Finances)
Algeria	●	82 (3.4)	41 (4.8)	58 (4.3)	88 (2.6)	31 (4.2)
Armenia	○	90 (2.8)	52 (4.1)	85 (3.2)	90 (2.7)	90 (2.6)
Australia	○	100 (0.5)	97 (1.3)	98 (1.0)	96 (1.8)	96 (1.6)
Austria	●	91 (1.8)	56 (3.6)	98 (0.9)	93 (2.0)	100 (0.0)
Chinese Taipei	●	95 (1.9)	38 (4.3)	88 (2.9)	99 (0.7)	92 (2.3)
Colombia	●	91 (3.1)	41 (5.2)	93 (2.4)	99 (1.3)	69 (4.2)
Czech Republic	○	62 (4.3)	41 (4.2)	80 (3.3)	96 (1.6)	61 (4.5)
Denmark	●	88 (3.7)	11 (3.1)	13 (3.0)	100 (0.0)	93 (2.7)
El Salvador	●	86 (3.3)	46 (4.6)	87 (3.2)	97 (1.5)	81 (3.6)
England	○	100 (0.5)	98 (1.5)	93 (2.0)	99 (1.0)	84 (3.1)
Georgia	●	87 (3.4)	61 (4.6)	93 (2.4)	95 (1.8)	82 (3.7)
Germany	●	98 (0.7)	68 (3.0)	99 (0.6)	95 (1.5)	97 (1.0)
Hong Kong SAR	●	94 (2.2)	78 (3.9)	97 (1.5)	95 (1.8)	63 (4.1)
Hungary	○	78 (3.9)	73 (4.0)	92 (2.6)	93 (2.3)	64 (4.4)
Iran, Islamic Rep. of	●	77 (3.2)	69 (3.4)	82 (2.8)	94 (1.8)	70 (3.5)
Italy	●	99 (0.8)	37 (3.8)	51 (4.1)	96 (1.5)	51 (3.9)
Japan	●	98 (1.2)	2 (1.3)	92 (2.3)	87 (2.7)	23 (3.6)
Kazakhstan	●	97 (1.4)	60 (5.4)	83 (4.5)	99 (0.9)	82 (4.1)
Kuwait	●	87 (3.1)	4 (1.7)	70 (4.1)	89 (2.6)	24 (3.5)
Latvia	○	97 (1.5)	48 (4.0)	81 (3.4)	82 (2.9)	71 (3.7)
Lithuania	●	99 (0.8)	74 (3.3)	96 (1.7)	96 (1.6)	88 (2.5)
Morocco	●	89 (2.5)	46 (4.0)	70 (3.5)	96 (1.5)	31 (3.6)
Netherlands	●	r 87 (3.5)	r 33 (3.9)	r 94 (2.9)	r 96 (2.5)	r 90 (3.2)
New Zealand	●	100 (0.0)	96 (1.3)	100 (0.0)	94 (1.5)	94 (1.6)
Norway	●	96 (1.7)	10 (2.7)	97 (1.1)	97 (1.6)	89 (2.4)
Qatar	○	94 (0.1)	26 (0.2)	75 (0.1)	91 (0.1)	25 (0.2)
Russian Federation	○	99 (0.6)	67 (3.1)	96 (1.4)	99 (0.7)	91 (2.5)
Scotland	●	100 (0.0)	100 (0.0)	98 (1.4)	100 (0.0)	95 (1.8)
Singapore	●	99 (0.0)	69 (0.0)	99 (0.0)	99 (0.0)	67 (0.0)
Slovak Republic	●	57 (3.9)	66 (3.4)	83 (3.2)	91 (2.3)	82 (3.2)
Slovenia	●	98 (1.3)	41 (4.3)	73 (4.2)	98 (1.2)	39 (4.2)
Sweden	●	91 (2.1)	3 (1.2)	86 (3.1)	99 (0.6)	65 (3.9)
Tunisia	○	70 (3.9)	62 (4.2)	74 (3.6)	94 (2.1)	44 (3.9)
Ukraine	●	97 (1.3)	95 (1.9)	90 (2.4)	96 (1.8)	89 (2.4)
United States	●	100 (0.3)	94 (1.6)	98 (0.9)	100 (0.4)	89 (2.1)
Yemen	●	65 (4.3)	45 (4.9)	67 (4.4)	93 (2.1)	50 (4.8)
International Avg.		90 (0.4)	54 (0.6)	84 (0.5)	95 (0.3)	71 (0.5)
<b>Benchmarking Participants</b>						
Alberta, Canada	○	96 (1.6)	77 (3.6)	94 (2.0)	99 (1.0)	66 (3.9)
British Columbia, Canada	●	94 (2.3)	88 (3.1)	92 (2.7)	99 (0.9)	75 (4.3)
Dubai, UAE	○	r 96 (0.1)	r 38 (0.4)	r 61 (0.4)	r 100 (0.0)	r 27 (0.3)
Massachusetts, US	●	100 (0.0)	97 (2.2)	100 (0.0)	100 (0.0)	94 (4.0)
Minnesota, US	○	100 (0.0)	93 (3.9)	100 (0.3)	100 (0.3)	84 (7.0)
Ontario, Canada	●	95 (2.2)	88 (3.6)	96 (2.1)	96 (2.5)	69 (5.1)
Quebec, Canada	●	99 (0.9)	88 (2.6)	97 (2.4)	99 (0.8)	75 (3.7)

● Yes ○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by schools.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Note: In some countries, schools are not permitted to ask parents to raise funds or serve on school committees.

TIMSS & PIRLS  
International Study Center  
Lynch School of Education, Boston College



Exhibit 8.6 Schools' Encouragement of Parental Involvement (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Have Policy to Encourage Parental Involvement in Schools	Percentages of Students Whose Schools Reported That They Ask Parents to Be Involved in the School-related Activity				
		Attend Special Events (e.g., Science Fair, Concert, Sporting Events)	Raise Funds for the School	Volunteer for School Projects, Programs, and Trips	Ensure That Their Child Completes His/Her Homework	Serve on School Committees (e.g., Select School Personnel, Review School Finances)
Algeria	●	84 (3.5)	37 (3.8)	56 (4.3)	85 (3.1)	48 (4.0)
Armenia	○	91 (2.5)	53 (4.0)	84 (3.5)	91 (2.7)	90 (2.8)
Australia	○	96 (1.8)	71 (4.0)	77 (3.1)	97 (1.3)	97 (1.2)
Bahrain	●	92 (0.1)	31 (0.2)	64 (0.2)	97 (0.2)	32 (0.3)
Bosnia and Herzegovina	●	84 (2.9)	52 (3.7)	92 (2.3)	92 (2.3)	91 (2.1)
Botswana	○	82 (3.3)	99 (0.7)	76 (3.6)	88 (2.9)	89 (2.3)
Bulgaria	○	95 (1.3)	62 (3.5)	70 (3.8)	83 (3.1)	63 (4.2)
Chinese Taipei	●	90 (2.4)	38 (3.9)	77 (3.7)	98 (1.2)	83 (3.1)
Colombia	●	93 (2.2)	31 (4.5)	90 (2.9)	98 (1.5)	63 (4.4)
Cyprus	●	93 (0.1)	74 (0.2)	51 (0.3)	95 (0.1)	79 (0.2)
Czech Republic	○	58 (3.8)	40 (3.7)	76 (3.9)	95 (1.9)	70 (4.1)
Egypt	○	94 (2.0)	56 (4.2)	81 (3.1)	94 (1.7)	65 (4.1)
El Salvador	●	94 (1.9)	44 (4.6)	89 (2.8)	93 (2.2)	81 (3.4)
England	○	99 (1.1)	67 (4.3)	61 (4.5)	99 (1.0)	71 (4.2)
Georgia	●	89 (2.7)	64 (5.1)	89 (2.8)	99 (0.8)	90 (2.3)
Ghana	●	82 (3.3)	66 (4.2)	62 (4.0)	79 (3.2)	95 (1.8)
Hong Kong SAR	●	92 (2.6)	66 (4.6)	83 (3.6)	91 (2.7)	60 (4.0)
Hungary	○	75 (3.7)	77 (3.0)	91 (2.8)	94 (2.2)	62 (4.5)
Indonesia	●	77 (3.7)	71 (4.0)	54 (4.3)	97 (1.6)	80 (3.4)
Iran, Islamic Rep. of	●	72 (3.4)	70 (3.4)	77 (3.5)	89 (2.3)	63 (3.8)
Israel	●	91 (2.5)	33 (4.2)	83 (3.0)	86 (3.0)	56 (4.4)
Italy	●	96 (1.5)	27 (3.3)	47 (3.8)	96 (1.5)	51 (4.3)
Japan	●	100 (0.0)	13 (3.0)	74 (3.9)	78 (3.6)	29 (3.8)
Jordan	●	96 (1.7)	33 (3.5)	78 (3.6)	95 (1.8)	46 (4.0)
Korea, Rep. of	●	93 (2.2)	11 (2.2)	51 (3.9)	60 (4.0)	92 (2.0)
Kuwait	●	79 (3.2)	9 (2.5)	65 (4.2)	90 (2.4)	28 (4.5)
Lebanon	○	79 (4.0)	46 (4.9)	52 (3.8)	91 (2.8)	73 (4.6)
Lithuania	●	99 (0.7)	74 (3.6)	98 (1.1)	97 (1.3)	85 (2.7)
Malaysia	●	98 (1.2)	85 (3.0)	77 (3.5)	92 (2.5)	57 (3.8)
Malta	●	99 (0.0)	74 (0.2)	58 (0.2)	100 (0.0)	75 (0.2)
Norway	●	90 (2.6)	18 (3.8)	90 (3.0)	92 (2.5)	91 (2.4)
Oman	●	98 (1.1)	24 (3.8)	85 (2.9)	94 (1.8)	21 (3.6)
Palestinian Nat'l Auth.	○	100 (0.0)	38 (3.8)	80 (3.2)	99 (0.9)	19 (3.3)
Qatar	○	91 (0.1)	28 (0.1)	75 (0.1)	94 (0.1)	30 (0.1)
Romania	○	78 (3.6)	49 (4.2)	85 (2.7)	99 (1.0)	68 (4.5)
Russian Federation	○	98 (1.1)	69 (3.9)	95 (1.8)	88 (2.9)	92 (2.0)
Saudi Arabia	●	96 (1.6)	16 (3.3)	44 (4.2)	97 (1.4)	93 (1.9)
Scotland	●	99 (0.9)	79 (4.1)	53 (5.0)	99 (1.0)	85 (3.8)
Serbia	○	77 (4.2)	72 (3.9)	83 (3.2)	97 (1.5)	96 (1.6)
Singapore	●	98 (0.0)	69 (0.0)	96 (0.0)	91 (0.0)	63 (0.0)
Slovenia	●	98 (1.2)	44 (4.4)	70 (4.2)	96 (1.7)	38 (4.1)
Sweden	●	85 (3.1)	10 (2.4)	74 (3.6)	96 (1.5)	68 (4.2)
Syrian Arab Republic	●	91 (2.6)	14 (2.9)	80 (3.4)	98 (1.2)	52 (4.6)
Thailand	●	95 (1.8)	92 (2.1)	78 (3.2)	89 (2.6)	77 (3.3)
Tunisia	○	79 (3.2)	36 (4.1)	60 (3.5)	97 (1.4)	21 (3.7)
Turkey	●	80 (3.2)	81 (3.1)	80 (3.3)	59 (4.5)	62 (4.1)
Ukraine	●	97 (1.5)	91 (2.6)	86 (2.7)	93 (2.3)	90 (2.6)
United States	●	99 (0.8)	82 (2.6)	97 (1.3)	98 (0.9)	89 (2.5)
‡ Morocco	●	95 (1.9)	35 (4.0)	87 (2.3)	69 (4.0)	65 (5.6)
International Avg.		90 (0.3)	51 (0.5)	75 (0.5)	92 (0.3)	67 (0.5)
<b>Benchmarking Participants</b>						
Basque Country, Spain	●	85 (2.6)	34 (5.0)	79 (4.3)	92 (2.6)	95 (2.1)
British Columbia, Canada	●	94 (2.1)	57 (4.4)	78 (3.3)	94 (1.7)	83 (3.6)
Dubai, UAE	○	r 100 (0.0)	r 35 (0.7)	s 66 (0.7)	r 100 (0.0)	r 24 (0.8)
Massachusetts, US	●	99 (1.2)	93 (3.5)	94 (3.8)	98 (2.4)	93 (3.8)
Minnesota, US	○	98 (1.8)	71 (7.0)	99 (0.7)	99 (0.6)	84 (4.9)
Ontario, Canada	●	92 (2.8)	82 (3.9)	91 (2.7)	99 (0.8)	62 (4.9)
Quebec, Canada	●	97 (1.4)	66 (4.8)	59 (4.6)	97 (1.3)	73 (4.3)

● Yes ○ No

Background data provided by National Research Coordinators and by schools.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Note: In some countries, schools are not permitted to ask parents to raise funds or serve on school committees.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

### What School Resources Are Available to Support School Learning?

To provide information about the level of school resources available to schools for mathematics instruction and in particular about the impact of shortages of important resources, TIMSS created an index based on principals' responses to questions about shortages affecting schools' general capacity to provide instruction, and to provide mathematics instruction in particular. To create the Index of Availability of School Resources for Mathematics Instruction (ASRMI), principals were asked the degree to which shortages or inadequacies in five areas affected their school's general capacity to provide instruction: instructional materials (textbooks, for example); budget for supplies (paper, pencils, etc.); school buildings and grounds; heating/cooling and lighting systems; and instructional space (classrooms, for example). They also responded to five questions about shortages affecting mathematics instruction: computers for mathematics instruction; computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; and audio-visual resources. Responses were coded on a four-point scale: *1 = none*, *2 = a little*, *3 = some*, and *4 = a lot*, and averages calculated across the five general questions and the five mathematics instruction questions for each principal. Students were assigned to one of three levels of the index on the basis of their school principals' average responses. The high level of the index indicates that both averages were lower than 2, and the low level that both averages were at least 3. The medium level includes all other possible combinations.

Exhibit 8.7 displays the percentage of students at the high, medium, and low levels of the Index of Availability of School Resources for Mathematics Instruction Index for each TIMSS participant, at both fourth and eighth grades, together with average mathematics achievement.

At fourth grade, 36 percent of students, internationally, were at the high level of the index, where principals reported that resource shortages did not adversely effect instruction. A further 55 percent of the students were at the medium level and just 9 percent at the low index level. There was considerable variation across countries, however, with the majority

of students in Singapore (84%), Austria (73%), the Czech Republic (65%), Scotland (61%), Slovenia (61%), Japan (58%), Australia (57%), Hong Kong SAR (57%), Germany (56%), New Zealand (55%), England (53%), Hungary (51%), and Denmark (50%) as well as the benchmarking participants Dubai (79%) and Quebec (51%) at the high level, for example, and less than 10 percent in Colombia, Yemen, Morocco, Tunisia, and Algeria. Average mathematics achievement was highest among students at the high index level (480 points), next at the medium level (472 points), and lowest at the low level of the index (429 points).

At eighth grade, the situation was similar, with 27 percent of students at the high level, 62 percent at the medium level, and 10 percent at the low level. Again there were large differences between countries, with the majority of students at the high index level in Singapore (91%), Hong Kong SAR (70%), Slovenia (63%), the Czech Republic (62%), Australia (55%), Malta (54%), the United States (51%), and Japan (51%) and in benchmarking participants Dubai (72%), the Basque Country (69%), British Columbia (57%), and Quebec (53%). In contrast, there was less than 10 percent in Saudi Arabia, Turkey, Georgia, Bosnia and Herzegovina, Indonesia, Tunisia, Botswana, and Morocco. Students at the high level of the index had highest average mathematics achievement (464 points), followed by students at the medium level (449 points) and then by students at the low level (420 points).

For countries that participated in previous cycles of TIMSS, Exhibit 8.8 presents changes in the percentage of students at the high level of the Index of Availability of School Resources for Mathematics Instruction (ASRMI). At fourth grade, changes are shown since 1995 and 2003 for participants in those assessments. TIMSS participants showing an increase since 1995 in percentage of students at the high level included Singapore, the Czech Republic, Slovenia, Japan, Australia, Hong Kong SAR, New Zealand, England, Hungary, the United States, Latvia, and among benchmarking participants, the provinces of Alberta and Ontario, and the state of Minnesota. No country had a significant decrease since 1995. At the eighth grade, Exhibit 8.8 presents changes in percentages from three earlier cycles of TIMSS—1995, 1999, and 2003. Almost all participants showed an increase in 2007 compared to

**Exhibit 8.7 Index of Availability of School Resources for Mathematics Instruction (ASRMI)**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High ASRMI		Medium ASRMI		Low ASRMI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	84 (0.0)	599 (4.2)	15 (0.0)	605 (8.3)	1 (0.0)	~ ~
Austria	73 (3.1)	505 (2.5)	27 (3.1)	505 (4.9)	0 (0.0)	~ ~
Czech Republic	65 (3.7)	489 (3.7)	35 (3.7)	481 (3.8)	0 (0.0)	~ ~
Scotland	61 (3.8)	499 (3.5)	38 (3.8)	488 (3.9)	1 (0.0)	~ ~
Slovenia	61 (4.2)	502 (2.6)	38 (4.1)	501 (2.4)	1 (0.7)	~ ~
Japan	58 (4.1)	568 (3.0)	40 (4.2)	567 (2.9)	3 (1.4)	587 (16.4)
Australia	57 (4.9)	523 (3.1)	42 (4.9)	505 (8.0)	1 (0.5)	~ ~
Hong Kong SAR	57 (4.1)	608 (4.9)	43 (4.0)	603 (5.3)	1 (0.8)	~ ~
Germany	56 (3.8)	531 (2.8)	42 (3.7)	521 (3.9)	2 (1.1)	~ ~
New Zealand	55 (3.3)	493 (3.3)	44 (3.3)	494 (4.0)	1 (0.8)	~ ~
England	53 (4.6)	547 (4.6)	46 (4.5)	535 (4.1)	0 (0.0)	~ ~
Hungary	51 (4.5)	512 (6.7)	47 (4.5)	507 (5.6)	3 (1.2)	513 (15.8)
Denmark	50 (5.3)	530 (3.4)	49 (5.4)	518 (4.0)	1 (0.0)	~ ~
United States	49 (3.5)	536 (4.2)	48 (3.5)	525 (3.7)	3 (1.0)	481 (15.2)
Russian Federation	45 (4.4)	550 (8.0)	53 (4.2)	540 (6.0)	2 (1.0)	~ ~
Netherlands	42 (4.9)	538 (3.4)	54 (4.8)	528 (3.5)	4 (2.1)	551 (23.4)
Kazakhstan	39 (5.1)	555 (8.5)	57 (5.0)	545 (11.0)	4 (1.6)	557 (12.5)
Sweden	37 (4.1)	510 (3.0)	59 (4.3)	499 (3.7)	3 (1.5)	484 (9.0)
Chinese Taipei	33 (4.1)	579 (3.9)	63 (4.0)	575 (2.4)	4 (1.8)	559 (10.3)
Italy	27 (3.3)	509 (7.1)	68 (3.4)	506 (3.9)	4 (1.7)	499 (7.1)
Slovak Republic	27 (3.6)	498 (7.5)	65 (3.9)	494 (5.5)	9 (2.4)	496 (13.5)
Norway	27 (3.8)	483 (4.7)	72 (3.9)	469 (3.6)	1 (0.8)	~ ~
Qatar	26 (0.1)	312 (1.9)	70 (0.2)	292 (1.3)	4 (0.1)	310 (6.5)
Kuwait	24 (3.7)	316 (8.9)	73 (3.9)	317 (5.2)	3 (1.6)	331 (25.8)
Lithuania	24 (3.6)	520 (6.8)	74 (3.7)	532 (3.0)	2 (1.1)	~ ~
Latvia	23 (3.9)	535 (5.6)	75 (4.1)	539 (2.7)	2 (1.4)	~ ~
Armenia	17 (3.1)	484 (5.8)	72 (3.9)	504 (5.9)	11 (2.7)	492 (10.2)
Ukraine	15 (2.6)	490 (6.5)	76 (3.3)	466 (3.5)	9 (2.5)	457 (16.6)
Georgia	13 (3.2)	420 (9.9)	75 (4.0)	440 (4.6)	12 (3.0)	444 (17.8)
El Salvador	12 (1.7)	381 (14.4)	65 (4.0)	326 (5.0)	23 (3.7)	314 (10.2)
Iran, Islamic Rep. of	10 (2.2)	414 (17.3)	74 (3.6)	406 (4.5)	16 (3.1)	380 (10.1)
Colombia	9 (3.1)	441 (16.8)	51 (4.9)	362 (6.5)	40 (4.0)	330 (8.6)
Yemen	8 (2.4)	223 (10.7)	35 (3.9)	230 (8.3)	57 (3.9)	220 (8.9)
Morocco	7 (2.8)	385 (35.2)	50 (4.0)	340 (6.9)	43 (3.6)	326 (8.8)
Tunisia	7 (2.1)	345 (15.9)	65 (4.1)	334 (6.0)	28 (3.9)	309 (9.6)
Algeria	5 (1.7)	367 (16.7)	72 (4.9)	382 (4.9)	22 (4.8)	360 (20.6)
International Avg.	36 (0.6)	480 (1.7)	55 (0.7)	472 (0.9)	9 (0.4)	429 (3.1)
<b>Benchmarking Participants</b>						
Dubai, UAE	79 (0.3)	445 (2.7)	21 (0.3)	437 (3.4)	1 (0.1)	~ ~
Quebec, Canada	51 (4.3)	521 (4.8)	49 (4.3)	516 (4.3)	0 (0.2)	~ ~
Alberta, Canada	49 (4.6)	507 (3.7)	49 (4.5)	504 (4.7)	3 (1.3)	499 (18.0)
British Columbia, Canada	46 (4.8)	505 (4.6)	54 (4.8)	506 (3.8)	0 (0.0)	~ ~
Massachusetts, US	43 (6.3)	575 (8.7)	53 (6.4)	574 (5.1)	3 (2.3)	546 (21.1)
Minnesota, US	40 (9.5)	558 (14.1)	58 (9.1)	553 (6.6)	1 (1.6)	~ ~
Ontario, Canada	37 (4.0)	522 (3.7)	61 (4.3)	506 (4.6)	2 (1.4)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to five questions about shortages that affect mathematics instruction: computers for mathematics instruction; computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; and audio-visual resources for mathematics instruction. Average is computed based on a 4-point scale: 1 = none; 2 = a little; 3 = some; and 4 = a lot. High level indicates that both

shortages are on average lower than 2. Low level indicates that both shortages are on average greater than or equal to 3. Medium level includes all other possible combinations of responses.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

**Exhibit 8.7 Index of Availability of School Resources for Mathematics Instruction (ASRMI) (Continued)**
**TIMSS2007**  
**Mathematics** 8<sup>th</sup>  
**Grade**

Country	High ASRMI		Medium ASRMI		Low ASRMI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	91 (0.0)	593 (4.1)	9 (0.0)	588 (12.1)	0 (0.0)	~ ~
Hong Kong SAR	70 (3.8)	571 (7.3)	30 (3.8)	571 (10.9)	0 (0.0)	~ ~
Slovenia	63 (4.4)	502 (2.5)	37 (4.4)	501 (3.9)	0 (0.0)	~ ~
Czech Republic	62 (3.9)	503 (3.6)	38 (3.9)	505 (3.6)	0 (0.0)	~ ~
Australia	55 (3.8)	514 (6.2)	43 (3.9)	476 (6.0)	2 (1.0)	~ ~
Malta	54 (0.2)	494 (1.5)	42 (0.2)	479 (1.7)	4 (0.1)	486 (4.6)
United States	51 (3.6)	512 (4.4)	45 (3.7)	505 (4.6)	4 (1.4)	490 (17.1)
Japan	51 (4.2)	574 (4.4)	49 (4.2)	565 (3.6)	0 (0.0)	~ ~
Hungary	49 (4.7)	523 (6.0)	48 (4.8)	512 (5.6)	3 (1.4)	498 (7.8)
Sweden	49 (4.3)	489 (3.3)	50 (4.2)	494 (2.9)	1 (1.1)	~ ~
Scotland	48 (4.5)	485 (5.5)	51 (4.6)	491 (6.7)	1 (1.0)	~ ~
Malaysia	42 (4.3)	481 (7.5)	45 (4.5)	463 (7.1)	13 (2.5)	486 (14.4)
Lebanon	37 (4.5)	469 (7.7)	60 (4.3)	435 (4.9)	3 (2.8)	406 (77.7)
Israel	36 (4.4)	481 (8.1)	59 (4.6)	456 (5.9)	5 (1.4)	468 (15.0)
Chinese Taipei	36 (3.8)	598 (7.7)	58 (3.9)	598 (6.1)	6 (2.5)	602 (15.2)
England	34 (3.7)	511 (8.4)	61 (3.9)	518 (6.8)	5 (1.7)	487 (8.4)
Korea, Rep. of	30 (3.9)	593 (4.8)	69 (3.9)	599 (3.2)	1 (0.0)	~ ~
Bulgaria	29 (3.6)	474 (9.0)	65 (3.6)	458 (7.4)	6 (2.3)	477 (20.5)
Russian Federation	28 (2.8)	525 (6.8)	67 (3.2)	509 (4.8)	5 (1.7)	480 (13.0)
Qatar	28 (0.1)	326 (2.5)	70 (0.1)	300 (1.4)	3 (0.1)	301 (6.8)
Egypt	27 (3.7)	402 (8.4)	68 (3.9)	387 (5.0)	6 (2.0)	371 (17.6)
Italy	25 (3.4)	479 (4.7)	73 (3.7)	479 (4.0)	3 (1.3)	495 (4.3)
Bahrain	24 (0.2)	419 (3.5)	72 (0.2)	391 (1.9)	4 (0.1)	392 (7.5)
Lithuania	22 (3.9)	504 (6.0)	76 (3.8)	506 (3.0)	2 (1.2)	~ ~
Norway	22 (3.8)	480 (4.2)	76 (3.9)	466 (2.1)	2 (1.2)	~ ~
Jordan	21 (3.3)	439 (9.4)	70 (3.7)	423 (5.6)	9 (2.0)	428 (18.4)
Palestinian Nat'l Auth.	19 (3.2)	390 (5.9)	67 (3.8)	366 (4.4)	14 (2.7)	340 (11.7)
Armenia	19 (3.3)	489 (7.1)	73 (3.6)	501 (4.3)	8 (2.1)	500 (6.3)
Romania	19 (3.3)	456 (13.5)	75 (3.5)	466 (4.9)	6 (2.2)	432 (26.9)
Colombia	16 (3.5)	399 (13.8)	52 (5.0)	387 (4.4)	31 (4.1)	354 (7.1)
Oman	16 (3.0)	381 (7.5)	65 (4.1)	373 (4.5)	19 (3.4)	364 (8.6)
Serbia	15 (3.1)	504 (10.9)	70 (4.1)	487 (3.8)	15 (2.8)	462 (10.0)
Kuwait	14 (3.0)	360 (8.1)	79 (3.7)	352 (2.9)	7 (2.5)	357 (9.6)
El Salvador	13 (2.6)	381 (8.6)	63 (3.8)	337 (4.2)	24 (3.6)	327 (5.5)
Thailand	13 (2.5)	494 (17.0)	66 (3.7)	433 (5.4)	21 (3.2)	438 (12.5)
Ukraine	13 (2.9)	481 (14.3)	77 (3.8)	460 (4.2)	11 (2.8)	458 (10.4)
Syrian Arab Republic	12 (2.7)	393 (9.9)	82 (3.2)	394 (4.9)	6 (2.0)	398 (19.1)
Cyprus	12 (0.2)	467 (4.1)	79 (0.2)	464 (1.9)	9 (0.1)	466 (5.2)
Algeria	11 (2.6)	387 (6.3)	80 (3.5)	387 (2.5)	9 (2.8)	387 (5.9)
Ghana	11 (2.7)	273 (13.9)	77 (3.7)	314 (5.0)	12 (2.6)	313 (12.1)
Iran, Islamic Rep. of	11 (2.2)	460 (14.8)	72 (3.2)	401 (4.6)	18 (2.7)	379 (9.7)
Saudi Arabia	8 (2.0)	346 (14.3)	77 (3.9)	329 (3.3)	15 (3.6)	319 (8.3)
Turkey	8 (2.3)	500 (17.4)	67 (4.2)	435 (6.0)	25 (3.9)	403 (10.3)
Georgia	7 (2.2)	407 (10.3)	77 (4.9)	411 (7.0)	17 (4.5)	404 (18.3)
Bosnia and Herzegovina	6 (1.8)	473 (16.8)	74 (3.6)	455 (2.9)	20 (3.3)	451 (8.1)
Indonesia	6 (2.0)	458 (21.1)	61 (4.5)	401 (5.8)	33 (4.2)	380 (7.7)
Tunisia	6 (1.6)	433 (9.3)	73 (3.4)	420 (2.8)	21 (3.2)	418 (5.7)
Botswana	4 (1.7)	386 (20.3)	65 (3.6)	361 (3.2)	30 (3.7)	362 (4.4)
‡ Morocco	3 (0.7)	465 (9.2)	48 (6.0)	382 (4.6)	49 (6.0)	372 (4.9)
<b>International Avg.</b>	<b>27 (0.5)</b>	<b>464 (1.4)</b>	<b>62 (0.5)</b>	<b>449 (0.9)</b>	<b>10 (0.4)</b>	<b>420 (2.8)</b>

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Benchmarking Participants**

Dubai, UAE <sup>s</sup>	72 (0.5)	477 (3.7)	25 (0.5)	432 (4.0)	3 (0.1)	399 (7.5)
Basque Country, Spain	69 (4.5)	498 (4.2)	30 (4.6)	502 (4.8)	0 (0.3)	~ ~
British Columbia, Canada	57 (4.8)	511 (4.4)	41 (4.8)	508 (4.9)	2 (1.3)	~ ~
Quebec, Canada	53 (4.9)	545 (6.2)	46 (4.9)	510 (4.6)	1 (0.4)	~ ~
Massachusetts, US	48 (6.8)	561 (8.6)	49 (7.2)	531 (9.4)	2 (2.3)	~ ~
Minnesota, US	48 (9.1)	532 (8.6)	45 (8.7)	536 (4.0)	7 (4.4)	507 (8.9)
Ontario, Canada	36 (4.7)	523 (4.9)	61 (4.8)	516 (4.6)	4 (2.3)	553 (16.2)

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to five questions about shortages that affect mathematics instruction: computers for mathematics instruction; computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; and audio-visual resources for mathematics instruction. Average is computed based on a 4-point scale: 1 = none; 2 = a little; 3 = some; and 4 = a lot. High level indicates that both

shortages are on average lower than 2. Low level indicates that both shortages are on average greater than or equal to 3. Medium level includes all other possible combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "s" indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 8.8 High Index of Availability of School Resources for Mathematics Instruction (ASRMI) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High ASRMI			
	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1995	
Singapore	84 (0.0)	-2 (2.7)	38 (4.0)	▲
Austria	73 (3.1)	◊ ◊	7 (5.2)	
Czech Republic	65 (3.7)	◊ ◊	30 (5.6)	▲
Scotland	61 (3.8)	-1 (5.8)	--	
Slovenia	r 61 (4.2)	3 (5.7)	50 (5.1)	●
Japan	58 (4.1)	0 (5.6)	33 (5.5)	▲
Australia	57 (4.9)	11 (6.4)	30 (6.8)	▲
Hong Kong SAR	57 (4.1)	5 (6.4)	24 (6.8)	▲
New Zealand	55 (3.3)	5 (4.9)	27 (5.1)	▲
England	r 53 (4.6)	9 (6.7)	26 (6.4)	●
Hungary	51 (4.5)	13 (6.4)	▲ 31 (5.7)	▲
United States	r 49 (3.5)	6 (4.8)	17 (5.2)	▲
Russian Federation	45 (4.4)	35 (4.8)	▲ ◊ ◊	
Netherlands	r 42 (4.9)	3 (7.0)	7 (7.1)	
Chinese Taipei	33 (4.1)	16 (5.1)	▲ ◊ ◊	
Italy	27 (3.3)	-1 (4.9)	--	
Norway	r 27 (3.8)	-5 (5.9)	-2 (6.1)	
Lithuania	24 (3.6)	13 (4.5)	▲ ◊ ◊	
Latvia	r 23 (3.9)	-6 (6.3)	22 (3.9)	▲
Armenia	r 17 (3.1)	11 (4.2)	▲ ◊ ◊	
Iran, Islamic Rep. of	10 (2.2)	-3 (4.2)	3 (3.3)	
Morocco	r 7 (2.8)	1 (3.8)	◊ ◊	
Tunisia	6 (2.1)	-8 (3.5)	▼ ◊ ◊	
<b>International Avg.</b>	<b>43 (0.8)</b>			
<b>Benchmarking Participants</b>				
Quebec, Canada	51 (4.3)	6 (6.2)	-3 (9.5)	
Alberta, Canada	49 (4.6)	◊ ◊	36 (7.0)	▲
Minnesota, US	r 40 (9.5)	◊ ◊	30 (10.9)	▲
Ontario, Canada	37 (4.0)	2 (6.3)	15 (5.7)	▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 percent significantly higher ▲

2007 percent significantly lower ▼

For a detailed definition of the ASRMI index, refer to Exhibit 8.7.

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.



**Exhibit 8.8 High Index of Availability of School Resources for Mathematics Instruction (ASRMI) with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High ASRMI			
	2007 Percent of Students	Difference in Percent from 2003	Difference in Percent from 1999	Difference in Percent from 1995
Singapore	91 (0.0)	3 (0.0) ▲	41 (4.0) ▲	36 (4.6) ▲
Hong Kong SAR	70 (3.8)	7 (5.5)	48 (5.6) ▲	48 (6.6) ▲
Slovenia	r 63 (4.4)	7 (5.7)	--	50 (5.4) ▲
Czech Republic	62 (3.9)	0 0	12 (5.4) ▲	32 (6.4) ▲
Australia	r 55 (3.8)	-1 (5.4)	--	13 (6.3) ▲
United States	r 51 (3.6)	-2 (5.2)	14 (5.2) ▲	33 (4.8) ▲
Japan	51 (4.2)	-7 (5.6)	14 (6.0) ▲	23 (5.5) ▲
Hungary	49 (4.7)	17 (6.1) ▲	14 (6.2) ▲	30 (5.7) ▲
Sweden	49 (4.3)	11 (6.0)	0 0	10 (6.4)
Scotland	s 48 (4.5)	10 (7.2)	0 0	--
Malaysia	42 (4.3)	24 (5.4) ▲	22 (5.6) ▲	0 0
Lebanon	37 (4.5)	12 (5.6) ▲	0 0	0 0
Israel	36 (4.4)	-13 (6.2) ▼	5 (6.0)	--
Chinese Taipei	36 (3.8)	12 (5.1) ▲	30 (4.2) ▲	0 0
England	s 34 (3.7)	-1 (7.6)	8 (5.6)	9 (6.0)
Korea, Rep. of	30 (3.9)	2 (5.6)	26 (4.2) ▲	26 (4.3) ▲
Bulgaria	29 (3.6)	24 (4.0) ▲	28 (3.7) ▲	--
Russian Federation	28 (2.8)	23 (3.2) ▲	27 (3.0) ▲	27 (2.8) ▲
Egypt	27 (3.7)	-7 (5.5)	0 0	0 0
Italy	25 (3.4)	-14 (5.0) ▼	-3 (4.8)	--
Bahrain	24 (0.2)	9 (0.3) ▲	0 0	0 0
Lithuania	22 (3.9)	14 (4.7) ▲	14 (4.5) ▲	20 (4.0) ▲
Norway	r 22 (3.8)	1 (5.5)	0 0	-15 (5.5) ▼
Jordan	21 (3.3)	5 (4.7)	16 (3.8) ▲	0 0
Palestinian Nat'l Auth.	19 (3.2)	7 (4.3)	0 0	0 0
Armenia	r 19 (3.3)	11 (4.3) ▲	0 0	0 0
Romania	19 (3.3)	11 (4.0) ▲	12 (4.0) ▲	14 (3.6) ▲
Colombia	16 (3.5)	0 0	0 0	7 (4.3)
Serbia	15 (3.1)	10 (3.7) ▲	0 0	0 0
Thailand	13 (2.5)	0 0	12 (2.6) ▲	--
Cyprus	r 12 (0.2)	0 (0.2)	-3 (0.2) ▼	-19 (0.5) ▼
Ghana	11 (2.7)	-1 (3.9)	0 0	0 0
Iran, Islamic Rep. of	11 (2.2)	2 (3.2)	4 (2.8)	9 (2.4) ▲
Indonesia	7 (2.5)	0 (3.2)	-16 (4.7) ▼	0 0
Tunisia	6 (1.6)	-8 (3.4) ▼	2 (2.4)	0 0
Botswana	4 (1.7)	1 (2.4)	0 0	0 0
<b>International Avg.</b>	<b>32 (0.6)</b>			
<b>Benchmarking Participants</b>				
Basque Country, Spain	69 (4.5)	10 (6.8)	0 0	0 0
British Columbia, Canada	57 (4.8)	0 0	26 (8.5) ▲	0 0
Quebec, Canada	r 53 (4.9)	-2 (6.7)	-3 (7.6)	12 (9.0)
Massachusetts, US	s 48 (6.8)	0 0	13 (10.0)	0 0
Minnesota, US	48 (9.1)	0 0	0 0	34 (10.0) ▲
Ontario, Canada	36 (4.7)	7 (6.5)	14 (6.0) ▲	18 (6.2) ▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

2007 percent significantly higher ▲  
2007 percent significantly lower ▼

For a detailed definition of the ASRMI index, refer to Exhibit 8.7.  
Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.  
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available.  
An “r” indicates data are available for at least 70 but less than 85% of the students. An “s” indicates data are available for at least 50 but less than 70% of the students.  
A diamond (0) indicates the country did not participate in the assessment.

at least one of the previous assessments, and only six countries showed a decrease—Israel, Italy, Norway, Cyprus, Indonesia, and Tunisia.

As another perspective on school resources for mathematics instruction, Exhibit 8.9 presents teachers' reports on physical aspects of the school environment that impact their working conditions and capacity to provide effective mathematics instruction. Teachers were asked to respond to three statements about problems in their schools: school buildings need significant repair, classrooms are overcrowded, and teachers do not have adequate workspace outside their classroom. For each teacher, an average was computed on a three-point scale: 1 = *not a problem*; 2 = *minor problem*; and 3 = *serious problem*. Students were assigned to the high level of the Index of Teachers' Adequate Working Conditions (TAWC) if their teacher's average response was equal to 1. Students were assigned to the medium level if their teacher's average response was greater than 1 but less than or equal to 2, and to the low level of the index if their teacher's average was greater than 2.

Exhibit 8.9 presents the percentage of students at each of the three levels of the Index of Teachers' Adequate Working Conditions, together with average mathematics achievement, for all TIMSS 2007 participants at the fourth and eighth grades. The average percentage of students at each level of the index was similar at both grades—13 to 15 percent at the high level, 54 to 56 percent at the medium level, and 29 to 33 percent at the low level. At fourth grade, only Singapore (40%) and Dubai (58%) had more than 40 percent of students at the high level of the index, i.e., in schools where teachers reported few problems with working conditions, the next highest percentages were 7 countries and 2 benchmarking participants reporting from 21 to 27 percent of students in such schools. At eighth grade, Lebanon (35%), the Czech Republic (29%), the United States (26%), Singapore (24%), Hong Kong SAR (22%), Qatar (22%), Romania (21%), Slovenia (20%), and Chinese Taipei (20%), as well as the benchmarking participants of Dubai (52%), the Basque Country (32%), Massachusetts (31%), British Columbia (25%) and Ontario (21%) had 20 percent or more students at the high level of the index.



At the fourth grade, internationally, there was a modest association between higher average achievement and more positive teachers' reports about the adequacy of their working conditions. However, there was considerable variation in results across countries, with higher achievement associated with the low category of the index in a number of countries. At the eighth grade, students in the high category according to their teachers' reports on the adequacy of their working conditions had higher achievement than students in the medium or low category. However, similar to the fourth grade, there was considerable variation from country to country in the pattern of achievement in relation to teachers' reports.

Well-educated teachers who have kept abreast of pedagogical developments in their fields may be a school's most important educational resource. TIMSS asked principals to report on the percentage of teachers in their schools that had been involved in professional development opportunities in mathematics and science. More specifically, principals were asked about opportunities during the past two years in three areas of professional development in these subjects: improving content knowledge, improving teaching skills, and using information and communication technology for educational purposes. Schools were categorized into three groups on the basis of principals' responses: schools where most (76–100%) teachers had professional development, schools where some (26–75%) teachers had professional development, and schools where few (25% or less) teachers had professional development during the past two years.

Exhibit 8.10 presents the percentage of students in each of the three school categories by area of professional development, for each TIMSS 2007 participant at the fourth and eighth grades. At fourth grade, 26 percent of students, on average internationally, were in schools where most teachers (at least 76%) had professional development in improving content knowledge in mathematics and science, 30 percent in schools where most teachers had worked on improving teaching skills, and 25 percent where most teachers had professional development in using information and communication technology for educational purposes. Participants with the most emphasis

Exhibit 8.9 Index of Teachers' Adequate Working Conditions (TAWC)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	High TAWC		Medium TAWC		Low TAWC	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	40 (2.4)	598 (6.7)	51 (2.5)	601 (5.1)	9 (1.6)	600 (12.5)
Kazakhstan	27 (5.0)	543 (10.4)	52 (5.2)	554 (9.6)	22 (4.0)	546 (13.9)
Austria	26 (2.8)	502 (3.9)	55 (3.0)	506 (2.3)	19 (3.1)	507 (4.6)
Qatar	26 (0.1)	292 (2.1)	38 (0.2)	300 (2.0)	37 (0.2)	296 (2.0)
Kuwait	26 (3.9)	313 (9.8)	55 (4.6)	313 (5.9)	20 (3.6)	321 (10.2)
United States	25 (2.5)	540 (4.2)	62 (2.7)	529 (2.9)	13 (1.6)	515 (7.4)
Czech Republic	21 (3.0)	487 (6.5)	74 (3.3)	486 (3.3)	6 (1.5)	494 (7.1)
Hong Kong SAR	21 (2.8)	607 (7.5)	58 (3.9)	606 (4.6)	21 (3.2)	611 (8.5)
Russian Federation	19 (3.6)	563 (11.2)	67 (3.5)	539 (5.4)	14 (2.8)	549 (7.1)
England	18 (3.3)	542 (6.1)	65 (3.5)	544 (4.2)	16 (2.8)	530 (6.5)
Slovenia	18 (2.8)	497 (3.9)	59 (3.5)	500 (2.3)	23 (2.8)	510 (3.7)
New Zealand	18 (2.1)	485 (6.9)	72 (2.5)	495 (2.8)	10 (1.5)	493 (10.2)
Hungary	17 (3.2)	488 (10.8)	67 (3.9)	515 (4.7)	16 (2.8)	512 (10.2)
Chinese Taipei	16 (3.0)	575 (4.2)	54 (4.3)	576 (3.1)	30 (3.6)	575 (3.1)
Norway	15 (2.7)	488 (8.1)	61 (3.5)	470 (2.7)	24 (3.1)	470 (5.9)
Netherlands	15 (3.6)	543 (6.6)	60 (4.2)	530 (2.8)	26 (3.9)	540 (5.5)
Georgia	14 (3.2)	447 (10.7)	53 (5.0)	444 (6.3)	33 (4.9)	430 (7.2)
Ukraine	13 (2.6)	477 (9.1)	70 (3.5)	466 (3.5)	17 (2.9)	477 (10.1)
Scotland	12 (2.8)	475 (8.1)	63 (4.0)	501 (3.7)	25 (3.6)	489 (5.9)
Sweden	12 (2.4)	506 (5.5)	61 (3.2)	502 (3.6)	27 (3.2)	502 (4.6)
Italy	12 (2.1)	513 (9.3)	51 (3.0)	510 (4.0)	38 (3.2)	501 (5.2)
Australia	11 (2.5)	531 (12.6)	67 (4.0)	515 (4.7)	22 (3.4)	509 (8.3)
Iran, Islamic Rep. of	11 (2.8)	413 (9.9)	57 (3.9)	401 (6.0)	32 (3.9)	403 (6.6)
Tunisia	10 (2.2)	341 (24.1)	43 (4.1)	330 (7.3)	47 (4.1)	323 (6.0)
El Salvador	9 (2.0)	355 (14.0)	56 (4.0)	334 (5.1)	35 (4.2)	318 (8.5)
Germany	9 (2.1)	524 (8.9)	55 (3.2)	529 (2.8)	36 (3.2)	520 (4.1)
Algeria	8 (2.4)	374 (13.5)	25 (4.2)	384 (7.2)	67 (4.4)	374 (8.1)
Latvia	8 (2.2)	538 (8.2)	68 (3.4)	534 (2.8)	25 (2.9)	548 (4.2)
Colombia	8 (2.0)	411 (17.3)	48 (4.7)	365 (7.3)	45 (4.7)	340 (8.5)
Slovak Republic	8 (1.7)	489 (13.8)	70 (3.2)	493 (5.4)	22 (3.2)	507 (6.7)
Yemen	8 (2.7)	195 (19.3)	28 (4.4)	245 (13.2)	64 (4.6)	217 (7.3)
Lithuania	7 (1.9)	494 (9.9)	64 (3.7)	533 (3.6)	29 (3.6)	532 (4.1)
Denmark	7 (2.3)	545 (7.2)	58 (4.3)	522 (3.1)	35 (3.7)	523 (4.7)
Armenia	6 (1.5)	495 (7.8)	49 (4.1)	496 (5.4)	44 (3.9)	504 (8.0)
Morocco	6 (2.4)	429 (19.1)	28 (3.6)	351 (7.7)	66 (3.7)	328 (6.8)
Japan	5 (1.6)	570 (12.3)	50 (4.0)	567 (2.9)	45 (3.9)	569 (3.2)
International Avg.	15 (0.4)	477 (1.9)	56 (0.6)	475 (0.9)	29 (0.6)	472 (1.2)
<b>Benchmarking Participants</b>						
Dubai, UAE	58 (4.1)	446 (4.8)	39 (4.3)	433 (5.8)	3 (1.4)	442 (51.7)
Minnesota, US	24 (5.0)	535 (12.4)	59 (7.3)	563 (5.7)	17 (4.6)	559 (15.3)
Massachusetts, US	23 (4.3)	579 (7.7)	65 (5.2)	573 (3.8)	12 (3.2)	558 (10.8)
Alberta, Canada	18 (2.8)	510 (9.3)	69 (3.8)	507 (3.1)	13 (2.8)	488 (8.2)
British Columbia, Canada	16 (3.1)	501 (7.1)	61 (3.8)	505 (3.6)	23 (3.8)	507 (5.5)
Ontario, Canada	14 (4.0)	526 (8.6)	70 (4.6)	508 (4.3)	16 (3.7)	511 (7.3)
Quebec, Canada	10 (2.8)	528 (10.4)	63 (4.1)	521 (3.6)	28 (4.1)	515 (5.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to three statements about severity of problems in their schools: school building needs significant repair; classrooms are overcrowded; and teachers do not have adequate workspace outside their classroom. Average is computed based on a 3-point scale: 1 = not a problem; 2 = minor problem; and 3 = serious problem. High level indicates average is equal to 1. Medium level indicates that average value is greater than 1 and less than or equal to 2. Low level indicates average is greater than 2.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
An "r" indicates data are available for at least 70 but less than 85% of the students.

Exhibit 8.9 Index of Teachers' Adequate Working Conditions (TAWC) (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High TAWC		Medium TAWC		Low TAWC	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Lebanon	35 (4.7)	454 (8.7)	55 (4.6)	448 (5.9)	10 (2.6)	439 (13.2)
Czech Republic	29 (3.4)	503 (5.5)	65 (3.6)	502 (3.1)	6 (1.9)	530 (21.4)
United States	26 (2.7)	519 (5.3)	60 (2.9)	513 (4.0)	14 (2.0)	474 (8.3)
Singapore	24 (1.9)	611 (7.5)	56 (2.4)	591 (5.7)	20 (1.8)	575 (9.8)
Hong Kong SAR	22 (4.1)	566 (13.0)	54 (4.4)	573 (9.4)	24 (3.8)	579 (13.7)
Qatar	22 (0.1)	307 (2.5)	52 (0.2)	312 (2.2)	26 (0.1)	298 (2.0)
Romania	21 (3.4)	464 (9.4)	57 (4.2)	466 (5.9)	22 (3.5)	451 (8.0)
Slovenia	20 (2.9)	493 (5.7)	60 (3.4)	503 (2.8)	19 (2.8)	503 (4.2)
Chinese Taipei	20 (3.6)	585 (11.2)	53 (4.4)	599 (6.5)	27 (3.9)	606 (6.6)
Hungary	19 (3.4)	504 (6.5)	58 (3.9)	513 (4.9)	23 (3.3)	536 (7.4)
Armenia	19 (2.6)	500 (10.2)	43 (3.8)	497 (3.7)	38 (3.7)	500 (6.7)
Thailand	18 (3.1)	421 (12.6)	66 (4.0)	443 (6.3)	16 (3.2)	457 (15.6)
Australia	18 (3.2)	512 (12.2)	62 (3.5)	496 (5.3)	20 (3.1)	492 (10.4)
Scotland	16 (2.5)	487 (9.2)	60 (3.3)	489 (5.7)	24 (3.3)	483 (8.9)
Colombia	14 (3.2)	421 (10.8)	37 (4.7)	381 (5.8)	48 (5.0)	368 (7.0)
Japan	14 (2.4)	578 (6.9)	55 (3.1)	571 (3.9)	30 (3.3)	566 (6.2)
Tunisia	14 (3.0)	414 (6.1)	46 (3.7)	423 (2.9)	40 (3.7)	420 (4.4)
Iran, Islamic Rep. of	13 (2.4)	407 (13.0)	54 (4.0)	407 (5.8)	33 (3.6)	397 (7.1)
Ukraine	13 (3.0)	467 (13.2)	73 (3.8)	460 (4.4)	14 (2.8)	467 (8.2)
Egypt	13 (2.5)	411 (10.8)	55 (4.2)	391 (5.7)	33 (3.6)	381 (5.7)
Serbia	12 (2.6)	496 (7.3)	57 (4.3)	482 (4.7)	31 (4.0)	488 (5.9)
Norway	12 (2.6)	475 (7.6)	59 (3.8)	471 (2.1)	28 (3.7)	462 (3.4)
Bahrain	12 (2.0)	410 (6.2)	63 (2.7)	401 (2.1)	25 (2.3)	378 (4.1)
England	12 (2.1)	549 (14.8)	61 (3.5)	507 (6.2)	27 (3.1)	512 (8.8)
Bulgaria	11 (2.7)	500 (10.4)	55 (3.6)	455 (6.9)	34 (3.5)	467 (8.3)
Oman	11 (2.4)	372 (6.2)	53 (4.8)	381 (4.4)	36 (4.5)	359 (9.0)
Sweden	11 (2.1)	496 (6.1)	62 (3.3)	491 (2.6)	27 (3.0)	490 (4.3)
Italy	11 (2.3)	473 (8.0)	54 (3.4)	483 (4.1)	35 (3.0)	478 (5.0)
Malta	11 (0.1)	552 (3.1)	49 (0.3)	493 (1.3)	41 (0.2)	463 (1.9)
Russian Federation	10 (1.8)	516 (12.5)	72 (2.9)	510 (4.4)	18 (2.7)	518 (7.9)
Lithuania	9 (2.4)	483 (6.7)	56 (3.6)	505 (3.7)	35 (3.2)	512 (5.3)
Syrian Arab Republic	9 (2.6)	397 (9.8)	49 (4.4)	397 (6.2)	42 (4.1)	391 (5.9)
Georgia	8 (2.2)	411 (13.5)	54 (5.7)	413 (6.3)	37 (5.9)	408 (11.9)
Israel <sup>r</sup>	8 (2.1)	446 (14.5)	45 (3.3)	470 (6.7)	47 (3.2)	464 (6.7)
Kuwait <sup>r</sup>	8 (2.3)	349 (13.9)	65 (3.9)	357 (3.4)	27 (3.7)	356 (5.0)
Palestinian Nat'l Auth.	8 (2.1)	391 (17.0)	51 (4.3)	369 (5.4)	42 (4.0)	360 (5.9)
Turkey	7 (2.0)	475 (20.0)	52 (4.1)	436 (6.5)	40 (4.1)	419 (8.7)
Cyprus	7 (1.5)	454 (7.0)	47 (2.9)	466 (2.8)	46 (2.9)	466 (2.9)
Jordan	6 (2.4)	468 (16.3)	48 (4.0)	425 (6.9)	45 (3.6)	424 (6.0)
El Salvador	6 (1.8)	376 (12.9)	52 (4.5)	343 (3.8)	42 (4.3)	330 (4.7)
Malaysia	6 (1.9)	455 (20.9)	69 (3.6)	474 (6.3)	25 (3.3)	479 (8.6)
Bosnia and Herzegovina	6 (1.9)	464 (8.3)	47 (4.1)	454 (3.4)	47 (3.9)	460 (4.8)
Ghana	5 (1.6)	322 (19.2)	36 (3.9)	318 (8.8)	60 (4.0)	304 (6.1)
Korea, Rep. of	4 (1.5)	620 (11.3)	56 (3.5)	597 (3.8)	40 (3.5)	596 (5.1)
Algeria	4 (1.5)	378 (7.0)	41 (4.1)	388 (2.8)	56 (4.2)	387 (3.0)
Botswana	3 (1.1)	408 (30.0)	38 (4.4)	371 (3.9)	59 (4.4)	356 (3.5)
Indonesia	1 (0.9)	~ ~	31 (4.0)	406 (8.9)	68 (4.1)	394 (5.5)
Saudi Arabia	--	--	--	--	--	--
‡ Morocco	7 (1.4)	448 (14.2)	38 (4.8)	375 (5.5)	55 (4.8)	377 (3.2)
International Avg.	13 (0.4)	464 (1.8)	54 (0.6)	454 (0.9)	33 (0.5)	450 (1.2)
<b>Benchmarking Participants</b>						
Dubai, UAE <sup>s</sup>	52 (4.8)	479 (5.5)	39 (4.7)	434 (7.2)	8 (3.7)	443 (23.5)
Basque Country, Spain	32 (4.3)	504 (6.1)	59 (4.6)	497 (3.7)	9 (2.7)	496 (8.6)
Massachusetts, US	31 (6.1)	543 (10.0)	56 (6.5)	550 (8.8)	13 (5.2)	534 (12.3)
British Columbia, Canada	25 (3.9)	522 (7.4)	62 (3.8)	507 (4.0)	13 (2.8)	508 (10.4)
Ontario, Canada	21 (4.1)	513 (9.0)	59 (5.0)	519 (3.7)	19 (3.7)	518 (7.9)
Minnesota, US <sup>r</sup>	15 (5.8)	520 (16.7)	75 (5.4)	533 (5.6)	10 (5.1)	535 (40.6)
Quebec, Canada	13 (2.9)	535 (9.0)	68 (3.9)	533 (5.7)	19 (2.9)	512 (5.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to three statements about severity of problems in their schools: school building needs significant repair; classrooms are overcrowded; and teachers do not have adequate workspace outside their classroom. Average is computed based on a 3-point scale: 1 = not a problem; 2 = minor problem; and 3 = serious problem. High level indicates average is equal to 1. Medium level indicates that average value is greater than 1 and less than or equal to 2. Low level indicates average is greater than 2.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (–) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



**Exhibit 8.10 Schools' Reports on Teachers' Mathematics and Science Professional Development in the Past 2 Years**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	Percentage of Students in Schools Where Most (76–100%) Teachers Had Professional Development in			Percentage of Students in Schools Where Some (26–75%) Teachers Had Professional Development in			Percentage of Students in Schools Where Few (25% or less) Teachers Had Professional Development in		
	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes
Algeria	6 (2.0)	9 (2.6)	1 (0.0)	70 (4.0)	70 (4.1)	19 (4.8)	24 (3.6)	21 (3.6)	81 (4.8)
Armenia	27 (4.2)	32 (4.4)	14 (2.9)	57 (4.1)	55 (4.4)	48 (4.5)	17 (3.6)	13 (3.1)	39 (4.3)
Australia	58 (4.0)	63 (3.8)	53 (4.8)	29 (3.9)	26 (3.4)	32 (4.7)	12 (2.1)	11 (2.6)	15 (3.0)
Austria	30 (2.9)	26 (2.9)	23 (3.0)	44 (3.1)	46 (3.5)	45 (3.8)	26 (2.9)	28 (3.2)	33 (3.6)
Chinese Taipei	19 (3.1)	22 (3.3)	23 (3.7)	60 (4.4)	64 (4.4)	60 (4.3)	21 (3.8)	14 (3.2)	17 (3.3)
Colombia	12 (2.9)	21 (3.8)	16 (3.9)	56 (5.5)	64 (4.3)	45 (5.3)	32 (5.3)	15 (3.2)	39 (4.6)
Czech Republic	31 (4.3)	26 (3.9)	43 (4.1)	37 (4.2)	43 (4.0)	38 (4.7)	32 (3.9)	30 (3.9)	19 (3.5)
Denmark	8 (2.7)	7 (2.4)	10 (2.7)	24 (4.4)	39 (4.4)	40 (4.7)	68 (4.8)	55 (4.5)	50 (4.4)
El Salvador	13 (2.7)	18 (3.2)	9 (2.1)	53 (4.3)	55 (4.4)	29 (3.5)	34 (3.8)	28 (3.6)	62 (4.0)
England	55 (4.6)	62 (4.4)	72 (4.1)	26 (4.3)	22 (3.8)	19 (3.4)	20 (3.3)	16 (3.3)	9 (2.7)
Georgia	26 (4.3)	23 (4.0)	10 (2.7)	47 (5.2)	54 (4.9)	39 (4.8)	27 (4.7)	24 (4.2)	50 (5.2)
Germany	14 (1.9)	13 (2.0)	11 (2.1)	50 (3.0)	49 (3.1)	34 (2.7)	36 (3.0)	38 (3.0)	55 (3.2)
Hong Kong SAR	23 (3.6)	27 (4.0)	30 (4.5)	66 (4.3)	63 (4.2)	54 (4.7)	11 (3.0)	10 (2.8)	16 (3.6)
Hungary	17 (3.7)	22 (4.0)	12 (3.0)	42 (4.1)	43 (4.1)	35 (4.0)	41 (4.0)	35 (3.7)	53 (4.2)
Iran, Islamic Rep. of	20 (3.2)	31 (3.9)	10 (2.2)	60 (3.7)	54 (4.1)	43 (3.6)	20 (2.9)	16 (2.9)	47 (4.0)
Italy	7 (2.0)	9 (2.3)	14 (2.8)	38 (3.9)	47 (4.2)	49 (4.0)	55 (4.1)	43 (4.4)	37 (3.8)
Japan	22 (3.3)	25 (3.5)	7 (1.9)	49 (4.3)	50 (4.1)	44 (4.0)	28 (3.4)	25 (3.7)	49 (4.0)
Kazakhstan	31 (4.2)	37 (4.5)	7 (2.1)	52 (4.3)	46 (3.3)	33 (4.6)	17 (4.2)	17 (4.2)	60 (4.5)
Kuwait	10 (2.6)	21 (3.6)	24 (3.7)	59 (4.5)	62 (4.5)	60 (4.6)	31 (4.2)	16 (3.6)	16 (3.5)
Latvia	30 (3.9)	31 (3.9)	14 (3.0)	33 (4.2)	39 (4.0)	38 (4.0)	37 (4.2)	30 (3.9)	48 (3.8)
Lithuania	43 (3.9)	42 (4.1)	34 (4.1)	39 (4.0)	42 (4.0)	33 (3.8)	18 (3.3)	16 (3.2)	33 (4.3)
Morocco	4 (1.4)	6 (2.6)	1 (0.8)	25 (3.6)	23 (3.9)	13 (2.6)	72 (3.4)	71 (3.4)	87 (2.7)
Netherlands	r 23 (3.9)	r 37 (4.2)	r 30 (3.9)	24 (4.3)	27 (4.2)	34 (4.7)	54 (4.2)	36 (4.0)	37 (4.2)
New Zealand	66 (3.8)	70 (3.4)	60 (3.4)	26 (3.3)	25 (3.3)	25 (3.2)	8 (2.0)	4 (1.3)	14 (2.6)
Norway	24 (3.4)	18 (3.4)	38 (4.2)	25 (3.7)	15 (3.1)	20 (3.8)	51 (4.4)	67 (4.3)	43 (4.4)
Qatar	r 17 (0.1)	r 24 (0.1)	r 10 (0.1)	50 (0.2)	53 (0.2)	57 (0.2)	33 (0.2)	23 (0.2)	32 (0.2)
Russian Federation	30 (2.9)	35 (3.6)	27 (4.0)	40 (4.1)	41 (4.4)	31 (3.3)	30 (4.0)	24 (3.7)	42 (3.8)
Scotland	47 (4.6)	65 (4.3)	69 (4.3)	29 (4.4)	18 (3.2)	24 (4.0)	24 (4.0)	17 (3.6)	7 (2.0)
Singapore	46 (0.0)	57 (0.0)	44 (0.0)	46 (0.0)	38 (0.0)	47 (0.0)	8 (0.0)	5 (0.0)	9 (0.0)
Slovak Republic	17 (3.0)	21 (3.2)	67 (3.4)	38 (3.9)	44 (4.1)	24 (3.2)	45 (3.9)	36 (4.0)	10 (2.3)
Slovenia	46 (4.4)	31 (4.0)	37 (4.7)	48 (4.1)	61 (4.4)	45 (4.5)	5 (2.0)	8 (2.3)	18 (3.3)
Sweden	25 (3.8)	21 (3.5)	15 (3.2)	33 (4.6)	31 (4.3)	31 (4.2)	42 (4.9)	48 (4.7)	53 (4.9)
Tunisia	17 (3.1)	20 (3.1)	7 (2.2)	54 (3.9)	58 (4.3)	29 (3.7)	29 (3.6)	23 (3.5)	64 (4.1)
Ukraine	34 (4.2)	38 (4.3)	20 (3.2)	32 (4.2)	37 (4.3)	29 (3.9)	34 (3.8)	25 (3.6)	52 (4.0)
United States	45 (3.0)	55 (3.2)	46 (3.4)	32 (2.8)	33 (3.4)	34 (3.0)	22 (2.5)	12 (2.1)	20 (2.3)
Yemen	0 (0.4)	5 (1.9)	2 (1.2)	45 (4.5)	47 (4.2)	4 (1.5)	55 (4.5)	48 (4.0)	95 (1.9)
<b>International Avg.</b>	<b>26 (0.6)</b>	<b>30 (0.6)</b>	<b>25 (0.5)</b>	<b>43 (0.7)</b>	<b>44 (0.7)</b>	<b>36 (0.7)</b>	<b>31 (0.6)</b>	<b>26 (0.6)</b>	<b>39 (0.6)</b>
<b>Benchmarking Participants</b>									
Alberta, Canada	42 (4.3)	56 (4.5)	46 (4.4)	30 (4.1)	24 (3.4)	31 (4.0)	27 (4.2)	19 (3.7)	23 (3.5)
British Columbia, Canada	41 (3.7)	43 (4.5)	32 (4.2)	44 (4.3)	45 (4.6)	42 (4.9)	16 (3.1)	12 (2.7)	26 (4.4)
Dubai, UAE	r 47 (0.4)	r 53 (0.4)	r 27 (0.3)	39 (0.4)	43 (0.4)	67 (0.3)	14 (0.2)	5 (0.1)	7 (0.2)
Massachusetts, US	60 (6.6)	58 (7.0)	51 (7.5)	29 (7.2)	34 (6.5)	32 (7.4)	10 (5.0)	8 (4.5)	17 (5.9)
Minnesota, US	67 (6.8)	63 (7.3)	27 (8.1)	15 (6.8)	18 (7.1)	45 (8.0)	17 (7.1)	18 (7.5)	28 (7.1)
Ontario, Canada	43 (4.1)	57 (4.8)	36 (5.0)	38 (4.9)	34 (4.4)	39 (5.2)	18 (4.3)	9 (2.5)	24 (4.5)
Quebec, Canada	33 (4.7)	23 (4.5)	15 (3.6)	23 (4.0)	30 (4.3)	33 (4.6)	43 (4.6)	46 (4.9)	52 (5.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by schools.

An "r" indicates data are available for at least 70 but less than 85% of the students.

(i) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 8.10 Schools' Reports on Teachers' Mathematics and Science Professional Development in the Past 2 Years (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Percentage of Students in Schools Where Most (76–100%) Teachers Had Professional Development in			Percentage of Students in Schools Where Some (26–75%) Teachers Had Professional Development in			Percentage of Students in Schools Where Few (25% or less) Teachers Had Professional Development in		
	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes	Improving Content Knowledge	Improving Teaching Skills	Using Information and Communication Technology for Educational Purposes
Algeria	6 (2.2)	9 (2.5)	4 (1.8)	63 (4.2)	60 (4.2)	37 (4.1)	31 (4.1)	31 (4.2)	59 (4.0)
Armenia	21 (3.2)	26 (3.9)	11 (3.4)	61 (4.3)	62 (3.7)	53 (4.6)	18 (3.7)	11 (2.7)	36 (4.0)
Australia	29 (3.3)	28 (4.1)	39 (3.8)	53 (3.8)	59 (4.4)	47 (3.2)	19 (2.9)	13 (2.8)	14 (2.8)
Bahrain	24 (0.3)	33 (0.2)	31 (0.3)	48 (0.2)	46 (0.2)	53 (0.3)	28 (0.2)	21 (0.2)	16 (0.2)
Bosnia and Herzegovina	18 (3.1)	18 (3.4)	9 (2.2)	55 (3.8)	51 (4.3)	51 (3.7)	27 (3.4)	31 (3.7)	40 (3.7)
Botswana	13 (2.7)	14 (2.9)	10 (2.6)	42 (4.2)	41 (4.5)	41 (4.3)	45 (4.3)	45 (4.5)	49 (4.3)
Bulgaria	17 (2.7)	18 (3.4)	42 (4.1)	50 (3.9)	52 (3.8)	36 (3.9)	33 (3.7)	30 (3.5)	22 (3.0)
Chinese Taipei	21 (3.4)	21 (3.2)	17 (3.1)	62 (3.9)	60 (4.0)	58 (3.7)	17 (3.3)	19 (3.2)	25 (3.7)
Colombia	19 (5.2)	22 (5.1)	12 (2.3)	66 (5.2)	63 (5.1)	56 (4.5)	16 (2.8)	15 (2.7)	33 (4.0)
Cyprus	11 (0.2)	7 (0.2)	9 (0.2)	49 (0.3)	57 (0.3)	65 (0.3)	40 (0.2)	36 (0.2)	25 (0.2)
Czech Republic	15 (3.2)	11 (2.6)	34 (3.8)	54 (4.2)	59 (4.3)	47 (4.3)	31 (4.0)	30 (4.0)	19 (3.2)
Egypt	15 (2.4)	25 (3.3)	34 (3.6)	68 (3.7)	70 (3.7)	59 (3.9)	17 (2.8)	5 (1.6)	6 (2.0)
El Salvador	18 (3.3)	23 (3.7)	15 (2.8)	48 (4.3)	46 (4.1)	35 (3.8)	35 (3.8)	31 (3.6)	50 (3.8)
England	23 (3.5)	43 (4.1)	48 (4.4)	53 (4.3)	43 (4.6)	38 (4.5)	24 (3.4)	14 (3.2)	14 (3.2)
Georgia	18 (3.5)	19 (3.7)	5 (1.4)	63 (4.9)	65 (4.4)	58 (5.4)	19 (3.9)	17 (3.5)	36 (5.2)
Ghana	13 (3.2)	14 (3.1)	3 (1.7)	59 (4.4)	64 (4.2)	20 (3.6)	28 (3.9)	22 (3.7)	77 (3.7)
Hong Kong SAR	17 (3.5)	22 (4.0)	18 (3.9)	68 (4.4)	64 (4.7)	62 (4.8)	15 (3.3)	14 (3.1)	20 (4.0)
Hungary	13 (3.0)	17 (3.3)	7 (2.6)	44 (4.4)	42 (4.0)	48 (4.2)	43 (4.6)	41 (3.9)	45 (3.7)
Indonesia	38 (3.4)	34 (3.0)	9 (2.2)	52 (3.6)	57 (3.2)	56 (4.3)	10 (2.7)	9 (2.4)	34 (4.1)
Iran, Islamic Rep. of	16 (2.8)	18 (3.0)	14 (2.7)	62 (4.2)	65 (4.0)	40 (3.8)	22 (3.5)	17 (3.0)	46 (3.7)
Israel	24 (3.7)	24 (3.8)	11 (3.0)	63 (4.3)	62 (4.2)	54 (4.5)	14 (3.2)	14 (3.0)	35 (4.3)
Italy	9 (2.3)	9 (2.3)	11 (2.6)	38 (4.0)	49 (3.8)	50 (4.1)	53 (4.2)	42 (3.9)	40 (4.0)
Japan	23 (3.4)	27 (3.5)	11 (2.5)	50 (4.0)	44 (4.1)	39 (4.2)	27 (3.9)	29 (3.9)	50 (4.4)
Jordan	18 (2.9)	24 (3.1)	33 (3.8)	64 (3.6)	66 (3.8)	55 (4.4)	19 (3.2)	10 (2.4)	12 (2.7)
Korea, Rep. of	8 (2.4)	10 (2.2)	8 (2.2)	58 (4.0)	59 (4.3)	60 (4.1)	34 (4.0)	32 (3.9)	32 (4.0)
Kuwait	11 (3.3)	12 (3.0)	11 (2.6)	54 (4.8)	61 (4.4)	61 (4.0)	35 (4.4)	26 (3.9)	28 (3.9)
Lebanon	23 (3.5)	25 (4.0)	11 (2.9)	62 (4.1)	66 (4.6)	57 (5.0)	15 (3.2)	10 (2.6)	32 (4.4)
Lithuania	40 (4.1)	43 (4.1)	23 (3.9)	52 (4.4)	53 (4.2)	65 (4.7)	8 (2.5)	5 (1.8)	12 (3.0)
Malaysia	41 (4.2)	35 (4.2)	38 (4.3)	51 (4.1)	58 (4.2)	55 (4.5)	8 (2.1)	7 (2.2)	7 (2.2)
Malta	23 (0.2)	26 (0.2)	29 (0.2)	62 (0.2)	57 (0.2)	45 (0.2)	15 (0.2)	17 (0.2)	26 (0.2)
Norway	20 (3.8)	14 (3.3)	35 (4.3)	27 (4.8)	27 (4.5)	27 (4.3)	53 (5.0)	58 (5.1)	39 (4.4)
Oman	8 (2.6)	14 (3.5)	14 (3.2)	56 (3.9)	64 (3.6)	47 (4.4)	36 (3.6)	22 (3.4)	39 (4.6)
Palestinian Nat'l Auth.	6 (2.0)	8 (2.1)	5 (1.4)	61 (4.3)	69 (3.9)	53 (4.2)	33 (3.8)	24 (3.6)	42 (4.3)
Qatar	r 24 (0.1)	r 22 (0.1)	r 22 (0.1)	48 (0.2)	58 (0.2)	48 (0.2)	28 (0.1)	20 (0.1)	30 (0.2)
Romania	36 (4.3)	37 (4.3)	21 (3.5)	46 (4.1)	52 (4.7)	51 (4.2)	18 (3.7)	11 (2.9)	28 (3.8)
Russian Federation	30 (3.3)	30 (3.6)	20 (2.9)	47 (3.6)	48 (3.3)	44 (3.3)	23 (3.5)	22 (3.7)	36 (3.3)
Saudi Arabia	11 (3.0)	10 (2.3)	15 (3.6)	51 (4.1)	55 (4.4)	41 (4.2)	38 (4.0)	34 (4.0)	44 (4.7)
Scotland	r 33 (4.6)	r 49 (4.8)	r 51 (5.0)	50 (4.9)	40 (4.6)	37 (4.8)	17 (3.9)	11 (3.0)	12 (3.1)
Serbia	19 (3.6)	16 (3.4)	15 (3.0)	59 (4.0)	50 (4.5)	45 (4.0)	22 (3.2)	34 (4.0)	40 (4.0)
Singapore	48 (0.0)	60 (0.0)	48 (0.0)	43 (0.0)	38 (0.0)	49 (0.0)	9 (0.0)	2 (0.0)	3 (0.0)
Slovenia	45 (4.3)	31 (3.6)	34 (4.2)	46 (4.7)	60 (4.3)	50 (4.1)	8 (2.6)	9 (2.7)	16 (3.3)
Sweden	16 (3.4)	15 (2.6)	16 (3.5)	40 (4.4)	29 (4.1)	28 (3.6)	44 (4.2)	56 (4.1)	56 (4.1)
Syrian Arab Republic	5 (1.8)	5 (1.8)	8 (2.2)	50 (3.8)	60 (3.8)	39 (4.3)	45 (4.0)	34 (4.0)	53 (4.3)
Thailand	19 (3.1)	17 (3.0)	15 (3.1)	76 (3.3)	78 (3.2)	78 (3.6)	5 (1.8)	5 (1.8)	7 (2.1)
Tunisia	15 (3.1)	18 (3.4)	6 (2.2)	50 (3.9)	57 (3.7)	35 (3.9)	35 (4.1)	25 (3.2)	59 (4.0)
Turkey	13 (2.6)	15 (2.8)	17 (3.0)	74 (3.7)	70 (4.0)	73 (3.9)	13 (3.3)	15 (3.4)	10 (2.4)
Ukraine	34 (3.5)	33 (3.6)	16 (2.9)	41 (4.2)	45 (3.9)	38 (4.4)	25 (3.9)	21 (3.5)	46 (4.2)
United States	48 (4.0)	53 (3.7)	43 (3.6)	40 (4.0)	40 (3.5)	40 (3.4)	12 (2.4)	7 (2.1)	17 (2.5)
‡ Morocco	r 5 (1.7)	r 4 (0.8)	r 8 (4.0)	56 (5.0)	61 (5.7)	26 (3.9)	39 (4.9)	35 (5.7)	67 (5.5)
International Avg.	21 (0.4)	23 (0.5)	20 (0.4)	54 (0.6)	55 (0.6)	48 (0.6)	25 (0.5)	22 (0.5)	32 (0.5)
<b>Benchmarking Participants</b>									
Basque Country, Spain	12 (3.2)	11 (3.1)	16 (3.8)	36 (5.0)	35 (4.5)	41 (5.5)	53 (5.2)	53 (4.5)	42 (5.0)
British Columbia, Canada	28 (4.2)	31 (4.0)	30 (4.2)	54 (5.0)	55 (4.4)	49 (4.8)	18 (3.5)	14 (2.8)	21 (3.5)
Dubai, UAE	s 46 (0.7)	s 57 (0.6)	s 34 (0.6)	45 (0.6)	40 (0.6)	59 (0.6)	9 (0.3)	3 (0.1)	6 (0.2)
Massachusetts, US	58 (8.3)	57 (7.7)	41 (6.2)	36 (8.2)	43 (7.7)	38 (6.7)	7 (4.0)	0 (0.0)	21 (7.2)
Minnesota, US	37 (8.6)	32 (8.4)	37 (7.7)	47 (9.8)	60 (8.1)	47 (8.6)	16 (6.9)	8 (4.0)	16 (6.6)
Ontario, Canada	36 (4.5)	47 (4.6)	34 (4.3)	48 (4.3)	45 (4.9)	45 (4.6)	16 (3.2)	8 (2.8)	20 (3.8)
Quebec, Canada	45 (4.7)	25 (4.0)	17 (3.6)	40 (4.9)	49 (4.7)	40 (4.4)	14 (3.2)	27 (4.0)	42 (4.7)

Background data provided by schools.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.



on professional development for improving content knowledge (more than 50 percent of students in schools where most teachers had this type of professional development) included Australia, England, New Zealand, and the U.S. states of Massachusetts and Minnesota. Similarly, most professional development emphasis on improving teaching skills was in Australia, England, New Zealand, Scotland, Singapore, the United States, and among benchmarking participants, Alberta, Ontario, Dubai, Massachusetts, and Minnesota, and on using information technology in Australia, England, New Zealand, Scotland, the Slovak Republic, and the state of Massachusetts. Relatively few students (less than 15%) were in schools where most teachers had professional development in any of the areas in Algeria, Denmark, Italy, Morocco, and Yemen.

At eighth grade, the overall picture was similar to fourth grade, although with the level of professional development reported to be somewhat less. On average across countries, 21 percent of students were in schools where most teachers had professional development in improving content knowledge, 23 percent in schools where most teachers had professional development in improving teaching skills, and 20 percent in schools where most teachers had professional development in using information technology. Participants with the most emphasis on professional development for improving content knowledge at eighth grade included Lithuania (40%), Malaysia (41%), Singapore (48%), Slovenia (45%), and the United States (48%), as well as the benchmarking participants of Dubai (46%), Massachusetts (58%), and Quebec (45%). The highest proportion of professional development emphasis on improving teaching skills was in England (43%), Lithuania (43%), Scotland (49%), Singapore (60%), the United States (53%), and benchmarking participants Dubai (57%), Massachusetts (57%), and Ontario (47%), and on using information technology in Bulgaria (42%), England (48%), Scotland (51%), Singapore (48%), the United States (43%), and the state of Massachusetts (41%).

### What Are the Perceptions of School Climate?

TIMSS asked both school principals and teachers to characterize the climate of their school in terms of an environment supportive of learning. The Index of Principals' Perception of School Climate (PPSC) was based on school principals' ratings of the following on a scale from *very high* to *very low*:

- ▶ Teachers' job satisfaction
- ▶ Teachers' understanding of the school's curricular goals
- ▶ Teachers' degree of success in implementing the school's curriculum
- ▶ Teachers' expectations for student achievement
- ▶ Parental support for student achievement
- ▶ Parental involvement in school activities
- ▶ Students' regard for school property
- ▶ Students' desire to do well in school.

Students were assigned to the high level of the index if they attended schools where the principal averaged *high* or *very high* on these aspects of school climate, and to the low level where the principal averaged *low* or *very low*. Students at the medium level had principals with other response combinations.

Exhibit 8.11 presents, for each TIMSS participant at fourth and eighth grade, the percentage of students at each level of the index, together with average mathematics achievement and changes in percentages since 2003. At fourth grade, on average internationally, 22 percent of students were at the high level of the principals' perception of school climate index. That is, they attended schools where the principal rated the school climate positively. The majority of students (68%) were at the medium index level and just 10 percent at the low level. More than 40 percent of students were at the high level of the principals' perception index in Chinese Taipei, Australia, New Zealand, Scotland, the United States, England, and six of the seven benchmarking participants—Massachusetts, Dubai, Alberta, Minnesota, British Columbia, and Ontario. In contrast, less than 10 percent of students

were at this index level in the Russian Federation, Tunisia, Algeria, Armenia, the Slovak Republic, the Ukraine, Latvia, Georgia, and the Czech Republic. The percentage of students at the high index level increased in Australia, Slovenia, Morocco, and the Russian Federation and decreased in Lithuania and Japan.

At eighth grade, 16 percent of students were at the high level of the principals' perception of school climate index, on average, with 68 percent at the medium level and 16 percent at the low level. There was only one country (Chinese Taipei) and three benchmarking participants where 40 percent or more of students were at the high level of the index. Sixteen countries had less than 10 percent at the low level.

At both fourth and eighth grades, average mathematics achievement was highest among students at the high level of the principals' perception of school climate index (487 points and 473 points, respectively), next highest at the medium level (471 and 450 points, respectively), and lowest at the low level (441 and 428 points, respectively).

Exhibit 8.12 presents mathematics<sup>1</sup> teachers' perceptions of their school climate, based on teachers' ratings of the same eight attributes as rated by the principals. The Index of Mathematics Teachers' Perception of School Climate (TPSC) was calculated in the same way as the principals' index, and shows generally similar results. At the fourth grade, 17 percent of students, on average, were in schools where teachers had a positive view of the school climate and so were at the high level of the index. Two-thirds of students were at the medium level of the teachers' perception index, and 16 percent at the low level. Teacher perceptions of school climate were most favorable in Scotland, the United States, England, New Zealand, Australia, and Austria, as well as in the benchmarking participants of Massachusetts, Alberta, Minnesota, and Dubai, where 30 percent or more of students were at the high index level. However, there were 12 countries with less than 10 percent of the fourth grade students at the high level.

1 At fourth grade in most countries, the mathematics teacher was the classroom teacher.



At the eighth grade, teachers had a somewhat less positive outlook on school climate than principals. On average across countries, 11 percent of students were at the high level of the index (vs. 16% for principals), 60 percent at the medium level (vs. 68% for principals), and 29 percent at the low level (vs. 16% for principals). Twenty-four countries had less than 10 percent of students at the high level of the teachers' perception index. Average mathematics achievement was positively related to teachers' perceptions of school climate at both fourth and eighth grades, with average achievement higher among students at the high index level and lower among students at the low level of the index.

Exhibit 8.11 Index of Principals' Perception of School Climate (PPSC) with Trends

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	High PPSC			Medium PPSC			Low PPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	64 (3.7)	577 (2.4)	7 (5.3)	35 (3.6)	576 (3.2)	-6 (5.3)	1 (0.7)	~ ~	-1 (1.1)
Australia	50 (4.2)	536 (4.6)	12 (6.2) ▲	47 (3.8)	499 (4.8)	-7 (6.4)	2 (1.2)	~ ~	-5 (3.8)
New Zealand	49 (3.2)	513 (3.5)	0 (4.6)	47 (3.0)	477 (4.0)	0 (4.4)	4 (1.2)	463 (10.6)	0 (1.9)
Scotland	48 (4.8)	500 (4.0)	-2 (6.9)	51 (4.8)	490 (4.7)	6 (6.8)	0 (0.5)	~ ~	-3 (1.8)
United States	48 (3.0)	547 (3.8)	0 (4.6)	46 (3.1)	517 (2.8)	1 (4.6)	6 (1.5)	474 (7.4)	-1 (2.2)
England	r 45 (4.5)	550 (4.5)	11 (6.5)	47 (4.6)	538 (4.0)	-17 (6.8) ▼	8 (2.3)	513 (8.8)	6 (2.7) ▲
Austria	36 (3.1)	509 (3.7)	◊ ◊	62 (3.1)	503 (2.2)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Singapore	36 (0.0)	616 (6.1)	4 (4.1)	62 (0.0)	592 (4.5)	-1 (4.1)	2 (0.0)	~ ~	-3 (1.6)
Iran, Islamic Rep. of	31 (3.8)	416 (8.1)	7 (5.5)	64 (3.8)	396 (5.6)	-3 (5.7)	5 (1.7)	396 (11.3)	-3 (3.1)
Kazakhstan	29 (5.4)	556 (14.6)	◊ ◊	65 (5.7)	547 (7.2)	◊ ◊	5 (2.3)	538 (33.4)	◊ ◊
Sweden	27 (3.6)	510 (4.6)	◊ ◊	66 (4.0)	503 (2.9)	◊ ◊	6 (2.6)	461 (10.7)	◊ ◊
Hong Kong SAR	27 (3.9)	608 (6.1)	-3 (6.0)	69 (4.2)	607 (4.3)	4 (6.4)	5 (2.0)	583 (15.4)	-1 (2.9)
El Salvador	26 (4.1)	356 (11.4)	◊ ◊	60 (4.4)	318 (5.0)	◊ ◊	14 (3.1)	328 (10.8)	◊ ◊
Denmark	26 (3.9)	538 (4.3)	◊ ◊	69 (4.1)	519 (3.2)	◊ ◊	5 (2.1)	509 (15.5)	◊ ◊
Qatar	24 (0.2)	323 (2.3)	◊ ◊	69 (0.2)	287 (1.5)	◊ ◊	7 (0.1)	304 (3.6)	◊ ◊
Norway	21 (3.8)	481 (5.1)	-5 (5.5)	78 (3.9)	470 (3.2)	6 (5.6)	1 (1.0)	~ ~	-1 (1.4)
Kuwait	18 (2.9)	322 (10.1)	◊ ◊	73 (3.5)	320 (4.6)	◊ ◊	9 (2.3)	273 (10.1)	◊ ◊
Slovenia	18 (3.7)	500 (5.5)	10 (4.2) ▲	78 (3.8)	502 (2.1)	-7 (4.7)	4 (1.7)	500 (6.0)	-3 (2.7)
Lithuania	15 (3.0)	542 (4.7)	-10 (4.6) ▼	81 (3.3)	529 (2.7)	9 (5.0)	4 (1.4)	504 (9.4)	1 (2.0)
Morocco	r 13 (3.8)	370 (24.6)	10 (4.0) ▲	56 (5.0)	342 (6.8)	16 (6.9) ▲	31 (3.9)	323 (9.7)	-25 (6.1) ▼
Germany	13 (2.6)	536 (3.9)	◊ ◊	78 (3.0)	528 (2.3)	◊ ◊	9 (2.0)	491 (10.6)	◊ ◊
Hungary	12 (3.0)	553 (9.8)	4 (3.7)	78 (4.0)	511 (3.9)	-7 (5.0)	10 (3.1)	456 (13.2)	3 (3.9)
Colombia	12 (2.6)	409 (11.2)	◊ ◊	63 (5.0)	352 (6.4)	◊ ◊	25 (4.8)	342 (10.8)	◊ ◊
Italy	12 (2.7)	505 (7.5)	-3 (3.9)	81 (2.9)	507 (3.4)	5 (4.4)	8 (1.8)	505 (17.7)	-2 (3.0)
Netherlands	r 11 (2.6)	546 (11.1)	-8 (4.6)	84 (3.1)	534 (2.7)	5 (5.0)	5 (2.1)	496 (10.4)	3 (2.4)
Yemen	11 (2.7)	249 (15.1)	◊ ◊	71 (3.8)	225 (7.2)	◊ ◊	18 (3.6)	204 (14.2)	◊ ◊
Japan	10 (2.6)	578 (6.2)	-8 (4.0) ▼	84 (3.0)	568 (2.3)	6 (4.5)	7 (1.9)	553 (5.3)	2 (2.6)
Russian Federation	9 (2.0)	569 (10.6)	5 (2.3) ▲	83 (3.1)	543 (5.2)	-1 (4.1)	8 (2.5)	522 (20.3)	-4 (3.5)
Tunisia	9 (2.5)	371 (15.8)	0 (3.5)	66 (3.9)	334 (4.7)	17 (5.5) ▲	25 (3.6)	290 (10.4)	-17 (5.3) ▼
Algeria	7 (2.1)	374 (10.7)	◊ ◊	65 (4.4)	378 (7.2)	◊ ◊	28 (4.1)	373 (9.8)	◊ ◊
Armenia	r 5 (1.8)	513 (23.6)	3 (2.2)	72 (3.7)	499 (5.4)	-8 (5.2)	23 (3.5)	498 (9.3)	5 (4.9)
Slovak Republic	4 (1.5)	547 (13.0)	◊ ◊	69 (3.4)	501 (3.6)	◊ ◊	27 (3.4)	473 (10.7)	◊ ◊
Ukraine	3 (1.3)	469 (15.9)	◊ ◊	93 (2.3)	471 (3.0)	◊ ◊	5 (1.9)	437 (26.4)	◊ ◊
Latvia	2 (1.4)	~ ~	-4 (3.1)	84 (3.2)	539 (2.4)	-1 (5.3)	14 (3.2)	530 (6.5)	5 (4.4)
Georgia	2 (1.1)	~ ~	◊ ◊	73 (4.0)	445 (5.2)	◊ ◊	26 (4.1)	421 (9.1)	◊ ◊
Czech Republic	1 (0.0)	~ ~	◊ ◊	79 (3.8)	489 (3.0)	◊ ◊	21 (3.9)	479 (6.0)	◊ ◊
International Avg.	22 (0.5)	487 (1.8)		68 (0.6)	471 (0.7)		10 (0.4)	441 (2.4)	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Benchmarking Participants

Massachusetts, US	70 (7.8)	579 (4.9)	◊ ◊	30 (7.9)	557 (7.4)	◊ ◊	1 (0.9)	~ ~	◊ ◊
Dubai, UAE	r 60 (0.4)	444 (2.4)	◊ ◊	37 (0.4)	445 (5.0)	◊ ◊	4 (0.3)	426 (5.6)	◊ ◊
Alberta, Canada	58 (4.4)	512 (3.5)	◊ ◊	39 (4.3)	499 (3.5)	◊ ◊	3 (1.6)	455 (18.0)	◊ ◊
Minnesota, US	54 (9.4)	565 (10.7)	◊ ◊	46 (9.4)	549 (9.2)	◊ ◊	0 (0.0)	~ ~	◊ ◊
British Columbia, Canada	45 (4.6)	517 (4.4)	◊ ◊	49 (4.3)	498 (3.6)	◊ ◊	6 (1.8)	469 (11.6)	◊ ◊
Ontario, Canada	41 (5.0)	522 (4.3)	-2 (6.7)	50 (5.1)	510 (3.9)	-2 (6.9)	9 (2.3)	471 (10.9)	4 (3.3)
Quebec, Canada	17 (3.1)	529 (6.9)	-8 (4.7)	82 (3.3)	517 (3.6)	12 (5.1) ▲	2 (1.0)	~ ~	-4 (2.3)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on principals' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.



Exhibit 8.11 Index of Principals' Perception of School Climate (PPSC) with Trends (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	High PPSC			Medium PPSC			Low PPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	54 (4.2)	611 (5.9)	17 (5.7) ▲	42 (4.2)	587 (6.9)	-18 (5.7) ▼	4 (1.6)	548 (15.7)	1 (1.9)
Scotland s	35 (4.1)	503 (7.4)	-7 (5.9)	59 (4.6)	476 (5.5)	7 (6.6)	6 (2.4)	495 (31.6)	0 (3.5)
Australia	33 (3.5)	541 (8.5)	2 (5.6)	58 (4.5)	481 (4.1)	-3 (6.5)	9 (2.4)	447 (9.4)	2 (3.6)
Indonesia	32 (4.0)	421 (10.2)	13 (5.1) ▲	58 (4.4)	399 (6.6)	-13 (5.8) ▼	11 (3.1)	391 (12.0)	0 (4.2)
United States	32 (3.2)	533 (4.6)	-11 (4.6) ▼	57 (3.7)	501 (3.6)	8 (4.9)	12 (2.2)	475 (9.9)	4 (2.9)
England s	31 (3.9)	535 (8.8)	-1 (7.0)	65 (3.9)	508 (6.3)	2 (7.3)	4 (1.7)	445 (21.1)	-1 (3.6)
Israel	26 (3.4)	488 (9.9)	-2 (5.3)	66 (4.1)	462 (5.5)	-3 (5.8)	7 (2.3)	427 (16.7)	5 (2.6) ▲
Egypt	25 (3.4)	411 (7.3)	-1 (4.8)	65 (3.8)	385 (4.9)	3 (5.7)	10 (2.9)	369 (12.5)	-2 (4.2)
Korea, Rep. of	25 (3.6)	601 (4.9)	9 (4.9)	66 (3.6)	597 (3.5)	-2 (5.3)	9 (2.2)	590 (9.4)	-7 (3.7)
Jordan	25 (3.4)	456 (7.6)	7 (4.7)	67 (4.1)	423 (4.9)	-5 (5.9)	8 (2.3)	373 (12.7)	-3 (3.5)
Singapore	24 (0.0)	644 (6.5)	-6 (0.0) ▼	70 (0.0)	579 (4.9)	4 (0.0) ▲	6 (0.0)	538 (14.4)	2 (0.0) ▲
Malaysia	23 (3.8)	504 (11.3)	7 (5.0)	70 (3.7)	463 (5.2)	0 (5.6)	6 (1.8)	477 (14.7)	-7 (3.6)
Qatar	23 (0.1)	302 (2.7)	0 0	70 (0.1)	310 (1.3)	0 0	7 (0.1)	286 (3.7)	0 0
El Salvador	23 (3.4)	359 (6.7)	0 0	62 (4.3)	340 (4.1)	0 0	15 (3.3)	317 (6.6)	0 0
Thailand	22 (3.6)	462 (13.5)	0 0	73 (4.0)	438 (5.8)	0 0	5 (1.9)	406 (22.9)	0 0
Malta	21 (0.2)	527 (1.6)	0 0	61 (0.2)	503 (1.4)	0 0	18 (0.2)	389 (2.7)	0 0
Hong Kong SAR	21 (3.6)	621 (9.8)	9 (4.5) ▲	67 (4.4)	563 (7.4)	-3 (6.0)	12 (3.2)	528 (20.0)	-6 (4.7)
Oman	20 (3.6)	385 (7.9)	0 0	69 (4.0)	372 (4.5)	0 0	11 (2.6)	353 (12.4)	0 0
Ghana	20 (3.2)	352 (8.7)	7 (4.7)	59 (4.2)	302 (6.6)	-9 (6.1)	21 (3.9)	290 (7.7)	3 (5.1)
Bahrain	18 (0.2)	423 (4.9)	7 (0.2) ▲	76 (0.2)	395 (1.5)	3 (0.3) ▲	6 (0.1)	366 (8.2)	-9 (0.2) ▼
Syrian Arab Republic	17 (3.1)	391 (10.2)	0 0	69 (3.3)	395 (4.6)	0 0	14 (2.8)	402 (10.7)	0 0
Lebanon	17 (3.3)	478 (6.7)	-1 (4.8)	66 (4.3)	452 (4.9)	2 (6.3)	18 (3.2)	408 (10.6)	-1 (4.3)
Iran, Islamic Rep. of	16 (2.6)	458 (11.3)	6 (3.4)	64 (3.8)	400 (4.2)	-4 (5.3)	20 (3.1)	369 (7.2)	-2 (4.3)
Saudi Arabia	16 (3.3)	335 (6.2)	--	63 (4.6)	330 (3.8)	--	21 (3.9)	320 (7.2)	--
Kuwait	15 (2.7)	366 (7.4)	0 0	70 (3.8)	354 (2.8)	0 0	15 (3.1)	340 (8.2)	0 0
Colombia	14 (2.6)	408 (9.7)	0 0	52 (4.5)	383 (5.1)	0 0	34 (4.8)	364 (9.1)	0 0
Sweden	13 (2.5)	510 (5.8)	-8 (4.0)	78 (3.6)	488 (2.5)	6 (5.2)	8 (2.6)	492 (9.6)	2 (3.4)
Palestinian Nat'l Auth.	11 (2.6)	390 (7.5)	-3 (4.0)	78 (3.3)	366 (3.8)	1 (4.8)	11 (2.4)	354 (16.3)	2 (3.5)
Cyprus	11 (0.1)	460 (4.9)	-10 (0.2) ▼	74 (0.2)	467 (2.0)	-2 (0.3) ▼	16 (0.2)	458 (3.6)	12 (0.2) ▲
Japan	10 (2.3)	623 (12.7)	-18 (4.2) ▼	77 (3.2)	568 (3.0)	8 (4.7)	13 (2.7)	543 (7.6)	10 (3.0) ▲
Hungary	9 (2.8)	571 (13.2)	3 (3.5)	79 (4.0)	514 (4.3)	-4 (5.2)	11 (3.1)	496 (7.8)	1 (4.0)
Bulgaria	9 (2.3)	525 (19.8)	5 (2.7)	63 (4.0)	467 (6.7)	-9 (5.3)	27 (3.7)	435 (10.5)	4 (4.8)
Turkey	8 (2.2)	498 (23.8)	0 0	55 (4.4)	444 (6.6)	0 0	36 (4.3)	398 (7.8)	0 0
Romania	8 (2.1)	503 (14.5)	1 (3.1)	61 (4.2)	467 (4.9)	-8 (5.9)	31 (4.1)	442 (9.3)	8 (5.5)
Bosnia and Herzegovina	7 (2.0)	458 (6.9)	0 0	80 (3.0)	456 (3.3)	0 0	13 (2.5)	453 (5.4)	0 0
Algeria	7 (2.2)	392 (7.3)	0 0	60 (4.0)	387 (2.6)	0 0	33 (3.9)	385 (2.9)	0 0
Italy	7 (2.2)	484 (9.1)	-5 (3.5)	77 (3.7)	481 (3.6)	1 (5.1)	16 (3.1)	468 (6.8)	4 (3.9)
Slovenia	7 (2.0)	521 (8.6)	-2 (3.0)	85 (3.0)	501 (2.2)	2 (4.1)	8 (2.2)	492 (9.3)	0 (3.2)
Serbia	7 (2.3)	476 (18.3)	4 (2.7)	81 (3.4)	489 (3.8)	9 (5.3)	13 (2.9)	473 (8.1)	-13 (4.8) ▼
Botswana	6 (2.1)	380 (14.7)	5 (2.3) ▲	58 (4.6)	366 (3.3)	27 (6.2) ▲	35 (4.8)	354 (3.7)	-32 (6.4) ▼
Norway	5 (2.0)	485 (6.6)	-8 (3.3) ▼	89 (2.9)	469 (2.3)	8 (4.5)	6 (2.2)	462 (4.6)	1 (3.1)
Armenia r	4 (1.7)	490 (13.7)	1 (2.2)	73 (3.8)	500 (4.5)	-6 (5.6)	23 (3.5)	497 (6.2)	5 (5.3)
Ukraine	4 (1.6)	549 (17.1)	0 0	87 (2.9)	463 (3.9)	0 0	10 (2.4)	421 (10.0)	0 0
Tunisia	3 (1.4)	468 (9.0)	1 (1.7)	44 (3.6)	428 (4.1)	14 (5.2) ▲	54 (3.5)	412 (2.9)	-15 (5.1) ▼
Czech Republic	2 (1.8)	~ ~	0 0	58 (4.0)	515 (3.4)	0 0	40 (4.2)	488 (3.9)	0 0
Lithuania	2 (1.4)	~ ~	-6 (2.7) ▼	94 (2.1)	507 (2.5)	6 (3.7)	4 (1.6)	477 (8.2)	0 (2.5)
Russian Federation	2 (0.9)	~ ~	1 (1.1)	79 (3.0)	514 (4.4)	9 (4.2) ▲	19 (3.1)	494 (6.4)	-10 (4.2) ▼
Georgia	0 (0.0)	~ ~	0 0	72 (4.3)	412 (7.4)	0 0	28 (4.3)	398 (8.8)	0 0
‡ Morocco	16 (5.3)	389 (13.9)	--	68 (5.4)	380 (4.7)	--	15 (4.1)	377 (14.5)	--
International Avg.	16 (0.4)	473 (1.6)		68 (0.5)	450 (0.7)		16 (0.4)	428 (1.6)	
<b>Benmarking Participants</b>									
Dubai, UAE r	56 (0.7)	482 (4.3)	0 0	42 (0.7)	438 (2.7)	0 0	2 (0.3)	~ ~	0 0
Massachusetts, US	44 (7.4)	564 (5.7)	0 0	45 (8.1)	550 (9.1)	0 0	10 (3.0)	481 (14.0)	0 0
Minnesota, US	44 (7.2)	529 (7.5)	0 0	53 (6.9)	540 (5.2)	0 0	3 (2.7)	442 (6.6)	0 0
British Columbia, Canada	35 (4.9)	525 (5.5)	0 0	62 (5.0)	503 (4.7)	0 0	3 (1.5)	512 (51.5)	0 0
Ontario, Canada	34 (4.7)	539 (5.3)	-8 (6.4)	57 (5.1)	511 (3.9)	5 (6.9)	9 (2.5)	499 (10.0)	4 (3.3)
Basque Country, Spain	23 (4.8)	524 (5.6)	11 (5.9)	65 (4.9)	496 (3.3)	-13 (6.2) ▼	12 (2.1)	465 (7.8)	3 (3.3)
Quebec, Canada	18 (3.5)	570 (9.7)	4 (4.1)	71 (4.3)	523 (4.5)	-7 (5.3)	12 (3.1)	496 (6.1)	4 (3.8)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on principals' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.  
 An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.  
 A diamond (0) indicates the country did not participate in the assessment.

**Exhibit 8.12 Index of Mathematics Teachers' Perception of School Climate (TPSC) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High TPSC			Medium TPSC			Low TPSC			
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	
Scotland	r 48 (3.4)	505 (3.3)	7 (6.1)	49 (3.3)	487 (3.6)	-9 (6.0)	3 (1.5)	453 (27.6)	1 (1.8)	
United States	38 (2.7)	552 (3.9)	-3 (3.7)	49 (2.6)	525 (2.7)	2 (3.6)	14 (1.9)	486 (6.0)	2 (2.5)	
England	r 37 (3.9)	559 (5.4)	8 (5.9)	57 (3.9)	534 (3.5)	-5 (6.3)	6 (1.7)	501 (8.1)	-3 (2.9)	
New Zealand	36 (2.3)	514 (3.6)	-1 (3.7)	57 (2.6)	484 (3.1)	-1 (4.0)	6 (1.4)	460 (8.2)	2 (1.7)	
Australia	35 (3.5)	537 (5.7)	5 (5.0)	56 (3.3)	508 (4.9)	-3 (4.9)	9 (1.8)	491 (16.3)	-2 (3.0)	
Austria	34 (2.6)	510 (2.8)	0 0	62 (2.5)	505 (2.5)	0 0	4 (1.3)	472 (8.2)	0 0	
El Salvador	29 (3.9)	345 (9.7)	0 0	60 (4.3)	325 (6.0)	0 0	11 (2.5)	315 (11.8)	0 0	
Kazakhstan	29 (5.5)	551 (15.4)	0 0	67 (5.7)	548 (7.2)	0 0	4 (1.8)	567 (22.4)	0 0	
Iran, Islamic Rep. of	28 (3.8)	415 (9.9)	3 (5.5)	58 (4.0)	401 (5.5)	-2 (6.1)	15 (2.6)	385 (7.1)	-1 (4.4)	
Chinese Taipei	25 (3.7)	586 (4.0)	-10 (5.5)	71 (4.0)	572 (2.1)	10 (5.7)	4 (1.5)	560 (8.2)	0 (2.1)	
Qatar	24 (0.2)	304 (2.0)	0 0	60 (0.2)	296 (1.5)	0 0	16 (0.1)	287 (2.6)	0 0	
Hong Kong SAR	22 (3.8)	620 (6.6)	14 (4.5) ⬆	65 (4.1)	608 (4.4)	-13 (5.6) ⬇	14 (2.8)	581 (8.7)	-1 (4.3)	
Lithuania	20 (3.0)	544 (6.9)	-14 (4.5) ⬇	76 (3.2)	528 (3.0)	11 (4.6) ⬆	4 (1.2)	499 (15.2)	3 (1.2) ⬆	
Denmark	19 (3.8)	537 (5.7)	0 0	68 (4.2)	526 (2.8)	0 0	13 (3.1)	497 (8.3)	0 0	
Norway	18 (3.1)	490 (5.5)	0 (4.7)	80 (3.1)	470 (2.7)	3 (4.8)	3 (0.8)	448 (17.4)	-3 (2.0)	
Germany	17 (2.7)	540 (5.3)	0 0	70 (3.3)	528 (2.3)	0 0	13 (2.3)	490 (8.3)	0 0	
Ukraine	15 (2.9)	471 (7.9)	0 0	80 (3.2)	469 (3.5)	0 0	5 (1.7)	457 (7.9)	0 0	
Sweden	15 (2.3)	515 (4.7)	0 0	76 (3.0)	503 (3.1)	0 0	9 (2.2)	476 (6.8)	0 0	
Slovenia	15 (2.2)	503 (4.8)	-2 (4.2)	81 (2.3)	502 (1.9)	1 (4.6)	5 (1.2)	497 (7.6)	1 (2.2)	
Singapore	13 (2.1)	608 (10.4)	-8 (4.4)	77 (2.6)	601 (4.6)	5 (4.7)	10 (1.5)	579 (7.2)	3 (2.5)	
Kuwait	r 11 (3.2)	333 (14.4)	0 0	74 (4.2)	313 (3.9)	0 0	15 (3.1)	307 (12.7)	0 0	
Yemen	11 (2.6)	221 (18.9)	0 0	59 (4.6)	226 (8.5)	0 0	30 (4.2)	215 (7.5)	0 0	
Georgia	11 (3.1)	456 (9.0)	0 0	68 (4.4)	441 (5.0)	0 0	21 (3.9)	423 (8.7)	0 0	
Colombia	10 (2.6)	384 (22.2)	0 0	66 (4.6)	362 (6.7)	0 0	25 (4.1)	333 (9.5)	0 0	
Italy	9 (2.0)	513 (6.7)	1 (3.0)	73 (3.0)	511 (3.2)	0 (4.5)	18 (2.7)	484 (8.5)	-1 (3.8)	
Russian Federation	9 (2.0)	575 (15.3)	3 (2.7)	83 (2.7)	546 (5.4)	4 (4.3)	8 (1.9)	509 (17.5)	-7 (3.7)	
Hungary	6 (1.5)	554 (10.8)	-8 (3.2) ⬇	74 (3.7)	518 (3.8)	-4 (4.9)	19 (3.6)	466 (11.0)	13 (4.1) ⬆	
Tunisia	r 6 (1.6)	355 (23.0)	-1 (2.7)	58 (3.7)	333 (5.9)	0 (5.3)	36 (3.8)	314 (8.1)	0 (5.3)	
Slovak Republic	5 (1.6)	513 (8.1)	0 0	71 (3.6)	497 (5.5)	0 0	24 (3.1)	488 (9.4)	0 0	
Algeria	5 (1.9)	391 (12.1)	0 0	57 (4.9)	377 (8.9)	0 0	38 (4.9)	374 (8.6)	0 0	
Netherlands	4 (1.9)	537 (8.9)	-3 (3.2)	83 (3.2)	539 (2.5)	-1 (4.8)	13 (2.6)	505 (9.0)	5 (3.6)	
Japan	4 (1.5)	591 (15.6)	-8 (3.1) ⬇	74 (3.4)	569 (2.3)	-2 (4.8)	22 (3.2)	560 (3.8)	10 (4.1) ⬆	
Latvia	4 (1.3)	552 (11.6)	-3 (3.0)	83 (2.6)	537 (2.4)	-1 (4.5)	13 (2.5)	538 (7.2)	4 (3.8)	
Morocco	s 4 (1.7)	391 (41.2)	0 (2.2)	41 (4.1)	362 (10.0)	7 (5.7)	55 (3.7)	321 (5.3)	-7 (5.5)	
Armenia	r 4 (1.4)	498 (13.0)	-10 (3.2) ⬇	52 (4.0)	499 (5.6)	-19 (5.3) ⬇	45 (4.0)	501 (7.6)	29 (4.9) ⬆	
Czech Republic	1 (0.8)	~ ~	0 0	69 (4.0)	491 (3.1)	0 0	30 (3.9)	477 (4.4)	0 0	
International Avg.	17 (0.5)	488 (2.1)		67 (0.6)	473 (0.8)		16 (0.5)	453 (1.8)		
<b>Benchmarking Participants</b>										
Massachusetts, US	49 (7.2)	583 (5.6)	0 0	46 (6.6)	567 (5.4)	0 0	5 (3.0)	522 (19.3)	0 0	
Alberta, Canada	46 (4.0)	517 (3.9)	0 0	50 (4.1)	496 (3.8)	0 0	3 (1.4)	465 (37.0)	0 0	
Dubai, UAE	r 44 (4.6)	451 (6.5)	0 0	50 (4.6)	439 (4.6)	0 0	6 (1.1)	368 (21.6)	0 0	
Minnesota, US	38 (8.2)	578 (6.7)	0 0	56 (8.0)	545 (7.6)	0 0	5 (2.8)	502 (20.6)	0 0	
British Columbia, Canada	r 26 (3.4)	525 (5.0)	0 0	67 (4.1)	498 (3.3)	0 0	7 (2.7)	482 (4.5)	0 0	
Ontario, Canada	26 (4.3)	525 (5.4)	-11 (6.0)	63 (4.7)	512 (4.4)	8 (6.5)	11 (3.2)	480 (11.4)	3 (4.5)	
Quebec, Canada	14 (2.9)	535 (5.3)	0 (3.9)	71 (3.9)	521 (3.7)	-2 (5.3)	15 (2.9)	504 (7.8)	2 (4.2)	

⬆ 2007 percent significantly higher

⬇ 2007 percent significantly lower

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.



**Exhibit 8.12 Index of Mathematics Teachers' Perception of School Climate (TPSC) with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High TPSC			Medium TPSC			Low TPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	26 (4.4)	424 (12.8)	8 (5.6)	58 (4.7)	400 (6.8)	-5 (6.4)	16 (3.9)	402 (11.5)	-2 (5.4)
Lebanon	24 (3.3)	475 (7.6)	4 (5.2)	64 (4.0)	445 (6.0)	8 (6.3)	12 (2.1)	422 (8.6)	-11 (4.0) ▼
Chinese Taipei	24 (3.8)	624 (8.2)	3 (5.1)	65 (4.1)	596 (4.8)	-3 (5.7)	11 (2.6)	554 (11.5)	1 (3.7)
United States	21 (2.4)	534 (5.1)	-1 (3.7)	57 (2.7)	513 (3.9)	0 (4.2)	23 (2.0)	472 (5.9)	0 (3.3)
Egypt	20 (3.3)	409 (8.0)	1 (4.7)	59 (4.4)	391 (4.5)	1 (6.1)	21 (3.5)	370 (10.0)	-2 (4.9)
Israel	r 20 (3.2)	504 (8.0)	-7 (5.2)	60 (4.0)	467 (6.8)	0 (5.9)	20 (2.7)	421 (8.1)	7 (3.4) ●
Australia	20 (3.2)	544 (10.2)	4 (4.1)	53 (3.9)	497 (5.8)	-4 (5.9)	27 (2.5)	465 (5.3)	0 (4.7)
Scotland	r 18 (2.9)	498 (11.5)	3 (4.5)	67 (3.4)	489 (4.6)	7 (5.7)	15 (2.4)	467 (13.3)	-10 (4.5) ▼
England	r 18 (2.2)	567 (10.5)	5 (3.9)	65 (3.1)	509 (5.5)	-8 (5.9)	17 (2.5)	472 (12.7)	3 (4.9)
Syrian Arab Republic	17 (2.8)	405 (8.4)	0 0	64 (3.7)	392 (5.3)	0 0	20 (3.2)	396 (8.7)	0 0
El Salvador	16 (2.9)	338 (9.2)	0 0	56 (4.3)	341 (4.2)	0 0	28 (4.1)	336 (6.8)	0 0
Bahrain	15 (1.5)	405 (3.2)	8 (2.3) ●	59 (2.4)	403 (2.4)	10 (4.3) ●	26 (1.8)	374 (3.7)	-18 (3.8) ▼
Ghana	15 (2.2)	353 (9.9)	-2 (4.5)	59 (4.2)	307 (6.8)	6 (6.3)	26 (3.8)	290 (7.4)	-4 (5.9)
Oman	15 (2.7)	394 (9.6)	0 0	64 (3.8)	378 (4.2)	0 0	21 (3.3)	341 (8.3)	0 0
Singapore	14 (1.6)	655 (11.2)	0 (2.0)	57 (2.4)	596 (5.2)	-4 (3.2)	29 (1.9)	553 (6.7)	4 (2.7)
Saudi Arabia	14 (2.9)	330 (11.1)	--	55 (4.4)	331 (4.1)	--	31 (3.7)	323 (5.2)	--
Malta	14 (0.2)	524 (3.1)	0 0	54 (0.3)	506 (1.7)	0 0	32 (0.3)	441 (1.9)	0 0
Malaysia	13 (2.6)	506 (13.0)	-2 (3.9)	70 (3.6)	472 (5.7)	3 (5.1)	17 (2.9)	455 (13.3)	-1 (4.3)
Qatar	12 (0.1)	316 (2.8)	0 0	67 (0.2)	311 (1.7)	0 0	21 (0.1)	289 (2.1)	0 0
Colombia	12 (2.4)	421 (10.5)	0 0	47 (5.4)	382 (6.3)	0 0	42 (5.1)	367 (5.1)	0 0
Palestinian Nat'l Auth.	12 (2.8)	381 (14.3)	4 (3.7)	58 (3.9)	368 (4.9)	-8 (5.4)	30 (3.0)	360 (7.2)	4 (4.4)
Bosnia and Herzegovina	11 (2.5)	451 (12.3)	0 0	57 (4.3)	461 (3.9)	0 0	32 (3.9)	448 (4.5)	0 0
Iran, Islamic Rep. of	10 (2.1)	461 (12.8)	-2 (3.4)	47 (3.9)	416 (6.3)	12 (5.3) ●	43 (3.5)	376 (4.2)	-10 (5.3)
Bulgaria	10 (1.8)	512 (23.5)	9 (2.0) ●	47 (3.7)	475 (7.9)	-10 (5.6)	43 (3.5)	441 (6.9)	2 (5.4)
Romania	10 (2.2)	492 (13.4)	0 (3.4)	57 (3.7)	467 (5.6)	-2 (5.5)	34 (3.6)	444 (7.9)	2 (5.3)
Cyprus	9 (1.9)	458 (6.2)	-5 (2.7)	67 (2.7)	467 (2.2)	-1 (3.6)	23 (2.1)	462 (4.1)	6 (2.8) ●
Jordan	9 (2.6)	478 (12.0)	2 (3.7)	58 (4.4)	439 (5.7)	3 (6.1)	32 (3.9)	391 (6.9)	-6 (5.7)
Hong Kong SAR	9 (2.7)	646 (13.7)	2 (3.7)	67 (4.3)	579 (6.0)	9 (5.6)	24 (3.8)	531 (13.8)	-11 (5.1) ▼
Korea, Rep. of	s 9 (2.0)	625 (10.0)	2 (2.8)	61 (3.4)	600 (3.6)	0 (5.1)	30 (3.1)	583 (4.8)	-2 (4.7)
Ukraine	8 (2.3)	523 (15.7)	0 0	80 (3.3)	459 (4.0)	0 0	12 (2.5)	438 (10.4)	0 0
Thailand	8 (2.3)	454 (25.2)	0 0	69 (3.7)	445 (6.5)	0 0	23 (3.4)	425 (8.5)	0 0
Kuwait	r 8 (2.4)	355 (14.0)	0 0	71 (3.6)	355 (3.1)	0 0	21 (3.1)	357 (7.4)	0 0
Japan	7 (2.1)	586 (12.4)	2 (2.7)	61 (3.7)	578 (3.4)	-9 (5.3)	32 (3.7)	552 (4.3)	7 (5.2)
Sweden	7 (1.4)	514 (6.7)	-3 (2.9)	72 (3.2)	492 (2.4)	5 (4.8)	21 (2.9)	483 (5.0)	-2 (4.3)
Serbia	7 (1.8)	492 (10.1)	-1 (2.7)	67 (3.6)	493 (3.6)	-1 (5.4)	26 (3.5)	467 (7.1)	2 (5.1)
Slovenia	6 (1.2)	522 (10.2)	2 (2.1)	70 (3.0)	502 (2.6)	-9 (4.7)	24 (2.9)	493 (4.9)	7 (4.4)
Norway	5 (1.7)	473 (6.9)	-3 (2.7)	85 (2.6)	471 (2.3)	3 (4.0)	10 (2.3)	455 (3.9)	0 (3.3)
Hungary	4 (1.4)	541 (21.2)	1 (2.0)	75 (3.3)	519 (4.3)	-7 (4.4)	20 (3.0)	502 (7.1)	6 (3.9)
Turkey	4 (1.6)	503 (21.0)	0 0	42 (4.2)	453 (9.0)	0 0	54 (4.1)	410 (5.4)	0 0
Tunisia	4 (1.6)	446 (18.4)	-2 (2.4)	37 (4.0)	428 (4.6)	-13 (5.8) ▼	59 (4.1)	415 (2.8)	15 (5.9) ●
Botswana	4 (1.5)	417 (15.0)	0 (2.2)	42 (4.7)	374 (4.6)	13 (6.4) ●	55 (4.7)	351 (3.0)	-13 (6.5) ▼
Lithuania	3 (1.3)	522 (16.4)	-2 (2.1)	81 (2.7)	507 (2.6)	-5 (4.0)	16 (2.5)	498 (6.4)	7 (3.4) ●
Italy	3 (1.1)	477 (29.4)	-1 (2.1)	55 (3.6)	488 (3.9)	6 (5.6)	42 (3.7)	470 (4.4)	-5 (5.4)
Armenia	3 (1.0)	501 (8.4)	-7 (2.4) ▼	64 (3.7)	498 (4.2)	4 (5.4)	33 (3.7)	500 (6.7)	2 (5.2)
Algeria	2 (1.2)	~ ~	0 0	46 (4.7)	390 (3.0)	0 0	52 (4.6)	384 (2.6)	0 0
Russian Federation	2 (0.9)	~ ~	1 (1.1)	67 (3.2)	516 (5.1)	8 (5.3)	31 (3.3)	501 (6.2)	-9 (5.2)
Georgia	1 (0.9)	~ ~	0 0	54 (5.2)	420 (7.6)	0 0	45 (5.3)	398 (9.2)	0 0
Czech Republic	0 (0.5)	~ ~	0 0	46 (3.3)	517 (4.1)	0 0	53 (3.2)	492 (3.3)	0 0
‡ Morocco	8 (2.7)	439 (23.8)	--	30 (5.5)	391 (8.7)	--	62 (5.6)	374 (4.7)	--
<b>International Avg.</b>	<b>11 (0.3)</b>	<b>478 (2.0)</b>		<b>60 (0.5)</b>	<b>455 (0.7)</b>		<b>29 (0.5)</b>	<b>433 (1.1)</b>	

**Benchmarking Participants**

Dubai, UAE	s 44 (4.1)	485 (6.9)	0 0	47 (5.0)	440 (7.7)	0 0	9 (2.8)	418 (20.0)	0 0
Ontario, Canada	32 (4.9)	536 (4.9)	7 (6.8)	51 (5.3)	516 (4.0)	-10 (7.2)	17 (3.8)	487 (10.9)	2 (5.2)
Massachusetts, US	32 (5.6)	576 (7.3)	0 0	50 (6.9)	539 (9.2)	0 0	18 (4.5)	511 (16.0)	0 0
British Columbia, Canada	24 (3.8)	535 (6.6)	0 0	65 (4.0)	503 (3.7)	0 0	11 (2.4)	497 (13.7)	0 0
Basque Country, Spain	13 (3.7)	518 (8.6)	6 (4.6)	66 (5.1)	506 (3.3)	3 (7.1)	21 (3.5)	466 (6.9)	-10 (6.0)
Quebec, Canada	12 (3.5)	596 (14.3)	-2 (4.5)	49 (4.2)	532 (4.2)	-15 (6.1) ▼	39 (3.8)	505 (5.9)	17 (5.5) ●
Minnesota, US	10 (3.8)	553 (16.8)	0 0	67 (6.7)	538 (5.0)	0 0	22 (6.4)	502 (15.2)	0 0

● 2007 percent significantly higher      ▼ 2007 percent significantly lower

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.  
 An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.  
 A diamond (0) indicates the country did not participate in the assessment.

### How Safe and Orderly Are Schools?

Since a supportive school environment for learning is one in which teachers and students feel safe and secure, TIMSS asked teachers and students about their perceptions of safety in their schools. The Index of Mathematics Teachers' Perception of Safety in School (TPSS) is based on mathematics teachers' responses to three statements about their schools:

- ▶ This school is located in a safe neighborhood
- ▶ I feel safe at this school
- ▶ This school's security policies and practices are sufficient.

Students were assigned to the high level when their teachers agreed with all three statements and to the low level when their teachers disagreed with all three. Students whose teachers provided other response combinations were assigned to the medium level.

As shown in Exhibit 8.13, fourth grade teachers generally agreed that their schools were safe, reporting that, on average, most students were at the high (80%) or medium (15%) level of the teachers' perception of safety index. In the Czech Republic, Singapore, Austria, Norway, the Slovak Republic, Kuwait, Germany, and Lithuania, as well as in Dubai, Massachusetts, and Alberta, 90 percent or more of students were at the high level of the index. There were increased percentages of students at the high level (since 2003) in Singapore, Lithuania, Scotland, England, Slovenia, Italy, the Russian Federation, and Japan, and decreases in Tunisia and Armenia. Average mathematics achievement was highest at the high level of the index (476 points, on average), next at the medium level (461 points), and lowest at the low level (410 points).

Eighth grade mathematics teachers also tended to report that schools felt safe, with more than three fourths of students (77%) at the high and another 18 percent at the medium level of the teacher perception of safety index, on average, at the eighth grade. Ninety percent, or more, of students in Norway, Singapore, Hungary, Indonesia, and Qatar as well as in Dubai were at the high level of the index. Countries with increased percentages since 2003

included Norway, Hong Kong SAR, Bulgaria, the Russian Federation, Italy, Scotland, Korea, the Palestinian National Authority, Japan, and Botswana, as well as the Basque Country of Spain, while Armenia and the Canadian province of Quebec had decreases. Similar to the fourth grade, average mathematics achievement was positively related to teacher perceptions of safety at eighth grade, with achievement highest among students at the high index level, and lowest at the low level of the index.

To complement teachers' perceptions of school safety, TIMSS asked students about their school experiences in terms of how often the following happened in their school in the past month:

- ▶ Something of mine was stolen
- ▶ I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking)
- ▶ I was made to do things I didn't want to do by other students
- ▶ I was made fun of or called names
- ▶ I was left out of activities by other students

Students at the high level of the Index of Students' Perception of Being Safe in School (SPBSS) responded *No* to all five statements, while students at the low level responded *Yes* to three or more statements. Students with other combinations of responses were at the medium index level.

As shown in Exhibit 8.14, students at both grades reported a range of experiences across the TIMSS participants. At fourth grade, 42 percent of students were at the high level of the index, on average internationally, indicating that they encountered none of the events listed above. However, 40 percent were at the medium level and 18 percent at the low level, implying that they had encountered at least some of these unpleasant events in school in the past month. The majority of students in Kazakhstan, Sweden, Denmark, Norway, Germany, Japan, the Ukraine, and the Russian Federation were at the high level. The percentage of students at the high level increased since 2003 in Japan, the Russian Federation, Lithuania, the Netherlands, Iran, Scotland, Italy, and Singapore, and decreased in Armenia.

**Exhibit 8.13 Index of Mathematics Teachers' Perception of Safety in School (TPSS) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High TPSS			Medium TPSS			Low TPSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Czech Republic	97 (1.3)	487 (2.8)	◊ ◊	3 (1.2)	468 (12.5)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Singapore	96 (1.0)	600 (3.7)	9 (3.0) ▲	3 (1.0)	619 (22.7)	-9 (2.9) ▼	0 (0.0)	~ ~	0 (0.2)
Austria	95 (1.1)	506 (2.1)	◊ ◊	4 (1.1)	495 (9.9)	◊ ◊	0 (0.2)	~ ~	◊ ◊
Norway	95 (1.7)	473 (2.7)	5 (3.2)	4 (1.4)	481 (13.1)	-5 (3.0)	1 (0.9)	~ ~	1 (1.1)
Slovak Republic	92 (2.0)	496 (4.9)	◊ ◊	8 (2.0)	497 (8.7)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Kuwait	r 91 (2.6)	315 (4.4)	◊ ◊	9 (2.6)	304 (11.9)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Germany	91 (1.7)	528 (2.3)	◊ ◊	8 (1.7)	483 (12.1)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Lithuania	91 (2.1)	530 (2.6)	10 (3.8) ▲	7 (1.8)	530 (6.3)	-10 (3.3) ▼	2 (1.1)	~ ~	0 (1.6)
Georgia	89 (2.3)	441 (4.7)	◊ ◊	8 (1.8)	438 (11.2)	◊ ◊	4 (1.5)	428 (18.8)	◊ ◊
Hong Kong SAR	88 (3.2)	608 (4.0)	9 (5.1)	12 (3.2)	605 (9.1)	-5 (5.0)	0 (0.0)	~ ~	-4 (1.7) ▼
Kazakhstan	88 (3.3)	553 (6.3)	◊ ◊	12 (3.2)	525 (30.3)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Scotland	r 87 (2.6)	498 (2.7)	10 (4.1) ▲	13 (2.6)	470 (8.3)	-9 (4.1) ▼	0 (0.0)	~ ~	-1 (0.0)
Qatar	87 (0.1)	297 (1.1)	◊ ◊	11 (0.1)	296 (4.3)	◊ ◊	2 (0.0)	~ ~	◊ ◊
Hungary	86 (2.6)	516 (3.8)	-2 (4.0)	12 (2.4)	472 (10.1)	2 (3.7)	1 (0.9)	~ ~	0 (1.3)
New Zealand	86 (1.8)	499 (2.6)	-1 (2.7)	14 (1.8)	451 (7.0)	1 (2.7)	0 (0.1)	~ ~	0 (0.4)
Netherlands	86 (2.9)	540 (2.4)	1 (3.6)	10 (2.1)	493 (8.2)	-3 (2.9)	5 (1.8)	528 (18.8)	2 (2.4)
Australia	86 (2.4)	521 (4.3)	7 (4.3)	14 (2.3)	483 (10.2)	-6 (4.2)	1 (0.4)	~ ~	-1 (0.9)
England	r 86 (2.4)	547 (3.2)	15 (4.7) ▲	14 (2.4)	509 (5.6)	-14 (4.7) ▼	0 (0.3)	~ ~	-1 (1.2)
Ukraine	84 (3.0)	470 (3.6)	◊ ◊	14 (2.8)	460 (7.1)	◊ ◊	2 (1.0)	~ ~	◊ ◊
Slovenia	84 (2.0)	502 (2.0)	11 (4.6) ▲	14 (1.9)	502 (4.0)	-9 (4.4) ▼	2 (0.8)	~ ~	-2 (1.9)
Italy	83 (2.4)	510 (3.0)	18 (4.2) ▲	15 (2.0)	500 (10.7)	-9 (3.6) ▼	2 (1.1)	~ ~	-9 (2.5) ▼
Denmark	83 (3.4)	528 (2.2)	◊ ◊	16 (3.2)	501 (6.3)	◊ ◊	1 (1.1)	~ ~	◊ ◊
Sweden	82 (3.0)	507 (2.6)	◊ ◊	16 (3.1)	486 (5.7)	◊ ◊	1 (0.9)	~ ~	◊ ◊
Russian Federation	82 (3.2)	544 (5.6)	9 (4.5) ▲	18 (3.2)	551 (8.0)	-8 (4.5)	0 (0.5)	~ ~	-1 (0.8)
Iran, Islamic Rep. of	81 (3.1)	405 (4.4)	0 (5.3)	14 (2.6)	394 (10.0)	-3 (4.8)	5 (1.8)	391 (17.7)	3 (2.3)
United States	80 (2.2)	538 (2.7)	-2 (3.1)	19 (2.2)	493 (5.8)	4 (2.9)	1 (0.3)	~ ~	-1 (0.8)
Yemen	77 (4.1)	221 (7.2)	◊ ◊	17 (3.6)	218 (9.4)	◊ ◊	5 (2.1)	252 (31.3)	◊ ◊
Latvia	70 (3.9)	536 (2.8)	8 (5.9)	28 (3.8)	539 (4.5)	-8 (5.7)	2 (1.0)	~ ~	-1 (1.9)
Algeria	68 (4.8)	380 (5.5)	◊ ◊	24 (4.3)	368 (16.7)	◊ ◊	8 (2.5)	371 (16.5)	◊ ◊
Japan	66 (3.5)	569 (2.5)	11 (5.3) ▲	30 (3.3)	565 (4.1)	-7 (5.3)	4 (1.6)	566 (5.2)	-4 (2.8)
Chinese Taipei	65 (4.1)	580 (2.2)	-4 (5.5)	27 (4.0)	570 (3.8)	-1 (5.4)	7 (2.3)	565 (6.1)	5 (2.6)
Tunisia	r 64 (4.0)	326 (6.7)	-15 (5.5) ▼	16 (3.0)	349 (9.7)	5 (4.0)	20 (3.1)	312 (9.0)	10 (4.2) ▲
El Salvador	63 (3.8)	333 (6.3)	◊ ◊	20 (3.3)	322 (9.1)	◊ ◊	17 (3.5)	325 (9.8)	◊ ◊
Colombia	56 (5.7)	367 (8.6)	◊ ◊	24 (3.9)	342 (8.4)	◊ ◊	20 (4.8)	348 (10.5)	◊ ◊
Morocco	s 44 (3.3)	361 (8.5)	-4 (5.7)	33 (3.6)	325 (8.4)	2 (5.8)	23 (3.1)	323 (13.6)	2 (5.3)
Armenia	r 38 (4.0)	502 (7.6)	-41 (5.1) ▼	23 (3.4)	485 (7.3)	5 (4.9)	39 (3.5)	507 (6.6)	36 (3.7) ▲
International Avg.	80 (0.5)	476 (0.7)		15 (0.5)	461 (1.8)		5 (0.3)	410 (4.5)	
<b>Benchmarking Participants</b>									
Dubai, UAE	s 100 (0.0)	445 (3.7)	◊ ◊	0 (0.0)	~ ~	◊ ◊	0 (0.0)	~ ~	◊ ◊
Alberta, Canada	92 (2.0)	506 (3.1)	◊ ◊	7 (2.0)	489 (5.7)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Massachusetts, US	90 (4.2)	578 (3.8)	◊ ◊	9 (3.9)	533 (5.1)	◊ ◊	1 (0.0)	~ ~	◊ ◊
Quebec, Canada	89 (2.8)	524 (3.2)	8 (4.6)	9 (2.3)	485 (6.8)	-8 (4.1)	2 (1.3)	~ ~	0 (1.8)
British Columbia, Canada	88 (2.9)	508 (2.7)	◊ ◊	12 (2.9)	487 (8.6)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Minnesota, US	87 (4.6)	559 (6.3)	◊ ◊	13 (4.6)	531 (14.8)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Ontario, Canada	86 (3.4)	516 (3.0)	-4 (4.6)	14 (3.4)	485 (10.7)	4 (4.5)	0 (0.3)	~ ~	0 (0.4)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and practices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three statements. Medium level includes all other combinations of responses.

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.





**Exhibit 8.13 Index of Mathematics Teachers' Perception of Safety in School (TPSS) with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High TPSS			Medium TPSS			Low TPSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Norway	94 (1.4)	469 (1.9)	6 (2.9) ▲	6 (1.4)	460 (7.2)	-6 (2.9) ▼	0 (0.0)	~ ~	0 (0.0)
Singapore	93 (1.2)	597 (4.0)	1 (1.9)	6 (1.1)	539 (16.3)	-1 (1.8)	1 (0.6)	~ ~	0 (0.8)
Hungary	91 (2.1)	517 (3.8)	4 (3.3)	7 (1.7)	527 (12.2)	-3 (2.7)	2 (1.1)	~ ~	-1 (1.7)
Indonesia	91 (2.7)	407 (4.9)	7 (3.7)	8 (2.6)	402 (16.3)	-4 (3.3)	1 (0.7)	~ ~	-3 (1.8)
Qatar	90 (0.1)	308 (1.3)	0 0	8 (0.1)	294 (4.5)	0 0	1 (0.0)	~ ~	0 0
Australia	89 (2.0)	504 (3.8)	8 (3.9)	10 (1.8)	448 (11.9)	-5 (3.5)	1 (0.8)	~ ~	-3 (1.7)
Hong Kong SAR	89 (2.8)	581 (6.0)	10 (4.5) ▲	10 (2.6)	509 (24.4)	-11 (4.4) ▼	1 (1.0)	~ ~	1 (1.0)
Kuwait r	89 (2.8)	358 (2.7)	0 0	8 (2.6)	343 (10.2)	0 0	4 (1.5)	357 (14.1)	0 0
Lithuania	89 (2.4)	507 (2.6)	4 (3.4)	8 (2.0)	488 (8.3)	-5 (3.1)	3 (1.4)	496 (11.6)	1 (1.7)
Czech Republic	89 (2.7)	505 (2.8)	0 0	11 (2.7)	492 (3.4)	0 0	0 (0.0)	~ ~	0 0
Thailand	88 (2.4)	442 (5.7)	0 0	10 (2.4)	452 (15.3)	0 0	3 (0.8)	402 (11.7)	0 0
Oman	87 (3.1)	375 (3.5)	0 0	12 (3.2)	353 (12.5)	0 0	1 (0.6)	~ ~	0 0
Egypt	87 (2.7)	393 (3.6)	0 (3.9)	11 (2.6)	381 (13.9)	4 (3.4)	2 (0.8)	~ ~	-3 (2.1)
Georgia	87 (3.9)	411 (5.7)	0 0	12 (3.8)	406 (24.9)	0 0	1 (0.0)	~ ~	0 0
Syrian Arab Republic	87 (3.0)	396 (4.1)	0 0	11 (2.8)	393 (14.6)	0 0	2 (1.1)	~ ~	0 0
Bahrain	87 (1.7)	397 (1.8)	-1 (2.1)	12 (1.7)	392 (5.3)	1 (2.4)	2 (0.0)	~ ~	0 (1.1)
Ukraine	86 (2.9)	463 (4.3)	0 0	13 (2.8)	458 (10.1)	0 0	0 (0.4)	~ ~	0 0
Bosnia and Herzegovina	85 (3.2)	456 (3.0)	0 0	11 (2.6)	460 (8.4)	0 0	3 (1.6)	465 (12.9)	0 0
Israel r	85 (2.5)	473 (5.6)	5 (3.8)	13 (2.3)	422 (10.4)	-6 (3.6)	3 (1.2)	444 (27.6)	1 (1.4)
Sweden	83 (2.4)	494 (2.5)	1 (3.9)	16 (2.4)	478 (5.8)	-1 (3.9)	0 (0.0)	~ ~	0 (0.4)
Bulgaria	81 (3.2)	464 (5.8)	12 (4.9) ▲	17 (3.0)	462 (10.9)	-10 (4.6) ▼	2 (1.1)	~ ~	-2 (1.9)
Lebanon	80 (3.5)	458 (5.2)	1 (5.4)	18 (3.7)	415 (7.6)	-1 (5.5)	2 (1.1)	~ ~	0 (1.5)
England r	79 (3.3)	518 (5.2)	10 (7.8)	18 (2.9)	493 (14.0)	-6 (6.6)	2 (1.4)	~ ~	-4 (3.8)
Russian Federation	79 (2.7)	513 (4.9)	18 (4.4) ▲	19 (2.6)	513 (9.1)	-16 (4.5) ▼	2 (1.0)	~ ~	-2 (1.7)
Malaysia	79 (3.4)	478 (5.9)	-5 (4.7)	18 (3.2)	456 (11.0)	3 (4.5)	4 (1.6)	465 (28.2)	3 (1.8)
Tunisia	79 (3.7)	421 (2.9)	1 (5.2)	16 (3.1)	418 (5.7)	-4 (4.7)	6 (1.9)	426 (8.9)	3 (2.4)
Italy	78 (2.9)	482 (3.4)	10 (4.4) ▲	18 (2.6)	472 (7.3)	-5 (3.9)	4 (1.3)	463 (10.7)	-5 (2.5)
United States	78 (2.2)	515 (3.3)	-6 (3.1)	19 (2.2)	488 (7.2)	3 (3.1)	3 (0.9)	482 (17.7)	3 (1.0) ▲
Serbia	77 (3.4)	487 (3.6)	-4 (5.0)	20 (3.2)	476 (8.2)	8 (4.3)	3 (1.2)	500 (32.0)	-4 (2.5)
Slovenia	77 (2.4)	503 (2.7)	7 (4.8)	20 (2.1)	493 (5.1)	-6 (4.5)	3 (0.9)	507 (14.2)	-1 (1.7)
Cyprus	77 (2.3)	465 (2.0)	-2 (2.8)	20 (2.3)	465 (5.2)	1 (2.7)	3 (0.9)	475 (7.9)	0 (1.1)
Saudi Arabia	77 (3.2)	332 (3.3)	--	18 (2.9)	315 (6.5)	--	5 (1.7)	326 (8.0)	--
Jordan	77 (3.3)	429 (5.1)	-1 (4.7)	17 (3.1)	424 (8.9)	1 (4.5)	6 (2.0)	417 (20.8)	0 (3.0)
Iran, Islamic Rep. of	77 (2.9)	409 (4.6)	5 (4.8)	18 (2.9)	390 (9.5)	-7 (4.5)	6 (1.7)	367 (16.7)	2 (2.3)
Romania	75 (3.7)	468 (4.6)	-4 (5.3)	21 (3.4)	442 (10.0)	5 (4.8)	4 (1.4)	458 (14.6)	-1 (2.3)
Turkey	72 (4.0)	438 (6.3)	0 0	20 (3.4)	415 (8.9)	0 0	7 (2.4)	414 (12.7)	0 0
Scotland	72 (3.5)	488 (4.5)	13 (5.4) ▲	27 (3.5)	485 (8.6)	-7 (5.4)	1 (0.5)	~ ~	-6 (2.5) ▼
Korea, Rep. of s	70 (3.3)	599 (3.5)	19 (4.9) ▲	25 (3.0)	596 (5.5)	-11 (4.6) ▼	6 (1.7)	581 (11.5)	-8 (3.3) ▼
Chinese Taipei	69 (4.3)	600 (5.6)	-1 (5.5)	27 (4.1)	594 (8.9)	0 (5.2)	4 (1.5)	599 (19.4)	0 (2.2)
Palestinian Nat'l Auth.	68 (3.8)	372 (4.3)	17 (6.0) ▲	24 (3.5)	355 (8.7)	-12 (5.5) ▼	8 (2.2)	352 (19.1)	-5 (3.8)
Japan	68 (3.9)	575 (3.0)	14 (5.6) ▲	25 (3.6)	568 (4.9)	-9 (5.3)	7 (2.3)	538 (13.8)	-5 (3.7)
Malta	65 (0.2)	498 (1.3)	0 0	23 (0.2)	462 (2.4)	0 0	12 (0.1)	489 (3.3)	0 0
Algeria	62 (4.4)	384 (3.1)	0 0	28 (4.0)	390 (3.3)	0 0	9 (2.4)	396 (5.8)	0 0
El Salvador	58 (4.1)	342 (4.2)	0 0	26 (4.1)	338 (7.2)	0 0	16 (3.2)	335 (5.7)	0 0
Colombia	52 (4.9)	383 (5.4)	0 0	35 (5.7)	382 (7.5)	0 0	13 (3.4)	362 (9.3)	0 0
Ghana	41 (3.8)	328 (7.7)	1 (6.0)	43 (4.1)	299 (7.0)	-3 (6.2)	16 (3.0)	280 (9.6)	2 (4.3)
Botswana	37 (4.2)	369 (4.5)	15 (5.6) ▲	39 (4.6)	365 (4.9)	-7 (6.6)	24 (3.6)	354 (4.7)	-8 (5.9)
Armenia	35 (3.6)	497 (4.8)	-42 (4.8) ▼	29 (4.0)	499 (5.4)	8 (5.0)	36 (3.6)	500 (7.0)	34 (3.7) ▲
‡ Morocco	50 (5.4)	399 (5.1)	--	33 (4.7)	368 (3.5)	--	18 (4.1)	375 (10.3)	--
International Avg.	77 (0.5)	454 (0.6)		18 (0.4)	440 (1.5)		5 (0.2)	435 (2.8)	
<b>Benchmarking Participants</b>									
Dubai, UAE s	95 (2.6)	460 (3.1)	0 0	5 (2.6)	418 (16.8)	0 0	0 (0.0)	~ ~	0 0
Basque Country, Spain	89 (2.3)	502 (3.1)	16 (5.3) ▲	11 (2.3)	483 (8.9)	-15 (5.3) ▼	0 (0.0)	~ ~	-1 (1.0)
Ontario, Canada	86 (3.2)	521 (3.4)	2 (4.2)	13 (3.1)	494 (13.4)	1 (4.5)	1 (0.4)	~ ~	-2 (1.6)
British Columbia, Canada	86 (3.1)	511 (3.7)	0 0	14 (3.1)	512 (10.6)	0 0	0 (0.0)	~ ~	0 0
Minnesota, US r	84 (6.2)	533 (5.9)	0 0	15 (6.0)	530 (28.2)	0 0	1 (0.1)	~ ~	0 0
Quebec, Canada	83 (3.1)	535 (4.1)	-10 (3.7) ▼	16 (3.0)	502 (9.9)	10 (3.7) ▲	2 (0.9)	~ ~	0 (1.5)
Massachusetts, US	77 (4.6)	551 (6.7)	0 0	21 (4.3)	538 (15.7)	0 0	2 (1.9)	~ ~	0 0

▲ 2007 percent significantly higher      ▼ 2007 percent significantly lower

Index based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and practices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three statements. Medium level includes all other combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (0) indicates the country did not participate in the assessment.

**Exhibit 8.14 Index of Students' Perception of Being Safe in School (SPBSS) with Trends**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Country	High SPBSS			Medium SPBSS			Low SPBSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Kazakhstan	80 (2.3)	552 (8.0)	◊ ◊	18 (2.2)	542 (6.4)	◊ ◊	3 (0.4)	530 (11.7)	◊ ◊
Sweden	70 (1.2)	508 (2.6)	◊ ◊	25 (0.9)	496 (3.1)	◊ ◊	5 (0.5)	463 (7.8)	◊ ◊
Denmark	59 (1.5)	529 (2.7)	◊ ◊	34 (1.4)	520 (2.9)	◊ ◊	8 (0.5)	502 (5.7)	◊ ◊
Norway	55 (1.3)	487 (3.0)	2 (1.7)	34 (0.9)	468 (3.4)	0 (1.3)	12 (0.8)	446 (5.9)	-1 (1.1)
Germany	54 (1.1)	538 (2.4)	◊ ◊	34 (0.8)	520 (2.9)	◊ ◊	12 (0.6)	504 (5.2)	◊ ◊
Japan	52 (1.3)	574 (2.5)	7 (1.8) ▲	34 (0.9)	566 (2.9)	-4 (1.2) ▼	14 (0.8)	553 (4.1)	-3 (1.1) ▼
Ukraine	52 (1.4)	479 (3.2)	◊ ◊	37 (1.0)	469 (3.3)	◊ ◊	11 (0.8)	451 (6.9)	◊ ◊
Russian Federation	51 (1.3)	552 (4.7)	11 (1.8) ▲	40 (1.1)	539 (6.1)	-6 (1.5) ▼	9 (0.6)	522 (7.8)	-5 (1.0) ▼
Lithuania	50 (1.3)	542 (2.7)	6 (1.7) ▲	38 (1.1)	524 (3.5)	-5 (1.5) ▼	12 (0.7)	499 (5.3)	-1 (1.0)
Austria	49 (1.0)	513 (2.1)	◊ ◊	35 (0.9)	503 (3.0)	◊ ◊	15 (0.9)	488 (3.6)	◊ ◊
Armenia	r 49 (1.6)	508 (3.7)	-9 (2.2) ▼	38 (1.3)	494 (7.4)	1 (1.9)	13 (1.0)	508 (9.8)	7 (1.1) ▲
Netherlands	48 (1.4)	544 (2.5)	5 (2.0) ▲	38 (1.1)	532 (2.7)	-2 (1.5)	14 (0.8)	512 (4.2)	-3 (1.3) ▼
Georgia	48 (1.5)	459 (4.7)	◊ ◊	43 (1.4)	434 (4.9)	◊ ◊	9 (0.7)	408 (6.7)	◊ ◊
Czech Republic	45 (1.5)	498 (3.3)	◊ ◊	43 (1.2)	483 (3.1)	◊ ◊	11 (0.7)	458 (4.7)	◊ ◊
Slovak Republic	44 (1.3)	515 (3.4)	◊ ◊	40 (1.0)	493 (5.0)	◊ ◊	15 (1.2)	463 (6.1)	◊ ◊
Iran, Islamic Rep. of	43 (1.4)	405 (4.1)	10 (2.6) ▲	43 (1.2)	403 (4.7)	-1 (1.9)	14 (0.8)	397 (6.9)	-9 (1.7) ▼
Latvia	41 (1.2)	547 (3.0)	-1 (1.9)	46 (1.1)	537 (2.8)	2 (1.6)	12 (0.8)	512 (4.2)	-1 (1.2)
Scotland	40 (1.2)	501 (2.9)	7 (1.8) ▲	39 (0.9)	499 (3.0)	0 (1.4)	21 (1.0)	475 (4.3)	-6 (1.6) ▼
Slovenia	40 (1.2)	508 (2.2)	0 (1.9)	42 (1.0)	505 (2.6)	2 (1.5)	18 (0.6)	486 (3.1)	-2 (1.4)
Yemen	39 (2.1)	234 (7.6)	◊ ◊	42 (1.5)	239 (6.0)	◊ ◊	19 (1.2)	211 (7.7)	◊ ◊
Italy	39 (1.0)	516 (4.1)	6 (1.5) ▲	41 (0.9)	503 (3.4)	0 (1.3)	20 (0.9)	496 (3.7)	-5 (1.3) ▼
Hong Kong SAR	37 (1.3)	613 (3.8)	-3 (1.9)	42 (0.9)	608 (3.7)	2 (1.3)	22 (1.1)	594 (5.0)	1 (1.6)
Algeria	36 (2.2)	400 (6.4)	◊ ◊	47 (1.6)	374 (5.4)	◊ ◊	17 (1.1)	353 (9.0)	◊ ◊
Hungary	35 (1.5)	529 (4.2)	-2 (1.9)	42 (1.2)	509 (4.6)	-1 (1.6)	23 (1.2)	486 (6.3)	3 (1.4)
Kuwait	34 (1.4)	353 (4.4)	◊ ◊	39 (1.0)	321 (3.7)	◊ ◊	27 (1.1)	288 (6.2)	◊ ◊
El Salvador	32 (1.4)	340 (4.5)	◊ ◊	46 (0.9)	333 (4.9)	◊ ◊	22 (1.2)	319 (5.8)	◊ ◊
England	32 (1.1)	558 (3.6)	0 (1.6)	43 (0.9)	544 (3.2)	1 (1.3)	25 (0.9)	518 (4.5)	-1 (1.5)
Colombia	31 (1.3)	376 (5.5)	◊ ◊	48 (1.0)	356 (4.9)	◊ ◊	21 (1.1)	343 (7.3)	◊ ◊
Australia	30 (1.2)	534 (3.9)	1 (1.6)	44 (1.3)	518 (3.5)	5 (1.6) ▲	26 (1.4)	497 (5.4)	-6 (1.9) ▼
Singapore	30 (0.9)	622 (4.1)	4 (1.3) ●	45 (0.7)	597 (3.9)	-2 (1.0)	25 (0.7)	579 (5.0)	-3 (1.2) ▼
Qatar	28 (0.5)	327 (2.3)	◊ ◊	40 (0.6)	302 (1.9)	◊ ◊	31 (0.6)	283 (2.2)	◊ ◊
Chinese Taipei	28 (1.1)	590 (2.3)	0 (1.5)	38 (0.9)	577 (2.2)	0 (1.2)	35 (1.1)	564 (2.7)	0 (1.5)
Morocco	r 26 (1.3)	359 (5.8)	1 (2.5)	54 (1.5)	343 (5.9)	2 (2.3)	20 (1.4)	337 (9.5)	-4 (2.0)
New Zealand	25 (0.9)	514 (3.1)	-1 (1.2)	42 (0.9)	498 (2.9)	0 (1.3)	33 (1.1)	473 (3.0)	1 (1.3)
Tunisia	23 (1.4)	367 (6.3)	0 (2.3)	49 (1.1)	334 (4.8)	-1 (1.6)	28 (1.1)	310 (6.1)	1 (1.8)
United States	--	--	--	--	--	--	--	--	--
International Avg.	42 (0.2)	485 (0.7)		40 (0.2)	471 (0.7)		18 (0.2)	452 (1.0)	
<b>Benchmarking Participants</b>									
British Columbia, Canada	37 (0.9)	518 (3.5)	◊ ◊	41 (0.9)	507 (3.2)	◊ ◊	22 (0.7)	484 (3.7)	◊ ◊
Quebec, Canada	35 (1.2)	530 (3.6)	1 (1.6)	43 (1.1)	520 (3.3)	1 (1.4)	22 (1.0)	501 (3.9)	-3 (1.5)
Alberta, Canada	35 (1.1)	517 (3.7)	◊ ◊	41 (1.0)	505 (3.3)	◊ ◊	24 (1.1)	491 (3.0)	◊ ◊
Ontario, Canada	32 (1.1)	525 (3.9)	2 (1.6)	42 (1.0)	512 (3.9)	2 (1.4)	25 (1.1)	496 (3.8)	-4 (1.6) ▼
Dubai, UAE	25 (1.3)	471 (3.9)	◊ ◊	48 (1.1)	449 (3.6)	◊ ◊	27 (1.4)	429 (3.7)	◊ ◊
Massachusetts, US	--	--	◊ ◊	--	--	◊ ◊	--	--	◊ ◊
Minnesota, US	--	--	◊ ◊	--	--	◊ ◊	--	--	◊ ◊

● 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to five statements about things that happened in their schools in the last month (1 = yes and 2 = no): something of mine was stolen; I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking); I was made to do things that I didn't want to do by other students; I was made fun of or called names; and I was left out of activities by other students. High level indicates that the student answered NO to all five statements. Low level indicates that the student answered YES to three or more statements. Medium level includes all other possible combinations of responses.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.



**Exhibit 8.14 Index of Students' Perception of Being Safe in School (SPBSS) with Trends (Continued)**

**TIMSS2007**  
Mathematics **8<sup>th</sup>** Grade

Country	High SPBSS			Medium SPBSS			Low SPBSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Sweden	75 (0.8)	496 (2.3)	-3 (1.3) ▼	20 (0.7)	491 (2.7)	1 (1.1)	5 (0.4)	456 (6.7)	2 (0.5) ▲
Georgia	73 (1.5)	422 (6.5)	0 0	22 (1.5)	408 (4.8)	0 0	5 (0.5)	386 (12.6)	0 0
Russian Federation	71 (1.1)	518 (3.9)	12 (1.4) ▲	25 (0.9)	505 (5.3)	-10 (1.3) ▼	4 (0.3)	477 (10.4)	-2 (0.5) ▼
Ukraine	70 (0.9)	471 (3.3)	0 0	25 (0.8)	455 (5.0)	0 0	4 (0.4)	435 (11.6)	0 0
Serbia	69 (1.1)	494 (3.1)	1 (1.6)	25 (0.9)	477 (5.1)	-2 (1.4)	6 (0.5)	457 (9.6)	1 (0.7)
Bosnia and Herzegovina	67 (1.0)	464 (2.5)	0 0	26 (0.9)	450 (3.5)	0 0	7 (0.6)	419 (7.4)	0 0
Norway	65 (1.1)	474 (2.3)	2 (1.5)	29 (1.0)	465 (2.5)	-1 (1.3)	5 (0.3)	454 (4.8)	-1 (0.6)
Armenia	65 (1.1)	501 (2.8)	-7 (1.5) ▼	27 (0.9)	499 (5.7)	5 (1.2) ▲	8 (0.6)	494 (11.2)	2 (0.8)
Japan	65 (1.0)	574 (2.8)	4 (1.4) ▲	28 (0.8)	566 (3.5)	-3 (1.1) ▼	7 (0.5)	559 (6.0)	-1 (0.7)
Italy	63 (1.1)	485 (3.5)	7 (1.5) ▲	32 (1.1)	472 (2.9)	-3 (1.4)	5 (0.4)	458 (7.9)	-4 (0.7) ▼
Hungary	61 (1.0)	524 (3.9)	0 (1.5)	30 (0.8)	510 (3.9)	-2 (1.3)	9 (0.7)	499 (6.5)	2 (0.8) ▲
Israel	61 (1.3)	477 (4.1)	7 (1.8) ▲	29 (1.1)	467 (4.9)	-7 (1.6) ▼	10 (0.8)	426 (7.4)	-1 (1.0)
Scotland	60 (1.1)	491 (3.8)	0 (1.7)	32 (1.0)	489 (4.4)	0 (1.4)	8 (0.6)	474 (7.2)	0 (0.9)
Lithuania	59 (1.0)	511 (2.7)	0 (1.5)	35 (1.0)	505 (3.0)	1 (1.3)	6 (0.5)	480 (7.3)	-1 (0.7)
Czech Republic	59 (1.2)	510 (3.0)	0 0	35 (0.9)	499 (2.5)	0 0	6 (0.5)	476 (4.9)	0 0
England	58 (1.1)	517 (4.8)	7 (1.8) ▲	33 (0.9)	514 (5.5)	-5 (1.4) ▼	9 (0.6)	500 (8.8)	-3 (1.1) ▼
Kuwait	58 (1.1)	364 (2.3)	0 0	31 (1.0)	353 (3.8)	0 0	11 (0.6)	322 (5.1)	0 0
El Salvador	54 (1.1)	345 (2.9)	0 0	38 (1.0)	339 (3.2)	0 0	8 (0.6)	337 (5.8)	0 0
Slovenia	54 (1.2)	502 (2.2)	1 (1.8)	36 (1.0)	505 (2.8)	-1 (1.6)	10 (0.7)	490 (5.7)	0 (0.9)
Bulgaria	53 (1.2)	476 (4.6)	-15 (1.6) ▼	36 (1.0)	463 (7.0)	11 (1.3) ▲	11 (0.9)	433 (9.0)	4 (1.1) ▲
Jordan	53 (1.4)	445 (4.6)	35 (2.7) ▲	38 (1.2)	417 (4.6)	16 (2.0) ▲	9 (0.6)	394 (7.2)	-51 (3.3) ▼
Singapore	52 (0.9)	605 (3.5)	8 (1.2) ▲	37 (0.7)	588 (4.4)	-6 (1.0) ▼	11 (0.7)	557 (7.6)	-2 (0.8) ▼
Malta	52 (0.8)	500 (1.8)	0 0	37 (0.7)	486 (2.2)	0 0	12 (0.5)	450 (5.0)	0 0
Korea, Rep. of	51 (1.3)	597 (3.1)	-11 (1.7) ▼	41 (1.1)	599 (3.5)	9 (1.4) ▲	8 (0.5)	594 (5.9)	2 (0.7) ▲
Hong Kong SAR	51 (1.0)	581 (5.5)	5 (1.7) ▲	39 (0.8)	571 (6.1)	-4 (1.2) ▼	10 (0.7)	543 (10.3)	-2 (1.0) ▼
Malaysia	51 (1.5)	485 (5.1)	0 (1.9)	40 (1.1)	464 (5.5)	-1 (1.5)	9 (0.7)	456 (8.7)	1 (0.9)
Turkey	50 (1.4)	447 (5.5)	0 0	40 (1.2)	422 (5.5)	0 0	10 (0.6)	398 (7.1)	0 0
Cyprus	50 (0.9)	476 (1.9)	9 (1.3) ▲	37 (0.8)	467 (2.3)	-5 (1.2) ▼	13 (0.5)	431 (4.9)	-4 (0.9) ▼
Syrian Arab Republic	49 (1.1)	405 (4.1)	0 0	36 (0.9)	395 (4.4)	0 0	15 (0.8)	377 (5.9)	0 0
Chinese Taipei	49 (1.2)	604 (5.4)	2 (1.4)	35 (0.8)	596 (4.4)	-1 (1.1)	16 (0.7)	588 (6.3)	-1 (1.0)
Iran, Islamic Rep. of	49 (1.5)	416 (4.4)	-1 (2.1)	41 (1.2)	395 (4.9)	2 (1.6)	10 (0.7)	380 (5.9)	-1 (1.0)
Oman	48 (1.2)	387 (3.9)	0 0	39 (0.9)	372 (3.7)	0 0	13 (0.7)	338 (7.2)	0 0
Romania	48 (1.1)	479 (4.1)	0 (1.8)	38 (1.0)	457 (4.8)	0 (1.4)	14 (0.7)	428 (6.9)	0 (1.2)
Qatar	47 (0.5)	321 (1.6)	0 0	38 (0.6)	309 (2.3)	0 0	15 (0.4)	273 (2.9)	0 0
Australia	46 (1.2)	503 (4.5)	4 (1.7) ▲	38 (1.0)	494 (4.2)	-1 (1.4)	15 (0.7)	487 (5.7)	-3 (1.1) ▼
Saudi Arabia	46 (1.2)	336 (3.3)	--	41 (1.0)	330 (2.9)	--	13 (0.7)	314 (6.4)	--
Algeria	46 (1.3)	391 (2.8)	0 0	43 (1.1)	386 (2.0)	0 0	11 (0.6)	381 (4.6)	0 0
Palestinian Nat'l Auth.	45 (1.4)	387 (3.9)	4 (1.9) ▲	42 (1.1)	365 (4.2)	0 (1.5)	13 (0.8)	327 (8.6)	-4 (1.2) ▼
Tunisia	43 (1.2)	421 (3.0)	-3 (1.5) ▼	43 (0.9)	421 (2.6)	3 (1.3) ▲	14 (0.9)	420 (4.8)	1 (1.1)
Egypt	42 (1.3)	419 (3.8)	0 (1.9)	39 (0.8)	386 (4.5)	-1 (1.3)	19 (1.2)	357 (5.4)	1 (1.5)
Colombia	40 (1.6)	385 (4.1)	0 0	48 (1.2)	378 (3.9)	0 0	12 (0.8)	377 (5.4)	0 0
Lebanon	39 (1.9)	473 (4.5)	2 (2.6) ▼	38 (1.8)	448 (5.8)	1 (2.0) ▲	23 (1.5)	420 (4.3)	-3 (2.3)
Bahrain	37 (0.8)	412 (2.5)	-5 (1.3) ▼	45 (0.8)	399 (2.1)	3 (1.2) ▲	18 (0.7)	376 (3.7)	1 (1.1)
Indonesia	36 (1.3)	401 (4.7)	-3 (1.8)	45 (1.1)	403 (4.2)	0 (1.5)	19 (1.1)	384 (6.0)	3 (1.4) ▲
Thailand	30 (1.2)	452 (5.3)	0 0	47 (1.0)	442 (4.9)	0 0	23 (1.0)	426 (6.9)	0 0
Ghana	14 (0.9)	338 (6.5)	1 (1.4)	50 (1.0)	317 (4.5)	1 (1.4)	36 (1.1)	293 (4.9)	-1 (1.7)
Botswana	10 (0.6)	393 (3.9)	-2 (0.8) ▼	59 (0.9)	372 (2.4)	3 (1.2) ▲	31 (1.0)	343 (3.1)	-1 (1.4)
United States	--	--	--	--	--	--	--	--	--
‡ Morocco	37 (1.4)	387 (5.3)	--	47 (1.1)	381 (3.2)	--	16 (1.0)	373 (6.2)	--
International Avg.	51 (0.2)	460 (0.6)		37 (0.1)	448 (0.6)		12 (0.1)	427 (1.0)	

**Benchmarking Participants**

Basque Country, Spain	63 (1.5)	507 (3.1)	1 (2.5)	31 (1.4)	492 (3.8)	-1 (2.1)	6 (0.7)	456 (8.2)	0 (1.0)
Quebec, Canada	60 (1.1)	533 (3.9)	5 (1.6) ▲	34 (1.0)	528 (3.6)	-2 (1.4)	7 (0.6)	509 (5.7)	-3 (0.9) ▼
British Columbia, Canada	49 (1.1)	515 (3.5)	0 0	38 (0.9)	509 (3.6)	0 0	13 (0.8)	492 (5.0)	0 0
Ontario, Canada	47 (1.5)	520 (4.9)	2 (2.1)	39 (1.1)	517 (3.5)	-1 (1.5)	14 (1.0)	510 (4.1)	-1 (1.5)
Dubai, UAE	47 (1.9)	475 (3.7)	0 0	41 (1.5)	460 (3.2)	0 0	12 (0.8)	442 (6.3)	0 0
Massachusetts, US	--	--	0 0	--	--	0 0	--	--	0 0
Minnesota, US	--	--	0 0	--	--	0 0	--	--	0 0

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on students' responses to five statements about things that happened in their schools in the last month (1 = yes and 2 = no): something of mine was stolen; I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking); I was made to do things that I didn't want to do by other students; I was made fun of or called names; and I was left out of activities by other students. High level indicates that the student answered NO to all five statements. Low level indicates that the student answered YES to three or more statements. Medium level includes all other possible combinations of responses.

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (-) indicates comparable data are not available.  
 A diamond (0) indicates the country did not participate in the assessment.

At eighth grade, more than half (51%) the students across countries were at the high level of the students' perception of being safe index, with 37 percent at the medium level and 12 percent at the low level. In Sweden, Georgia, the Russian Federation, and the Ukraine, 70 percent or more of students were at the high level of the index. Less than 20% of students were at the high level in Ghana and Botswana. TIMSS participants with increased percentages of students since 2003 at the high level of the index included the Russian Federation, Japan, Italy, Israel, England, Jordan, Singapore, Hong Kong SAR, Cyprus, Australia, the Palestinian National Authority, and the province of Quebec. There were decreases in Sweden, Armenia, Bulgaria, Korea, Tunisia, Bahrain, and Botswana.

There was a positive association between average mathematics achievement and students' perception of being safe at both fourth and eighth grades, with highest achievement among students at the high level of the index and lowest achievement among those at the low index level.





# Appendix A

## *Supporting Documentation*

### **TIMSS 2007 Mathematics Framework**

The content and cognitive domains were the foundation of the TIMSS 2007 fourth and eighth grade mathematics assessments. Exhibit A.1, shows the content and cognitive domains together with the target percentages designated in the TIMSS 2007 assessment framework for mathematics. The content domains differed for the fourth and eighth grades, reflecting the nature and difficulty of the mathematics widely taught at each grade.<sup>1</sup> There was more emphasis on number at the fourth grade than at the eighth grade. At the eighth grade, two of the four content domains were geometry and algebra, but since geometry and algebra generally are not taught as formal subjects in primary school, the geometry topics assessed at the fourth grade focused on geometric shapes and measures and introductory algebra concepts were included as part of number. At the fourth grade, the domain pertaining to data focused on reading and displaying data whereas at eighth grade it included more emphasis on interpretation of data and the fundamentals of probability (called “chance”). The cognitive domains were the same for both grades, encompassing a range of cognitive processes involved in working mathematically and solving problems through the primary and middle school years.

<sup>1</sup> Each content domain had several topic areas (e.g., “number” at eighth grade was further categorized by whole numbers; fractions and decimals; integers; and ratio, proportion, and percent). Each topic area was presented as a list of objectives covered in many participating countries, at either fourth grade or eighth grade as appropriate. For the complete framework for the TIMSS 2007 mathematics assessment, see Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O’Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Exhibit A.1 **Overview of TIMSS 2007 Mathematics Framework**TIMSS2007  
Mathematics **4<sup>th</sup> & 8<sup>th</sup>  
Grades**

Fourth-Grade Content Domains		Percentages	
Number		50%	
Geometric Shapes and Measures		35%	
Data Display		15%	
Eighth-Grade Content Domains		Percentages	
Number		30%	
Algebra		30%	
Geometry		20%	
Data and Chance		20%	
Cognitive Domains	Percentages		
	Fourth Grade	Eighth Grade	
Knowing	40%	35%	
Applying	40%	40%	
Reasoning	20%	25%	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



### Number of Items by Mathematics Content and Cognitive Domains

Exhibit A.2 shows the distribution of the TIMSS 2007 items by content and cognitive domain for fourth and eighth grades. The fourth grade assessment had 93 items in number, 60 items in geometric shapes and measures, and 26 data display items, for a total of 179 items. Each item also was categorized according to its cognitive domain, with 69 items in the knowing domain, 70 in the applying domain, and 40 in the reasoning domain. It can be seen that the percentages of score points for the content and cognitive domains were nearly identical to those designated in the mathematics assessment framework. A little more than half the items (96) were in multiple-choice format and the rest (83) were constructed-response items. The constructed-response items required students to generate and write their own answers. Some items required short answers while others demanded a more elaborate response. In scoring the assessment, correct answers to most questions (including all those in multiple-choice format) were worth 1 point. However, responses to questions seeking more elaborate responses were evaluated for partial credit, with a fully-correct answer being awarded 2 points. Thus, the total number of score points available for analyses (192) somewhat exceeds the number of items in the assessment.

In the eighth grade assessment, there were 63 number items, 64 algebra items, 47 geometry items, and 41 data and chance items, for a total of 215. Of these, 81 were classified as measuring knowing, 88 as measuring applying, and 46 as measuring reasoning skills. More than half the items (117) were multiple choice and the remainder (98) constructed response. Fifty-one percent of the score points on the eighth grade assessment came from constructed response items.

**Exhibit A.2 Distribution of Mathematics Items by Content Domain and Cognitive Domain**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Content Domain	Number of Multiple-choice Items	Number of Constructed-response Items	Total Number of Items	Total Number of Score Points <sup>1</sup>	Percentage of Score Points
Number	50	43	93	98	51
Geometric Shapes and Measures	32	28	60	65	34
Data Display	14	12	26	29	15
<b>Total</b>	96	83	179	192	100

Cognitive Domain	Number of Multiple-choice Items	Number of Constructed-response Items	Total Number of Items	Total Number of Score Points <sup>1</sup>	Percentage of Score Points
Knowing	45	24	69	73	38
Applying	37	33	70	75	39
Reasoning	14	26	40	44	23
<b>Total</b>	96	83	179	192	100

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>1</sup> In scoring the tests, correct answers to most items were worth one point. However, responses to some constructed-response items were evaluated for partial credit with a fully correct answer awarded two points. Thus, the number of score points exceeds the number of items in the test.

Exhibit A.2 **Distribution of Mathematics Items by Content Domain and Cognitive Domain (Continued)**

TIMSS2007  
Mathematics 8<sup>th</sup>  
Grade

Content Domain	Number of Multiple-choice Items	Number of Constructed-response Items	Total Number of Items	Total Number of Score Points <sup>1</sup>	Percentage of Score Points
Number	35	28	63	72	30
Algebra	34	30	64	69	29
Geometry	31	16	47	50	21
Data and Chance	17	24	41	47	20
<b>Total</b>	117	98	215	238	100

Cognitive Domain	Number of Multiple-choice Items	Number of Constructed-response Items	Total Number of Items	Total Number of Score Points <sup>1</sup>	Percentage of Score Points
Knowing	54	27	81	83	35
Applying	48	40	88	98	41
Reasoning	15	31	46	57	24
<b>Total</b>	117	98	215	238	100

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

<sup>1</sup> In scoring the tests, correct answers to most items were worth one point. However, responses to some constructed-response items were evaluated for partial credit with a fully correct answer awarded two points. Thus, the number of score points exceeds the number of items in the test.

## Grades and Ages Assessed

At fourth grade, the TIMSS 2007 target population consisted of all students enrolled in the fourth year of formal schooling, counting from the first year of primary school as defined by UNESCO's International Standard Classification for Education (ISCED).<sup>2</sup> According to the ISCED classification, Level 1 corresponds to primary education or the first stage of basic education, and the first year of Level 1 should mark the beginning of formal instruction in reading, writing, and mathematics. Accordingly, the fourth year of Level 1 should be fourth grade in most countries. To avoid testing very young children, however, TIMSS has a policy that the average age of children in the grade tested should not be below 9.5 years old at the time of testing. At eighth grade, the TIMSS 2007 target population was all students enrolled in the eighth year of formal schooling, again counting from the first year of primary school. This should be the eighth grade in most countries. However, the average age of students should not be below 13.5 years old.

Exhibit A.3 presents, for each of the TIMSS 2007 participants, the name of the grade tested in TIMSS, the number of years of formal schooling, and the average age of the students when TIMSS was conducted. Although almost all students assessed by TIMSS were in the fourth grade and had had four years of formal schooling or were in the eighth grade and had had eight years of formal schooling (the exceptions were England, Malta, New Zealand, and Scotland where children at these grade levels would have been too young), there was some variation across participants in students' average age. Because the distribution of ages within a grade level is determined by the policy on age of entry to primary school and how this is implemented in practice, and by promotion and retention practices through the grades, the exhibit also provides a summary of each participant's policy on age of entry, the usual age of entry in practice, and an indication of whether or not participants have a policy on promotion and retention.

2 UNESCO Institute for Statistics. (1999). *Operational manual for ISCED-1997 (international standard classification of education)*. Paris: Author.

Although most TIMSS participants require children to begin primary school when they are 6 or 7 years old, there are many variations on how this policy is implemented that have an impact on the age of the assessed population. For example, participants that require children to begin school in the calendar year in which they turn six generally had the youngest student populations in TIMSS—about 9.8 years old in fourth grade and 13.8 in eighth grade. Australia, Italy, Norway, Qatar, and Slovenia, as well as the Canadian provinces of Alberta, British Columbia, and Ontario follow this model. Requiring students to be six years old by September of the year in which they start school results in a population older by about four months on average, and an average of about 10.2 or 14.2 years, at fourth and eighth grades, respectively, at the time of the TIMSS testing. Examples of TIMSS participants following this approach include Austria, Chinese Taipei, the Czech Republic, the Slovak Republic, and the state of Minnesota and province of Quebec. Where students begin school in the calendar year in which they turn seven, which is the practice in several northern and eastern European countries such as Bulgaria, Denmark, Latvia, Lithuania, and Sweden, the TIMSS student population is older still—10.8 to 11.0 years old, on average.

**Exhibit A.3 Information About the Grades and Ages of Students Tested in TIMSS 2007**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup> & 8<sup>th</sup>**  
**Grades**

Country	Grades 4 and 8		
	Policy on Age of Entry to Primary School*	Practice on Age of Entry to Primary School	Policy on Promotion/Retention
Algeria	Children must be 6 years old by December 31st of the academic year in which they enroll	6	●
Armenia	Children must be 6 years old by the end of June to begin in September	7	●
Australia	Age of entry requirement varies among the states and territories; generally children must start in the year in which they turn 6	5	○
Austria	Children must be 6 years old by September 1st, or upon special request, by March 1st the following year	6	●
Bahrain	Children must be 6 years old by the end of December	6	●
Bosnia and Herzegovina	Children must be 6 years old by December 31st	6	●
Botswana	Children must be 6 years old by June, although in rural or remote areas the entry age is flexible	6	●
Bulgaria	Children must be 7 years old in the calendar year, or 6 years old with parent/guardian permission	7	○
Chinese Taipei	Children must be 6 years old by September 1st	6	○
Colombia	Children must be 6 years old	6	●
Cyprus	Children must be 5 years, 8 months old by September 1st	5 years, 8 months	●
Czech Republic	Children must be 6 years old by September 1st	6	●
Denmark	Children must be 7 years old in the calendar year to begin August 1st	7	●
Egypt	Children must be 6 years old by October 1st	6	●
El Salvador	Children must be 7 years old by May of the academic year	7	●
England	Children must begin school at the start of the term following their 5th birthday	5	○
Georgia	Children must be 6 years old by the end of December	6	●
Germany	Children must be 6 years old by June 30th, or upon special request, by December 31st of that year	6	●
Ghana	Children must be 6 years old in the calendar year to begin in September	6	●
Hong Kong SAR	Children must be 5 years, 8 months old in September	6	●
Hungary	Children must be 6 years old by May 31st or upon special request, by December 31st to begin school in September	6 to 7	●
Indonesia	Children may enter at 6 years old, but must enter at 7 years old	6	●
Iran, Islamic Rep. of	Children must be 6 years old by September 20th to start school on September 21st of the same year	6	●
Israel	Children must be 6 years old; each year there is an announcement specifying the birth dates that are relevant to the requirement	6	●
Italy	Children must be 6 years old by December 31st, or by March 31st the following year with an examination	6	●
Japan	Children must be 6 years old by April 1st	6	●
Jordan	Children must be 5 years, 8 months old	5 years, 8 months	●
Kazakhstan	Children must be 6 years old by the end of August to begin in September	6 to 7	●
Korea, Rep. of	Children must be 6 years old, or 5 years old based on the guardian's decision	6	●
Kuwait	Children must be 5.5 years old by September 15th	6	–
Latvia	Children must be 7 years old during the calendar year	7	○
Lebanon	Children must be 6 years old	6	●
Lithuania	Children may begin school when they are 6 years old, and are required when they are 7	6 to 7 (more 7)	●
Malaysia	Children begin school during the calendar year of their 7th birthday	7	○
Malta	Children must be 5 years old by the end of December	5	●
Mongolia	Children must 7 years old, or in special cases, 8 years old	7 to 8	●
Morocco	Children must be 6 years old in September	6	●
Netherlands	Children usually begin primary school at age 6	6	○
New Zealand	Children must be in school by the time they are 6 years old, but they may start from their 5th birthday	5	●
Norway	Children begin school during the calendar year of their 6th birthday	6	●
Oman	Children must be 6 years old by September 1st	6	●
Palestinian Nat'l Auth.	Children must be 5 years, 8 months old by September 1st	5.5	●
Qatar	Children must be 6 years old at the end of September to begin school in September	6	●
Romania	Children are 6–7 years old, but there is no specific date regulation about the age of entry	7	●
Russian Federation	Children must be 6.5 years old	6 to 7	○
Saudi Arabia	Children must be 6 years old, or must turn 6 within 90 days of starting school	5 to 6	●
Scotland	Children can begin school between the ages of 4.5 and 6; those with a March–August birth date must start in the August following their 5th birthday; children with a September–February birth date may defer entry until the following year	4.5 to 5.5	○
Serbia	Children must be at least 6.5 years old and no older than 7.5 years old by September 1st to begin school in September	7	●
Singapore	Children must be 6 years old by January 1st of the year of admission	6	●
Slovak Republic	Children must be 6 years old by the end of August to begin school in September	6	●

 ● Yes  
 ○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators.

\* Age of entry to primary school based on the beginning of ISCED Level 1 in UNESCO's International Standard Classification of Education (Operational Manual for ISCED-97).

\*\* Represents years of schooling counting from the first year of ISCED Level 1.


**TIMSS & PIRLS**  
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**Exhibit A.3 Information About the Grades and Ages of Students Tested in TIMSS 2007 (Continued)**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup> & 8<sup>th</sup> Grades**

Grade 4			Grade 8			Country
Country's Name for Grade Tested	Years of Formal Schooling**	Average Age at Time of Testing	Country's Name for Grade Tested	Years of Formal Schooling**	Average Age at Time of Testing	
Four year primary	4	10.2	Second year of middle school	8	14.5	Algeria
Grade 4	4	10.6	Grade 8	8	14.9	Armenia
Year 4	4	9.9	Year 8	8	13.9	Australia
Fourth grade / Last grade of primary education	4	10.3				Austria
			Second intermediate	8	14.1	Bahrain
			Final grade (grade 8 and grade 9)	8 or 9	14.7	Bosnia and Herzegovina
			Form one	8	14.9	Botswana
			Grade 8	8	14.9	Bulgaria
Elementary school, grade 4	4	10.2	Junior high school, grade 8	8	14.2	Chinese Taipei
Fourth grade	4	10.4	Eighth grade	8	14.5	Colombia
			B Gymnasium	8	13.8	Cyprus
Grade 4	4	10.3	Grade 8	8	14.4	Czech Republic
Grade 4	4	11.0				Denmark
			Preparatory 2	8	14.1	Egypt
Fourth grade of basic education	4	11.0	Eighth grade of basic education	8	15.0	El Salvador
Year 5	5	10.2	Year 9	9	14.2	England
Grade 4	4	10.1	Grade 8	8	14.2	Georgia
Grade 4	4	10.4				Germany
			Junior secondary school II (JSS II)	8	15.8	Ghana
Primary 4	4	10.2	Secondary 2	8	14.4	Hong Kong SAR
Fourth grade	4	10.7	Eighth grade	8	14.6	Hungary
			Grade 8	8	14.3	Indonesia
Fourth grade of primary school	4	10.2	Third year in guidance school	8	14.2	Iran, Islamic Rep. of
			Eighth Grade	8	14.0	Israel
Grade 4 (IV class of primary school)	4	9.8	Grade 8 (III Media)	8	13.9	Italy
Fourth grade at the elementary school	4	10.5	Second grade at the lower secondary school	8	14.5	Japan
			Grade 8	8	14.0	Jordan
Fourth grade (1st stage of basic education)	4	10.6				Kazakhstan
			Grade 2 of middle school	8	14.3	Korea, Rep. of
Grade 5 (Primary)	4	10.2	Ninth grade (Intermediate)	8	14.4	Kuwait
Grade 4	4	11.0				Latvia
			Grade 8 of the basic educational level	8	14.4	Lebanon
Grade 4	4	10.8	Grade 8	8	14.9	Lithuania
			Form 2 (Grade 8)	8	14.3	Malaysia
			Form 3 (Grade 9)	9	14.0	Malta
Primary 4	4	10.6	Secondary 8	8	14.9	Mongolia
Grade 4 primary school	4	10.6	Second year collegial	8	14.8	Morocco
Grade 6 (the first year of kindergarten is grade 1)	4	10.2				Netherlands
Year 5 (year 1 is equivalent to kindergarten)	4.5–5.5	10.0				New Zealand
Grade 4	4	9.8	Grade 8	8	13.8	Norway
			Grade 8	8	14.3	Oman
			Eighth grade	8	14.0	Palestinian Nat'l Auth.
Fourth grade	4	9.7	Grade 8	8	13.9	Qatar
			Grade 8	8	15.0	Romania
Fourth grade	4	10.8	Eighth grade	7 or 8	14.6	Russian Federation
			Second year of middle school	8	14.4	Saudi Arabia
Primary 5 (P5)	5	9.8	Secondary 2 (S2)	9	13.7	Scotland
			Eighth grade	8	14.9	Serbia
Primary 4	4	10.4	Secondary 2	8	14.4	Singapore
Fourth grade	4	10.4				Slovak Republic

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

**Exhibit A.3 Information About the Grades and Ages of Students Tested in TIMSS 2007 (Continued)**
**TIMSS2007**  
**Mathematics** **4<sup>th</sup> & 8<sup>th</sup> Grades**

Country	Grades 4 and 8		
	Policy on Age of Entry to Primary School*	Practice on Age of Entry to Primary School	Policy on Promotion/Retention
Slovenia	Children must be 6 years old by December 31st	6	●
Sweden	Children must begin during the calendar year they turn 7; upon parental request, children may start school the year they turn 6 or 8	7	○
Syrian Arab Republic	Children must be 5 years, 9 months old by January	6	●
Thailand	Children must be 6 years old by May 16th	5 to 7	○
Tunisia	Children must be 6 years old by the end of December of the year in which they enter school, or by the end of March if there are vacancies	6	●
Turkey	Children must be 6 years old by the end of September	6	●
Ukraine	Children begin school during the calendar year of their 7th birthday	7	●
United States	Policies vary by state	6	○
Yemen	Children must be 6 years old by October 1st of the related school year	6	●
<b>Benchmarking Participants</b>			
Alberta, Canada	Children must be 6 years old by June 1st to begin school the following September	5	○
Basque Country, Spain	Children begin school during the calendar year of their 6th birthday	6	●
British Columbia, Canada	Children must be 6 years old by December 31 of that school year	6	○
Dubai, UAE	Children must be 5.5 years old by October 1st	5 years, 8 months	○
Massachusetts, US	Children must be 6 years old during the calendar year (or younger if the school committee agrees) to start in September	5 or 6	○
Minnesota, US	Children must be in school by the time they are 7 years old	6	○
Ontario, Canada	Children who are 6 years old by the first school day in September are required to begin, but any student who is 6 by December 31st may also begin in September	6	○
Quebec, Canada	Children must be 6 years old by October 1st to begin in September	6	●

● Yes  
○ No

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007





**Exhibit A.3 Information About the Grades and Ages of Students Tested in TIMSS 2007 (Continued)**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup> & 8<sup>th</sup> Grades**

Grade 4			Grade 8			Country
Country's Name for Grade Tested	Years of Formal Schooling**	Average Age at Time of Testing	Country's Name for Grade Tested	Years of Formal Schooling**	Average Age at Time of Testing	
Grade 4	4	9.8	Grade 8	7 or 8	13.8	Slovenia
Grade 4	4	10.8	Grade 8	8	14.8	Sweden
			Grade 8	8	13.9	Syrian Arab Republic
			Middle school grade 2	8	14.3	Thailand
Fourth grade of basic school	4	10.2	Eighth year of basic school	8	14.5	Tunisia
			Eighth Grade	8	14.0	Turkey
Grade 4	4	10.3	Grade 8	8	14.2	Ukraine
Grade 4 of elementary school	4	10.3	Grade 8	8	14.3	United States
Grade 4	4	11.2				Yemen
<b>Benchmarking Participants</b>						
Grade 4	4	9.8				Alberta, Canada
			Second course of secondary compulsory education	8	14.1	Basque Country, Spain
Grade 4	4	9.8	Grade 8	8	13.9	British Columbia, Canada
Grade 4 or Grade 5	4	10.0	Grade 8 or Grade 9	8	14.2	Dubai, UAE
Fourth grade	4	10.3	Eighth grade	8	14.2	Massachusetts, US
Fourth grade	4	10.3	Eighth grade	8	14.3	Minnesota, US
Grade 4	4	9.8	Grade 8	8	13.8	Ontario, Canada
Second year of second cycle	4	10.1	Secondary II (cycle one)	8	14.2	Quebec, Canada

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

### Sample Implementation and Participation Rates

The TIMSS 2007 assessment was administered to scientifically-selected random samples of students from the target population in each country. Because the accuracy of the TIMSS results depends on the quality of the national samples, TIMSS worked with participating countries on all phases of sampling to ensure efficient sampling design and implementation. National coordinators were trained in how to select the school and student samples, and how to use the *WinW3S* sampling software provided by the IEA Data Processing and Research Center. Staff from Statistics Canada reviewed the national sampling plans, sampling data, sampling frames, and sample selections. The sampling documentation was used by the TIMSS & PIRLS International Study Center (in consultation with Statistics Canada and the sampling referee) to evaluate the quality of the samples.

In a few situations where it was not possible to test the entire international target population (i.e., all students enrolled in the fourth or eighth grade), countries were permitted to define a target population that excluded part of the international target population. Exhibit A.4 shows any differences in coverage between the international and national target populations. Almost all participants achieved 100% coverage, the exceptions at fourth grade being Georgia (tested only students taught in Georgian), Kazakhstan (students taught in Kazakh or Russian), Latvia (students taught in Latvian), and Lithuania (students taught in Lithuanian), and, at eighth grade, Georgia (tested only students taught in Georgian), Lithuania (students taught in Lithuanian), and Serbia (did not include Kosovo).

Within the target population, countries could define a population that excluded a small percentage (no more than 5%) of certain kinds of schools or students that would be very difficult or resource intensive to test (e.g., schools for students with special needs or schools that were very small or located in remote rural areas). Almost all countries kept their excluded students below the 5% limit. The only exceptions at the fourth grade were the United States and among benchmarking participants, the U.S. states of Massachusetts and Minnesota and the Canadian provinces of Alberta, British Columbia, Ontario and Quebec, which excluded more than 5 but less than 10 percent of their fourth grade populations. Exceptions at the eighth grade included Serbia and the United States, as well as Massachusetts, Minnesota, and Ontario, which excluded more than 5 but less than 10 percent of their eighth grade population, and Israel, British Columbia, and Quebec, which excluded more than 10 percent of their eighth-grade student population.

The basic design of the sample used in TIMSS 2007 was a two-stage stratified cluster design.<sup>3</sup> The first stage consisted of a sampling of schools, and the second stage of a sampling of intact classrooms from the target grade in the sampled schools. Schools were selected with probability proportional to size, and classrooms with equal probabilities. Most countries sampled 150 schools and one or two intact classrooms from each school.<sup>4</sup> This approach was designed to yield a representative sample of at least 4,500 students in each country.

3 See Joncas, M. (2008). TIMSS sampling design. In J.F. Olson, M.O. Martin, & I.V.S. Mullis (Eds.), *TIMSS 2007 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

4 For further detail, see Joncas, M. (2008). TIMSS 2007 sampling weights and participation rates. In J.F. Olson, M.O. Martin, & I.V.S. Mullis (Eds.), *TIMSS 2007 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

## Exhibit A.4 Coverage of TIMSS 2007 Target Population

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Algeria	100%		2.1%	0.0%	2.1%
Armenia	100%		2.7%	0.7%	3.4%
Australia	100%		1.3%	2.7%	4.0%
Austria	100%		1.3%	3.7%	5.0%
Chinese Taipei	100%		0.2%	2.5%	2.8%
Colombia	100%		1.3%	0.8%	2.1%
Czech Republic	100%		4.4%	0.5%	4.9%
Denmark	100%		2.0%	2.1%	4.1%
El Salvador	100%		1.4%	0.9%	2.3%
England	100%		1.6%	0.5%	2.1%
Georgia	85%	Students taught in Georgian	2.3%	2.5%	4.8%
Germany	100%		1.2%	0.2%	1.3%
Hong Kong SAR	100%		4.9%	0.5%	5.4%
Hungary	100%		2.6%	1.7%	4.4%
Iran, Islamic Rep. of	100%		2.9%	0.0%	3.0%
Italy	100%		0.1%	5.3%	5.3%
Japan	100%		0.4%	0.6%	1.1%
Kazakhstan	94%	Students taught in Kazakh or Russian	2.2%	3.1%	5.3%
Kuwait	100%		0.0%	0.0%	0.0%
Latvia	72%	Students taught in Latvian	4.2%	0.4%	4.6%
Lithuania	93%	Students taught in Lithuanian	2.2%	3.1%	5.4%
Morocco	100%		1.4%	0.0%	1.4%
Netherlands	100%		3.7%	1.0%	4.8%
New Zealand	100%		2.8%	2.6%	5.4%
Norway	100%		1.9%	3.3%	5.1%
Qatar	100%		1.5%	0.2%	1.8%
Russian Federation	100%		2.2%	1.5%	3.6%
Scotland	100%		2.6%	1.9%	4.5%
Singapore	100%		1.5%	0.0%	1.5%
Slovak Republic	100%		1.4%	1.9%	3.3%
Slovenia	100%		0.8%	1.3%	2.1%
Sweden	100%		2.0%	1.1%	3.1%
Tunisia	100%		2.7%	0.2%	2.9%
Ukraine	100%		0.6%	0.0%	0.6%
United States	100%		0.0%	9.2%	9.2%
Yemen	100%		1.9%	0.1%	2.0%
<b>Benchmarking Participants</b>					
Alberta, Canada	100%		2.0%	5.7%	7.6%
British Columbia, Canada	100%		2.2%	6.9%	9.2%
Dubai, UAE	100%		4.2%	1.2%	5.4%
Massachusetts, US	100%		0.0%	10.4%	10.4%
Minnesota, US	100%		0.0%	8.3%	8.3%
Ontario, Canada	100%		0.6%	5.7%	6.3%
Quebec, Canada	100%		2.1%	4.3%	6.4%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit A.4 Coverage of TIMSS 2007 Target Population (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Algeria	100%		0.1%	0.0%	0.1%
Armenia	100%		2.7%	0.5%	3.3%
Australia	100%		0.6%	1.2%	1.9%
Bahrain	100%		1.4%	0.1%	1.5%
Bosnia and Herzegovina	100%		0.4%	1.1%	1.5%
Botswana	100%		0.0%	0.1%	0.1%
Bulgaria	100%		2.2%	1.3%	3.4%
Chinese Taipei	100%		0.1%	3.3%	3.3%
Colombia	100%		1.5%	0.1%	1.6%
Cyprus	100%		0.0%	2.5%	2.5%
Czech Republic	100%		4.3%	0.3%	4.6%
Egypt	100%		0.1%	0.4%	0.5%
El Salvador	100%		1.2%	1.6%	2.8%
England	100%		2.0%	0.3%	2.3%
Georgia	85%	Students taught in Georgian	2.3%	1.6%	3.9%
Ghana	100%		0.9%	0.0%	0.9%
Hong Kong SAR	100%		3.7%	0.1%	3.8%
Hungary	100%		2.6%	1.4%	3.9%
Indonesia	100%		3.4%	0.0%	3.4%
Iran, Islamic Rep. of	100%		0.5%	0.0%	0.5%
Israel	100%		14.5%	8.3%	22.8%
Italy	100%		0.0%	4.9%	5.0%
Japan	100%		0.6%	2.9%	3.5%
Jordan	100%		0.2%	1.8%	2.0%
Korea, Rep. of	100%		1.2%	0.5%	1.6%
Kuwait	100%		0.0%	0.3%	0.3%
Lebanon	100%		1.4%	0.0%	1.4%
Lithuania	92%	Students taught in Lithuanian	1.4%	2.7%	4.2%
Malaysia	100%		3.3%	0.0%	3.3%
Malta	100%		0.8%	2.1%	2.9%
Morocco	100%		0.1%	0.0%	0.1%
Norway	100%		0.9%	1.7%	2.6%
Oman	100%		0.3%	0.9%	1.2%
Palestinian Nat'l Auth.	100%		0.1%	0.9%	1.0%
Qatar	100%		0.6%	0.2%	0.8%
Romania	100%		1.5%	0.3%	1.8%
Russian Federation	100%		1.1%	1.2%	2.3%
Saudi Arabia	100%		0.4%	0.1%	0.5%
Scotland	100%		1.3%	0.4%	1.7%
Serbia	80%	Serbia without Kosovo	2.9%	3.9%	6.8%
Singapore	100%		1.8%	0.0%	1.8%
Slovenia	100%		0.9%	1.0%	1.9%
Sweden	100%		2.1%	1.6%	3.6%
Syrian Arab Republic	100%		0.6%	0.0%	0.6%
Thailand	100%		3.4%	0.0%	3.4%
Tunisia	100%		0.0%	0.0%	0.0%
Turkey	100%		2.1%	0.5%	2.6%
Ukraine	100%		0.2%	0.0%	0.2%
United States	100%		0.0%	7.9%	7.9%
<b>Benchmarking Participants</b>					
Basque Country, Spain	100%		1.2%	3.0%	4.2%
British Columbia, Canada	100%		2.8%	15.0%	17.7%
Dubai, UAE	100%		4.2%	0.8%	5.0%
Massachusetts, US	100%		0.0%	8.4%	8.4%
Minnesota, US	100%		0.0%	7.5%	7.5%
Ontario, Canada	100%		0.4%	5.8%	6.2%
Quebec, Canada	100%		1.5%	12.1%	13.6%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibits A.5 and A.6 present achieved sample sizes for schools and students, respectively.<sup>5</sup> Exhibit A.7 shows the participation rates for schools, students, and overall—both with and without the use of replacement schools. Most countries achieved the minimum acceptable participation rates—85 percent of both the schools and students, or a combined rate (the product of school and student participation) of 75 percent—although, at the fourth grade, Denmark, Scotland, the United States, and Minnesota did so only after including replacement schools and have been annotated in the exhibits of this report. Although the Netherlands had an overall participation rate of 91 percent including replacement schools, its participation rate among schools before replacement (48%) was just below the required minimum of 50 percent, and so the Netherlands has been annotated accordingly. At the eighth grade, all participants except Morocco achieved the minimum acceptable participation rate, although England, Hong Kong SAR, Scotland, the United States, and Minnesota did so only after including replacement schools and were annotated in exhibits in this report. Morocco, with an overall participation rate of 55 percent, was annotated in report exhibits and placed below a line following the other countries. Mongolia did not provide the necessary documentation for sampling, data collection, and scoring activities so its achievement data are summarized in Appendix E.

Because an important goal of the TIMSS 2007 assessment was to measure changes in students' mathematics achievement since 1995, it was important to track any changes in population composition and coverage since then that might be related to student achievement. Exhibit A.8 presents, for each TIMSS participant, four attributes of the fourth grade populations sampled in 2007, 2003, and 1995 and the eighth grade populations sampled in 2007, 2003, 1999, and 1995: number of years of formal schooling, average student age at time of testing, percentage of students excluded from the assessment, and overall sampling participation rate (after replacement). Most countries and provinces were very similar with regard to these attributes across the three TIMSS cycles at fourth grade and four cycles at eighth grade, although there have been changes in some countries in the age and grade structure of the assessed populations, and in the exclusion rate.

5 In cases where students were not given parental permission to participate, they were absent and included as such in Exhibits A.6 and A.7.

Although Australia, since 2003, has tested only fourth grade students for the fourth grade population and only eighth grade students for the eighth grade population, in 1995 the younger assessment population contained fourth grade students from some states and fifth grade students from other states, and similarly the older population contained a mixture of eighth and ninth grade students. Because of this, Australian students were somewhat older, on average, in 1995. The Russian Federation and Slovenia have undergone structural changes in the age at which children enter schools that are reflected in their samples. In 2003, the Russian fourth grade sample contained third-grade students from some regions and fourth-grade students from others, whereas all students were in fourth grade in 2007. At the eighth grade, there was still a mixture of seventh and eighth grade students in 2007, although with proportionally more eighth grade students, and correspondingly a higher average age. Slovenia is in transition towards having all children begin school at an earlier age so that they all will have four years of primary schooling at the fourth grade instead of three years, as was the case in 2003. At eighth grade, the transition was not complete in 2007.

## Exhibit A.5 School Sample Sizes

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Algeria	150	150	149	0	149
Armenia	150	148	143	5	148
Australia	230	229	226	3	229
Austria	199	197	194	2	196
Chinese Taipei	150	150	150	0	150
Colombia	150	143	132	10	142
Czech Republic	150	147	132	12	144
Denmark	150	150	105	32	137
El Salvador	150	148	146	2	148
England	160	159	131	12	143
Georgia	152	144	131	13	144
Germany	250	247	239	7	246
Hong Kong SAR	150	150	122	4	126
Hungary	150	145	135	9	144
Iran, Islamic Rep. of	240	224	224	0	224
Italy	170	170	155	15	170
Japan	150	150	145	3	148
Kazakhstan	150	141	140	1	141
Kuwait	150	150	149	0	149
Latvia	150	150	140	6	146
Lithuania	163	156	154	2	156
Morocco	226	224	184	0	184
Netherlands	150	148	72	69	141
New Zealand	220	220	213	7	220
Norway	150	150	131	14	145
Qatar	114	114	114	0	114
Russian Federation	206	206	206	0	206
Scotland	150	148	114	25	139
Singapore	177	177	177	0	177
Slovak Republic	184	184	181	3	184
Slovenia	150	150	138	10	148
Sweden	160	155	151	4	155
Tunisia	150	150	150	0	150
Ukraine	150	150	144	0	144
United States	300	290	202	55	257
Yemen	150	144	143	1	144
<b>Benchmarking Participants</b>					
Alberta, Canada	150	148	146	0	146
British Columbia, Canada	150	150	147	3	150
Dubai, UAE	143	132	97	0	97
Massachusetts, US	50	49	45	2	47
Minnesota, US	50	50	30	20	50
Ontario, Canada	200	197	179	9	188
Quebec, Canada	200	192	185	1	186

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007





Exhibit A.5 School Sample Sizes (Continued)					TIMSS2007 Mathematics 8 <sup>th</sup> Grade
Country	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample that Participated	Number of Replacement Schools that Participated	Total Number of Schools that Participated
Algeria	150	150	149	0	149
Armenia	150	148	143	5	148
Australia	230	228	228	0	228
Bahrain	74	74	74	0	74
Bosnia and Herzegovina	150	150	150	0	150
Botswana	150	150	150	0	150
Bulgaria	170	166	158	5	163
Chinese Taipei	150	150	150	0	150
Colombia	150	148	142	6	148
Cyprus	67	67	67	0	67
Czech Republic	150	147	135	12	147
Egypt	237	233	231	2	233
El Salvador	150	145	143	2	145
England	160	160	126	11	137
Georgia	152	135	131	4	135
Ghana	163	163	163	0	163
Hong Kong SAR	152	152	112	8	120
Hungary	150	145	133	11	144
Indonesia	150	149	149	0	149
Iran, Islamic Rep. of	220	208	208	0	208
Israel	150	150	140	6	146
Italy	170	170	159	11	170
Japan	150	150	144	2	146
Jordan	200	200	200	0	200
Korea, Rep. of	150	150	150	0	150
Kuwait	163	163	158	0	158
Lebanon	150	148	120	16	136
Lithuania	150	144	141	1	142
Malaysia	150	150	150	0	150
Malta	60	59	59	0	59
Morocco	205	205	131	0	131
Norway	150	150	133	6	139
Oman	150	146	146	0	146
Palestinian Nat'l Auth.	155	148	147	1	148
Qatar	67	67	66	0	66
Romania	150	150	149	0	149
Russian Federation	210	210	210	0	210
Saudi Arabia	167	166	165	0	165
Scotland	150	150	109	20	129
Serbia	150	147	147	0	147
Singapore	164	164	164	0	164
Slovenia	150	150	138	10	148
Sweden	160	159	158	1	159
Syrian Arab Republic	150	150	150	0	150
Thailand	150	150	134	16	150
Tunisia	150	150	150	0	150
Turkey	150	146	146	0	146
Ukraine	150	150	146	0	146
United States	300	287	197	42	239
<b>Benchmarking Participants</b>					
Basque Country, Spain	130	130	130	0	130
British Columbia, Canada	150	150	147	3	150
Dubai, UAE	122	115	88	0	88
Massachusetts, US	50	49	45	3	48
Minnesota, US	50	50	32	17	49
Ontario, Canada	200	191	168	8	176
Quebec, Canada	191	183	170	0	170

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Exhibit A.6 Student Sample Sizes

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Algeria	97%	4366	22	0	4344	121	4223
Armenia	96%	4253	0	0	4253	174	4079
Australia	95%	4511	78	105	4328	220	4108
Austria	98%	5158	18	156	4984	125	4859
Chinese Taipei	100%	4260	17	93	4150	19	4131
Colombia	98%	5320	349	40	4931	130	4801
Czech Republic	94%	4583	41	17	4525	290	4235
Denmark	94%	3907	59	89	3759	240	3519
El Salvador	98%	4467	202	0	4265	99	4166
England	93%	4784	128	33	4623	307	4316
Georgia	98%	4384	69	68	4247	139	4108
Germany	97%	5464	78	9	5377	177	5200
Hong Kong SAR	96%	3965	13	23	3929	138	3791
Hungary	97%	4221	22	26	4173	125	4048
Iran, Islamic Rep. of	99%	3939	53	2	3884	51	3833
Italy	97%	4912	20	256	4636	166	4470
Japan	97%	4677	7	20	4650	163	4487
Kazakhstan	100%	4063	22	39	4002	12	3990
Kuwait	85%	4468	439	0	4029	226	3803
Latvia	95%	4188	2	10	4176	268	3908
Lithuania	94%	4345	15	122	4208	228	3980
Morocco	96%	4282	215	0	4067	173	3894
Netherlands	97%	3608	152	9	3447	98	3349
New Zealand	96%	5347	104	86	5157	217	4940
Norway	95%	4462	21	143	4298	190	4108
Qatar	97%	7411	153	18	7240	221	7019
Russian Federation	98%	4659	36	42	4581	117	4464
Scotland	94%	4320	92	32	4196	267	3929
Singapore	96%	5235	26	1	5208	167	5041
Slovak Republic	97%	5269	47	64	5158	195	4963
Slovenia	95%	4664	10	57	4597	246	4351
Sweden	97%	4965	60	49	4856	180	4676
Tunisia	99%	4242	50	10	4182	48	4134
Ukraine	97%	4459	16	0	4443	151	4292
United States	95%	9000	140	543	8317	421	7896
Yemen	98%	6128	180	8	5940	129	5811
<b>Benchmarking Participants</b>							
Alberta, Canada	96%	4557	105	222	4230	193	4037
British Columbia, Canada	96%	4758	67	342	4349	196	4153
Dubai, UAE	91%	3421	19	4	3398	334	3064
Massachusetts, US	96%	1971	11	136	1824	77	1747
Minnesota, US	97%	2034	23	101	1910	64	1846
Ontario, Canada	95%	3903	34	194	3675	179	3496
Quebec, Canada	86%	4645	34	78	4533	648	3885

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



## Exhibit A.6 Student Sample Sizes (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Within-school Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/School	Number of Students Excluded	Number of Eligible Students	Number of Students Absent	Number of Students Assessed
Algeria	96%	5793	83	0	5710	263	5447
Armenia	96%	4898	0	0	4898	209	4689
Australia	93%	4549	84	37	4428	359	4069
Bahrain	97%	4434	61	5	4368	138	4230
Bosnia and Herzegovina	98%	4373	22	44	4307	87	4220
Botswana	99%	4310	63	2	4245	37	4208
Bulgaria	96%	4312	87	7	4218	199	4019
Chinese Taipei	99%	4164	25	53	4086	40	4046
Colombia	98%	5343	368	4	4971	98	4873
Cyprus	96%	4755	41	139	4575	176	4399
Czech Republic	95%	5182	41	12	5129	284	4845
Egypt	98%	6906	151	1	6754	172	6582
El Salvador	98%	4329	191	0	4138	75	4063
England	88%	4768	153	15	4600	575	4025
Georgia	97%	4533	139	48	4346	168	4178
Ghana	98%	5678	270	0	5408	114	5294
Hong Kong SAR	96%	3657	29	2	3626	156	3470
Hungary	97%	4321	21	30	4270	159	4111
Indonesia	97%	4419	95	0	4324	121	4203
Iran, Islamic Rep. of	98%	4140	95	0	4045	64	3981
Israel	94%	3708	12	183	3513	219	3294
Italy	96%	4873	40	231	4602	194	4408
Japan	93%	4656	31	6	4619	307	4312
Jordan	96%	5733	184	88	5461	210	5251
Korea, Rep. of	99%	4358	36	19	4303	63	4240
Kuwait	87%	4721	381	18	4322	231	4091
Lebanon	93%	4062	0	0	4062	276	3786
Lithuania	91%	4537	35	96	4406	415	3991
Malaysia	98%	4589	33	0	4556	90	4466
Malta	95%	5053	18	106	4929	259	4670
Morocco	85%	3731	134	0	3597	537	3060
Norway	93%	5085	17	78	4990	363	4627
Oman	99%	4894	57	36	4801	49	4752
Palestinian Nat'l Auth.	98%	4572	70	29	4473	95	4378
Qatar	97%	7558	128	17	7413	229	7184
Romania	97%	4447	119	12	4316	118	4198
Russian Federation	97%	4706	42	51	4613	141	4472
Saudi Arabia	95%	4515	1	3	4511	268	4243
Scotland	90%	4700	137	19	4544	474	4070
Serbia	98%	4246	16	78	4152	107	4045
Singapore	95%	4828	37	0	4791	192	4599
Slovenia	93%	4414	10	42	4362	319	4043
Sweden	94%	5712	87	58	5567	352	5215
Syrian Arab Republic	96%	5025	199	0	4826	176	4650
Thailand	99%	5579	89	0	5490	78	5412
Tunisia	98%	4258	84	0	4174	94	4080
Turkey	98%	4682	87	19	4576	78	4498
Ukraine	97%	4598	27	0	4571	147	4424
United States	93%	8447	202	272	7973	596	7377
<b>Benchmarking Participants</b>							
Basque Country, Spain	98%	2481	46	83	2352	56	2296
British Columbia, Canada	94%	4836	129	146	4561	305	4256
Dubai, UAE	88%	3625	17	6	3602	407	3195
Massachusetts, US	94%	2093	23	56	2014	117	1897
Minnesota, US	95%	1988	21	82	1885	108	1777
Ontario, Canada	95%	3842	43	171	3628	180	3448
Quebec, Canada	85%	4739	59	45	4635	679	3956

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

## Exhibit A.7 Participation Rates (Weighted)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Algeria	99%	99%	100%	97%	97%	97%
Armenia	93%	100%	100%	96%	90%	96%
Australia	99%	100%	100%	95%	94%	95%
Austria	98%	99%	99%	98%	96%	97%
Chinese Taipei	100%	100%	100%	100%	100%	100%
Colombia	93%	99%	100%	98%	91%	97%
Czech Republic	89%	98%	100%	94%	83%	92%
Denmark	71%	91%	99%	94%	66%	85%
El Salvador	99%	100%	100%	98%	97%	98%
England	83%	90%	100%	93%	77%	84%
Georgia	92%	100%	100%	98%	90%	98%
Germany	96%	100%	100%	97%	93%	96%
Hong Kong SAR	81%	84%	100%	96%	78%	81%
Hungary	93%	99%	100%	97%	90%	96%
Iran, Islamic Rep. of	100%	100%	100%	99%	99%	99%
Italy	91%	100%	100%	97%	88%	97%
Japan	97%	99%	100%	97%	94%	95%
Kazakhstan	99%	100%	100%	100%	99%	100%
Kuwait	100%	100%	100%	85%	85%	85%
Latvia	93%	97%	100%	95%	89%	92%
Lithuania	99%	100%	100%	94%	93%	94%
Morocco	81%	81%	100%	96%	77%	77%
Netherlands	48%	95%	98%	97%	46%	91%
New Zealand	97%	100%	100%	96%	93%	96%
Norway	88%	97%	100%	95%	83%	92%
Qatar	100%	100%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	98%	98%	98%
Scotland	77%	94%	100%	94%	72%	88%
Singapore	100%	100%	100%	96%	96%	96%
Slovak Republic	98%	100%	100%	97%	95%	97%
Slovenia	92%	99%	100%	95%	87%	93%
Sweden	98%	100%	100%	97%	94%	97%
Tunisia	100%	100%	100%	99%	99%	99%
Ukraine	96%	96%	100%	97%	93%	93%
United States	70%	89%	100%	95%	66%	84%
Yemen	99%	100%	100%	98%	97%	98%
<b>Benchmarking Participants</b>						
Alberta, Canada	99%	99%	100%	96%	94%	94%
British Columbia, Canada	98%	100%	100%	96%	94%	96%
Dubai, UAE	75%	75%	98%	91%	67%	67%
Massachusetts, US	92%	96%	100%	96%	88%	92%
Minnesota, US	53%	100%	100%	97%	52%	97%
Ontario, Canada	95%	96%	100%	95%	91%	92%
Quebec, Canada	97%	98%	100%	86%	83%	84%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007



Exhibit A.7 Participation Rates (Weighted) (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Algeria	99%	99%	100%	96%	95%	95%
Armenia	94%	100%	100%	96%	90%	96%
Australia	100%	100%	100%	93%	93%	93%
Bahrain	100%	100%	100%	97%	97%	97%
Bosnia and Herzegovina	100%	100%	100%	98%	98%	98%
Botswana	100%	100%	100%	99%	99%	99%
Bulgaria	94%	98%	100%	96%	90%	94%
Chinese Taipei	100%	100%	100%	99%	99%	99%
Colombia	96%	100%	100%	98%	94%	98%
Cyprus	100%	100%	100%	96%	96%	96%
Czech Republic	92%	100%	100%	95%	87%	95%
Egypt	99%	100%	100%	98%	97%	98%
El Salvador	99%	100%	100%	98%	97%	98%
England	78%	86%	100%	88%	69%	75%
Georgia	97%	100%	100%	97%	95%	97%
Ghana	100%	100%	100%	98%	98%	98%
Hong Kong SAR	73%	79%	100%	96%	70%	75%
Hungary	92%	99%	100%	97%	89%	96%
Indonesia	100%	100%	100%	97%	97%	97%
Iran, Islamic Rep. of	100%	100%	100%	98%	98%	98%
Israel	94%	97%	100%	94%	88%	91%
Italy	93%	100%	100%	96%	89%	96%
Japan	96%	97%	100%	93%	90%	91%
Jordan	100%	100%	100%	96%	96%	96%
Korea, Rep. of	100%	100%	100%	99%	99%	99%
Kuwait	97%	97%	100%	87%	84%	84%
Lebanon	81%	92%	100%	93%	76%	85%
Lithuania	98%	99%	100%	91%	89%	90%
Malaysia	100%	100%	100%	98%	98%	98%
Malta	100%	100%	100%	95%	94%	94%
Morocco	65%	65%	100%	85%	55%	55%
Norway	88%	93%	100%	93%	82%	86%
Oman	100%	100%	100%	99%	99%	99%
Palestinian Nat'l Auth.	100%	100%	100%	98%	98%	98%
Qatar	100%	100%	100%	97%	97%	97%
Romania	99%	99%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Saudi Arabia	99%	99%	100%	95%	94%	94%
Scotland	74%	86%	100%	90%	66%	77%
Serbia	100%	100%	100%	98%	98%	98%
Singapore	100%	100%	99%	95%	95%	95%
Slovenia	92%	99%	100%	93%	85%	92%
Sweden	100%	100%	100%	94%	93%	94%
Syrian Arab Republic	100%	100%	100%	96%	96%	96%
Thailand	90%	100%	100%	99%	88%	99%
Tunisia	100%	100%	100%	98%	98%	98%
Turkey	100%	100%	100%	98%	98%	98%
Ukraine	98%	98%	100%	97%	95%	95%
United States	68%	83%	99%	93%	63%	77%
<b>Benchmarking Participants</b>						
Basque Country, Spain	100%	100%	100%	98%	98%	98%
British Columbia, Canada	98%	100%	100%	94%	92%	94%
Dubai, UAE	79%	79%	99%	88%	69%	69%
Massachusetts, US	93%	98%	100%	94%	88%	92%
Minnesota, US	61%	98%	100%	95%	58%	93%
Ontario, Canada	90%	94%	100%	95%	86%	89%
Quebec, Canada	93%	93%	97%	85%	77%	77%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

In general, the exclusion rates do not exceed the TIMSS 2007 guidelines of 5 percent, and have not changed very much across assessments for most countries. Also, in most cases, the exclusion rates have decreased. However, the student exclusion rate was higher in 2007 than in previous assessments at eighth grade in Serbia, the United States, and the Canadian provinces of British Columbia and Quebec. For each assessment year in Exhibit 1.3 containing the trend results, exclusion rates over 5 percent were documented with footnote 2 and over 10 percent with footnote 3. At the fourth grade, those with a variation from assessment to assessment, included the United States, the state of Minnesota, and the provinces of Alberta and Quebec with a footnote 2 for 2007; the Russian Federation, Hungary, and Iran with a footnote 2 for 2003; England with a footnote 3 for 1995; Scotland with a footnote 2 for 1995; and the province of Ontario with a footnote 2 for 1995 and 2007. At the eighth grade, the United States and Serbia have a footnote 2 for 2007, Hungary and Iran have a footnote 2 for 2003, Italy a footnote 2 for 1999, the Russian Federation and Lithuania a footnote 2 for 1995, and England a footnote 3 for 1995. Among the benchmarking participants, the provinces of Quebec and British Columbia have a footnote 3 for 2007, the states of Massachusetts and Minnesota a footnote 2 for 2007, the province of Ontario a footnote 2 for 2003 and 2007, and the Basque Country in Spain a footnote 2 for 2003.

Exhibit A.8 Trends in Student Populations

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Years of Formal Schooling*			Average Age at Time of Testing			Overall Exclusion Rates			Overall Participation Rates (After Replacement)		
	2007	2003	1995	2007	2003	1995	2007	2003	1995	2007	2003	1995
Armenia	4	4		10.6	10.9		3.4%	2.9%		96%	90%	
Australia	4	4	4 or 5	9.9	9.9	10.2	4.0%	2.7%	1.8%	95%	85%	66%
Austria	4		4	10.3		10.5	5.0%		2.8%	97%		69%
Chinese Taipei	4	4		10.2	10.2		2.8%	3.1%		100%	99%	
Czech Republic	4		4	10.3		10.4	4.9%		4.1%	92%		86%
England	5	5	5	10.2	10.3	10.0	2.1%	1.9%	12.1%	84%	76%	83%
Hong Kong SAR	4	4	4	10.2	10.2	10.1	5.4%	3.8%	2.7%	81%	83%	83%
Hungary	4	4	4	10.7	10.5	10.4	4.4%	8.1%	3.8%	96%	93%	92%
Iran, Islamic Rep. of	4	4	4	10.2	10.4	10.5	3.0%	5.7%	1.3%	99%	98%	97%
Italy	4	4		9.8	9.8		5.3%	4.2%		97%	97%	
Japan	4	4	4	10.5	10.4	10.4	1.1%	0.8%	3.0%	95%	97%	92%
Latvia	4	4	4	11.0	11.1	10.5	4.6%	4.4%	2.1%	92%	88%	69%
Lithuania	4	4		10.8	10.9		5.4%	4.6%		94%	87%	
Morocco	4	4		10.6	11.0		1.4%	2.2%		77%	81%	
Netherlands	4	4	4	10.2	10.2	10.3	4.8%	5.2%	4.4%	91%	84%	59%
New Zealand	4.5 – 5.5	4.5 – 5.5	4.5 – 5.5	10.0	10.0	10.0	5.4%	4.0%	1.3%	96%	93%	95%
Norway	4	4	4	9.8	9.8	9.9	5.1%	4.4%	3.1%	92%	88%	91%
Russian Federation	4	3 or 4		10.8	10.6		3.6%	6.8%		98%	97%	
Scotland	5	5	5	9.8	9.7	9.7	4.5%	1.5%	6.7%	88%	77%	76%
Singapore	4	4	4	10.4	10.3	10.3	1.5%	0.0%	0.0%	96%	98%	98%
Slovenia	4	3 or 4	3	9.8	9.8	9.9	2.1%	1.3%	1.9%	93%	91%	77%
Tunisia	4	4		10.2	10.4		2.9%	0.9%		99%	99%	
United States	4	4	4	10.3	10.2	10.2	9.2%	5.1%	4.7%	84%	78%	80%
<b>Benchmarking Participants</b>												
Alberta, Canada	4		4	9.8		10.0	7.6%		–	94%		91%
Minnesota, US	4		4	10.3		10.3	8.3%		–	97%		–
Ontario, Canada	4	4	4	9.8	9.8	9.9	6.3%	4.8%	–	92%	90%	92%
Quebec, Canada	4	4	4	10.1	10.1	10.3	6.4%	3.6%	–	84%	91%	81%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Represents years of schooling counting from the first year of ISCED Level 1.  
A dash (–) indicates comparable data are not available.

## Exhibit A.8 Trends in Student Populations (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Years of Formal Schooling*				Average Age at Time of Testing			
	2007	2003	1999	1995	2007	2003	1999	1995
Armenia	8	8			14.9	14.9		
Australia	8	8		8 or 9	13.9	13.9		14.2
Bahrain	8	8			14.1	14.1		
Botswana	8	8			14.9	15.1		
Bulgaria	8	8	8	8	14.9	14.9	14.8	14.0
Chinese Taipei	8	8	8		14.2	14.2	14.2	
Colombia	8			8	14.5			14.5
Cyprus	8	8	8	8	13.8	13.8	13.8	13.7
Czech Republic	8		8	8	14.4		14.4	14.4
Egypt	8	8			14.1	14.4		
England	9	9	9	9	14.2	14.3	14.2	14.0
Ghana	8	8			15.8	15.5		
Hong Kong SAR	8	8	8	8	14.4	14.4	14.2	14.2
Hungary	8	8	8	8	14.6	14.5	14.4	14.3
Indonesia	8	8	8		14.3	14.5	14.6	
Iran, Islamic Rep. of	8	8	8	8	14.2	14.4	14.6	14.6
Israel	8	8	8		14.0	14.0	14.1	
Italy	8	8	8		13.9	13.9	14.0	
Japan	8	8	8	8	14.5	14.4	14.4	14.4
Jordan	8	8	8		14.0	13.9	14.0	
Korea, Rep. of**	8	8	8	8	14.3	14.6	14.4	14.2
Lebanon	8	8			14.4	14.6		
Lithuania**	8	8	8.5	8	14.9	14.9	15.2	14.3
Malaysia	8	8	8		14.3	14.3	14.4	
Norway	8	8		8	13.8	13.8		13.9
Palestinian Nat'l Auth.	8	8			14.0	14.1		
Romania	8	8	8	8	15.0	15.0	14.8	14.6
Russian Federation	7 or 8	7 or 8	7 or 8	7 or 8	14.6	14.2	14.1	14.0
Scotland	9	9		9	13.7	13.7		13.7
Serbia	8	8			14.9	14.9		
Singapore	8	8	8	8	14.4	14.3	14.4	14.5
Slovenia	7 or 8	7 or 8		7	13.8	13.8		13.8
Sweden	8	8		8	14.8	14.9		14.9
Thailand	8		8		14.3		14.5	
Tunisia	8	8	8		14.5	14.8	14.8	
United States	8	8	8	8	14.3	14.2	14.2	14.2
<b>Benchmarking Participants</b>								
Basque Country, Spain	8	8			14.1	14.1		
British Columbia, Canada	8		8		13.9		13.9	
Massachusetts, US	8		8		14.2		14.1	
Minnesota, US	8			8	14.3			14.3
Ontario, Canada	8	8	8	8	13.8	13.8	13.9	14.0
Quebec, Canada	8	8	8	8	14.2	14.2	14.3	14.5

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Represents years of schooling counting from the first year of ISCED Level 1.

\*\* Lithuania tested the same cohort of students as other countries, but later in 1999, at the beginning of the next school year. Korea tested the same cohort of students as other countries, but later in 2003, at the beginning of the next school year.

A dash (-) indicates comparable data are not available.


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Exhibit A.8 Trends in Student Populations (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Overall Exclusion Rates				Overall Participation Rates (After Replacement)			
	2007	2003	1999	1995	2007	2003	1999	1995
Armenia	3.3%	2.9%			96%	89%		
Australia	1.9%	1.3%		0.8%	93%	83%		70%
Bahrain	1.5%	0.0%			97%	98%		
Botswana	0.1%	3.0%			99%	96%		
Bulgaria	3.4%	0.5%	4.6%	0.6%	94%	92%	84%	63%
Chinese Taipei	3.3%	4.8%	1.6%		99%	99%	93%	
Colombia	1.6%			3.8%	98%			86%
Cyprus	2.5%	2.5%	0.8%	0.0%	96%	96%	97%	97%
Czech Republic	4.6%		5.2%	4.9%	95%		96%	92%
Egypt	0.5%	3.4%			98%	97%		
England	2.3%	2.1%	5.0%	11.3%	75%	46%	77%	77%
Ghana	0.9%	0.9%			98%	93%		
Hong Kong SAR	3.8%	3.4%	0.8%	2.0%	75%	80%	75%	81%
Hungary	3.9%	8.5%	4.3%	3.8%	96%	94%	93%	87%
Indonesia	3.4%	0.4%	0.0%		97%	99%	97%	
Iran, Islamic Rep. of	0.5%	6.5%	4.4%	0.3%	98%	98%	98%	98%
Israel	22.8%	22.5%	16.1%		91%	94%	94%	
Italy	5.0%	3.6%	6.7%		96%	97%	97%	
Japan	3.5%	0.6%	1.3%	0.6%	91%	93%	89%	90%
Jordan	2.0%	1.3%	3.0%		96%	96%	99%	
Korea, Rep. of**	1.6%	4.9%	4.0%	3.8%	99%	98%	100%	95%
Lebanon	1.4%	1.4%			85%	91%		
Lithuania**	4.2%	2.6%	4.5%	6.6%	90%	84%	89%	83%
Malaysia	3.3%	4.0%	4.6%		98%	98%	99%	
Norway	2.6%	2.3%		2.2%	86%	85%		93%
Palestinian Nat'l Auth.	1.0%	0.5%			98%	99%		
Romania	1.8%	0.5%	3.7%	2.8%	97%	98%	97%	89%
Russian Federation	2.3%	5.5%	1.7%	6.3%	97%	96%	97%	95%
Scotland	1.7%	0.0%		2.2%	77%	76%		73%
Serbia	6.8%	2.9%			98%	96%		
Singapore	1.8%	0.0%	0.0%	4.6%	95%	97%	98%	95%
Slovenia	1.9%	1.4%		2.6%	92%	91%		77%
Sweden	3.6%	2.8%		0.9%	94%	87%		90%
Thailand	3.4%		3.3%		99%		99%	
Tunisia	0.0%	1.8%	0.1%		98%	98%	98%	
United States	7.9%	4.9%	3.9%	2.1%	77%	73%	85%	78%
<b>Benchmarking Participants</b>								
Basque Country, Spain	4.2%	5.8%			98%	98%		
British Columbia, Canada	17.7%		3.6%		94%		93%	
Massachusetts, US	8.4%		5.0%		92%		93%	
Minnesota, US	7.5%				93%			
Ontario, Canada	6.2%	6.0%	5.1%		89%	89%	93%	90%
Quebec, Canada	13.6%	4.8%	1.3%		77%	85%	92%	89%

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

### Translation and Layout Verification

Participants were given detailed guidelines for translating the TIMSS 2007 instruments developed in English into their target language(s) and adapting them to be appropriate for their cultural contexts. They also were urged to work with an experienced translator who would be well suited to the task of working with the TIMSS materials. Because the goal was to create a set of instruments comparable to the originals in terms of difficulty and accessibility, the instruments were subjected to a stringent international translation verification process. Each participant was asked to submit the following materials for verification prior to both the field test and main data collection: items and directions; questionnaires for students, teachers, and schools; manuals; and scoring guides for constructed-response items, where necessary. Verifiers documented their suggestions, and the NRCs were responsible for reviewing the suggestions and revising the instruments. The verified instruments were used to generate the booklets and questionnaires in their final form and these were submitted to the TIMSS & PIRLS International Study Center for international layout verification. Participants who tested in English also were required to go through the verification steps. Although they had not translated the instruments, the materials were reviewed for national adaptations and comparable layout. Further information is provided in the *TIMSS 2007 Technical Report*.

## Survey Operations for Data Collection

Designing the survey operations for data collection was a collaborative effort between the TIMSS & PIRLS International Study Center, the IEA Secretariat, the IEA Data Processing and Research Center, and Statistics Canada. Data collection involved contacting schools and sampling classes, preparing materials for data collection, administering the assessment, conducting quality control, scoring the assessment, and creating the data files. Detailed information is provided in the *TIMSS 2007 Technical Report*. However, in brief, guidelines for each of these activities were described in an international set of materials, software, and manuals provided to each NRC, for example, manuals for the school coordinator, the test administrators, and the national quality control observers. The school coordinator was responsible for coordinating the testing, including arranging for test administrators, receiving the testing materials, and returning the completed materials to the national center. Within the schools, the assessment was conducted by the Test Administrator for each class, which involved distributing materials to the appropriate students, following the script for the administration, and timing the sessions accurately. During the test administrations, 10 percent of the schools were visited by an International Quality Control Monitor hired by the IEA Secretariat, and trained to verify the quality of the materials and adherence to the test administration procedures in each country. Additionally, countries were asked to conduct their own quality control procedures in another 10 percent of sampled schools, based on the international program.

## Scoring the Constructed-response Items

Because more than half of the score points on the assessment came from constructed-response items, TIMSS 2007 had to develop procedures for reliably evaluating student responses within and across countries. To ensure reliable scoring procedures based on the TIMSS scoring rubrics, the TIMSS & PIRLS International Study Center prepared detailed guides containing the rubrics and explanations of how to implement them,

together with example student responses for the various rubric categories. These guides, along with training packets containing extensive examples of student responses for practice in applying the rubrics, were used as a basis for intensive training in scoring the constructed-response items. The training sessions were designed to help representatives of national centers, who would then be responsible for training personnel in their own countries to apply the scoring rubrics reliably.

To gather and document information about the within-country agreement among scorers, TIMSS arranged to have systematic sub-samples of at least 200 students' responses to each item scored independently by two scorers. Scoring reliability within countries was high – the percentage of exact agreement for score points, on average, across countries, was 98 percent at both fourth grade and eighth grades. Country-by-country results are provided in the *TIMSS 2007 Technical Report*.

While the double scoring of a sample of the student test booklets provided a measure of the consistency with which the constructed-response questions were scored within each country, TIMSS also took steps to ensure that those constructed-response items from the 2003 assessment that were used in 2007 as part of the trend measurement were scored in the same way in both assessments. In anticipation of this, countries that participated in TIMSS 2003 sent samples of scored student booklets from their 2003 assessment to the IEA Data Processing and Research Center, where they were electronically scanned and incorporated into custom-built presentation software for use in 2007. On average, the software contained about 8,000 student responses for each country. After being trained in using the scoring rubrics for these items, scorers scored half of the student responses, using the scoring software supplied by the DPC. The software then reported on their scoring accuracy for these student responses. Scorers with less than 85 percent exact agreement with the scores assigned to the responses in 2003 were retrained before proceeding. There was a high degree of scoring consistency across assessments, with 97 percent exact agreement, on average internationally, at both grades between the scores awarded in 2003 and

those given by the 2007 scorers. Detailed results for the trend countries are presented in the *TIMSS 2007 Technical Report*.

To monitor the consistency with which the scoring rubrics were applied across countries, TIMSS 2007 collected a sample of 3,600 student responses to 18 constructed-response mathematics items from across the assessment at the fourth grade and a sample of 4,000 responses to 20 items at the eighth grade from the countries that administered TIMSS in English. The set of fourth grade student responses was then sent to each TIMSS participant at the fourth grade that had scorers proficient in English, and all responses in the set were scored independently by two of these scorers. Similarly, the set of eighth grade student responses was sent to eighth grade participants to be independently scored by two English-proficient scorers. Agreement across countries was defined in terms of the percentage of these comparisons that were in exact agreement and was generally high—95 percent at fourth grade and 91 percent at eighth grade. Details may be found in the *TIMSS 2007 Technical Report*.

### Test Reliability

As an indication of the reliability of the measurement of student achievement, TIMSS calculated a test reliability coefficient for each country. This coefficient is the median KR-20 reliability across the 14 test booklets. Reliabilities were generally high—0.8 to 0.9 in most countries. The median of the reliability coefficients across all countries was 0.83 at fourth grade 0.88 and at eighth grade. Details may be found in the *TIMSS 2007 Technical Report*.

### Scaling the Achievement Data

The primary approach to reporting the TIMSS 2007 achievement data was based on item response theory (IRT) scaling methods.<sup>6</sup> Student mathematics and science achievement was summarized using 2- and 3-parameter IRT models for dichotomously-scored items (right or wrong), and generalized partial credit models for constructed response items with two available score points.<sup>7</sup> The IRT scaling method produces a score by averaging the responses of each student to the items that he or she took in a way that

6 For a detailed description of the TIMSS 2007 scaling, see Foy, P., Galia, J., & Li, Isaac. (2008). Scaling the TIMSS 2007 mathematics and science assessment data. In J.F. Olson, M.O. Martin, & I.V.S. Mullis (Eds.), *TIMSS 2007 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

7 TIMSS first applied the 2- and 3-parameter scaling model approach in TIMSS 1999 and has used it ever since. However, achievement scaling in TIMSS 1995 was conducted originally using a 1-parameter model. To ensure compatibility with TIMSS 1999 and subsequent cycles of TIMSS, the 1995 fourth and eighth grade data were rescaled using the 2- and 3-parameter approach. This rescaling was described in Yamamoto, K. & Kulik, E. (2000). Scaling methods and procedures for the TIMSS mathematics and science scales. In M.O. Martin, K.D. Gregory, & S. Stemler, (Eds.), *TIMSS 1999 technical report*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. The rescaled 1995 data have been used in all trend analyses.



takes into account the difficulty and discriminating power of each item. The methodology used in TIMSS included refinements enabling reliable scores to be produced even though individual students responded to just one assessment booklet (each booklet contained about one-seventh of the TIMSS achievement items).

To allow more accurate estimation of summary statistics for student subpopulations, the TIMSS scaling made use of plausible-value technology: whereby five separate estimates of each student's score were generated on each scale, based on the student's responses to the items in the student's booklet, and on the student's background characteristics. The five score estimates are known as "plausible values," and the variability between them encapsulates the uncertainty inherent in the score estimation process. The IRT analysis provides a common scale on which performance can be compared across countries. In addition to providing a basis for estimating mean achievement, scale scores permit estimates of how students within countries vary and provide information on percentiles of performance.

Overall mathematics achievement scales were produced at both fourth and eighth grades, as were separate scales for each content domain (number, geometric shapes and measures, and data display at fourth grade and number, algebra, geometry, and data and chance at eighth grade) and each cognitive domain (knowing, applying, and reasoning at each grade level).

In order to measure trends in mathematics achievement across assessments, the TIMSS overall mathematics achievement scales were designed to provide reliable measures on a common scale spanning 1995, 1999, 2003, and 2007. The metric of the scales was established originally with the 1995 assessment. Treating all countries participating in TIMSS 1995 at each grade level equally, the TIMSS scale average across those countries was set to 500, and the standard deviation was set at 100. The average and standard deviation of the scale scores are arbitrary and do not affect scale interpretation. Since the countries varied in size, each country was weighted to contribute equally to the mean and standard deviation of the scale. To preserve the metric of the original 1995 scale for use with the 1999 data,

the 1999 eighth grade assessment was scaled using students from countries that participated in both 1995 and 1999. All mathematics items from 1995 and 1999 were included in this scaling, including about one-third of the items that were used in both assessments and formed the foundation for linking the 1995 and 1999 assessment data. When the link had been established, students from countries that participated in 1999 but not in 1995 were assigned scores on the TIMSS scale.

At the eighth grade, TIMSS developed the 2003 scale in the same way as in 1999, preserving the metric first with students from countries that participated in both 1999 and 2003, and then assigning scores on the basis of the scale to students tested in 2003 but not the earlier assessment. Because the 1995 student data had already been linked to the 1999 data, it was not necessary to include the 1995 data in the 1999–2003 calibration. At fourth grade, because there was no assessment in 1999, the 2003 and 1995 data were linked directly together using students from countries that participated in both assessments, and the students tested in 2003 but not 1995 were assigned scores on the basis of the scale. For TIMSS 2007, the same general procedure was followed at both grades, linking the data first for countries that participated in both 2003 and 2007, and then assigning scores on the basis of the scale to students tested in 2007 but not 2003. Because the TIMSS booklet design changed from 2003 to 2007, TIMSS conducted a bridge study in countries that participated at both years, which involved administering some of the 2003 student booklets to a sub-sample of the 2007 student sample. To account for any effect introduced by the booklet design change, the data collected in the bridging study were included in the 2003–2007 linking analysis. More information is provided in the *TIMSS 2007 Technical Report*.

To facilitate comparisons of countries' relative performance in the content domains (for example, do students perform relatively better in algebra than geometry?) and in the cognitive domains (for example, do students perform relatively better on applying items than on reasoning items?) TIMSS 2007 placed student achievement in each of the content

and cognitive domains on the same scale by aligning its achievement distribution with the achievement distribution of the overall mathematics scale at each grade level. As a result, each content and cognitive scale had the same mean and standard deviation as the overall mathematics scale, eliminating statistically any existing differences in the difficulty of the items on the scales in the interest of making relative comparisons.

To give an indication of the difficulty of the TIMSS mathematics items at the fourth and eighth grades, Exhibit A.9 presents, for each TIMSS participant, the percentage of students responding correctly to each item, averaged across the items for each content and cognitive scale, as well as across mathematics overall. At the fourth grade, the average percent correct in the number (46%) and geometric shapes and measures (47%) domains was similar to the average percent correct overall (48%), while students performed somewhat better on the data display items (54%). Among cognitive domains, however, students performed better, on average, on items in the knowing (51%) and applying (49%) domains and found the items in the reasoning domain more difficult (38%). The fourth grade mathematics items were particularly difficult for Yemen, where the average percent correct across all items was just 14 percent. Because of concerns about the reliability of domain scales based on such low-achieving students, results on the mathematics content and cognitive scales were not reported for Yemen. In addition, students in Kuwait, Morocco, Qatar, and Tunisia had particular difficulty with the mathematics reasoning items, with average percent correct ranging from 10 to 14 percent. Again because of concerns about reliability, results on the mathematics reasoning scale were not reported for these countries.

At the eighth grade, performance in three of the content domains—number (40%), geometry (40%), and data and chance (40%)—was similar to overall mathematics performance (39%), while performance in algebra (36%) was somewhat lower. As at fourth grade, there were differences among cognitive domains, with students having highest performance (46% correct, on average) on the knowing domain items, next highest on the



**Exhibit A.9 Average Percent Correct in the Mathematics Content and Cognitive Domains**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Country	Average Percent Correct						
	Mathematics	Mathematics Content Domains			Mathematics Cognitive Domains		
		Number	Geometric Shapes and Measures	Data Display	Knowing	Applying	Reasoning
Algeria	27 (0.8)	27 (0.8)	27 (0.7)	26 (0.9)	33 (0.8)	26 (0.8)	19 (0.7)
Armenia	51 (1.0)	55 (1.0)	48 (1.1)	47 (1.1)	58 (1.1)	51 (1.0)	40 (1.0)
Australia	55 (0.8)	49 (0.8)	59 (0.8)	69 (1.0)	58 (0.8)	59 (0.8)	45 (0.9)
Austria	52 (0.5)	49 (0.5)	52 (0.5)	61 (0.6)	56 (0.5)	53 (0.5)	42 (0.6)
Chinese Taipei	69 (0.4)	70 (0.4)	64 (0.5)	79 (0.5)	74 (0.4)	70 (0.4)	60 (0.5)
Colombia	23 (0.7)	22 (0.6)	22 (0.8)	27 (1.2)	27 (0.7)	23 (0.8)	16 (0.6)
Czech Republic	47 (0.7)	44 (0.7)	48 (0.7)	56 (0.9)	49 (0.6)	50 (0.7)	39 (0.8)
Denmark	57 (0.7)	51 (0.7)	60 (0.6)	68 (0.9)	59 (0.6)	60 (0.7)	47 (0.7)
El Salvador	20 (0.4)	19 (0.3)	21 (0.5)	26 (0.8)	23 (0.4)	21 (0.5)	15 (0.4)
England	61 (0.7)	57 (0.8)	63 (0.7)	73 (0.7)	65 (0.7)	64 (0.7)	50 (0.8)
Georgia	38 (0.9)	41 (0.9)	34 (0.9)	36 (1.1)	44 (0.9)	39 (0.9)	27 (0.9)
Germany	57 (0.5)	54 (0.5)	57 (0.6)	68 (0.7)	59 (0.5)	61 (0.6)	48 (0.6)
Hong Kong SAR	77 (0.7)	75 (0.8)	76 (0.7)	84 (0.6)	81 (0.6)	79 (0.7)	66 (0.9)
Hungary	54 (0.8)	53 (0.8)	54 (0.8)	60 (1.1)	59 (0.8)	55 (0.8)	45 (1.0)
Iran, Islamic Rep. of	30 (0.6)	28 (0.7)	34 (0.6)	32 (0.8)	36 (0.7)	31 (0.7)	21 (0.6)
Italy	53 (0.8)	51 (0.8)	53 (0.8)	60 (0.9)	59 (0.7)	53 (0.8)	43 (0.8)
Japan	67 (0.5)	64 (0.6)	66 (0.5)	81 (0.5)	70 (0.5)	70 (0.5)	59 (0.6)
Kazakhstan	64 (1.7)	64 (1.7)	62 (1.8)	67 (1.7)	69 (1.6)	65 (1.8)	53 (1.7)
Kuwait	20 (0.4)	20 (0.4)	19 (0.3)	21 (0.5)	27 (0.4)	19 (0.4)	11 (0.3)
Latvia	60 (0.6)	58 (0.6)	57 (0.6)	70 (0.6)	62 (0.5)	62 (0.6)	51 (0.7)
Lithuania	58 (0.6)	57 (0.6)	55 (0.6)	68 (0.7)	59 (0.6)	63 (0.6)	49 (0.8)
Morocco	23 (0.7)	22 (0.7)	25 (0.6)	20 (0.9)	28 (0.6)	23 (0.8)	14 (0.7)
Netherlands	59 (0.5)	58 (0.6)	55 (0.6)	72 (0.7)	60 (0.5)	63 (0.6)	49 (0.7)
New Zealand	49 (0.5)	45 (0.6)	50 (0.6)	63 (0.6)	51 (0.6)	52 (0.6)	41 (0.6)
Norway	44 (0.6)	40 (0.6)	46 (0.7)	55 (0.8)	46 (0.6)	47 (0.7)	37 (0.7)
Qatar	18 (0.1)	17 (0.1)	17 (0.2)	19 (0.3)	23 (0.2)	17 (0.2)	10 (0.1)
Russian Federation	62 (1.1)	61 (1.0)	60 (1.1)	67 (1.4)	65 (1.0)	64 (1.2)	53 (1.3)
Scotland	50 (0.6)	45 (0.6)	52 (0.6)	64 (0.7)	53 (0.6)	53 (0.6)	39 (0.7)
Singapore	74 (0.8)	75 (0.9)	70 (0.8)	82 (0.7)	80 (0.7)	76 (0.8)	63 (1.1)
Slovak Republic	50 (0.9)	49 (0.9)	50 (1.0)	57 (1.2)	54 (1.0)	52 (1.0)	41 (0.9)
Slovenia	52 (0.4)	45 (0.4)	56 (0.5)	64 (0.6)	55 (0.4)	54 (0.5)	42 (0.6)
Sweden	51 (0.6)	46 (0.6)	51 (0.6)	68 (0.8)	51 (0.6)	54 (0.6)	45 (0.7)
Tunisia	21 (0.5)	22 (0.5)	21 (0.6)	19 (0.7)	26 (0.7)	21 (0.6)	13 (0.5)
Ukraine	44 (0.6)	45 (0.6)	41 (0.6)	48 (0.9)	49 (0.6)	45 (0.7)	35 (0.7)
United States	59 (0.6)	56 (0.7)	57 (0.7)	72 (0.6)	65 (0.6)	60 (0.6)	46 (0.7)
Yemen	14 (0.4)	15 (0.4)	13 (0.4)	12 (0.5)	18 (0.6)	13 (0.4)	8 (0.3)
<b>International Avg.</b>	<b>48 (0.1)</b>	<b>46 (0.1)</b>	<b>47 (0.1)</b>	<b>54 (0.1)</b>	<b>51 (0.1)</b>	<b>49 (0.1)</b>	<b>38 (0.1)</b>
<b>Benchmarking Participants</b>							
Alberta, Canada	52 (0.7)	46 (0.8)	53 (0.8)	70 (0.8)	53 (0.8)	55 (0.8)	45 (0.8)
British Columbia, Canada	52 (0.7)	47 (0.7)	52 (0.7)	68 (0.7)	54 (0.6)	54 (0.7)	44 (0.7)
Dubai, UAE	39 (0.4)	37 (0.4)	37 (0.5)	48 (0.6)	46 (0.4)	38 (0.4)	29 (0.5)
Massachusetts, US	69 (0.8)	68 (1.0)	67 (1.0)	79 (0.8)	74 (0.8)	71 (0.9)	59 (1.1)
Minnesota, US	65 (1.3)	62 (1.6)	65 (1.2)	76 (1.3)	70 (1.3)	67 (1.3)	52 (1.5)
Ontario, Canada	54 (0.7)	46 (0.8)	58 (0.8)	72 (0.8)	55 (0.8)	58 (0.8)	47 (0.8)
Quebec, Canada	55 (0.8)	52 (0.8)	56 (0.9)	67 (0.9)	59 (0.8)	57 (0.8)	46 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

**Exhibit A.9 Average Percent Correct in the Mathematics Content and Cognitive Domains (Continued)**
**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Country	Average Percent Correct							
	Mathematics	Mathematics Content Domains				Mathematics Cognitive Domains		
		Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Algeria	23 (0.2)	26 (0.3)	18 (0.3)	30 (0.4)	21 (0.3)	26 (0.3)	28 (0.3)	12 (0.2)
Armenia	47 (0.9)	49 (0.9)	53 (0.8)	47 (1.2)	33 (1.0)	56 (0.8)	47 (0.9)	32 (1.1)
Australia	47 (0.9)	50 (1.0)	38 (1.1)	46 (1.0)	57 (0.8)	53 (0.9)	48 (1.0)	37 (1.0)
Bahrain	28 (0.2)	26 (0.3)	26 (0.4)	30 (0.3)	30 (0.4)	33 (0.3)	28 (0.2)	19 (0.4)
Bosnia and Herzegovina	38 (0.6)	38 (0.6)	39 (0.7)	37 (0.7)	36 (0.6)	50 (0.7)	35 (0.5)	24 (0.6)
Botswana	22 (0.3)	23 (0.4)	22 (0.3)	19 (0.3)	24 (0.4)	29 (0.4)	21 (0.2)	13 (0.3)
Bulgaria	41 (1.0)	41 (1.0)	42 (1.1)	43 (1.0)	38 (1.0)	51 (1.2)	41 (1.0)	28 (1.0)
Chinese Taipei	71 (1.0)	70 (0.9)	73 (1.1)	73 (0.9)	68 (0.9)	76 (0.9)	71 (1.0)	62 (1.1)
Colombia	24 (0.5)	23 (0.6)	22 (0.5)	22 (0.6)	27 (0.8)	27 (0.5)	24 (0.5)	18 (0.5)
Cyprus	40 (0.4)	41 (0.4)	38 (0.5)	40 (0.5)	41 (0.4)	47 (0.4)	41 (0.4)	28 (0.5)
Czech Republic	49 (0.6)	53 (0.6)	41 (0.7)	49 (0.7)	54 (0.7)	57 (0.6)	49 (0.6)	37 (0.7)
Egypt	28 (0.5)	28 (0.5)	27 (0.6)	31 (0.6)	25 (0.4)	34 (0.6)	28 (0.5)	17 (0.4)
El Salvador	19 (0.3)	21 (0.5)	17 (0.3)	18 (0.4)	21 (0.5)	23 (0.5)	19 (0.3)	12 (0.3)
England	52 (1.2)	52 (1.2)	44 (1.2)	53 (1.2)	63 (1.3)	59 (1.1)	53 (1.3)	42 (1.3)
Georgia	30 (0.9)	32 (0.9)	31 (1.2)	32 (1.0)	25 (0.6)	40 (1.2)	29 (0.8)	18 (0.7)
Ghana	18 (0.4)	17 (0.5)	20 (0.5)	17 (0.4)	17 (0.4)	24 (0.5)	17 (0.4)	10 (0.3)
Hong Kong SAR	66 (1.3)	68 (1.4)	64 (1.4)	68 (1.4)	64 (1.3)	74 (1.3)	66 (1.4)	53 (1.5)
Hungary	53 (0.8)	55 (0.9)	47 (0.9)	53 (0.9)	57 (0.8)	61 (0.9)	52 (0.9)	41 (0.9)
Indonesia	27 (0.6)	29 (0.7)	25 (0.7)	28 (0.7)	28 (0.6)	34 (0.8)	28 (0.7)	17 (0.5)
Iran, Islamic Rep. of	28 (0.7)	27 (0.8)	26 (0.8)	32 (0.9)	29 (0.7)	34 (0.8)	28 (0.8)	20 (0.7)
Israel	41 (0.8)	43 (0.8)	39 (0.9)	36 (0.8)	44 (0.9)	50 (0.8)	40 (0.8)	28 (0.9)
Italy	43 (0.7)	45 (0.7)	36 (0.8)	47 (0.9)	49 (0.8)	50 (0.8)	44 (0.7)	32 (0.8)
Japan	66 (0.5)	63 (0.5)	62 (0.6)	69 (0.5)	71 (0.5)	71 (0.5)	65 (0.5)	57 (0.6)
Jordan	34 (0.7)	33 (0.7)	35 (0.8)	35 (0.8)	33 (0.7)	41 (0.9)	33 (0.7)	24 (0.6)
Korea, Rep. of	71 (0.5)	71 (0.6)	70 (0.6)	72 (0.5)	73 (0.5)	78 (0.5)	72 (0.6)	60 (0.6)
Kuwait	21 (0.3)	21 (0.3)	19 (0.3)	25 (0.4)	21 (0.4)	27 (0.3)	22 (0.3)	12 (0.3)
Lebanon	36 (0.8)	38 (0.9)	37 (0.9)	39 (0.9)	29 (0.9)	46 (1.0)	35 (0.9)	23 (0.7)
Lithuania	49 (0.6)	52 (0.6)	42 (0.7)	51 (0.7)	56 (0.6)	58 (0.7)	51 (0.6)	34 (0.6)
Malaysia	42 (1.2)	48 (1.2)	34 (1.1)	43 (1.4)	42 (1.0)	50 (1.3)	43 (1.2)	28 (1.0)
Malta	46 (0.2)	51 (0.3)	39 (0.3)	48 (0.3)	49 (0.4)	55 (0.3)	47 (0.3)	32 (0.4)
Norway	40 (0.5)	45 (0.5)	27 (0.5)	40 (0.5)	52 (0.7)	44 (0.5)	42 (0.5)	30 (0.6)
Oman	25 (0.4)	23 (0.4)	24 (0.5)	27 (0.5)	26 (0.5)	30 (0.5)	24 (0.4)	18 (0.4)
Palestinian Nat'l Auth.	25 (0.5)	25 (0.6)	23 (0.5)	28 (0.5)	24 (0.4)	30 (0.6)	25 (0.5)	17 (0.4)
Qatar	18 (0.1)	20 (0.2)	16 (0.2)	19 (0.2)	17 (0.2)	23 (0.2)	19 (0.2)	10 (0.2)
Romania	40 (0.9)	40 (0.9)	42 (1.0)	42 (0.9)	35 (0.8)	49 (1.0)	40 (0.9)	27 (0.8)
Russian Federation	51 (1.0)	52 (0.9)	51 (1.1)	51 (1.2)	47 (0.9)	61 (1.0)	51 (1.1)	36 (0.9)
Saudi Arabia	18 (0.2)	17 (0.3)	17 (0.3)	22 (0.3)	19 (0.3)	21 (0.3)	20 (0.3)	12 (0.2)
Scotland	45 (0.9)	47 (0.9)	37 (1.0)	46 (0.9)	55 (1.0)	52 (0.9)	45 (0.9)	35 (1.0)
Serbia	45 (0.7)	45 (0.7)	46 (0.9)	46 (0.9)	41 (0.8)	56 (0.8)	44 (0.8)	31 (0.8)
Singapore	70 (0.9)	74 (0.9)	67 (1.1)	70 (1.0)	70 (0.9)	76 (0.9)	72 (1.0)	59 (1.1)
Slovenia	48 (0.5)	50 (0.6)	42 (0.7)	48 (0.6)	53 (0.6)	56 (0.6)	49 (0.6)	36 (0.7)
Sweden	46 (0.5)	51 (0.5)	34 (0.6)	43 (0.6)	57 (0.8)	51 (0.5)	47 (0.6)	35 (0.7)
Syrian Arab Republic	26 (0.6)	25 (0.6)	26 (0.7)	31 (0.7)	25 (0.5)	32 (0.7)	28 (0.6)	16 (0.5)
Thailand	36 (1.1)	38 (1.2)	31 (1.2)	37 (1.2)	38 (0.9)	41 (1.2)	36 (1.1)	27 (1.1)
Tunisia	30 (0.5)	32 (0.5)	26 (0.6)	32 (0.5)	28 (0.5)	36 (0.6)	31 (0.5)	19 (0.4)
Turkey	35 (0.9)	34 (0.9)	34 (1.1)	33 (1.0)	38 (0.9)	43 (1.0)	33 (0.9)	25 (0.9)
Ukraine	40 (0.7)	40 (0.8)	38 (0.8)	41 (0.8)	40 (0.8)	49 (0.8)	40 (0.8)	25 (0.7)
United States	50 (0.7)	54 (0.7)	45 (0.8)	44 (0.7)	59 (0.8)	61 (0.7)	49 (0.8)	37 (0.7)
‡ Morocco	24 (0.5)	25 (0.6)	22 (0.5)	28 (0.5)	23 (0.7)	28 (0.6)	26 (0.5)	16 (0.4)
International Avg.	39 (0.1)	40 (0.1)	36 (0.1)	40 (0.1)	40 (0.1)	46 (0.1)	39 (0.1)	28 (0.1)
<b>Benchmarking Participants</b>								
Basque Country, Spain	47 (0.7)	52 (0.8)	41 (0.9)	43 (0.8)	52 (0.8)	56 (0.8)	46 (0.7)	35 (1.0)
British Columbia, Canada	50 (0.8)	56 (0.9)	42 (0.9)	46 (0.9)	59 (0.8)	58 (0.8)	51 (0.8)	39 (0.9)
Dubai, UAE	40 (0.5)	41 (0.6)	40 (0.6)	37 (0.6)	41 (0.7)	49 (0.6)	39 (0.6)	29 (0.5)
Massachusetts, US	60 (1.2)	63 (1.3)	56 (1.4)	55 (1.3)	68 (1.2)	69 (1.2)	59 (1.2)	49 (1.4)
Minnesota, US	57 (1.2)	61 (1.3)	49 (1.4)	51 (1.2)	67 (1.1)	66 (1.1)	56 (1.3)	42 (1.1)
Ontario, Canada	53 (0.9)	57 (1.0)	43 (0.9)	51 (1.1)	62 (1.0)	59 (0.9)	53 (0.9)	43 (1.0)
Quebec, Canada	55 (0.9)	59 (0.9)	47 (0.9)	55 (0.9)	60 (0.9)	62 (0.8)	56 (0.9)	42 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.7).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

applying items (39%), and lowest performance (28%) on the items in the reasoning domain. Students in a number of countries, including Algeria, Botswana, El Salvador, Ghana, Kuwait, Qatar, and Saudi Arabia, had particular difficulty with the mathematics reasoning items, with average percent correct ranging from 10 to 13 percent. Because of concerns about reliability, results on the mathematics reasoning scale were not reported for these countries.

### Scale Anchoring Analysis

For the scale anchoring analysis, the students' achievement results from all the participating countries were pooled, so that the benchmark descriptions refer to all students achieving at that level. Thus, in determining performance in relation to the benchmarks, it does not matter what country a student is from, only how he or she performed on the test. Considering students' mathematics achievement scores, criteria were applied to identify the sets of items that students reaching each international benchmark were likely to answer correctly and that those at the next lower benchmark were unlikely to answer correctly.

For example, a multiple-choice item anchored at the Advanced International Benchmark if at least 65 percent of students scoring at 625 answered the item correctly and fewer than 50 percent of students scoring at the High International Benchmark (550) answered correctly. Similarly, a multiple-choice item anchored at the High International Benchmark if at least 65 percent of students scoring at 550 answered the item correctly and fewer than 50 percent of students scoring at the Intermediate International Benchmark (475) answered it correctly. A multiple-choice item anchored at the Intermediate International Benchmark if at least 65 percent of students scoring at 475 answered correctly and fewer than 50 percent of students scoring at the Low Benchmark (400) answered it correctly. A multiple-choice item anchored at the Low Benchmark if at least 65 percent of students scoring at 400 answered correctly. Since constructed-response questions nearly eliminate guessing, the criterion for the constructed-response items

was simply 50 percent at the particular benchmark. Also, the analysis was conducted based on the percentage of students receiving full credit.

The sets of items identified by the scale anchoring analysis represented the accomplishments of students reaching each successively higher benchmark, and were used by the TIMSS 2007 Science and Mathematics Item Review Committee (SMIRC) and the TIMSS 2007 Mathematics and Science Coordinators to develop the benchmark descriptions. For each benchmark, the work of the panelists involved developing a short description for each anchor item that characterized the content knowledge and skills demonstrated by students answering it successfully. These item-by-item descriptions were then summarized by the SMIRC members to provide the more general statements of achievement at each of the benchmarks. The item-by-item descriptions and further details about the analysis can be found in the *TIMSS 2007 Technical Report*.

The descriptions of achievement at the benchmarks are based solely on student performance on the TIMSS 2007 items and do not purport to be comprehensive. There are undoubtedly other curriculum elements on which students at the various benchmarks would have been successful if they had been included in the assessment. Also, some students scoring below a benchmark may indeed know or understand some of the concepts that characterize a high level. Finally, describing mathematical concepts or familiarity with procedures was more straightforward than describing the cognitive behavior necessary to answer the item correctly. An item may require only simple recall for a student familiar with the item's content, but necessitate problem-solving strategies from a student unfamiliar with the material. The descriptions are based on what the panelists believed to be the way the great majority of students at the fourth or eighth grade could be expected to respond to the item.

### Estimating Standard Errors

Because the statistics presented in this report are estimates of national performance based on samples of students—rather than on the values that could be calculated if every student in every country had answered every question—it is important to have measures for the degree of uncertainty of the estimates. The jackknife procedure was used to estimate the standard error associated with each statistic presented in this report.<sup>8</sup> As well as sampling error, the jackknife standard errors also include an error component due to variation between the five plausible values generated for each student. The use of confidence intervals (based on the standard errors) provides a way to make inferences about the population means and proportions in a manner that reflects the uncertainty associated with the sample estimates. An estimated sample statistic plus or minus two standard errors represents a 95 percent confidence interval for the corresponding population result.

8 Procedures for computing jackknifed standard errors are presented in the scaling chapter by Foy, Galia, & Li in the *TIMSS 2007 Technical Report*.



# Appendix B

*Multiple Comparisons of Average  
Achievement in Mathematics Content  
And Cognitive Domains*

Exhibit B.1: Multiple Comparisons of Average Achievement in Number

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Singapore	Hong Kong SAR	Chinese Taipei	Japan	Kazakhstan	Russian Federation	Latvia	Netherlands	Lithuania	England	United States	Armenia	Germany	Hungary	Denmark	Italy	Austria	Australia	Slovak Republic	Sweden	Slovenia	Czech Republic	Scotland	Ukraine	New Zealand	Georgia	Norway	Iran, Islamic Rep. of	Algeria
Singapore	611 (4.3)																													
Hong Kong SAR	606 (3.8)																													
Chinese Taipei	581 (1.9)	▼	▼																											
Japan	561 (2.2)	▼	▼	▼																										
Kazakhstan	556 (6.6)	▼	▼	▼																										
Russian Federation	546 (4.4)	▼	▼	▼	▼																									
Latvia	536 (2.1)	▼	▼	▼	▼	▼																								
Netherlands	535 (2.2)	▼	▼	▼	▼	▼																								
Lithuania	533 (2.3)	▼	▼	▼	▼	▼																								
England	531 (3.2)	▼	▼	▼	▼	▼																								
United States	524 (2.7)	▼	▼	▼	▼	▼																								
Armenia	522 (4.0)	▼	▼	▼	▼	▼																								
Germany	521 (2.2)	▼	▼	▼	▼	▼																								
Hungary	510 (3.7)	▼	▼	▼	▼	▼																								
Denmark	509 (2.9)	▼	▼	▼	▼	▼																								
Italy	505 (3.2)	▼	▼	▼	▼	▼																								
Austria	502 (2.2)	▼	▼	▼	▼	▼																								
Australia	496 (3.7)	▼	▼	▼	▼	▼																								
Slovak Republic	495 (3.9)	▼	▼	▼	▼	▼																								
Sweden	490 (2.5)	▼	▼	▼	▼	▼																								
Slovenia	485 (1.9)	▼	▼	▼	▼	▼																								
Czech Republic	482 (2.8)	▼	▼	▼	▼	▼																								
Scotland	481 (2.6)	▼	▼	▼	▼	▼																								
Ukraine	480 (2.9)	▼	▼	▼	▼	▼																								
New Zealand	478 (2.7)	▼	▼	▼	▼	▼																								
Georgia	464 (3.8)	▼	▼	▼	▼	▼																								
Norway	461 (2.8)	▼	▼	▼	▼	▼																								
Iran, Islamic Rep. of	398 (3.6)	▼	▼	▼	▼	▼																								
Algeria	391 (5.0)	▼	▼	▼	▼	▼																								
Colombia	360 (4.3)	▼	▼	▼	▼	▼																								
Morocco	353 (4.7)	▼	▼	▼	▼	▼																								
Tunisia	352 (4.5)	▼	▼	▼	▼	▼																								
Kuwait	321 (3.5)	▼	▼	▼	▼	▼																								
El Salvador	317 (3.9)	▼	▼	▼	▼	▼																								
Qatar	292 (1.2)	▼	▼	▼	▼	▼																								
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Benchmarking Participants</b>																														
Massachusetts, US	571 (4.0)	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	546 (6.2)	▼	▼	▼	▼																									
Quebec, Canada	511 (3.0)	▼	▼	▼	▼																									
British Columbia, Canada	493 (2.8)	▼	▼	▼	▼	▼																								
Alberta, Canada	489 (3.3)	▼	▼	▼	▼	▼																								
Ontario, Canada	489 (3.6)	▼	▼	▼	▼	▼																								
Dubai, UAE	444 (2.0)	▼	▼	▼	▼	▼																								

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.



Exhibit B.1: Multiple Comparisons of Average Achievement in Number (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	Morocco	Tunisia	Kuwait	El Salvador	Qatar	Yemen	Benchmarking Participants	Average Scale Score	Country
▶	▶	▶	▶	▶	▶	+	Massachusetts, US	611 (4.3)	Singapore
▶	▶	▶	▶	▶	▶	+	Minnesota, US	606 (3.8)	Hong Kong SAR
▶	▶	▶	▶	▶	▶	+	Quebec, Canada	581 (1.9)	Chinese Taipei
▶	▶	▶	▶	▶	▶	+	British Columbia, Canada	561 (2.2)	Japan
▶	▶	▶	▶	▶	▶	+	Alberta, Canada	556 (6.6)	Kazakhstan
▶	▶	▶	▶	▶	▶	+	Ontario, Canada	546 (4.4)	Russian Federation
▶	▶	▶	▶	▶	▶	+	Dubai, UAE	536 (2.1)	Latvia
▶	▶	▶	▶	▶	▶	+		535 (2.2)	Netherlands
▶	▶	▶	▶	▶	▶	+		533 (2.3)	Lithuania
▶	▶	▶	▶	▶	▶	+		531 (3.2)	England
▶	▶	▶	▶	▶	▶	+		524 (2.7)	United States
▶	▶	▶	▶	▶	▶	+		522 (4.0)	Armenia
▶	▶	▶	▶	▶	▶	+		521 (2.2)	Germany
▶	▶	▶	▶	▶	▶	+		510 (3.7)	Hungary
▶	▶	▶	▶	▶	▶	+		509 (2.9)	Denmark
▶	▶	▶	▶	▶	▶	+		505 (3.2)	Italy
▶	▶	▶	▶	▶	▶	+		502 (2.2)	Austria
▶	▶	▶	▶	▶	▶	+		496 (3.7)	Australia
▶	▶	▶	▶	▶	▶	+		495 (3.9)	Slovak Republic
▶	▶	▶	▶	▶	▶	+		490 (2.5)	Sweden
▶	▶	▶	▶	▶	▶	+		485 (1.9)	Slovenia
▶	▶	▶	▶	▶	▶	+		482 (2.8)	Czech Republic
▶	▶	▶	▶	▶	▶	+		481 (2.6)	Scotland
▶	▶	▶	▶	▶	▶	+		480 (2.9)	Ukraine
▶	▶	▶	▶	▶	▶	+		478 (2.7)	New Zealand
▶	▶	▶	▶	▶	▶	+		464 (3.8)	Georgia
▶	▶	▶	▶	▶	▶	+		461 (2.8)	Norway
▶	▶	▶	▶	▶	▶	+		398 (3.6)	Iran, Islamic Rep. of
▶	▶	▶	▶	▶	▶	+		391 (5.0)	Algeria
			▶	▶	▶	+		360 (4.3)	Colombia
			▶	▶	▶	+		353 (4.7)	Morocco
			▶	▶	▶	+		352 (4.5)	Tunisia
▼	▼	▼				+		321 (3.5)	Kuwait
▼	▼	▼				+		317 (3.9)	El Salvador
▼	▼	▼	▼	▼		+		292 (1.2)	Qatar
+	+	+	+	+	+	+		+	Yemen
<b>Benchmarking Participants</b>									
▶	▶	▶	▶	▶	▶	+		571 (4.0)	Massachusetts, US
▶	▶	▶	▶	▶	▶	+	▼	546 (6.2)	Minnesota, US
▶	▶	▶	▶	▶	▶	+	▼	511 (3.0)	Quebec, Canada
▶	▶	▶	▶	▶	▶	+	▼	493 (2.8)	British Columbia, Canada
▶	▶	▶	▶	▶	▶	+	▼	489 (3.3)	Alberta, Canada
▶	▶	▶	▶	▶	▶	+	▼	489 (3.6)	Ontario, Canada
▶	▶	▶	▶	▶	▶	+	▼	444 (2.0)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▶ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

**Exhibit B.2 Multiple Comparisons of Average Achievement in Geometric Shapes and Measures**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Comparison Countries																														
		Hong Kong SAR	Singapore	Japan	Chinese Taipei	England	Denmark	Kazakhstan	Russian Federation	Australia	Latvia	Germany	Netherlands	United States	Slovenia	Lithuania	Hungary	Italy	Austria	Sweden	Scotland	New Zealand	Slovak Republic	Czech Republic	Norway	Armenia	Ukraine	Iran, Islamic Rep. of	Georgia	Algeria		
Hong Kong SAR	599 (3.1)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Singapore	570 (3.6)	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Japan	566 (2.2)	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Chinese Taipei	556 (2.2)	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
England	548 (2.7)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Denmark	544 (2.6)	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Kazakhstan	542 (7.4)	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Russian Federation	538 (5.1)	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Australia	536 (3.1)	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Latvia	532 (2.6)	▼	▼	▼	▼	▼	▼																									
Germany	528 (2.0)	▼	▼	▼	▼	▼																										
Netherlands	522 (2.3)	▼	▼	▼	▼	▼	▼	▼																								
United States	522 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼																							
Slovenia	522 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼																						
Lithuania	518 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																					
Hungary	510 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																				
Italy	509 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																			
Austria	509 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																		
Sweden	508 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																	
Scotland	503 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																
New Zealand	502 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▼												
Slovak Republic	499 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															
Czech Republic	494 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
Norway	490 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Armenia	483 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												
Ukraine	457 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											
Iran, Islamic Rep. of	429 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										
Georgia	415 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									
Algeria	383 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								
Morocco	365 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							
Colombia	361 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						
Tunisia	334 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
El Salvador	333 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Kuwait	316 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Qatar	296 (1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>Benchmarking Participants</b>																																
Massachusetts, US	564 (4.1)	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Minnesota, US	556 (5.3)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ontario, Canada	530 (3.0)	▼	▼	▼	▼	▼																										
Quebec, Canada	525 (3.2)	▼	▼	▼	▼	▼	▼																									
Alberta, Canada	512 (2.9)	▼	▼	▼	▼	▼	▼	▼																								
British Columbia, Canada	510 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼																							
Dubai, UAE	440 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼																						

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.

**Exhibit B.2 Multiple Comparisons of Average Achievement in Geometric Shapes and Measures (Continued)**

**TIMSS2007**  
Mathematics **4<sup>th</sup>** Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Morocco	Colombia	Tunisia	El Salvador	Kuwait	Qatar	Yemen	Benchmarking Participants	Average Scale Score	Country
▲	▲	▲	▲	▲	▲	+	▼	599 (3.1)	Hong Kong SAR
▲	▲	▲	▲	▲	▲	+	▲	570 (3.6)	Singapore
▲	▲	▲	▲	▲	▲	+		566 (2.2)	Japan
▲	▲	▲	▲	▲	▲	+		556 (2.2)	Chinese Taipei
▲	▲	▲	▲	▲	▲	+	▼	548 (2.7)	England
▲	▲	▲	▲	▲	▲	+	▼	544 (2.6)	Denmark
▲	▲	▲	▲	▲	▲	+	▼	542 (7.4)	Kazakhstan
▲	▲	▲	▲	▲	▲	+	▼	538 (5.1)	Russian Federation
▲	▲	▲	▲	▲	▲	+	▼	536 (3.1)	Australia
▲	▲	▲	▲	▲	▲	+	▼	532 (2.6)	Latvia
▲	▲	▲	▲	▲	▲	+	▼	528 (2.0)	Germany
▲	▲	▲	▲	▲	▲	+	▼	522 (2.3)	Netherlands
▲	▲	▲	▲	▲	▲	+	▼	522 (2.5)	United States
▲	▲	▲	▲	▲	▲	+	▼	522 (1.8)	Slovenia
▲	▲	▲	▲	▲	▲	+	▼	518 (2.4)	Lithuania
▲	▲	▲	▲	▲	▲	+	▼	510 (3.3)	Hungary
▲	▲	▲	▲	▲	▲	+	▼	509 (3.0)	Italy
▲	▲	▲	▲	▲	▲	+	▼	509 (2.4)	Austria
▲	▲	▲	▲	▲	▲	+	▼	508 (2.3)	Sweden
▲	▲	▲	▲	▲	▲	+	▼	503 (2.6)	Scotland
▲	▲	▲	▲	▲	▲	+	▼	502 (2.3)	New Zealand
▲	▲	▲	▲	▲	▲	+	▼	499 (4.3)	Slovak Republic
▲	▲	▲	▲	▲	▲	+	▼	494 (2.8)	Czech Republic
▲	▲	▲	▲	▲	▲	+	▼	490 (3.0)	Norway
▲	▲	▲	▲	▲	▲	+	▼	483 (4.7)	Armenia
▲	▲	▲	▲	▲	▲	+	▼	457 (2.8)	Ukraine
▲	▲	▲	▲	▲	▲	+	▼	429 (3.3)	Iran, Islamic Rep. of
▲	▲	▲	▲	▲	▲	+	▼	415 (4.8)	Georgia
▲	▲	▲	▲	▲	▲	+	▼	383 (4.5)	Algeria
▲	▲	▲	▲	▲	▲	+	▼	365 (4.3)	Morocco
▲	▲	▲	▲	▲	▲	+	▼	361 (4.8)	Colombia
▼	▼		▲	▲	▲	+	▼	334 (4.5)	Tunisia
▼	▼			▲	▲	+	▼	333 (4.3)	El Salvador
▼	▼	▼	▼			+	▼	316 (3.6)	Kuwait
▼	▼			▼		+	▼	296 (1.4)	Qatar
+	+	+	+	+	+	+	+	+	Yemen
▲	▲	▲	▲	▲	▲	+		564 (4.1)	Massachusetts, US
▲	▲	▲	▲	▲	▲	+		556 (5.3)	Minnesota, US
▲	▲	▲	▲	▲	▲	+	▼	530 (3.0)	Ontario, Canada
▲	▲	▲	▲	▲	▲	+	▼	525 (3.2)	Quebec, Canada
▲	▲	▲	▲	▲	▲	+	▼	512 (2.9)	Alberta, Canada
▲	▲	▲	▲	▲	▲	+	▼	510 (2.9)	British Columbia, Canada
▲	▲	▲	▲	▲	▲	+	▼	440 (2.8)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

Exhibit B.3 Multiple Comparisons of Average Achievement in Data Display

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Comparison Countries																													
		Hong Kong SAR	Singapore	Japan	Chinese Taipei	England	United States	Netherlands	Latvia	Australia	Germany	Lithuania	Russian Federation	Sweden	Denmark	Kazakhstan	Slovenia	Scotland	New Zealand	Austria	Italy	Hungary	Czech Republic	Slovak Republic	Norway	Ukraine	Armenia	Georgia	Iran, Islamic Rep. of	El Salvador	
Hong Kong SAR	585 (2.7)																														
Singapore	583 (3.2)																														
Japan	578 (2.8)																														
Chinese Taipei	567 (2.0)	▼	▼	▼																											
England	547 (2.5)	▼	▼	▼	▼																										
United States	543 (2.4)	▼	▼	▼	▼																										
Netherlands	543 (2.3)	▼	▼	▼	▼																										
Latvia	536 (3.0)	▼	▼	▼	▼	▼																									
Australia	534 (3.1)	▼	▼	▼	▼	▼	▼																								
Germany	534 (3.1)	▼	▼	▼	▼	▼	▼	▼																							
Lithuania	530 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼																						
Russian Federation	530 (4.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼																					
Sweden	529 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																				
Denmark	529 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																			
Kazakhstan	522 (5.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																		
Slovenia	518 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																	
Scotland	516 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																
New Zealand	513 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															
Austria	508 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
Italy	506 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Hungary	504 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												
Czech Republic	493 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											
Slovak Republic	492 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										
Norway	487 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									
Ukraine	462 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								
Armenia	458 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							
Georgia	414 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						
Iran, Islamic Rep. of	400 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
El Salvador	367 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Colombia	363 (5.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Algeria	361 (5.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Qatar	326 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Kuwait	318 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Morocco	316 (6.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Tunisia	307 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<b>Benchmarking Participants</b>																															
Massachusetts, US	571 (4.0)	▼	▼																												
Minnesota, US	557 (4.8)	▼	▼	▼																											
Ontario, Canada	544 (3.4)	▼	▼	▼	▼																										
Alberta, Canada	537 (3.7)	▼	▼	▼	▼	▼																									
British Columbia, Canada	531 (2.8)	▼	▼	▼	▼	▼	▼																								
Quebec, Canada	527 (3.6)	▼	▼	▼	▼	▼	▼	▼																							
Dubai, UAE	461 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼																						

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit B.3 Multiple Comparisons of Average Achievement in Data Display (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	Algeria	Qatar	Kuwait	Morocco	Tunisia	Yemen	Benchmarking Participants	Average Scale Score	Country
▶	▶	▶	▶	▶	▶	+	▶	585 (2.7)	Hong Kong SAR
▶	▶	▶	▶	▶	▶	+	▶	583 (3.2)	Singapore
▶	▶	▶	▶	▶	▶	+	▶	578 (2.8)	Japan
▶	▶	▶	▶	▶	▶	+	▶	567 (2.0)	Chinese Taipei
▶	▶	▶	▶	▶	▶	+	◀	547 (2.5)	England
▶	▶	▶	▶	▶	▶	+	◀	543 (2.4)	United States
▶	▶	▶	▶	▶	▶	+	◀	543 (2.3)	Netherlands
▶	▶	▶	▶	▶	▶	+	◀	536 (3.0)	Latvia
▶	▶	▶	▶	▶	▶	+	◀	534 (3.1)	Australia
▶	▶	▶	▶	▶	▶	+	◀	534 (3.1)	Germany
▶	▶	▶	▶	▶	▶	+	◀	530 (2.9)	Lithuania
▶	▶	▶	▶	▶	▶	+	◀	530 (4.9)	Russian Federation
▶	▶	▶	▶	▶	▶	+	◀	529 (2.7)	Sweden
▶	▶	▶	▶	▶	▶	+	◀	529 (3.4)	Denmark
▶	▶	▶	▶	▶	▶	+	◀	522 (5.8)	Kazakhstan
▶	▶	▶	▶	▶	▶	+	◀	518 (2.5)	Slovenia
▶	▶	▶	▶	▶	▶	+	◀	516 (2.2)	Scotland
▶	▶	▶	▶	▶	▶	+	◀	513 (2.6)	New Zealand
▶	▶	▶	▶	▶	▶	+	◀	508 (2.6)	Austria
▶	▶	▶	▶	▶	▶	+	◀	506 (3.4)	Italy
▶	▶	▶	▶	▶	▶	+	◀	504 (3.5)	Hungary
▶	▶	▶	▶	▶	▶	+	◀	493 (3.3)	Czech Republic
▶	▶	▶	▶	▶	▶	+	◀	492 (4.2)	Slovak Republic
▶	▶	▶	▶	▶	▶	+	◀	487 (2.6)	Norway
▶	▶	▶	▶	▶	▶	+	◀	462 (3.2)	Ukraine
▶	▶	▶	▶	▶	▶	+	◀	458 (4.3)	Armenia
▶	▶	▶	▶	▶	▶	+	◀	414 (4.6)	Georgia
▶	▶	▶	▶	▶	▶	+	◀	400 (4.0)	Iran, Islamic Rep. of
▶	▶	▶	▶	▶	▶	+	◀	367 (3.5)	El Salvador
▶	▶	▶	▶	▶	▶	+	◀	363 (5.9)	Colombia
▶	▶	▶	▶	▶	▶	+	◀	361 (5.2)	Algeria
◀	◀	▶	▶	▶	▶	+	◀	326 (1.6)	Qatar
◀	◀	▶	▶	▶	▶	+	◀	318 (4.7)	Kuwait
◀	◀	▶	▶	▶	▶	+	◀	316 (6.1)	Morocco
◀	◀	▶	▶	▶	▶	+	◀	307 (4.8)	Tunisia
+	+	+	+	+	+	+	+	+	Yemen
<b>Benchmarking Participants</b>									
▶	▶	▶	▶	▶	▶	+	▶	571 (4.0)	Massachusetts, US
▶	▶	▶	▶	▶	▶	+	◀	557 (4.8)	Minnesota, US
▶	▶	▶	▶	▶	▶	+	◀	544 (3.4)	Ontario, Canada
▶	▶	▶	▶	▶	▶	+	▶	537 (3.7)	Alberta, Canada
▶	▶	▶	▶	▶	▶	+	▶	531 (2.8)	British Columbia, Canada
▶	▶	▶	▶	▶	▶	+	▶	527 (3.6)	Quebec, Canada
▶	▶	▶	▶	▶	▶	+	▶	461 (2.7)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▶ Average achievement significantly higher than comparison country    ◀ Average achievement significantly lower than comparison country

Exhibit B.4 Multiple Comparisons of Average Achievement in Knowing

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Singapore	Hong Kong SAR	Chinese Taipei	Japan	Kazakhstan	England	United States	Russian Federation	Latvia	Netherlands	Lithuania	Armenia	Germany	Italy	Denmark	Hungary	Australia	Austria	Slovenia	Slovak Republic	Scotland	Sweden	New Zealand	Czech Republic	Ukraine	Norway	Georgia	Iran, Islamic Rep. of	Algeria	
Singapore	620 (4.0)																														
Hong Kong SAR	617 (3.5)																														
Chinese Taipei	584 (1.7)	▼	▼																												
Japan	565 (2.1)	▼	▼	▼																											
Kazakhstan	559 (7.3)	▼	▼	▼																											
England	544 (3.6)	▼	▼	▼	▼																										
United States	541 (2.6)	▼	▼	▼	▼	▼																									
Russian Federation	538 (4.5)	▼	▼	▼	▼	▼																									
Latvia	530 (2.2)	▼	▼	▼	▼	▼	▼																								
Netherlands	525 (2.2)	▼	▼	▼	▼	▼	▼	▼																							
Lithuania	520 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼																						
Armenia	518 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼																					
Germany	514 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																				
Italy	514 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																			
Denmark	513 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																		
Hungary	511 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																	
Australia	509 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																
Austria	505 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															
Slovenia	497 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
Slovak Republic	492 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Scotland	489 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												
Sweden	482 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										
New Zealand	482 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									
Czech Republic	473 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								
Ukraine	472 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							
Norway	461 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						
Georgia	450 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Iran, Islamic Rep. of	410 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Algeria	384 (5.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Colombia	360 (5.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Morocco	354 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Tunisia	343 (4.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Kuwait	326 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
El Salvador	312 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Qatar	293 (1.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>Benchmarking Participants</b>																															
Massachusetts, US	581 (4.1)	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Minnesota, US	565 (6.2)	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Quebec, Canada	517 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Ontario, Canada	498 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
British Columbia, Canada	498 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Alberta, Canada	494 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	
Dubai, UAE	457 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit B.4 Multiple Comparisons of Average Achievement in Knowing (Continued)

TIMSS2007 Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	Morocco	Tunisia	Kuwait	El Salvador	Qatar	Yemen	Benchmarking Participants							Average Scale Score	Country
							Massachusetts, US	Minnesota, US	Quebec, Canada	Ontario, Canada	British Columbia, Canada	Alberta, Canada	Dubai, UAE		
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	620 (4.0)	Singapore
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	617 (3.5)	Hong Kong SAR
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	584 (1.7)	Chinese Taipei
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	565 (2.1)	Japan
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	559 (7.3)	Kazakhstan
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	544 (3.6)	England
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	541 (2.6)	United States
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	538 (4.5)	Russian Federation
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	530 (2.2)	Latvia
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	525 (2.2)	Netherlands
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	520 (2.8)	Lithuania
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	518 (4.8)	Armenia
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	514 (2.0)	Germany
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	514 (3.2)	Italy
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	513 (2.7)	Denmark
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	511 (3.4)	Hungary
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	509 (4.2)	Australia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	505 (2.0)	Austria
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	497 (1.8)	Slovenia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	492 (3.9)	Slovak Republic
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	489 (2.6)	Scotland
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	482 (2.5)	Sweden
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	482 (2.5)	New Zealand
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	473 (2.4)	Czech Republic
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	472 (3.0)	Ukraine
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	461 (2.9)	Norway
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	450 (4.0)	Georgia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	410 (3.6)	Iran, Islamic Rep. of
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	384 (5.4)	Algeria
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	360 (5.2)	Colombia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	354 (4.8)	Morocco
▼	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	343 (4.9)	Tunisia
▼	▼	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	326 (4.6)	Kuwait
▼	▼	▼	▼	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	312 (4.1)	El Salvador
▼	▼	▼	▼	▼	▲	+	▼	▼	▼	▼	▼	▼	▲	293 (1.3)	Qatar
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Yemen
<b>Benchmarking Participants</b>															
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	581 (4.1)	Massachusetts, US
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	565 (6.2)	Minnesota, US
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	517 (3.2)	Quebec, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	498 (3.2)	Ontario, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	498 (2.5)	British Columbia, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	494 (3.1)	Alberta, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	457 (2.1)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

Exhibit B.5 Multiple Comparisons of Average Achievement in Applying

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Hong Kong SAR	Singapore	Chinese Taipei	Japan	Kazakhstan	Russian Federation	England	Latvia	Netherlands	Lithuania	Germany	Denmark	United States	Australia	Sweden	Hungary	Austria	Slovenia	Italy	Scotland	Slovak Republic	Czech Republic	New Zealand	Armenia	Norway	Ukraine	Georgia	Iran, Islamic Rep. of	Algeria
Hong Kong SAR	599 (3.4)																													
Singapore	590 (3.7)	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	569 (1.7)	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	566 (2.0)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Kazakhstan	547 (7.2)	▼	▼	▼	▼																									
Russian Federation	547 (4.8)	▼	▼	▼	▼																									
England	540 (3.1)	▼	▼	▼	▼																									
Latvia	540 (2.5)	▼	▼	▼	▼																									
Netherlands	540 (2.0)	▼	▼	▼	▼																									
Lithuania	539 (2.4)	▼	▼	▼	▼																									
Germany	531 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Denmark	528 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
United States	524 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Australia	523 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Sweden	508 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Hungary	507 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Austria	507 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Slovenia	504 (1.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Italy	501 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Scotland	500 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Slovak Republic	498 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Czech Republic	496 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
New Zealand	495 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Armenia	493 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Norway	479 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ukraine	466 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Georgia	433 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iran, Islamic Rep. of	405 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Algeria	376 (5.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Colombia	357 (5.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	346 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
El Salvador	339 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	329 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kuwait	305 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	296 (1.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Benchmarking Participants</b>																														
Massachusetts, US	566 (3.5)	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	548 (5.5)	▼	▼	▼	▼																									
Quebec, Canada	517 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ontario, Canada	515 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Alberta, Canada	505 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
British Columbia, Canada	505 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Dubai, UAE	441 (1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.



Exhibit B.5 Multiple Comparisons of Average Achievement in Applying (Continued)

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	Morocco	El Salvador	Tunisia	Kuwait	Qatar	Yemen	Benchmarking Participants							Average Scale Score	Country
							Massachusetts, US	Minnesota, US	Quebec, Canada	Ontario, Canada	Alberta, Canada	British Columbia, Canada	Dubai, UAE		
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	599 (3.4)	Hong Kong SAR
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	590 (3.7)	Singapore
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	569 (1.7)	Chinese Taipei
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	566 (2.0)	Japan
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	547 (7.2)	Kazakhstan
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	547 (4.8)	Russian Federation
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	540 (3.1)	England
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	540 (2.5)	Latvia
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	540 (2.0)	Netherlands
▲	▲	▲	▲	▲	▲	+	▼	▲	▲	▲	▲	▲	▲	539 (2.4)	Lithuania
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	531 (2.2)	Germany
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	528 (2.5)	Denmark
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	524 (2.6)	United States
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	523 (3.5)	Australia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	508 (2.2)	Sweden
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	507 (3.5)	Hungary
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	507 (1.8)	Austria
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	504 (1.9)	Slovenia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	501 (2.9)	Italy
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	500 (2.4)	Scotland
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▲	▲	▲	498 (4.0)	Slovak Republic
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	496 (2.7)	Czech Republic
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	495 (2.3)	New Zealand
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	493 (4.1)	Armenia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	479 (2.8)	Norway
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	466 (3.1)	Ukraine
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	433 (4.5)	Georgia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	405 (3.7)	Iran, Islamic Rep. of
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	376 (5.2)	Algeria
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	357 (5.1)	Colombia
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	346 (4.7)	Morocco
▼	▼	▼	▼	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	339 (3.7)	El Salvador
▼	▼	▼	▼	▲	▲	+	▼	▼	▼	▼	▼	▼	▲	329 (4.8)	Tunisia
▼	▼	▼	▼	▼	▲	+	▼	▼	▼	▼	▼	▼	▲	305 (4.1)	Kuwait
▼	▼	▼	▼	▼	▲	+	▼	▼	▼	▼	▼	▼	▲	296 (1.2)	Qatar
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Yemen
<b>Benchmarking Participants</b>															
▲	▲	▲	▲	▲	▲	+	▲	▲	▲	▲	▲	▲	▲	566 (3.5)	Massachusetts, US
▼	▼	▼	▼	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	548 (5.5)	Minnesota, US
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	517 (2.8)	Quebec, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▲	▲	▲	▲	▲	515 (3.1)	Ontario, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	505 (2.9)	Alberta, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▲	▲	▲	▲	505 (2.6)	British Columbia, Canada
▲	▲	▲	▲	▲	▲	+	▼	▼	▼	▼	▼	▲	▲	441 (1.7)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

Exhibit B.6 Multiple Comparisons of Average Achievement in Reasoning

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Hong Kong SAR	Singapore	Chinese Taipei	Japan	Russian Federation	Kazakhstan	England	Latvia	Netherlands	Germany	Lithuania	Denmark	United States	Sweden	Australia	Italy	Hungary	Austria	Slovenia	New Zealand	Slovak Republic	Scotland	Czech Republic	Armenia	Norway	Ukraine	Georgia	Iran, Islamic Rep. of	Algeria
Hong Kong SAR	589 (3.5)																													
Singapore	578 (3.8)	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chinese Taipei	566 (1.9)	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Japan	563 (2.1)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Russian Federation	540 (4.8)	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Kazakhstan	539 (6.1)	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
England	537 (3.1)	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Latvia	537 (2.5)	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Netherlands	534 (2.4)	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Germany	528 (2.5)	▼	▼	▼	▼	▼		▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lithuania	526 (2.5)	▼	▼	▼	▼	▼		▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Denmark	524 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United States	523 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Sweden	519 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Australia	516 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Italy	509 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																	
Hungary	509 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																
Austria	506 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															
Slovenia	505 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
New Zealand	503 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
Slovak Republic	499 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Scotland	497 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												
Czech Republic	493 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											
Armenia	489 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										
Norway	489 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									
Ukraine	474 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								
Georgia	437 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							
Iran, Islamic Rep. of	410 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						
Algeria	387 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Colombia	372 (4.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
El Salvador	356 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Morocco	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Tunisia	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Kuwait	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Qatar	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Yemen	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>Benchmarking Participants</b>																														
Massachusetts, US	565 (3.2)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Minnesota, US	543 (5.1)	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ontario, Canada	526 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Quebec, Canada	523 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Alberta, Canada	519 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
British Columbia, Canada	516 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Dubai, UAE	446 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone. A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit B.6 Multiple Comparisons of Average Achievement in Reasoning (Continued)

TIMSS2007 Mathematics 4<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Colombia	El Salvador	Morocco	Tunisia	Kuwait	Qatar	Yemen	Benchmarking Participants							Average Scale Score	Country
							Massachusetts, US	Minnesota, US	Ontario, Canada	Quebec, Canada	Alberta, Canada	British Columbia, Canada	Dubai, UAE		
▲	▲	+	+	+	+	+	▲	▲	▲	▲	▲	▲	▲	589 (3.5)	Hong Kong SAR
▲	▲	+	+	+	+	+	▲	▲	▲	▲	▲	▲	▲	578 (3.8)	Singapore
▲	▲	+	+	+	+	+	▲	▲	▲	▲	▲	▲	▲	566 (1.9)	Chinese Taipei
▲	▲	+	+	+	+	+	▲	▲	▲	▲	▲	▲	▲	563 (2.1)	Japan
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	540 (4.8)	Russian Federation
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	539 (6.1)	Kazakhstan
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	537 (3.1)	England
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	537 (2.5)	Latvia
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	534 (2.4)	Netherlands
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	528 (2.5)	Germany
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	526 (2.5)	Lithuania
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	524 (2.1)	Denmark
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	523 (2.2)	United States
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	519 (2.5)	Sweden
▲	▲	+	+	+	+	+	▼	▼	▼	▲	▲	▲	▲	516 (3.4)	Australia
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▲	▲	▲	509 (3.1)	Italy
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▲	▲	509 (3.8)	Hungary
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	506 (2.1)	Austria
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	505 (2.1)	Slovenia
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	503 (2.8)	New Zealand
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	499 (4.0)	Slovak Republic
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	497 (2.2)	Scotland
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	493 (3.4)	Czech Republic
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	489 (4.7)	Armenia
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	489 (2.7)	Norway
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	474 (3.2)	Ukraine
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▲	437 (4.2)	Georgia
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▼	410 (3.8)	Iran, Islamic Rep. of
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▼	387 (4.7)	Algeria
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▼	372 (4.9)	Colombia
▼	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▼	356 (4.0)	El Salvador
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Morocco
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Tunisia
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Kuwait
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Qatar
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Yemen
<b>Benchmarking Participants</b>															
▲	▲	+	+	+	+	+	▲	▲	▲	▲	▲	▲	▲	565 (3.2)	Massachusetts, US
▲	▲	+	+	+	+	+	▼	▲	▲	▲	▲	▲	▲	543 (5.1)	Minnesota, US
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	526 (2.6)	Ontario, Canada
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	523 (3.0)	Quebec, Canada
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	519 (3.1)	Alberta, Canada
▲	▲	+	+	+	+	+	▼	▼	▲	▲	▲	▲	▲	516 (2.3)	British Columbia, Canada
▲	▲	+	+	+	+	+	▼	▼	▼	▼	▼	▼	▼	446 (2.9)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

Exhibit B.7 Multiple Comparisons of Average Achievement in Number

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Singapore	Korea, Rep. of	Chinese Taipei	Hong Kong SAR	Japan	Hungary	Czech Republic	United States	England	Sweden	Russian Federation	Lithuania	Australia	Slovenia	Malta	Armenia	Malaysia	Scotland	Norway	Serbia	Italy	Israel	Cyprus	Ukraine	Bulgaria	Romania	Lebanon	Bosnia and Herzegovina	Thailand
Singapore	597 (3.5)		▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	
Korea, Rep. of	583 (2.4)	▼			▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	
Chinese Taipei	577 (4.2)	▼				▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	
Hong Kong SAR	567 (5.6)	▼	▼			▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	
Japan	551 (2.3)	▼	▼	▼			▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	
Hungary	517 (3.6)	▼	▼	▼	▼						▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Czech Republic	511 (2.5)	▼	▼	▼	▼	▼									▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
United States	510 (2.7)	▼	▼	▼	▼	▼																								
England	510 (5.0)	▼	▼	▼	▼	▼									▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Sweden	507 (1.8)	▼	▼	▼	▼	▼	▼										▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Russian Federation	507 (3.8)	▼	▼	▼	▼	▼	▼										▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Lithuania	506 (2.7)	▼	▼	▼	▼	▼	▼										▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Australia	503 (3.7)	▼	▼	▼	▼	▼	▼																							
Slovenia	502 (2.3)	▼	▼	▼	▼	▼	▼	▼								▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		
Malta	496 (1.3)	▼	▼	▼	▼	▼	▼	▼	▼											▶	▶	▶	▶	▶	▶	▶	▶	▶		
Armenia	492 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼																				
Malaysia	491 (5.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																			
Scotland	489 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																		
Norway	488 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																	
Serbia	478 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼																
Italy	478 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															
Israel	469 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														
Cyprus	464 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													
Ukraine	460 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												
Bulgaria	458 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											
Romania	457 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										
Lebanon	454 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									
Bosnia and Herzegovina	451 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								
Thailand	444 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							
Turkey	429 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						
Tunisia	425 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					
Georgia	421 (5.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Jordan	416 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				
Algeria	403 (1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Indonesia	399 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Iran, Islamic Rep. of	395 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Syrian Arab Republic	393 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Egypt	393 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Morocco	389 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Bahrain	388 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Colombia	369 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Botswana	366 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Palestinian Nat'l Auth.	366 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Oman	363 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
El Salvador	355 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Kuwait	347 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Qatar	334 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Ghana	310 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
Saudi Arabia	309 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			
<b>Benchmarking Participants</b>																														
Massachusetts, US	548 (5.2)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
Minnesota, US	537 (4.3)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
Quebec, Canada	534 (3.4)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
Ontario, Canada	525 (4.0)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
British Columbia, Canada	520 (3.2)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
Basque Country, Spain	509 (2.9)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			
Dubai, UAE	458 (3.2)	▼	▼	▼	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶			

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.



Exhibit B.8 Multiple Comparisons of Average Achievement in Algebra

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Chinese Taipei	Korea, Rep. of	Singapore	Hong Kong SAR	Japan	Armenia	Russian Federation	Hungary	United States	Serbia	England	Slovenia	Czech Republic	Lithuania	Romania	Bulgaria	Bosnia and Herzegovina	Malta	Australia	Israel	Cyprus	Scotland	Lebanon	Ukraine	Italy	Sweden	Malaysia	Jordan	Turkey	
Chinese Taipei	617 (5.4)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Korea, Rep. of	596 (3.0)	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Singapore	579 (3.7)	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hong Kong SAR	565 (5.6)	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Japan	559 (2.5)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Armenia	532 (2.5)	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Russian Federation	518 (4.5)	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hungary	503 (3.6)	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United States	501 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Serbia	500 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
England	492 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Slovenia	488 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Czech Republic	484 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lithuania	483 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Romania	478 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Bulgaria	476 (5.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Bosnia and Herzegovina	475 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Malta	473 (1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Australia	471 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Israel	470 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	
Cyprus	468 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	
Scotland	467 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	
Lebanon	465 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	
Ukraine	464 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	
Italy	460 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	
Sweden	456 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	
Malaysia	454 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	
Jordan	448 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲
Turkey	440 (5.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Thailand	433 (5.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Norway	425 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	423 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Georgia	421 (6.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Egypt	409 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iran, Islamic Rep. of	408 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Syrian Arab Republic	406 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	405 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bahrain	403 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana	394 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Oman	391 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Colombia	390 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Palestinian Nat'l Auth.	382 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	362 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ghana	358 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kuwait	354 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Algeria	349 (2.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	344 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
El Salvador	331 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	312 (1.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
<b>Benchmarking Participants</b>																															
Massachusetts, US	538 (4.8)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	515 (4.7)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec, Canada	505 (3.3)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	490 (3.7)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
British Columbia, Canada	489 (3.1)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Basque Country, Spain	485 (3.1)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Dubai, UAE	475 (2.4)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.

Exhibit B.8 Multiple Comparisons of Average Achievement in Algebra (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

	Thailand	Norway	Tunisia	Georgia	Egypt	Iran, Islamic Rep. of	Syrian Arab Republic	Indonesia	Bahrain	Botswana	Oman	Colombia	Palestinian Nat'l Auth.	Morocco	Ghana	Kuwait	Algeria	Saudi Arabia	El Salvador	Qatar	Benchmarking Participants	Average Scale Score	Country		
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	617 (5.4)	Chinese Taipei	
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	596 (3.0)	Korea, Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	579 (3.7)	Singapore
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	565 (5.6)	Hong Kong SAR
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	559 (2.5)	Japan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	532 (2.5)	Armenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	518 (4.5)	Russian Federation
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	503 (3.6)	Hungary
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	501 (2.7)	United States
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	500 (3.2)	Serbia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	492 (4.6)	England
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	488 (2.4)	Slovenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	484 (2.4)	Czech Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	483 (2.7)	Lithuania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	478 (4.6)	Romania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	476 (5.1)	Bulgaria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	475 (3.2)	Bosnia and Herzegovina
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	473 (1.4)	Malta
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	471 (3.7)	Australia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	470 (3.9)	Israel
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	468 (2.0)	Cyprus
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	467 (3.7)	Scotland
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	465 (3.2)	Lebanon
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	464 (3.9)	Ukraine
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	460 (3.2)	Italy
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	456 (2.4)	Sweden
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	454 (4.3)	Malaysia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	448 (4.1)	Jordan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	440 (5.1)	Turkey
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	440 (5.1)	Thailand
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	433 (5.0)	Thailand
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	425 (2.8)	Norway
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	423 (2.6)	Tunisia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	421 (6.6)	Georgia
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	409 (3.3)	Egypt
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	408 (3.9)	Iran, Islamic Rep. of
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	406 (3.7)	Syrian Arab Republic
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	405 (3.5)	Indonesia
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	403 (1.8)	Bahrain
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	394 (2.2)	Botswana
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	391 (3.2)	Oman
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	390 (3.1)	Colombia
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	382 (3.4)	Palestinian Nat'l Auth.
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	362 (4.0)	Morocco
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	358 (3.6)	Ghana
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	354 (3.0)	Kuwait
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	349 (2.4)	Algeria
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	344 (2.8)	Saudi Arabia
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	331 (3.7)	El Salvador
	▼	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	312 (1.5)	Qatar
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	538 (4.8)	Massachusetts, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	515 (4.7)	Minnesota, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	505 (3.3)	Quebec, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	490 (3.7)	Ontario, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	489 (3.1)	British Columbia, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	485 (3.1)	Basque Country, Spain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	475 (2.4)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▶ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country

**Exhibit B.9 Multiple Comparisons of Average Achievement in Geometry**

**TIMSS2007**  
**Mathematics** **8<sup>th</sup> Grade**

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Chinese Taipei	Korea, Rep. of	Singapore	Japan	Hong Kong SAR	England	Russian Federation	Hungary	Lithuania	Slovenia	Czech Republic	Malta	Armenia	Italy	Australia	Serbia	Scotland	United States	Malaysia	Sweden	Bulgaria	Ukraine	Romania	Lebanon	Norway	Cyprus	Bosnia and Herzegovina	Thailand	Tunisia
Chinese Taipei	592 (4.6)			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Korea, Rep. of	587 (2.3)			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Singapore	578 (3.4)	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	573 (2.2)	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	570 (5.5)	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	510 (4.4)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	510 (4.1)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hungary	508 (3.6)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	507 (2.6)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Slovenia	499 (2.4)	▼	▼	▼	▼	▼	▼	▼		▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Czech Republic	498 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Malta	495 (1.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Armenia	493 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Italy	490 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Australia	487 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Serbia	486 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Scotland	485 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	480 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Malaysia	477 (5.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Sweden	472 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Bulgaria	468 (5.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ukraine	467 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Romania	466 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lebanon	462 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway	459 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Cyprus	458 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Bosnia and Herzegovina	451 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Thailand	442 (5.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Tunisia	437 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Israel	436 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Jordan	436 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Algeria	432 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Iran, Islamic Rep. of	423 (4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Syrian Arab Republic	417 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Bahrain	412 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Turkey	411 (5.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Georgia	409 (6.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Egypt	406 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Morocco	396 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Indonesia	395 (4.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Palestinian Nat'l Auth.	388 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Oman	387 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Kuwait	385 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Colombia	371 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Saudi Arabia	359 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Botswana	325 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
El Salvador	318 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Qatar	301 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ghana	275 (4.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
<b>Benchmarking Participants</b>																														
Quebec, Canada	523 (3.3)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Massachusetts, US	519 (4.3)	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	508 (4.2)	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	505 (4.4)	▼	▼	▼	▼	▼										▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
British Columbia, Canada	487 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Basque Country, Spain	476 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Dubai, UAE	451 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.



Exhibit B.9 Multiple Comparisons of Average Achievement in Geometry (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Israel	Jordan	Algeria	Iran, Islamic Rep. of	Syrian Arab Republic	Bahrain	Turkey	Georgia	Egypt	Morocco	Indonesia	Palestinian Nat'l Auth.	Oman	Kuwait	Colombia	Saudi Arabia	Botswana	El Salvador	Qatar	Ghana	Benchmarking Participants	Average Scale Score	Country	
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	592 (4.6)	Chinese Taipei
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	587 (2.3)	Korea, Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	578 (3.4)	Singapore
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	573 (2.2)	Japan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	570 (5.5)	Hong Kong SAR
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	510 (4.4)	England
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	510 (4.1)	Russian Federation
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	508 (3.6)	Hungary
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	507 (2.6)	Lithuania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	499 (2.4)	Slovenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	498 (2.7)	Czech Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	495 (1.1)	Malta
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	493 (4.1)	Armenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	490 (3.1)	Italy
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	487 (3.6)	Australia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	486 (3.6)	Serbia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	485 (3.9)	Scotland
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	480 (2.5)	United States
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	477 (5.6)	Malaysia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	472 (2.5)	Sweden
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	468 (5.0)	Bulgaria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	467 (3.6)	Ukraine
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	466 (4.0)	Romania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	462 (4.0)	Lebanon
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	459 (2.3)	Norway
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	458 (2.7)	Cyprus
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	451 (3.5)	Bosnia and Herzegovina
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	442 (5.3)	Thailand
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	437 (2.6)	Tunisia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	436 (4.3)	Israel
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	436 (3.9)	Jordan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	432 (2.1)	Algeria
	◀	◀	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	423 (4.4)	Iran, Islamic Rep. of
	◀	◀	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	417 (3.4)	Syrian Arab Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	412 (2.1)	Bahrain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	411 (5.1)	Turkey
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	409 (6.7)	Georgia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	406 (3.4)	Egypt
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	396 (3.6)	Morocco
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	395 (4.5)	Indonesia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	388 (3.8)	Palestinian Nat'l Auth.
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	387 (3.0)	Oman
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	385 (2.8)	Kuwait
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	371 (3.3)	Colombia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	359 (2.6)	Saudi Arabia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	325 (3.2)	Botswana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	318 (3.7)	El Salvador
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	301 (1.8)	Qatar
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	◀	275 (4.9)	Ghana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	523 (3.3)	Quebec, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	519 (4.3)	Massachusetts, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	508 (4.2)	Ontario, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	505 (4.4)	Minnesota, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	487 (3.7)	British Columbia, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	476 (3.7)	Basque Country, Spain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	451 (3.4)	Dubai, UAE

▶ Average achievement significantly higher than comparison country ◀ Average achievement significantly lower than comparison country

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit B.10 Multiple Comparisons of Average Achievement in Data and Chance

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Korea, Rep. of	Singapore	Japan	Chinese Taipei	Hong Kong SAR	England	United States	Sweden	Australia	Hungary	Lithuania	Scotland	Czech Republic	Slovenia	Norway	Italy	Russian Federation	Malta	Malaysia	Israel	Cyprus	Serbia	Ukraine	Thailand	Turkey	Bulgaria	Bosnia and Herzegovina	Romania	Armenia
Korea, Rep. of	580 (2.0)			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Singapore	574 (3.9)				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	573 (2.2)	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	566 (3.6)					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong SAR	549 (4.7)	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	547 (5.0)	▼	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	531 (2.8)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Sweden	526 (3.0)	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Australia	525 (3.2)	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hungary	524 (3.3)	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	523 (2.3)	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Scotland	517 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Czech Republic	512 (2.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Slovenia	511 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway	505 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Italy	491 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	487 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Malta	487 (1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Malaysia	469 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲
Israel	465 (4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲
Cyprus	464 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲
Serbia	458 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲
Ukraine	458 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲
Thailand	453 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲
Turkey	445 (4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲
Bulgaria	440 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼					▲	▲	▲
Bosnia and Herzegovina	437 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Romania	429 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Armenia	427 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Jordan	425 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Bahrain	418 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Iran, Islamic Rep. of	415 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Tunisia	411 (2.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Lebanon	407 (4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Colombia	405 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Indonesia	402 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Oman	389 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Syrian Arab Republic	387 (2.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Egypt	384 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Botswana	384 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Georgia	373 (4.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Algeria	371 (1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Morocco	371 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Palestinian Nat'l Auth.	371 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Kuwait	366 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
El Salvador	362 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Saudi Arabia	348 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Ghana	321 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
Qatar	305 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
<b>Benchmarking Participants</b>																														
Massachusetts, US	569 (5.2)	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Minnesota, US	560 (5.4)	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	543 (4.2)	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec, Canada	533 (3.0)	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
British Columbia, Canada	529 (3.2)	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Basque Country, Spain	504 (3.7)	▼	▼	▼	▼	▼	▼	▼																						
Dubai, UAE	457 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼																					

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.

Exhibit B.10 Multiple Comparisons of Average Achievement in Data and Chance (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Jordan	Bahrain	Iran, Islamic Rep. of	Tunisia	Lebanon	Colombia	Indonesia	Oman	Syrian Arab Republic	Egypt	Botswana	Georgia	Algeria	Morocco	Palestinian Nat'l Auth.	Kuwait	El Salvador	Saudi Arabia	Ghana	Qatar	Benchmarking Participants	Average Scale Score	Country	
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Massachusetts, US	580 (2.0)	Korea, Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Minnesota, US	574 (3.9)	Singapore
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Ontario, Canada	573 (2.2)	Japan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Quebec, Canada	566 (3.6)	Chinese Taipei
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	British Columbia, Canada	549 (4.7)	Hong Kong SAR
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Basque Country, Spain	547 (5.0)	England
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Dubai, UAE	531 (2.8)	United States
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		526 (3.0)	Sweden
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		525 (3.2)	Australia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		524 (3.3)	Hungary
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		523 (2.3)	Lithuania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		517 (3.5)	Scotland
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		512 (2.8)	Czech Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		511 (2.3)	Slovenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		505 (2.5)	Norway
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		491 (3.1)	Italy
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		487 (3.8)	Russian Federation
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		487 (1.4)	Malta
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		469 (4.1)	Malaysia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		465 (4.4)	Israel
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		464 (1.6)	Cyprus
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		458 (3.0)	Serbia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		458 (3.5)	Ukraine
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		453 (4.1)	Thailand
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		445 (4.4)	Turkey
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		440 (4.7)	Bulgaria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		437 (2.3)	Bosnia and Herzegovina
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		429 (3.7)	Romania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		427 (3.9)	Armenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		425 (3.8)	Jordan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		418 (2.1)	Bahrain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		415 (3.5)	Iran, Islamic Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		411 (2.3)	Tunisia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		407 (4.4)	Lebanon
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		405 (3.8)	Colombia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		402 (3.6)	Indonesia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		389 (3.0)	Oman
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		387 (2.7)	Syrian Arab Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		384 (3.1)	Egypt
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		384 (2.6)	Botswana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		373 (4.3)	Georgia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		371 (1.7)	Algeria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		371 (3.4)	Morocco
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		371 (2.9)	Palestinian Nat'l Auth.
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		366 (3.5)	Kuwait
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		362 (3.0)	El Salvador
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		348 (2.2)	Saudi Arabia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		321 (3.6)	Ghana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		305 (1.6)	Qatar
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		569 (5.2)	Massachusetts, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		560 (5.4)	Minnesota, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		543 (4.2)	Ontario, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		533 (3.0)	Quebec, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		529 (3.2)	British Columbia, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		504 (3.7)	Basque Country, Spain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		457 (3.2)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▶ Average achievement significantly higher than comparison country    ◀ Average achievement significantly lower than comparison country

Exhibit B.11 Multiple Comparisons of Average Achievement in Knowing

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Korea, Rep. of	Chinese Taipei	Singapore	Hong Kong SAR	Japan	Russian Federation	Hungary	United States	Lithuania	Armenia	England	Czech Republic	Serbia	Slovenia	Malta	Australia	Scotland	Sweden	Bosnia and Herzegovina	Bulgaria	Malaysia	Italy	Israel	Ukraine	Romania	Cyprus	Lebanon	Norway	Turkey
Korea, Rep. of	596 (2.5)		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chinese Taipei	594 (4.5)			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Singapore	581 (3.4)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hong Kong SAR	574 (5.4)	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Japan	560 (2.2)	▼	▼	▼			▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Russian Federation	521 (3.9)	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hungary	518 (3.3)	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United States	514 (2.6)	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lithuania	508 (2.5)	▼	▼	▼	▼	▼	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Armenia	507 (3.1)	▼	▼	▼	▼	▼	▼	▼									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
England	503 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Czech Republic	502 (2.5)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Serbia	500 (3.2)	▼	▼	▼	▼	▼	▼	▼	▼								▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Slovenia	500 (2.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Malta	490 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Australia	487 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Scotland	481 (3.3)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												▲	▲	▲	▲	▲	
Sweden	478 (2.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼															▲	
Bosnia and Herzegovina	478 (2.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼														▲	
Bulgaria	477 (4.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													▲	
Malaysia	477 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼													▲	
Italy	476 (3.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										▲	▲	▲	
Israel	473 (3.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼												▲	
Ukraine	471 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											▲	
Romania	470 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼											▲	
Cyprus	468 (1.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼										▲	
Lebanon	464 (3.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼									▲	
Norway	458 (1.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼								▲	
Turkey	439 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	
Thailand	436 (4.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	
Jordan	432 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	
Georgia	427 (5.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼							▲	
Tunisia	421 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Iran, Islamic Rep. of	403 (4.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Indonesia	397 (4.0)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Bahrain	395 (1.7)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Syrian Arab Republic	393 (4.2)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Egypt	392 (3.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Botswana	376 (2.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Oman	372 (3.5)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Algeria	371 (1.9)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Palestinian Nat'l Auth.	365 (3.8)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Morocco	365 (4.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Colombia	364 (3.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Kuwait	347 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
El Salvador	336 (3.1)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Ghana	313 (4.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Saudi Arabia	308 (2.6)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
Qatar	307 (1.4)	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼						▲	
<b>Benchmarking Participants</b>																														
Massachusetts, US	546 (4.5)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Minnesota, US	532 (4.6)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Quebec, Canada	520 (2.7)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ontario, Canada	505 (3.2)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
British Columbia, Canada	504 (2.9)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Basque Country, Spain	501 (2.9)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Dubai, UAE	469 (2.3)	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.



Exhibit B.12 Multiple Comparisons of Average Achievement in Applying

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Average Scale Score	Korea, Rep. of	Singapore	Chinese Taipei	Hong Kong SAR	Japan	England	Hungary	Lithuania	Russian Federation	Czech Republic	Slovenia	United States	Australia	Sweden	Armenia	Malta	Scotland	Italy	Serbia	Malaysia	Norway	Cyprus	Ukraine	Romania	Bulgaria	Israel	Lebanon	Thailand	Bosnia and Herzegovina	
Korea, Rep. of	595 (2.8)																														
Singapore	593 (3.6)																														
Chinese Taipei	592 (4.2)																														
Hong Kong SAR	569 (5.9)																														
Japan	565 (2.2)																														
England	514 (4.9)																														
Hungary	513 (3.1)																														
Lithuania	511 (2.4)																														
Russian Federation	510 (3.7)																														
Czech Republic	504 (2.7)																														
Slovenia	503 (2.0)																														
United States	503 (2.9)																														
Australia	500 (3.4)																														
Sweden	497 (2.0)																														
Armenia	493 (3.8)																														
Malta	492 (1.0)																														
Scotland	489 (3.7)																														
Italy	483 (2.9)																														
Serbia	478 (3.3)																														
Malaysia	478 (4.9)																														
Norway	477 (2.2)																														
Cyprus	465 (1.8)																														
Ukraine	464 (3.5)																														
Romania	462 (4.0)																														
Bulgaria	458 (4.8)																														
Israel	456 (4.1)																														
Lebanon	448 (4.6)																														
Thailand	446 (4.7)																														
Bosnia and Herzegovina	440 (2.6)																														
Turkey	425 (4.5)																														
Tunisia	423 (2.4)																														
Jordan	422 (4.1)																														
Algeria	412 (2.0)																														
Bahrain	403 (1.9)																														
Iran, Islamic Rep. of	402 (4.2)																														
Georgia	401 (5.5)																														
Syrian Arab Republic	401 (3.4)																														
Indonesia	398 (3.7)																														
Egypt	393 (3.6)																														
Morocco	389 (3.3)																														
Colombia	384 (3.7)																														
Palestinian Nat'l Auth.	371 (3.4)																														
Oman	368 (3.0)																														
Kuwait	361 (2.7)																														
Botswana	351 (2.6)																														
El Salvador	347 (3.3)																														
Saudi Arabia	335 (2.3)																														
Qatar	305 (1.4)																														
Ghana	297 (4.2)																														
<b>Benchmarking Participants</b>																															
Massachusetts, US	542 (4.4)																														
Minnesota, US	530 (4.8)																														
Quebec, Canada	529 (3.1)																														
Ontario, Canada	518 (3.7)																														
British Columbia, Canada	509 (3.1)																														
Basque Country, Spain	495 (3.0)																														
Dubai, UAE	456 (2.9)																														

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Note: 5% of these comparisons would be statistically significant by chance alone.

Exhibit B.12 Multiple Comparisons of Average Achievement in Applying (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

Country	Turkey	Tunisia	Jordan	Algeria	Bahrain	Iran, Islamic Rep. of	Georgia	Syrian Arab Republic	Indonesia	Egypt	Morocco	Colombia	Palestinian Nat'l Auth.	Oman	Kuwait	Botswana	El Salvador	Saudi Arabia	Qatar	Ghana	Benchmarking Participants	Average Scale Score	Country	
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Massachusetts, US	595 (2.8)	Korea, Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Minnesota, US	593 (3.6)	Singapore
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Quebec, Canada	592 (4.2)	Chinese Taipei
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Ontario, Canada	569 (5.9)	Hong Kong SAR
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	British Columbia, Canada	565 (2.2)	Japan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Basque Country, Spain	514 (4.9)	England
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	Dubai, UAE	513 (3.1)	Hungary
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		511 (2.4)	Lithuania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		510 (3.7)	Russian Federation
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		504 (2.7)	Czech Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		503 (2.0)	Slovenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		503 (2.9)	United States
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		500 (3.4)	Australia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		497 (2.0)	Sweden
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		493 (3.8)	Armenia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		492 (1.0)	Malta
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		489 (3.7)	Scotland
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		483 (2.9)	Italy
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		478 (3.3)	Serbia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		478 (4.9)	Malaysia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		477 (2.2)	Norway
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		465 (1.8)	Cyprus
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		464 (3.5)	Ukraine
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		462 (4.0)	Romania
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		458 (4.8)	Bulgaria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		456 (4.1)	Israel
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		448 (4.6)	Lebanon
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		446 (4.7)	Thailand
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		440 (2.6)	Bosnia and Herzegovina
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		425 (4.5)	Turkey
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		423 (2.4)	Tunisia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		422 (4.1)	Jordan
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		412 (2.0)	Algeria
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		403 (1.9)	Bahrain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		402 (4.2)	Iran, Islamic Rep. of
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		401 (5.5)	Georgia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		401 (3.4)	Syrian Arab Republic
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		398 (3.7)	Indonesia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		393 (3.6)	Egypt
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		389 (3.3)	Morocco
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		384 (3.7)	Colombia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		371 (3.4)	Palestinian Nat'l Auth.
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		368 (3.0)	Oman
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		361 (2.7)	Kuwait
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		351 (2.6)	Botswana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		347 (3.3)	El Salvador
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		335 (2.3)	Saudi Arabia
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		305 (1.4)	Qatar
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		297 (4.2)	Ghana
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		542 (4.4)	Massachusetts, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		530 (4.8)	Minnesota, US
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		529 (3.1)	Quebec, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		518 (3.7)	Ontario, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		509 (3.1)	British Columbia, Canada
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		495 (3.0)	Basque Country, Spain
	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶	▶		456 (2.9)	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▶ Average achievement significantly higher than comparison country    ◀ Average achievement significantly lower than comparison country





Exhibit B.13 Multiple Comparisons of Average Achievement in Reasoning (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Instructions: Read across the row for a country to compare performance with the countries listed along the top of the chart. The symbols indicate whether the average achievement of the country in the row is significantly lower than that of the comparison country, significantly higher than that of the comparison country, or if there is no statistically significant difference between the average achievement of the two countries.

	Jordan	Lebanon	Iran, Islamic Rep. of	Tunisia	Colombia	Bahrain	Indonesia	Oman	Egypt	Syrian Arab Republic	Georgia	Morocco	Palestinian Nat'l Auth.	Botswana	Algeria	Saudi Arabia	El Salvador	Kuwait	Ghana	Qatar	Benchmarking Participants	Average Scale Score	Country			
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	591 (4.1)	Chinese Taipei		
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	579 (2.3)	Korea, Rep. of	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	579 (4.1)	Singapore	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	568 (2.4)	Japan	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	557 (5.6)	Hong Kong SAR	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	518 (4.3)	England	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	513 (3.2)	Hungary	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	505 (2.4)	United States	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	502 (3.3)	Australia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	500 (2.6)	Czech Republic	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	497 (3.6)	Russian Federation	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	496 (2.5)	Slovenia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	495 (3.3)	Scotland	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	490 (2.6)	Sweden	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	489 (3.8)	Armenia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	486 (2.5)	Lithuania	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	483 (2.8)	Italy	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	475 (2.3)	Norway	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	475 (1.3)	Malta	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	474 (3.3)	Serbia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	468 (3.8)	Malaysia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	462 (4.1)	Israel	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	461 (2.1)	Cyprus	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	456 (4.4)	Thailand	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	455 (4.7)	Bulgaria	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	452 (2.9)	Bosnia and Herzegovina	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	449 (4.6)	Romania	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	445 (3.8)	Ukraine	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	441 (4.2)	Turkey	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	440 (3.6)	Jordan	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	429 (4.0)	Lebanon	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	427 (3.5)	Iran, Islamic Rep. of	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	425 (2.3)	Tunisia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	416 (3.3)	Colombia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	413 (2.1)	Bahrain	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	405 (3.3)	Indonesia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	397 (3.3)	Oman	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	396 (3.4)	Egypt	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	396 (3.4)	Syrian Arab Republic	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	389 (5.8)	Georgia	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	383 (3.5)	Morocco	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	381 (3.5)	Palestinian Nat'l Auth.	
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Botswana
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Algeria
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Saudi Arabia
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	El Salvador
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Kuwait
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Ghana
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Qatar
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Massachusetts, US
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Quebec, Canada
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Minnesota, US
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Ontario, Canada
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	British Columbia, Canada
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Basque Country, Spain
	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Dubai, UAE

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average achievement significantly higher than comparison country    ▼ Average achievement significantly lower than comparison country



# Appendix C

## *The Test-Curriculum Matching Analysis: Mathematics*

TIMSS went to great lengths to ensure that comparisons of student achievement across countries would be as fair and equitable as possible. The *TIMSS 2007 Assessment Frameworks* were designed to specify the important aspects of mathematics that participating countries agreed should be the focus of an international assessment of mathematics achievement, and the assessment items were developed through a collaborative process with national representatives to faithfully represent the specifications in the frameworks and field tested extensively in participating countries. Finalizing the TIMSS 2007 assessments involved a series of reviews by representatives of the participating countries, experts in mathematics, and testing specialists. At the end of this process, the National Research Coordinators from each country formally approved the TIMSS 2007 assessments, thus accepting them as being sufficiently fair to compare their students' mathematics achievement with that of students from other countries.

Although the assessments were developed to represent an agreed-upon framework and were intended to have as much in common across countries as possible, it was unavoidable that the match between the TIMSS 2007 assessment (or test) and the mathematics curriculum would not be the same in all countries. To restrict test items to just those topics included in the curricula of all participating countries and covered in the same sequence would severely limit test coverage and restrict the research questions that the

study is designed to address. The tests, therefore, inevitably have some items measuring topics unfamiliar to some students in some countries.

The Test-Curriculum Matching Analysis (TCMA) was conducted to investigate the extent to which the TIMSS 2007 mathematics assessment was relevant to each country's curriculum. The TCMA also investigates the impact on a country's performance of including only achievement items that were judged to be relevant to its own curriculum.<sup>1</sup>

To gather data about the extent to which the TIMSS 2007 tests were relevant to the curricula of the TIMSS countries and benchmarking participants, national coordinators were asked to examine each achievement item and indicate whether the item was in their country's intended curriculum at the grade tested (fourth or eighth grade). The national coordinator was asked to choose persons very familiar with the curriculum at these grades to make this determination. In some countries, the curriculum was prescribed for a range of grades and was not explicit about what was to be covered by the end of fourth or eighth grades. For example, in Sweden the curriculum specifies the curricular goals to be achieved by the end of the fifth and ninth grades, but does not provide a grade by grade specification. In such situations, coordinators were asked to make the best judgment possible.<sup>2</sup> Since an item might be in the curriculum for some but not all students in a country, coordinators were asked to consider an item included if it was in the intended curriculum for more than 50 percent of the students. All TIMSS 2007 participants took part in the TCMA analysis except Algeria, Armenia, El Salvador, Kuwait, Latvia, Lithuania, and the Ukraine at fourth grade and Algeria, Armenia, Bulgaria, El Salvador, Kuwait, Lithuania, Saudi Arabia, and the Ukraine at eighth grade.

Exhibits C.1 and C.2 present the TCMA results for the TIMSS 2007 mathematics test at fourth and eighth grades. Exhibit C.1 shows the average percent correct on the mathematics items judged appropriate by each country. Exhibit C.2 shows the standard errors corresponding to the percentages presented in Exhibit C.1.

In Exhibit C.1, the bottom row of the exhibit shows the number of items, in terms of score points, identified as appropriate in each country. At the

1 Because there may also be curriculum areas covered in some countries that are not covered by the TIMSS 2007 tests, the TCMA does not provide complete information about how well the tests cover the curricula of the countries.

2 Exhibit 5 of the *TIMSS 2007 Encyclopedia* provides information on the grade-to-grade structure of the curriculum for each TIMSS 2007 participant.

fourth grade, the maximum number of score points in the assessment was 188 points.<sup>3</sup> Generally, the proportion of items judged appropriate was fairly high. Reading along the bottom row, it can be seen that 19 of the 29 countries and 5 of the 7 benchmarking participants that took part in the TCMA analysis judged 75 percent or more (141 score points) to be appropriate. Only four participants—the Russian Federation, the Slovak Republic, Tunisia, and Yemen—judged half of the mathematics items or less to be included in their curricula.

At the eighth grade, the percentage of items judged appropriate was somewhat higher; with 8 of the 41 countries and 2 of the 7 benchmarking participants that took part in the TCMA analysis accepting 100 percent of the items (all 236 score points) and an additional 29 countries and 5 benchmarking participants accepting 75 percent or more (177 score points). For all participants, the majority of eighth grade mathematics was judged to be appropriate to their curricula.

Since most countries indicated that at least some items were not included in their intended curriculum at the grade tested, the data were analyzed to determine whether the inclusion of these items had any effect on the international performance comparisons.<sup>4</sup>

The first column of data in Exhibit C.1 shows the average percent correct on all test items for each participant, together with its standard error. Subsequent columns show the performance of each participant on those items judged appropriate by the participant listed at the head of the column. Participants are presented in order of their performance based on average percent correct on all items, from highest to lowest. To interpret this exhibit, choosing a country and reading across its row provides the average percent correct for the students in that country on the items selected by each of the countries listed along the top of the exhibit. For example, at the fourth grade, Hong Kong SAR, where the average percent correct was 78 percent on its own set of items, had 77 percent correct on the items selected by Singapore, 78 percent on the items selected by Chinese Taipei, 77 percent on the items selected by Japan, and so forth. The column for a country listed at the top shows how each of the other participants performed

3 The TIMSS 2007 fourth grade mathematics assessment contained 179 items yielding 192 score points. However, following item review, some items were deleted and response categories were combined for a number of items, resulting in data for reporting on 177 items and 188 score points. Similarly, following item review, the 215 items and 238 score points in the eighth grade assessment were reduced to 214 items and 236 score points.

4 It should be noted that the mathematics achievement presented in Exhibit C.1 is based on average percent correct, which is different from the average scale scores that are presented in Chapter 1.

on the set of items selected as appropriate for that country's students. Using the set of items selected by the Netherlands as an example, 79 percent of these items, on average, were answered correctly by students in Hong Kong SAR, 76 percent by students in Singapore, 72 percent by students in Chinese Taipei, 69 percent by students in Japan, 65 percent by those in Kazakhstan, and so forth. The shaded diagonal element in the exhibit shows how each country performed on the set of items that it selected based on its own curriculum. Thus, students from the Netherlands averaged 62 percent correct on the set of items identified by the Netherlands for the analysis.

For each country's selected items, the international averages across participating countries are presented in the lower part of the exhibit. These show that the selections of items by the participating countries varied somewhat in average difficulty, ranging at the fourth grade from 49 percent correct, for several participants, to 54 percent correct for those chosen by the Russian Federation. At the eighth grade, the average percent correct ranged from 40 percent, for many participants, to 43 percent for those chosen by Scotland.

Comparing the diagonal element for a country with the overall average percent correct shows the difference between performance on the set of items chosen as appropriate for that country and performance on the test as a whole. In general, countries performed better on their own item sets than on the items overall, although not by much. To illustrate, the average percent correct for Hong Kong SAR across all fourth-grade mathematics items was 77 percent. The diagonal element shows that students from Hong Kong had a slightly greater average percent correct (78 percent) across the set of items selected as appropriate for Hong Kong than they did overall. Almost all participants had a difference of one or two percentage points between the two performance measures, with the largest differences in the Russian Federation (11 percentage points), Tunisia and the province of Alberta (6 percentage points), and Austria and the Slovak Republic (5 percentage points). At the eighth grade, the differences were generally less; the largest being in Scotland (7 percentage points), and Malaysia and the Russian Federation (3 percentage points).

It is clear that the selection of items does not have a major effect on the relative performance among TIMSS participants. Participants that had relatively high or low performance across all the mathematics items also had relatively high or low performance on each of the various sets of items selected for the TCMA. For example, at the fourth grade, Hong Kong SAR had the highest average percent correct not only on the test as a whole, but also on all of the different item selections, with Singapore, Chinese Taipei, and Japan next in order of performance on practically all selections of items. Although there are some changes in the ordering of countries based on the items selected for the TCMA, most of these differences are within the boundaries of sampling error.<sup>5</sup>

Even when countries performed better on the items judged by them to be included in their curriculum than they did overall, their performance relative to other participants was little changed. As an example, consider the 68 score points selected by the Russian Federation at the fourth grade. The students in the Russian Federation did better on these items (73% correct) than on the test as a whole (62% correct). However, most other countries also did better on these particular items, with an international average of 54 percent correct compared with 49 percent correct overall. The countries that performed better than the Russian Federation on the overall test also performed as well or better on the items selected by the Russian Federation.

The TCMA results provide evidence that the TIMSS 2007 mathematics assessment provides a reasonable basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected, since making the assessment as fair as possible was a major consideration in test development. The fact that the majority of countries indicated that most items were appropriate for their students means that the different average percent correct estimates were based on many of the same items. Insofar as countries rejected items that would be difficult for their students, these items tended to be difficult for students in other countries as well. The analysis shows that omitting such items tends to improve the results for that country, but also tends to improve the results for all other countries, so that the overall pattern of relative performance is largely unaffected.

5 Small differences in performance between adjacent countries shown in this exhibit usually are not statistically significant. The standard errors for the average percent correct statistics based on the TIMSS 2007 sample are provided in Exhibit C.2. For any sample average shown in Exhibit C.1, it can be said with 95 percent confidence that the corresponding value in the population falls between the sample estimate plus or minus two standard errors.

**Exhibit C.1 Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum (See Exhibit C.2 for corresponding standard errors)

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Hong Kong SAR	Singapore	Chinese Taipei	Japan	Kazakhstan	Russian Federation	England	Netherlands	United States	Germany	Denmark	Australia	Hungary	Italy	Austria	Slovenia	Sweden	Slovak Republic	Scotland	New Zealand	Czech Republic	Norway	Georgia	Iran, Islamic Rep. of	Colombia	Morocco	Tunisia	
Hong Kong SAR	77 (0.7)	78	77	78	77	75	80	77	79	77	77	77	78	78	76	79	78	77	76	78	77	76	77	76	78	77	77	76	
Singapore	74 (0.8)	75	75	76	75	73	78	74	76	75	74	74	75	74	74	76	74	74	73	76	74	73	74	74	74	74	75	74	
Chinese Taipei	69 (0.4)	68	68	73	73	69	77	69	72	70	69	69	71	70	70	71	70	71	69	73	70	67	69	71	69	69	69	70	
Japan	67 (0.5)	66	66	70	70	67	72	67	69	67	68	68	69	68	68	68	69	69	66	70	68	66	68	68	67	67	68	67	
Kazakhstan	64 (1.7)	63	64	66	65	65	72	64	65	64	65	64	65	65	64	67	65	64	66	66	64	64	66	65	65	64	67	67	
Russian Federation	62 (1.1)	62	61	64	65	64	73	62	64	63	64	63	63	64	62	66	64	63	66	66	62	62	62	65	64	62	65	67	
England	61 (0.7)	61	61	63	61	59	62	61	63	62	62	62	63	62	60	64	63	62	58	64	63	60	62	62	62	61	62	59	
Netherlands	59 (0.5)	58	58	62	61	58	61	59	62	59	59	59	61	60	60	61	60	61	58	62	60	58	59	61	58	59	59	59	
United States	59 (0.6)	58	58	61	59	57	62	59	60	59	59	59	60	60	58	62	60	59	57	61	60	57	59	59	59	59	60	57	
Germany	57 (0.5)	56	56	59	58	58	62	57	60	58	60	58	59	59	57	62	61	58	56	60	59	57	58	60	57	57	60	59	
Denmark	57 (0.7)	56	56	58	57	55	57	57	58	57	57	58	58	58	56	59	59	58	54	59	58	56	57	58	56	57	58	55	
Australia	55 (0.8)	54	54	58	55	53	55	55	57	55	56	56	57	56	54	57	57	56	52	58	57	54	56	55	56	55	55	52	
Hungary	54 (0.8)	53	54	56	56	56	61	54	56	54	57	55	55	56	54	59	57	55	57	58	55	55	54	57	56	54	56	57	
Italy	53 (0.8)	51	52	55	54	52	57	53	54	53	54	54	53	54	52	56	54	53	52	55	54	52	53	53	53	53	56	53	
Austria	52 (0.5)	50	51	55	53	53	60	52	54	52	54	52	53	53	52	57	55	53	52	55	53	52	52	55	52	52	53	55	
Slovenia	52 (0.4)	51	51	54	52	52	57	52	54	52	55	53	53	54	51	57	56	53	52	55	54	52	52	54	53	52	53	53	
Sweden	51 (0.6)	50	49	54	53	51	55	51	53	51	53	52	53	52	51	53	54	54	51	55	53	50	51	54	49	51	52	52	
Slovak Republic	50 (0.9)	50	50	53	53	53	61	50	52	51	53	51	51	52	51	56	53	52	55	55	51	51	51	54	52	50	53	56	
Scotland	50 (0.6)	49	49	52	50	48	52	50	52	50	51	51	51	51	49	53	52	51	47	54	52	49	51	51	50	50	50	48	
New Zealand	49 (0.5)	48	48	51	49	47	49	49	51	49	50	50	51	50	48	51	52	50	46	52	51	49	50	50	49	49	49	46	
Czech Republic	47 (0.7)	46	46	50	49	50	57	47	50	47	51	48	49	49	47	53	51	49	50	52	48	48	48	51	48	47	51	53	
Norway	44 (0.6)	43	43	47	45	44	48	44	46	44	46	45	46	46	44	47	47	46	43	48	46	44	45	46	44	44	46	45	
Georgia	38 (0.9)	38	38	40	41	41	50	38	40	39	40	38	39	39	38	43	39	39	43	42	38	39	38	41	41	38	41	45	
Iran, Islamic Rep. of	30 (0.6)	30	30	32	31	32	38	30	32	31	32	31	32	32	30	35	32	31	32	33	32	31	31	31	33	30	34	34	
Colombia	23 (0.7)	22	22	24	24	23	27	23	24	23	24	23	23	24	23	25	24	23	23	25	23	22	23	24	23	23	24	25	
Morocco	23 (0.7)	21	22	23	22	23	26	22	23	23	24	23	23	23	22	26	23	22	23	23	23	23	23	23	24	23	26	25	
Tunisia	21 (0.5)	21	21	23	23	24	30	21	22	22	23	22	22	22	22	25	22	22	24	23	21	22	21	23	23	21	24	27	
Qatar	18 (0.1)	17	17	19	18	18	20	18	19	18	18	18	18	18	18	20	18	18	18	19	18	17	17	18	19	18	18	19	
Yemen	14 (0.4)	13	14	15	14	15	16	14	14	14	13	14	14	14	14	15	14	14	14	14	14	14	14	14	15	14	14	15	
<b>International Avg.</b>	<b>49 (0.1)</b>	<b>49</b>	<b>49</b>	<b>51</b>	<b>50</b>	<b>50</b>	<b>54</b>	<b>49</b>	<b>51</b>	<b>50</b>	<b>51</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>49</b>	<b>53</b>	<b>51</b>	<b>50</b>	<b>49</b>	<b>52</b>	<b>50</b>	<b>49</b>	<b>50</b>	<b>51</b>	<b>50</b>	<b>49</b>	<b>51</b>	<b>51</b>	
<b>Benchmarking Participants</b>																													
Massachusetts, US	69 (0.8)	69	69	71	70	68	72	69	71	70	69	70	70	70	69	72	71	70	68	71	70	68	69	69	71	69	70	68	
Minnesota, US	65 (1.3)	64	65	67	65	63	67	65	66	65	64	65	66	65	64	67	66	65	62	67	66	63	65	65	66	65	66	62	
Quebec, Canada	55 (0.8)	55	55	58	57	55	58	56	57	56	56	56	57	57	55	58	58	57	55	58	58	54	56	57	56	55	56	55	
Ontario, Canada	54 (0.7)	53	53	56	54	52	54	54	56	55	55	55	56	56	53	57	57	55	50	57	57	53	55	54	54	54	55	51	
Alberta, Canada	52 (0.7)	51	51	54	53	50	53	52	54	52	53	53	54	54	51	54	54	53	49	55	54	50	52	53	51	52	52	50	
British Columbia, Canada	52 (0.7)	51	51	54	53	50	54	52	53	52	53	53	53	53	52	54	54	53	50	55	54	51	52	53	51	52	52	51	
Dubai, UAE	39 (0.4)	39	39	41	40	38	43	39	40	40	40	39	40	40	39	41	40	39	38	41	40	38	39	40	39	39	40	40	
Number of Items (Score Points) Identified*	188	144	165	146	126	130	68	184	152	174	142	173	165	169	172	116	159	166	94	127	162	153	179	142	140	188	109	84	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Of the 179 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 192 total score points. Following item review, some

items were deleted and response categories were combined for a number of items, resulting in 177 items and 188 score points.



### Exhibit C.1 Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics (Continued)

TIMSS2007 Mathematics 4<sup>th</sup> Grade

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum (See Exhibit C.2 for corresponding standard errors)

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

		Benchmarking Participants								Country
Qatar	Yemen	Massachusetts, US	Minnesota, US	Quebec, Canada	Ontario, Canada	Alberta, Canada	British Columbia, Canada	Dubai, UAE	Average Percent Correct on All Items	
77	80	77	77	77	77	78	77	77	77 (0.7)	Hong Kong SAR
75	80	74	74	75	74	75	74	74	74 (0.8)	Singapore
70	76	69	68	69	69	71	69	69	69 (0.4)	Chinese Taipei
67	71	67	67	68	68	70	69	67	67 (0.5)	Japan
64	70	64	64	65	64	65	63	64	64 (1.7)	Kazakhstan
62	67	62	63	63	62	65	63	62	62 (1.1)	Russian Federation
61	62	61	62	62	63	66	63	61	61 (0.7)	England
59	61	59	59	59	60	63	59	59	59 (0.5)	Netherlands
59	63	59	59	59	59	62	60	59	59 (0.6)	United States
58	57	57	58	59	58	62	59	57	57 (0.5)	Germany
57	55	57	57	58	58	61	58	57	57 (0.7)	Denmark
55	55	55	55	56	57	60	57	55	55 (0.8)	Australia
54	57	54	55	55	55	57	55	54	54 (0.8)	Hungary
53	56	53	53	54	53	56	54	53	53 (0.8)	Italy
52	55	52	52	53	52	56	53	52	52 (0.5)	Austria
52	52	52	53	54	54	57	55	52	52 (0.4)	Slovenia
51	50	51	52	52	53	56	53	51	51 (0.6)	Sweden
50	54	50	51	52	51	54	51	50	50 (0.9)	Slovak Republic
50	50	50	50	51	52	55	53	50	50 (0.6)	Scotland
49	49	49	50	50	51	54	51	49	49 (0.5)	New Zealand
47	49	47	48	49	48	52	49	47	47 (0.7)	Czech Republic
44	44	44	45	45	46	49	46	44	44 (0.6)	Norway
38	47	38	38	39	38	40	38	38	38 (0.9)	Georgia
30	35	30	31	31	31	33	32	30	30 (0.6)	Iran, Islamic Rep. of
23	24	23	23	24	23	25	23	23	23 (0.7)	Colombia
23	25	23	22	23	23	24	23	23	23 (0.7)	Morocco
21	26	21	21	22	21	23	22	21	21 (0.5)	Tunisia
18	20	18	18	18	18	19	18	18	18 (0.1)	Qatar
14	17	14	14	14	14	13	14	14	14 (0.4)	Yemen
49	52	49	50	50	50	53	50	49	49 (0.1)	<b>International Avg.</b>
		Benchmarking Participants								
70	73	69	69	70	70	72	70	69	69 (0.8)	Massachusetts, US
65	68	65	65	65	66	68	66	65	65 (1.3)	Minnesota, US
56	58	55	56	57	57	60	58	55	55 (0.8)	Quebec, Canada
54	52	54	55	55	56	60	58	54	54 (0.7)	Ontario, Canada
52	51	52	52	53	54	58	55	52	52 (0.7)	Alberta, Canada
52	52	52	52	53	53	57	55	52	52 (0.7)	British Columbia, Canada
39	42	39	39	40	39	42	40	39	39 (0.4)	Dubai, UAE
178	73	188	174	165	157	140	134	188	188	Number of Items (Score Points) Identified*

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses.

**Exhibit C.1 Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics (Continued)**

**TIMSS2007**  
**Mathematics** **8<sup>th</sup>**  
**Grade**

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum (See Exhibit C.2 for corresponding standard errors)

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Korea, Rep. of	Chinese Taipei	Singapore	Hong Kong SAR	Japan	Hungary	England	Russian Federation	United States	Czech Republic	Slovenia	Australia	Malta	Sweden	Scotland	Serbia	Italy	Malaysia	Israel	Cyprus	Romania	Norway	Bosnia and Herzegovina	Lebanon	Thailand	Turkey	Jordan	Georgia	Tunisia
Korea, Rep. of	71 (0.5)	72	71	71	71	73	72	72	73	71	71	71	71	72	71	74	71	71	73	72	71	71	72	72	71	71	72	71	71	72
Chinese Taipei	71 (1.0)	71	71	71	71	72	71	71	72	71	71	71	71	71	70	72	71	71	73	71	71	71	71	72	71	71	72	71	71	72
Singapore	70 (0.9)	71	70	71	71	72	71	70	72	70	72	70	70	71	71	73	70	71	73	71	70	70	71	71	70	70	71	71	70	72
Hong Kong SAR	66 (1.3)	67	66	66	66	67	66	66	68	66	66	66	66	66	66	68	66	66	68	66	66	66	66	67	66	66	67	66	65	67
Japan	66 (0.5)	66	66	66	66	68	66	66	67	66	66	66	66	66	66	70	66	66	67	65	64	65	67	66	66	66	65	66	64	67
Hungary	53 (0.8)	53	53	52	53	54	53	53	55	52	53	53	53	53	53	57	53	53	55	52	52	52	53	54	53	53	52	53	51	54
England	52 (1.2)	52	52	52	52	53	52	53	53	52	52	52	52	53	53	59	52	52	53	52	50	52	54	52	52	52	51	51	50	53
Russian Federation	51 (1.0)	51	51	51	51	52	51	51	54	51	51	51	51	51	50	52	51	51	53	51	50	51	50	52	51	51	52	51	51	52
United States	50 (0.7)	50	50	50	49	51	50	51	52	50	51	50	50	51	51	54	50	50	51	51	49	50	51	50	50	50	50	50	48	51
Czech Republic	49 (0.6)	49	49	49	49	50	49	49	51	49	50	49	49	50	50	54	49	49	51	49	48	49	50	50	49	49	49	49	48	51
Slovenia	48 (0.5)	49	48	48	48	49	48	48	50	48	48	48	48	49	48	53	48	48	50	48	46	48	49	49	48	48	47	48	46	49
Australia	47 (0.9)	48	47	47	47	49	47	48	49	47	48	47	47	48	49	53	47	47	48	47	46	47	49	47	47	47	47	46	47	48
Malta	46 (0.2)	47	46	46	47	48	46	47	49	46	47	46	46	47	47	51	46	46	49	46	45	46	47	47	46	46	47	46	45	48
Sweden	46 (0.5)	46	46	45	46	47	46	46	47	45	46	45	46	46	48	53	46	46	47	46	45	45	47	46	46	46	45	45	43	47
Scotland	45 (0.9)	45	45	45	45	47	45	46	47	45	46	45	45	46	46	52	45	45	47	45	43	45	47	45	45	44	45	44	43	46
Serbia	45 (0.7)	45	45	45	45	45	45	45	47	45	45	45	45	45	44	46	45	45	47	45	45	45	44	46	45	45	46	45	45	46
Italy	43 (0.7)	44	43	43	43	44	44	43	45	43	44	43	43	44	44	48	43	43	45	43	42	43	44	44	43	43	43	43	42	45
Malaysia	42 (1.2)	42	42	42	43	43	42	42	44	42	43	42	42	43	42	46	42	42	45	42	41	42	42	43	42	42	42	42	41	44
Israel	41 (0.8)	41	41	40	40	42	41	41	43	41	41	41	41	41	41	44	41	41	42	41	40	41	41	42	41	41	41	41	40	42
Cyprus	40 (0.4)	41	40	40	41	41	40	42	40	40	40	40	40	41	40	44	40	40	42	41	40	40	40	41	40	40	41	40	40	41
Romania	40 (0.9)	40	40	40	40	40	40	40	42	40	40	40	40	41	39	41	40	40	43	41	40	40	39	41	40	40	42	40	40	41
Norway	40 (0.5)	40	40	40	40	41	40	41	42	40	41	40	40	41	42	48	40	40	41	40	39	40	42	40	40	40	39	40	37	41
Bosnia and Herzegovina	37 (0.6)	38	37	37	37	38	38	37	39	37	37	38	37	38	37	39	37	37	39	38	37	37	37	38	37	37	39	38	37	38
Lebanon	36 (0.8)	36	36	36	37	37	36	36	39	36	37	37	36	37	34	37	36	36	39	37	36	36	35	38	36	36	39	37	37	38
Thailand	36 (1.1)	36	36	36	36	36	36	36	37	36	36	36	36	36	36	39	36	36	37	35	35	36	37	36	36	35	36	35	36	36
Turkey	35 (0.9)	35	35	35	34	35	35	35	36	35	34	35	35	35	34	37	35	35	36	35	34	35	35	35	35	35	35	35	34	35
Jordan	34 (0.7)	34	34	34	34	34	34	34	35	34	34	34	34	34	33	35	34	34	36	34	33	34	34	35	34	34	35	34	33	34
Georgia	30 (0.9)	30	30	30	30	31	30	30	32	30	30	30	30	31	30	31	30	30	32	30	30	30	30	31	30	30	33	30	31	31
Tunisia	29 (0.5)	30	29	30	30	30	29	31	29	30	30	29	30	30	29	32	29	29	32	30	29	29	29	31	29	30	29	29	29	31
Iran, Islamic Rep. of	28 (0.7)	28	28	28	28	29	28	28	29	28	28	28	28	29	28	31	28	28	30	28	27	28	28	29	28	28	29	28	28	28
Egypt	28 (0.5)	28	28	28	28	28	28	28	29	28	28	28	28	28	27	29	28	28	30	28	27	28	27	29	28	28	29	28	28	28
Bahrain	28 (0.2)	28	28	27	27	28	28	28	29	27	27	27	28	28	27	30	28	28	28	27	26	27	27	28	28	28	28	27	27	28
Indonesia	27 (0.6)	28	27	27	27	28	28	27	29	27	28	27	27	28	27	30	27	28	29	27	26	27	27	28	27	27	28	27	27	28
Syrian Arab Republic	26 (0.6)	26	26	26	26	27	26	26	28	26	26	26	26	27	26	28	26	26	28	26	26	26	26	27	26	26	28	26	26	27
Palestinian Nat'l Auth.	25 (0.5)	25	25	25	24	25	25	24	26	25	24	25	25	25	24	26	25	25	26	24	24	25	24	25	25	25	26	25	24	25
Oman	25 (0.4)	25	25	24	24	25	25	25	26	24	24	25	25	25	24	26	25	25	25	24	23	24	24	25	25	25	25	25	24	24
Morocco	24 (0.5)	24	24	24	25	25	24	24	26	24	25	25	24	25	24	27	24	24	26	24	24	24	24	25	24	24	25	24	24	25
Colombia	24 (0.5)	24	24	23	23	24	24	24	24	24	24	24	24	24	24	26	24	24	24	23	23	23	23	24	24	24	23	24	23	24
Botswana	22 (0.3)	22	22	22	21	22	22	22	23	22	22	22	22	22	22	24	22	22	23	21	21	21	22	22	22	22	22	22	21	22
Qatar	18 (0.1)	18	18	18	18	19	18	18	19	18	18	18	18	18	18	19	18	18	19	18	18	18	18	18	18	18	18	18	18	18
Ghana	18 (0.4)	18	18	17	17	18	18	18	19	18	17	18	18	18	17	19	18	18	19	18	17	18	17	18	18	18	18	18	18	18
<b>International Avg.</b>	<b>40 (0.1)</b>	<b>41</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>41</b>	<b>40</b>	<b>40</b>	<b>42</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>41</b>	<b>40</b>	<b>43</b>	<b>40</b>	<b>40</b>	<b>42</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>40</b>	<b>41</b>	<b>40</b>	<b>40</b>	<b>41</b>	<b>40</b>	<b>41</b>	
<b>Benchmarking Participants</b>																														
Massachusetts, US	60 (1.2)	60	60	60	59	61	60	61	62	60	61	60	60	61	61	64	60	60	61	61	59	60	62	60	60	60	60	60	59	61
Minnesota, US	57 (1.2)	57	57	56	56	58	56	57	58	56	57	56	57	58	58	61	57	57	57	55	56	58	57	57	57	56	56	54	57	
Quebec, Canada	55 (0.9)	56	55	55	55	57	55	55	57	55	55	55	55	56	56	61	55	55	57	55	54	55	56	55	55	55	55	53	56	
Ontario, Canada	53 (0.9)	53	53	52	52	54	52	53	54	52	53	52	53	53	54	59	53	53	54	53	51	52	54	52	53	53	51	52	50	53
British Columbia, Canada	50 (0.8)	51	50	50	50	52	51	51	52	50	51	50	50	51	51	56	50	51	52	51	50	50	52	51	50	50	50	50	48	51
Basque Country, Spain	47 (0.7)	48	47	47	47	49	47	47	49	47	48	47	47	48	48	52	47	47	49	48	47	47	48	48	47	47	47	46	48	
Dubai, UAE	40 (0.5)	40	40	40	40	41	40	40	42	40	40	40	40	41	40	42	40	40	42	40	39	40	40	41	40	40	41	40	40	41
<b>Number of Items (Score Points) Identified*</b>	<b>236</b>	<b>227</b>	<b>236</b>	<b>221</b>	<b>207</b>	<b>204</b>	<b>234</b>	<b>226</b>	<b>195</b>	<b>229</b>	<b>206</b>	<b>227</b>	<b>236</b>	<b>224</b>	<b>205</b>	<b>147</b>	<b>236</b>	<b>235</b>	<b>178</b>	<b>206</b>	<b>190</b>	<b>231</b>	<b>213</b>	<b>218</b>	<b>236</b>					

### Exhibit C.1 Average Percent Correct for Test-Curriculum Matching Analysis – Mathematics (Continued)

TIMSS2007 Mathematics 8<sup>th</sup> Grade

Based on Subset of Items Specially Identified by Each Country as Addressing its Curriculum (See Exhibit C.2 for corresponding standard errors)

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Iran, Islamic Rep. of	Egypt	Bahrain	Indonesia	Syrian Arab Republic	Palestinian Nat'l Auth.	Oman	Morocco	Colombia	Botswana	Qatar	Ghana	Benchmarking Participants	Massachusetts, US	Minnesota, US	Quebec, Canada	Ontario, Canada	British Columbia, Canada	Basque Country, Spain	Dubai, UAE	Average Percent Correct on All Items	Country				
																						71	72	71	71
71	71	71	71	72	71	71	71	71	74	71	72	71	71	71	71	71	71	71	71	71	71	71	71	71 (1.0)	Chinese Taipei
71	71	71	70	71	71	71	72	70	74	70	72	70	70	71	71	71	70	70	70	70	70	70	70	70 (0.9)	Singapore
66	66	66	66	67	66	66	66	66	69	66	68	66	66	66	66	66	66	66	66	66	66	66	66	66 (1.3)	Hong Kong SAR
65	66	66	66	66	66	66	66	66	68	66	67	66	65	66	66	66	66	66	66	66	66	66	66	66 (0.5)	Japan
52	53	52	53	53	52	53	54	53	55	53	55	53	52	53	53	53	53	53	53	53	53	53	53 (0.8)	Hungary	
51	53	52	52	52	52	53	54	52	54	52	53	52	52	52	53	53	52	52	52	52	52	52	52 (1.2)	England	
51	51	51	52	51	51	51	51	51	54	51	54	51	51	51	50	51	51	51	51	51	51	51	51 (1.0)	Russian Federation	
49	51	50	50	51	50	51	51	50	53	50	51	50	50	50	51	51	50	50	50	50	50	50	50 (0.7)	United States	
48	50	49	49	49	49	50	51	49	51	49	51	49	49	49	49	49	49	49	49	49	49	49	49 (0.6)	Czech Republic	
47	48	48	48	49	48	49	49	48	50	48	50	48	48	48	49	48	48	48	48	48	48	48	48 (0.5)	Slovenia	
46	48	47	47	47	47	48	49	47	49	47	48	47	47	47	48	48	47	47	47	47	47	47	47 (0.9)	Australia	
46	47	46	46	47	46	47	48	46	50	46	49	46	46	47	47	47	46	46	46	46	46	46	46 (0.2)	Malta	
44	46	45	46	46	46	47	49	46	47	46	47	46	45	46	47	46	46	46	46	46	46	46	46 (0.5)	Sweden	
44	46	45	45	45	45	46	47	45	47	45	46	45	45	45	46	46	45	45	45	45	45	45	45 (0.9)	Scotland	
45	45	45	46	45	45	45	45	45	48	45	48	45	45	45	44	45	45	45	45	45	45	45	45 (0.7)	Serbia	
43	44	43	43	44	43	44	45	43	45	43	45	43	43	43	44	44	43	43	43	43	43	43	43 (0.7)	Italy	
42	43	42	42	43	42	43	44	42	45	42	45	42	42	42	42	42	42	42	42	42	42	42	42 (1.2)	Malaysia	
40	41	40	41	41	41	41	41	41	43	41	43	41	40	41	40	41	41	41	41	41	41	41	41 (0.8)	Israel	
40	41	40	40	41	40	41	41	40	43	40	42	40	40	40	40	40	40	40	40	40	40	40	40 (0.4)	Cyprus	
41	41	40	40	41	40	41	39	40	42	40	43	40	40	40	39	40	40	40	40	40	40	40	40 (0.9)	Romania	
38	41	40	40	40	40	41	43	40	42	40	42	40	40	40	41	41	40	40	40	40	40	40	40 (0.5)	Norway	
38	38	37	37	38	37	37	36	37	40	37	40	37	37	37	37	37	37	37	37	37	37	37	37 (0.6)	Bosnia and Herzegovina	
38	37	37	36	37	36	36	36	36	39	36	39	36	36	36	35	36	36	36	36	36	36	36	36 (0.8)	Lebanon	
36	36	36	36	36	35	36	36	36	38	36	37	36	36	36	36	36	36	36	36	36	36	36	36 (1.1)	Thailand	
35	35	34	35	35	35	35	34	35	36	35	36	35	35	35	34	35	35	35	35	35	35	35	35 (0.9)	Turkey	
34	34	34	34	35	34	34	33	34	36	34	36	34	34	34	33	34	34	34	34	34	34	34	34 (0.7)	Jordan	
31	31	30	30	31	30	30	29	30	32	30	33	30	30	30	30	30	30	30	30	30	30	30	30 (0.9)	Georgia	
30	30	30	29	30	29	30	30	29	32	29	31	29	29	30	30	29	29	29	29	29	29	29	29 (0.5)	Tunisia	
29	29	28	28	29	28	29	28	28	30	28	30	28	28	28	28	28	28	28	28	28	28	28	28 (0.7)	Iran, Islamic Rep. of	
28	28	28	28	28	28	28	28	28	30	28	30	28	28	28	27	28	28	28	28	28	28	28	28 (0.5)	Egypt	
27	28	27	28	27	28	28	27	28	29	28	29	28	27	28	27	28	28	28	28	28	28	28	28 (0.2)	Bahrain	
28	28	27	27	28	27	28	28	27	29	27	29	27	27	27	27	28	27	27	27	27	27	27	27 (0.6)	Indonesia	
27	27	26	26	27	26	26	26	26	27	26	29	26	26	26	26	26	26	26	26	26	26	26	26 (0.6)	Syrian Arab Republic	
25	25	25	25	25	25	25	24	25	26	25	26	25	24	25	24	25	25	25	25	25	25	25	25 (0.5)	Palestinian Nat'l Auth.	
25	25	24	25	25	24	25	24	25	26	25	26	25	24	25	24	25	25	25	25	25	25	25	25 (0.4)	Oman	
25	25	24	24	25	24	25	25	24	26	24	26	24	24	24	24	24	24	24	24	24	24	24	24 (0.5)	Morocco	
24	24	23	24	24	23	24	24	24	24	24	24	24	23	24	24	24	24	24	24	24	24	24	24 (0.5)	Colombia	
22	22	21	22	22	21	22	22	22	24	22	23	22	21	22	22	22	22	22	22	22	22	22	22 (0.3)	Botswana	
18	18	18	18	19	18	18	18	18	19	18	20	18	18	18	18	18	18	18	18	18	18	18	18 (0.1)	Qatar	
18	18	17	18	18	18	18	17	18	18	18	19	18	18	18	17	18	18	18	18	18	18	18	18 (0.4)	Ghana	
40	41	40	40	41	40	41	41	40	42	40	42	40	40	40	40	40	40	40	40	40	40	40	40 (0.1)	International Avg.	
<b>Benchmarking Participants</b>																									
59	61	60	60	61	60	61	61	60	63	60	61	60	60	61	61	61	60	60	60	60	60	60 (1.2)	Massachusetts, US		
55	57	56	57	57	57	58	57	57	59	57	58	57	56	57	58	57	57	57	57	57	57	57	57 (1.2)	Minnesota, US	
54	55	55	55	55	55	55	56	55	58	55	57	55	55	55	56	56	55	55	55	55	55	55	55 (0.9)	Quebec, Canada	
51	53	52	53	53	53	54	54	53	55	53	53	53	52	53	54	54	53	53	53	53	53	53	53 (0.9)	Ontario, Canada	
49	51	50	50	51	50	51	51	50	52	50	52	50	50	51	52	51	50	50	50	50	50	50	50 (0.8)	British Columbia, Canada	
47	48	47	47	47	47	48	49	47	49	47	49	47	47	47	48	47	47	47	47	47	47	47	47 (0.7)	Basque Country, Spain	
40	41	40	40	41	40	40	40	40	43	40	42	40	40	40	40	40	40	40	40	40	40	40	40 (0.5)	Dubai, UAE	
202	230	210	236	227	227	218	142	236	151	236	193	236	234	233	210	217	235	236	236	236	236	236	Number of Items (Score Points) Identified*		

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses.

**Exhibit C.2 Standard Errors for the Test-Curriculum Matching Analysis – Mathematics**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Country	Average Percent Correct on All Items	Hong Kong SAR	Singapore	Chinese Taipei	Japan	Kazakhstan	Russian Federation	England	Netherlands	United States	Germany	Denmark	Australia	Hungary	Italy	Austria	Slovenia	Sweden	Slovak Republic	Scotland	New Zealand	Czech Republic	Norway	Georgia	Iran, Islamic Rep. of	Colombia	Morocco	Tunisia	
Hong Kong SAR	77 (0.7)	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Singapore	74 (0.8)	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	
Chinese Taipei	69 (0.4)	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Japan	67 (0.5)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Kazakhstan	64 (1.7)	1.7	1.7	1.6	1.6	1.7	1.6	1.7	1.7	1.6	1.7	1.7	1.7	1.6	1.7	1.6	1.7	1.7	1.7	1.6	1.6	1.7	1.7	1.7	1.6	1.7	1.7	1.5	
Russian Federation	62 (1.1)	1.1	1.1	1.1	1.1	1.0	0.9	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.0	1.1	1.1	1.0	0.9	
England	61 (0.7)	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.8	
Netherlands	59 (0.5)	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	
United States	59 (0.6)	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	
Germany	57 (0.5)	0.6	0.5	0.5	0.5	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	
Denmark	57 (0.7)	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	
Australia	55 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Hungary	54 (0.8)	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Italy	53 (0.8)	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	
Austria	52 (0.5)	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4
Slovenia	52 (0.4)	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	
Sweden	51 (0.6)	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Slovak Republic	50 (0.9)	0.9	0.9	1.0	0.9	0.9	1.0	0.9	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Scotland	50 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	
New Zealand	49 (0.5)	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.6	
Czech Republic	47 (0.7)	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Norway	44 (0.6)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Georgia	38 (0.9)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Iran, Islamic Rep. of	30 (0.6)	0.6	0.6	0.6	0.6	0.6	0.8	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.7	0.7	
Colombia	23 (0.7)	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Morocco	23 (0.7)	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	
Tunisia	21 (0.5)	0.5	0.5	0.6	0.6	0.6	0.7	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.6	0.6	
Qatar	18 (0.1)	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
Yemen	14 (0.4)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
<b>International Avg.</b>	<b>49 (0.1)</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	
<b>Benchmarking Participants</b>																													
Massachusetts, US	69 (0.8)	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.9	0.8	0.9	0.8	0.9	0.9	0.9	0.9	0.8	0.9	
Minnesota, US	65 (1.3)	1.3	1.3	1.2	1.4	1.4	1.4	1.3	1.3	1.3	1.4	1.3	1.3	1.3	1.4	1.4	1.3	1.3	1.5	1.4	1.4	1.3	1.4	1.3	1.4	1.3	1.4	1.4	
Quebec, Canada	55 (0.8)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8
Ontario, Canada	54 (0.7)	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	
Alberta, Canada	52 (0.7)	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	
British Columbia, Canada	52 (0.7)	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	
Dubai, UAE	39 (0.4)	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Number of Items (Score Points) Identified*	188	144	165	146	126	130	68	184	152	174	142	173	165	169	172	116	159	166	94	127	162	153	179	142	140	188	109	84	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Of the 179 items in the Mathematics test, some extended-response items were scored on a two-point scale, resulting in 192 total score points. Following item review, some

items were deleted and response categories were combined for a number of items, resulting in 177 items and 188 score points.

**Exhibit C.2 Standard Errors for the Test-Curriculum Matching Analysis – Mathematics (Continued)**

**TIMSS2007**  
**Mathematics** **4<sup>th</sup>**  
**Grade**

Instructions: Read **across** the row to compare that country's performance based on the test items included by each of the countries across the top. Read **down** the column under a country name to compare the performance of the country down the left on the items included by the country listed on the top. Read along the **diagonal** to compare performance for each different country based on its own decisions about the test items to include.

Qatar	Yemen	Benchmarking Participants								Average Percent Correct on All Items	Country
		Massachusetts, US	Minnesota, US	Quebec, Canada	Ontario, Canada	Alberta, Canada	British Columbia, Canada	Dubai, UAE			
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	77 (0.7)	Hong Kong SAR	
0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	74 (0.8)	Singapore	
0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	69 (0.4)	Chinese Taipei	
0.5	0.6	0.5	0.5	0.5	0.5	0.4	0.5	0.5	67 (0.5)	Japan	
1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.7	1.7	64 (1.7)	Kazakhstan	
1.1	0.9	1.1	1.1	1.1	1.1	1.1	1.1	1.1	62 (1.1)	Russian Federation	
0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	61 (0.7)	England	
0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	59 (0.5)	Netherlands	
0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	59 (0.6)	United States	
0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	57 (0.5)	Germany	
0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	57 (0.7)	Denmark	
0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	55 (0.8)	Australia	
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	54 (0.8)	Hungary	
0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	53 (0.8)	Italy	
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	52 (0.5)	Austria	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	52 (0.4)	Slovenia	
0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6	51 (0.6)	Sweden	
0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	50 (0.9)	Slovak Republic	
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	50 (0.6)	Scotland	
0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.5	49 (0.5)	New Zealand	
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	47 (0.7)	Czech Republic	
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	44 (0.6)	Norway	
0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	38 (0.9)	Georgia	
0.6	0.8	0.6	0.6	0.6	0.6	0.7	0.7	0.6	30 (0.6)	Iran, Islamic Rep. of	
0.7	0.6	0.7	0.7	0.7	0.8	0.7	0.7	0.7	23 (0.7)	Colombia	
0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	23 (0.7)	Morocco	
0.5	0.7	0.5	0.6	0.6	0.5	0.6	0.5	0.5	21 (0.5)	Tunisia	
0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	18 (0.1)	Qatar	
0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	14 (0.4)	Yemen	
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	49 (0.1)	International Avg.	
<b>Benchmarking Participants</b>											
0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	69 (0.8)	Massachusetts, US	
1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	65 (1.3)	Minnesota, US	
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	55 (0.8)	Quebec, Canada	
0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	54 (0.7)	Ontario, Canada	
0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	52 (0.7)	Alberta, Canada	
0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	52 (0.7)	British Columbia, Canada	
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	39 (0.4)	Dubai, UAE	
178	73	188	174	165	157	140	134	188	188	Number of Items (Score Points) Identified*	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

(\*) Standard errors for the average percent of correct responses on all items appear in parentheses. The matrix contains standard errors corresponding to the average

percent correct responses based on TCMA subset of items, as displayed in Exhibit C.1.









# Appendix D

*Percentiles and Standard Deviations of  
Mathematics Achievement*

## Exhibit D.1 Percentiles of Achievement in Mathematics

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Algeria	227 (7.9)	261 (8.0)	318 (6.7)	379 (4.1)	439 (4.4)	493 (6.2)	522 (6.2)
Armenia	355 (6.2)	385 (5.1)	439 (4.3)	498 (3.6)	559 (5.8)	617 (8.2)	650 (5.4)
Australia	373 (8.2)	408 (6.5)	463 (4.1)	519 (4.3)	573 (4.2)	620 (2.9)	647 (3.9)
Austria	386 (3.1)	416 (2.9)	462 (3.6)	509 (2.3)	552 (3.0)	590 (3.7)	612 (1.5)
Chinese Taipei	457 (4.1)	488 (2.3)	532 (2.1)	578 (2.3)	623 (2.2)	663 (2.3)	686 (2.1)
Colombia	209 (10.2)	238 (4.7)	295 (6.4)	355 (6.0)	416 (4.2)	470 (5.2)	503 (8.5)
Czech Republic	361 (6.6)	392 (6.9)	440 (4.9)	490 (4.0)	536 (2.9)	576 (2.8)	597 (2.9)
Denmark	403 (9.9)	431 (4.2)	478 (3.9)	525 (3.0)	571 (2.4)	611 (3.6)	634 (4.8)
El Salvador	180 (8.9)	212 (5.7)	267 (5.0)	329 (4.9)	393 (4.2)	448 (5.0)	480 (5.4)
England	392 (4.2)	429 (5.2)	487 (3.5)	546 (2.4)	600 (3.6)	647 (4.9)	676 (4.3)
Georgia	289 (6.3)	322 (5.7)	378 (6.8)	442 (4.9)	501 (5.8)	549 (4.1)	582 (6.4)
Germany	409 (10.3)	440 (3.8)	483 (2.6)	529 (2.5)	572 (2.2)	607 (3.2)	629 (2.6)
Hong Kong SAR	493 (9.1)	520 (4.0)	564 (4.2)	609 (4.1)	653 (4.0)	691 (6.0)	712 (5.3)
Hungary	347 (12.4)	389 (8.4)	452 (6.6)	516 (3.6)	574 (3.7)	620 (2.9)	647 (4.6)
Iran, Islamic Rep. of	260 (5.6)	290 (4.4)	346 (4.9)	406 (3.2)	461 (4.2)	508 (2.9)	534 (6.4)
Italy	374 (6.1)	406 (5.6)	457 (3.7)	510 (4.4)	558 (3.3)	601 (3.8)	629 (12.2)
Japan	438 (2.6)	471 (3.0)	520 (2.1)	571 (2.9)	620 (2.1)	663 (3.3)	688 (3.8)
Kazakhstan	399 (16.3)	435 (9.1)	496 (9.9)	555 (6.4)	610 (6.2)	653 (7.3)	675 (4.3)
Kuwait	148 (8.7)	184 (5.3)	245 (3.4)	319 (5.7)	387 (3.1)	443 (5.5)	475 (5.5)
Latvia	416 (2.8)	444 (2.2)	490 (3.9)	540 (3.3)	587 (2.5)	628 (3.9)	650 (2.5)
Lithuania	396 (3.7)	430 (3.3)	482 (3.5)	535 (3.5)	583 (2.9)	624 (3.6)	645 (5.6)
Morocco	193 (3.9)	223 (6.3)	273 (6.4)	338 (4.5)	404 (6.4)	466 (6.3)	508 (15.1)
Netherlands	429 (7.0)	454 (4.9)	495 (2.9)	537 (2.0)	577 (2.8)	612 (2.6)	632 (2.3)
New Zealand	341 (7.3)	377 (4.8)	436 (2.6)	498 (2.5)	553 (2.5)	598 (2.6)	626 (3.6)
Norway	341 (7.0)	372 (3.3)	424 (4.6)	478 (3.4)	526 (2.8)	566 (3.0)	591 (5.6)
Qatar	149 (1.9)	179 (1.8)	233 (1.1)	297 (1.4)	360 (0.9)	413 (1.6)	444 (3.2)
Russian Federation	400 (4.1)	436 (4.7)	492 (5.4)	546 (4.6)	599 (5.1)	647 (6.9)	677 (9.8)
Scotland	359 (6.5)	389 (3.9)	442 (2.9)	499 (2.7)	549 (3.1)	592 (2.7)	618 (3.6)
Singapore	447 (6.5)	487 (7.1)	548 (5.1)	606 (3.5)	659 (4.0)	702 (4.5)	725 (4.1)
Slovak Republic	350 (9.8)	389 (9.7)	446 (4.2)	502 (2.6)	553 (3.8)	597 (4.5)	623 (5.2)
Slovenia	376 (4.0)	408 (3.0)	457 (2.5)	506 (1.4)	550 (2.3)	589 (3.1)	613 (2.8)
Sweden	388 (4.5)	417 (4.4)	459 (3.3)	505 (2.2)	548 (3.0)	586 (3.0)	608 (2.7)
Tunisia	139 (8.2)	178 (5.5)	249 (5.6)	332 (6.6)	411 (5.2)	469 (3.9)	501 (4.7)
Ukraine	321 (5.0)	356 (4.6)	414 (3.3)	475 (3.3)	528 (3.1)	573 (2.6)	599 (5.1)
United States	401 (3.8)	430 (4.2)	479 (2.3)	531 (2.6)	581 (3.0)	625 (3.1)	650 (5.2)
Yemen	46 (7.6)	81 (7.1)	145 (7.3)	219 (8.3)	298 (6.7)	371 (6.8)	414 (9.3)
<b>Benchmarking Participants</b>							
Alberta, Canada	394 (4.6)	421 (5.1)	463 (2.4)	506 (3.1)	550 (3.1)	588 (3.4)	612 (2.2)
British Columbia, Canada	384 (9.0)	414 (4.7)	460 (3.0)	507 (2.5)	553 (1.9)	595 (4.8)	620 (3.1)
Dubai, UAE	293 (9.5)	325 (5.7)	384 (3.6)	446 (2.0)	506 (2.3)	559 (2.1)	589 (6.2)
Massachusetts, US	457 (10.0)	485 (5.4)	527 (4.0)	573 (4.1)	619 (4.1)	661 (5.3)	687 (5.9)
Minnesota, US	418 (15.7)	452 (17.1)	504 (6.6)	559 (6.3)	609 (5.3)	649 (4.9)	675 (6.3)
Ontario, Canada	395 (4.5)	423 (5.4)	468 (6.2)	514 (5.3)	558 (5.2)	598 (4.2)	621 (3.6)
Quebec, Canada	406 (2.8)	432 (3.6)	473 (4.1)	521 (3.4)	566 (4.5)	605 (3.1)	627 (4.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

Exhibit D.1 Percentiles of Achievement in Mathematics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Algeria	291 (2.9)	311 (3.2)	346 (2.7)	386 (2.5)	427 (2.4)	465 (1.9)	485 (3.4)
Armenia	351 (5.9)	390 (5.3)	448 (2.4)	501 (2.9)	554 (4.5)	601 (6.3)	629 (6.1)
Australia	365 (6.8)	394 (8.3)	443 (3.9)	496 (2.8)	548 (4.7)	600 (7.9)	630 (8.8)
Bahrain	259 (6.5)	289 (5.3)	340 (2.7)	399 (2.2)	457 (2.3)	505 (5.3)	533 (3.1)
Bosnia and Herzegovina	322 (5.8)	352 (3.6)	405 (3.1)	460 (3.8)	509 (3.0)	552 (2.6)	578 (3.5)
Botswana	236 (3.6)	264 (3.6)	312 (2.9)	366 (2.7)	415 (3.8)	460 (3.8)	489 (4.6)
Bulgaria	280 (13.1)	324 (9.4)	398 (7.1)	473 (4.6)	536 (4.5)	586 (4.6)	617 (7.4)
Chinese Taipei	403 (7.7)	448 (6.5)	535 (5.8)	614 (5.8)	672 (4.7)	721 (4.6)	748 (7.0)
Colombia	250 (5.2)	281 (6.7)	329 (4.1)	380 (3.3)	431 (3.7)	477 (3.6)	507 (4.3)
Cyprus	310 (5.3)	347 (2.5)	409 (2.8)	471 (2.5)	528 (2.6)	575 (5.1)	603 (2.5)
Czech Republic	382 (4.5)	408 (3.2)	455 (2.5)	504 (5.0)	552 (2.7)	599 (3.6)	629 (6.3)
Egypt	222 (9.0)	258 (4.4)	321 (6.6)	392 (4.1)	462 (4.1)	521 (4.5)	553 (4.8)
El Salvador	222 (7.7)	248 (2.6)	291 (3.2)	340 (2.6)	389 (2.9)	433 (3.2)	462 (5.0)
England	366 (12.2)	400 (9.0)	459 (7.9)	518 (4.7)	574 (7.1)	618 (6.8)	642 (5.8)
Georgia	245 (9.9)	280 (8.4)	343 (8.4)	415 (6.3)	478 (3.1)	532 (10.1)	562 (6.9)
Ghana	162 (8.9)	192 (5.3)	246 (4.7)	309 (5.0)	372 (6.7)	428 (5.5)	461 (7.8)
Hong Kong SAR	394 (18.2)	438 (14.9)	518 (8.2)	585 (5.5)	638 (4.3)	681 (4.3)	706 (4.7)
Hungary	375 (9.8)	405 (4.3)	459 (6.4)	519 (3.9)	576 (3.8)	624 (5.4)	652 (4.2)
Indonesia	254 (10.7)	286 (8.7)	338 (4.5)	397 (4.2)	456 (3.4)	509 (5.4)	541 (6.6)
Iran, Islamic Rep. of	266 (5.8)	295 (4.7)	344 (4.9)	401 (4.4)	459 (5.7)	516 (7.6)	551 (9.2)
Israel	287 (9.7)	328 (8.3)	400 (6.1)	471 (2.9)	533 (5.5)	584 (7.3)	615 (4.7)
Italy	349 (5.1)	381 (5.3)	430 (3.5)	482 (2.9)	532 (3.4)	574 (6.3)	600 (5.6)
Japan	424 (4.5)	460 (5.5)	515 (3.6)	573 (3.3)	628 (4.2)	677 (4.0)	704 (4.5)
Jordan	253 (6.0)	290 (7.2)	356 (9.9)	433 (4.2)	503 (4.6)	556 (3.9)	584 (4.6)
Korea, Rep. of	435 (5.1)	475 (3.9)	537 (2.9)	604 (3.3)	662 (2.2)	711 (3.7)	738 (4.4)
Kuwait	221 (5.6)	252 (4.6)	301 (2.1)	355 (2.8)	408 (2.7)	455 (2.6)	481 (1.6)
Lebanon	329 (5.2)	354 (5.8)	397 (3.7)	446 (4.3)	502 (5.0)	549 (3.9)	574 (4.7)
Lithuania	371 (6.1)	402 (5.3)	453 (3.9)	506 (3.8)	561 (3.1)	609 (3.6)	635 (3.6)
Malaysia	342 (9.8)	372 (8.0)	421 (5.4)	474 (5.7)	529 (7.2)	578 (5.9)	603 (5.9)
Malta	315 (5.4)	359 (2.9)	431 (2.1)	499 (1.5)	553 (1.7)	597 (1.8)	622 (2.7)
Morocco	251 (5.2)	278 (5.3)	323 (4.6)	380 (3.7)	438 (4.6)	486 (5.0)	511 (4.8)
Norway	356 (4.3)	382 (2.3)	425 (2.8)	472 (2.1)	517 (1.9)	552 (2.3)	571 (3.6)
Oman	207 (7.5)	245 (6.5)	309 (5.3)	378 (4.4)	440 (3.0)	492 (2.8)	521 (2.5)
Palestinian Nat'l Auth.	195 (5.4)	233 (6.4)	297 (3.2)	370 (4.6)	439 (4.1)	498 (2.5)	530 (4.6)
Qatar	152 (3.4)	186 (3.1)	243 (1.6)	307 (1.8)	370 (2.1)	427 (2.3)	461 (1.6)
Romania	289 (7.6)	328 (7.5)	395 (5.6)	466 (5.8)	533 (6.4)	587 (4.3)	616 (4.3)
Russian Federation	372 (4.5)	402 (6.9)	455 (4.4)	515 (4.5)	569 (5.0)	617 (4.7)	644 (4.7)
Saudi Arabia	202 (5.3)	231 (4.3)	278 (3.7)	329 (3.8)	382 (4.8)	429 (4.5)	457 (4.8)
Scotland	355 (5.4)	381 (6.5)	432 (3.4)	489 (4.5)	544 (5.1)	590 (4.7)	616 (4.6)
Serbia	333 (4.9)	368 (3.8)	427 (3.8)	490 (3.9)	548 (2.8)	597 (5.4)	624 (4.1)
Singapore	422 (9.2)	463 (8.7)	533 (5.5)	601 (5.9)	661 (2.7)	706 (4.3)	731 (4.1)
Slovenia	384 (3.9)	409 (3.3)	454 (1.5)	501 (2.4)	550 (3.0)	594 (3.1)	619 (5.9)
Sweden	371 (4.7)	399 (4.1)	446 (4.9)	494 (2.7)	539 (1.9)	582 (2.8)	604 (2.8)
Syrian Arab Republic	259 (6.8)	290 (5.0)	339 (4.0)	394 (3.2)	452 (3.5)	502 (6.2)	530 (5.1)
Thailand	297 (5.3)	327 (4.7)	378 (5.9)	437 (6.2)	501 (9.3)	562 (11.0)	600 (8.9)
Tunisia	313 (4.1)	336 (2.7)	375 (4.4)	418 (2.6)	466 (3.6)	508 (2.2)	532 (5.4)
Turkey	263 (6.2)	297 (4.9)	354 (4.3)	424 (5.6)	503 (6.7)	581 (7.7)	624 (10.9)
Ukraine	310 (6.7)	346 (7.0)	404 (3.6)	467 (3.7)	523 (3.9)	572 (4.6)	603 (7.2)
United States	379 (4.8)	408 (3.4)	456 (2.6)	509 (3.2)	563 (2.5)	607 (3.3)	633 (5.3)
<b>Benchmarking Participants</b>							
Basque Country, Spain	379 (7.1)	411 (4.3)	456 (4.5)	503 (2.6)	546 (2.5)	582 (3.6)	603 (4.4)
British Columbia, Canada	386 (6.9)	415 (6.4)	462 (2.4)	512 (2.4)	558 (3.6)	600 (4.4)	624 (6.0)
Dubai, UAE	294 (5.1)	328 (4.5)	396 (4.5)	468 (3.5)	528 (4.1)	580 (3.4)	611 (4.4)
Massachusetts, US	404 (10.2)	438 (9.7)	498 (7.2)	554 (4.8)	604 (3.6)	644 (3.8)	667 (6.5)
Minnesota, US	414 (10.4)	444 (9.9)	488 (3.2)	535 (3.9)	578 (5.5)	617 (7.0)	639 (10.3)
Ontario, Canada	398 (5.0)	427 (6.7)	472 (3.7)	519 (3.4)	565 (4.7)	605 (4.0)	629 (6.2)
Quebec, Canada	418 (6.1)	442 (4.3)	481 (6.0)	527 (3.9)	575 (4.1)	617 (5.7)	641 (7.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

(1) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

## Exhibit D.2 Standard Deviations of Achievement in Mathematics

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Algeria	378 (5.2)	90 (2.9)	380 (5.9)	90 (3.1)	375 (5.2)	89 (3.2)
Armenia	500 (4.3)	90 (2.0)	504 (5.7)	90 (2.6)	495 (3.7)	89 (2.1)
Australia	516 (3.5)	83 (2.0)	513 (4.2)	79 (2.3)	519 (3.6)	87 (2.2)
Austria	505 (2.0)	68 (1.0)	498 (2.5)	66 (1.6)	512 (2.3)	69 (1.1)
Chinese Taipei	576 (1.7)	69 (0.9)	575 (2.0)	65 (1.3)	577 (2.0)	73 (1.5)
Colombia	355 (5.0)	90 (2.6)	347 (5.2)	86 (2.7)	364 (5.5)	93 (3.5)
Czech Republic	486 (2.8)	71 (1.3)	483 (3.3)	68 (1.8)	489 (3.0)	74 (1.7)
Denmark	523 (2.4)	71 (1.4)	520 (2.9)	68 (1.9)	526 (3.2)	73 (2.0)
El Salvador	330 (4.1)	91 (2.1)	325 (4.6)	89 (2.9)	334 (5.5)	92 (2.6)
England	541 (2.9)	86 (1.6)	541 (3.2)	83 (1.7)	542 (3.6)	88 (2.1)
Georgia	438 (4.2)	88 (2.1)	440 (4.2)	86 (2.5)	437 (4.9)	90 (2.6)
Germany	525 (2.3)	68 (1.2)	519 (2.5)	68 (1.7)	531 (2.5)	68 (1.8)
Hong Kong SAR	607 (3.6)	67 (1.4)	605 (3.2)	64 (1.5)	609 (4.4)	70 (1.9)
Hungary	510 (3.5)	91 (2.3)	508 (4.6)	90 (2.8)	511 (3.8)	93 (2.6)
Iran, Islamic Rep. of	402 (4.1)	84 (2.2)	409 (5.2)	79 (2.5)	396 (5.5)	87 (3.2)
Italy	507 (3.1)	77 (1.8)	499 (3.2)	76 (2.2)	514 (3.6)	78 (1.8)
Japan	568 (2.1)	76 (1.4)	568 (2.5)	73 (1.4)	568 (2.7)	79 (2.0)
Kazakhstan	549 (7.1)	84 (3.7)	553 (6.7)	82 (4.3)	545 (7.9)	85 (3.6)
Kuwait	316 (3.6)	99 (2.2)	333 (4.3)	92 (2.5)	297 (6.2)	103 (3.0)
Latvia	537 (2.3)	72 (1.3)	539 (2.9)	69 (1.9)	536 (3.0)	74 (2.0)
Lithuania	530 (2.4)	76 (1.8)	530 (2.8)	73 (1.7)	530 (3.2)	79 (2.4)
Morocco	341 (4.7)	95 (2.7)	339 (5.0)	94 (3.1)	343 (5.4)	96 (3.2)
Netherlands	535 (2.1)	61 (1.4)	530 (2.7)	61 (1.5)	540 (2.4)	61 (1.8)
New Zealand	492 (2.3)	86 (2.0)	492 (2.4)	82 (2.0)	493 (3.1)	90 (2.4)
Norway	473 (2.5)	76 (1.3)	470 (3.2)	76 (2.0)	477 (3.0)	76 (1.6)
Qatar	296 (1.0)	90 (0.7)	307 (2.0)	86 (1.4)	285 (2.1)	93 (1.5)
Russian Federation	544 (4.9)	83 (2.4)	548 (5.5)	81 (3.0)	540 (4.9)	85 (3.1)
Scotland	494 (2.2)	79 (1.4)	490 (2.6)	75 (2.0)	499 (2.8)	83 (1.6)
Singapore	599 (3.7)	84 (2.1)	603 (3.8)	80 (2.2)	596 (4.1)	88 (2.3)
Slovak Republic	496 (4.5)	85 (4.0)	493 (4.6)	85 (5.0)	499 (4.7)	85 (3.4)
Slovenia	502 (1.8)	71 (1.0)	499 (2.4)	68 (1.4)	504 (2.1)	74 (1.4)
Sweden	503 (2.5)	66 (1.2)	499 (2.4)	64 (1.4)	506 (3.1)	68 (1.7)
Tunisia	327 (4.5)	111 (2.3)	337 (4.7)	108 (2.9)	319 (5.0)	113 (2.5)
Ukraine	469 (2.9)	84 (1.6)	469 (3.3)	81 (2.0)	469 (3.4)	87 (2.2)
United States	529 (2.4)	75 (1.2)	526 (2.7)	74 (1.5)	532 (2.7)	77 (1.3)
Yemen	224 (6.0)	110 (2.7)	236 (8.0)	108 (3.5)	214 (6.6)	111 (3.4)
<b>Benchmarking Participants</b>						
Alberta, Canada	505 (3.0)	66 (1.8)	500 (3.2)	64 (1.8)	510 (3.2)	68 (2.3)
British Columbia, Canada	505 (2.7)	71 (1.5)	502 (3.1)	70 (1.8)	508 (3.0)	72 (1.8)
Dubai, UAE	444 (2.1)	90 (2.2)	452 (4.0)	82 (2.5)	438 (4.9)	95 (2.9)
Massachusetts, US	572 (3.5)	70 (1.8)	567 (3.7)	68 (2.5)	578 (4.2)	71 (2.6)
Minnesota, US	554 (5.9)	78 (3.6)	551 (6.1)	75 (2.9)	557 (6.3)	80 (5.6)
Ontario, Canada	512 (3.1)	68 (1.8)	509 (3.2)	66 (2.0)	514 (3.7)	70 (2.4)
Quebec, Canada	519 (3.0)	67 (1.1)	515 (3.5)	67 (1.7)	524 (3.3)	67 (1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

## Exhibit D.2 Standard Deviations of Achievement in Mathematics (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Algeria	387 (2.1)	59 (1.0)	384 (2.4)	60 (1.1)	389 (2.2)	59 (1.2)
Armenia	499 (3.5)	85 (2.7)	501 (4.4)	85 (3.5)	497 (3.5)	85 (2.6)
Australia	496 (3.9)	79 (2.2)	488 (5.5)	75 (2.8)	504 (5.4)	82 (3.0)
Bahrain	398 (1.6)	84 (1.5)	414 (2.2)	73 (1.6)	382 (2.6)	90 (1.9)
Bosnia and Herzegovina	456 (2.7)	78 (1.5)	456 (3.1)	77 (1.9)	455 (2.8)	79 (1.9)
Botswana	364 (2.3)	77 (1.4)	371 (2.4)	74 (1.7)	355 (3.2)	79 (1.7)
Bulgaria	464 (5.0)	102 (3.5)	471 (4.6)	97 (3.6)	456 (6.3)	106 (3.9)
Chinese Taipei	598 (4.5)	106 (2.2)	599 (4.6)	98 (2.3)	598 (5.3)	112 (3.0)
Colombia	380 (3.6)	79 (2.2)	364 (4.2)	74 (2.4)	396 (4.1)	81 (2.7)
Cyprus	465 (1.6)	89 (1.1)	476 (2.2)	84 (1.8)	455 (2.4)	94 (1.5)
Czech Republic	504 (2.4)	74 (1.7)	505 (2.5)	73 (2.1)	503 (2.8)	74 (1.9)
Egypt	391 (3.6)	100 (1.7)	397 (5.0)	98 (2.1)	384 (4.6)	102 (2.2)
El Salvador	340 (2.8)	73 (2.1)	331 (3.8)	73 (2.6)	351 (3.6)	71 (3.0)
England	513 (4.8)	84 (3.0)	511 (5.0)	82 (3.3)	516 (6.1)	85 (3.3)
Georgia	410 (5.9)	96 (3.0)	412 (5.9)	92 (2.5)	408 (6.7)	100 (4.1)
Ghana	309 (4.4)	92 (2.7)	297 (5.0)	91 (2.9)	319 (4.4)	91 (2.9)
Hong Kong SAR	572 (5.8)	94 (3.7)	578 (5.0)	87 (3.7)	567 (8.0)	99 (4.1)
Hungary	517 (3.5)	85 (1.8)	517 (4.1)	83 (2.3)	517 (3.7)	86 (2.1)
Indonesia	397 (3.8)	87 (2.3)	399 (4.1)	88 (2.8)	395 (4.4)	87 (2.5)
Iran, Islamic Rep. of	403 (4.1)	86 (2.4)	407 (5.3)	83 (3.3)	400 (6.1)	89 (3.6)
Israel	463 (3.9)	99 (2.3)	465 (4.6)	95 (2.8)	462 (4.9)	103 (2.9)
Italy	480 (3.0)	76 (1.8)	477 (3.3)	75 (2.3)	483 (3.5)	78 (1.9)
Japan	570 (2.4)	85 (1.6)	568 (3.2)	85 (2.6)	572 (3.2)	86 (1.8)
Jordan	427 (4.1)	102 (1.8)	438 (6.4)	96 (2.3)	417 (5.6)	107 (2.5)
Korea, Rep. of	597 (2.7)	92 (1.2)	595 (3.3)	89 (1.4)	599 (3.1)	95 (1.8)
Kuwait	354 (2.3)	79 (1.5)	364 (2.7)	71 (1.2)	342 (4.0)	85 (2.2)
Lebanon	449 (4.0)	75 (2.0)	443 (4.1)	74 (2.5)	456 (4.7)	75 (2.3)
Lithuania	506 (2.3)	80 (1.6)	509 (3.0)	78 (1.6)	502 (2.3)	81 (2.0)
Malaysia	474 (5.0)	79 (2.8)	479 (5.6)	77 (3.0)	468 (5.3)	81 (2.9)
Malta	488 (1.2)	92 (0.9)	488 (1.5)	88 (1.1)	488 (1.7)	96 (1.2)
Morocco	381 (3.0)	80 (1.6)	377 (3.7)	80 (2.4)	385 (3.9)	80 (2.4)
Norway	469 (2.0)	66 (0.9)	471 (2.1)	63 (1.3)	467 (2.6)	68 (1.3)
Oman	372 (3.4)	95 (1.9)	399 (3.6)	83 (1.6)	344 (5.0)	98 (2.4)
Palestinian Nat'l Auth.	367 (3.5)	102 (1.9)	385 (4.2)	98 (2.6)	349 (5.4)	103 (2.5)
Qatar	307 (1.4)	93 (0.9)	325 (2.1)	85 (1.5)	288 (2.0)	98 (1.2)
Romania	461 (4.1)	100 (2.4)	470 (4.2)	95 (2.7)	452 (4.6)	103 (2.7)
Russian Federation	512 (4.1)	83 (1.7)	514 (4.3)	80 (2.0)	509 (4.7)	86 (2.0)
Saudi Arabia	329 (2.9)	76 (1.4)	341 (3.6)	71 (1.4)	319 (4.0)	80 (2.1)
Scotland	487 (3.7)	80 (2.0)	486 (3.8)	78 (2.2)	489 (4.4)	81 (2.4)
Serbia	486 (3.3)	89 (1.9)	489 (3.6)	87 (2.5)	483 (4.0)	92 (2.2)
Singapore	593 (3.8)	93 (2.7)	600 (4.1)	88 (3.0)	586 (4.6)	97 (3.0)
Slovenia	501 (2.1)	72 (1.0)	500 (2.7)	69 (1.3)	503 (2.6)	74 (1.4)
Sweden	491 (2.3)	70 (1.3)	493 (2.6)	68 (1.6)	490 (2.5)	72 (1.7)
Syrian Arab Republic	395 (3.8)	82 (1.9)	387 (4.3)	80 (2.1)	403 (5.1)	84 (2.7)
Thailand	441 (5.0)	92 (3.3)	453 (5.3)	87 (3.3)	430 (5.5)	94 (3.8)
Tunisia	420 (2.4)	67 (1.2)	410 (2.8)	67 (1.4)	431 (2.7)	64 (1.7)
Turkey	432 (4.8)	109 (2.1)	432 (5.3)	107 (2.5)	432 (5.0)	110 (2.4)
Ukraine	462 (3.6)	89 (2.2)	465 (3.9)	85 (2.4)	459 (3.9)	94 (2.4)
United States	508 (2.8)	77 (1.4)	507 (3.0)	75 (1.5)	510 (3.1)	78 (1.4)
<b>Benchmarking Participants</b>						
Basque Country, Spain	499 (3.0)	69 (2.1)	496 (3.9)	65 (2.1)	501 (3.9)	72 (2.6)
British Columbia, Canada	509 (3.0)	72 (2.2)	507 (3.3)	70 (2.3)	512 (3.4)	74 (2.5)
Dubai, UAE	461 (2.4)	96 (1.6)	461 (5.2)	90 (2.6)	461 (5.9)	101 (3.3)
Massachusetts, US	547 (4.6)	79 (3.5)	544 (4.8)	79 (3.7)	550 (5.1)	79 (3.9)
Minnesota, US	532 (4.4)	68 (2.7)	531 (4.4)	66 (2.9)	535 (5.1)	70 (2.9)
Ontario, Canada	517 (3.5)	70 (2.3)	513 (4.1)	67 (2.1)	522 (4.0)	73 (3.0)
Quebec, Canada	528 (3.5)	68 (2.7)	527 (3.5)	66 (1.9)	529 (4.6)	70 (3.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



# Appendix E

*Mongolia—Mathematics Achievement*

## Exhibit E.1 Mongolia – Selected Mathematics Achievement Results\*

TIMSS2007  
Mathematics 4<sup>th</sup> Grade

Distribution of Mathematics Achievement									
Mean Achievement	Years of Formal Schooling**	Average Age at Time of Testing	5th Percentile (Scale Score)	10th Percentile (Scale Score)	25th Percentile (Scale Score)	50th Percentile (Scale Score)	75th Percentile (Scale Score)	90th Percentile (Scale Score)	95th Percentile (Scale Score)
436 (4.1)	4	11	289 (5.1)	321 (3.7)	378 (4.1)	440 (3.8)	497 (5.4)	542 (4.1)	569 (4.3)

Mathematics Achievement by Gender		
Mean Achievement	Girls' Mean	Boys' Mean
436 (4.1)	436 (4.3)	435 (4.6)

Average Achievement in Mathematics Content Domains by Gender			
Content Domain	Girls' Mean	Boys' Mean	Overall Mean
Number	463 (4.2)	463 (4.2)	463 (3.9)
Geometric Shapes and Measures	390 (4.7)	391 (5.4)	390 (4.6)
Data Display	424 (4.1)	423 (5.1)	424 (3.8)

Average Achievement in Mathematics Cognitive Domains by Gender			
Content Domain	Girls' Mean	Boys' Mean	Overall Mean
Knowing	451 (4.7)	455 (4.7)	454 (4.1)
Applying	428 (5.1)	424 (6.1)	426 (4.9)
Reasoning	429 (5.0)	432 (4.4)	431 (4.4)

Percentages of Students Reaching International Benchmarks in Mathematics			
Advanced International Benchmark (625)	High International Benchmark (550)	Intermediate International Benchmark (475)	Low International Benchmark (400)
1 (0.3)	8 (1.1)	34 (1.9)	67 (1.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Because characteristics of their samples and data are not completely known, selected achievement results for Mongolia at the fourth and eighth grades are presented in Appendix E.

\*\* Represents years of schooling counting from the first year of ISCED Level 1.

() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



Exhibit E.1 Mongolia – Selected Mathematics Achievement Results\* (Continued)

TIMSS2007  
Mathematics 8<sup>th</sup> Grade

Distribution of Mathematics Achievement									
Mean Achievement	Years of Formal Schooling**	Average Age at Time of Testing	5th Percentile (Scale Score)	10th Percentile (Scale Score)	25th Percentile (Scale Score)	50th Percentile (Scale Score)	75th Percentile (Scale Score)	90th Percentile (Scale Score)	95th Percentile (Scale Score)
432 (3.8)	8	15	295 (6.5)	326 (5.4)	377 (4.0)	435 (4.4)	490 (6.1)	536 (5.5)	563 (5.2)

Mathematics Achievement by Gender		
Mean Achievement	Girls' Mean	Boys' Mean
432 (3.8)	428 (3.8)	437 (4.4) ⬆

Average Achievement in Mathematics Content Domains by Gender			
Content Domain	Girls' Mean	Boys' Mean	Overall Mean
Number	441 (4.1)	453 (3.8) ⬆	447 (3.5)
Algebra	433 (3.9)	437 (4.7)	435 (3.9)
Geometry	408 (4.9)	418 (4.6) ⬆	413 (4.3)
Data and Chance	417 (3.3)	420 (4.5)	418 (3.5)

Average Achievement in Mathematics Cognitive Domains by Gender			
Cognitive Domain	Girls' Mean	Boys' Mean	Overall Mean
Knowing	439 (4.3)	445 (4.6)	442 (4.1)
Applying	415 (4.5)	426 (4.7) ⬆	420 (4.1)
Reasoning	444 (3.5)	453 (4.3) ⬆	449 (3.5)

Percentages of Students Reaching International Benchmarks in Mathematics			
Advanced International Benchmark (625)	High International Benchmark (550)	Intermediate International Benchmark (475)	Low International Benchmark (400)
1 (0.2)	7 (0.9)	31 (1.9)	66 (1.8)

⬆ Significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

\* Because characteristics of their samples and data are not completely known, selected achievement results for Mongolia at the fourth and eighth grades are presented in Appendix E.

\*\* Represents years of schooling counting from the first year of ISCED Level 1.

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.



# Appendix F

## *Organizations and Individuals Responsible for TIMSS 2007*

### **Introduction**

TIMSS 2007 was a collaborative effort involving hundreds of individuals around the world. This appendix recognizes the individuals and organizations for their contributions. Given the work on TIMSS 2007 has spanned approximately five years and has involved so many people and organizations, this list may not include all who contributed. Any omission is inadvertent.

Of the first importance, TIMSS 2007 is deeply indebted to the students, teachers, and school principals who contributed their time and effort to the study.

### **Management and Coordination**

TIMSS is a major undertaking of IEA, and together with PIRLS, comprises the core of IEA's regular cycle of studies. PIRLS, which regularly assesses reading at the fourth grade, complements the TIMSS assessments.

The TIMSS & PIRLS International Study Center at Boston College has responsibility for the overall direction and management of the TIMSS and PIRLS projects. Headed by Drs. Michael O. Martin and Ina V.S. Mullis, the study center is located in the Lynch School of Education. In carrying out the project, the TIMSS & PIRLS International Study Center worked closely with

the IEA Secretariat in Amsterdam, which provided guidance overall and was responsible for verification of all translations produced by the participating countries. The IEA Data Processing and Research Center in Hamburg was responsible for processing and verifying the internal consistency and accuracy of the data submitted by the participants. Statistics Canada in Ottawa was responsible for school and student sampling activities. Educational Testing Service (ETS) in Princeton, New Jersey provided psychometric methodology recommendations addressing calibration, scaling, and survey design changes implemented in TIMSS 2007, and assisted in executing the item calibration analyses and made available software for scaling the achievement data.

The Project Management Team, comprised of the Directors and Senior Management from the TIMSS & PIRLS International Study Center, the IEA Secretariat, the IEA Data Processing and Research Center, Statistics Canada, and ETS met twice a year throughout the study to discuss the study's progress, procedures, and schedule. In addition, the Directors of the TIMSS & PIRLS International Study Center met with members of IEA's Technical Executive Group twice yearly to review technical issues.

Dr. Graham Ruddock from the National Foundation for Educational Research in England (NFER) was the TIMSS 2007 Mathematics Coordinator and Dr. Christine O'Sullivan from K-12 Consulting was the TIMSS 2007 Science Coordinator. Together with the Science and Mathematics Item Review Committee, a panel of internationally recognized experts in mathematics and science research, curriculum, instructions, and assessments, they provided excellent guidance throughout TIMSS 2007.

To work with the international team and coordinate within-country activities, each participating country designated one or two individuals to be the TIMSS National Research Coordinator or Co-Coordinators, known as the NRCs. The NRCs had the complicated and challenging task of implementing the TIMSS 2007 study in their countries in accordance with TIMSS guidelines and procedures. The quality of the TIMSS 2007 assessment and data depends on the work of the NRCs and their colleagues in carrying out the very complex sampling, data collection, and scoring tasks involved. In addition, the Questionnaire Development Group, comprised of NRCs, provided advice on questionnaire development.

Continuing the tradition of truly exemplary work established in previous TIMSS assessments, the TIMSS 2007 NRCs (often the same NRCs as in previous assessments), performed their many tasks with dedication, competence, energy, and goodwill, and have been commended by the IEA Secretariat, the TIMSS & PIRLS International Study Center, the IEA Data Processing and Research Center, and Statistics Canada for their commitment to the project and the high quality of their work.

### **Funding**

A project of this magnitude requires considerable financial support. IEA's major funding partners for TIMSS 2007 included the World Bank, the U.S. Department of Education through the National Center for Education Statistics, the United Nations Development Programme (UNDP) and those countries that contributed by way of fees. The financial support provided by Boston College and NFER also is gratefully acknowledged.

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