

TRENDS IN INTERNATIONAL MATHEMATICS AND SCIENCE STUDY

# TIMSS

# TIMSS 2015 International Results in Mathematics

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TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS

# EIGHTH GRADE MATHEMATICS



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# About TIMSS 2015

In 2015, IEA and its TIMSS & PIRLS International Study Center at Boston College conducted TIMSS 2015 at fourth and eighth grades and TIMSS Advanced 2015 for students in the final year of secondary school enrolled in special advanced mathematics and physics programs or tracks. Both TIMSS 2015 and TIMSS Advanced 2015 provide 20-year trend measures for countries that participated in the first TIMSS assessments in 1995.

TIMSS 2015 and TIMSS Advanced 2015 continue the long history of international assessments in mathematics and science conducted by IEA – the International Association for the Evaluation of Educational Achievement. IEA is an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement since 1959. IEA pioneered international comparative assessments of educational achievement in the 1960s to gain a deeper understanding of the effects of policies across countries' different systems of education.

IEA's TIMSS & PIRLS International Study Center is located in the Lynch School of Education at Boston College and has been responsible for directing TIMSS and TIMSS Advanced since 1995.

## TIMSS 2015

TIMSS is an international assessment of mathematics and science at the fourth and eighth grades that has been conducted every four years since 1995. TIMSS 2015 is the sixth assessment in the TIMSS series monitoring 20 years of trends in educational achievement, together with comprehensive data on students' contexts for learning mathematics and science.

In 2015, 57 countries and 7 benchmarking entities (regional jurisdictions of countries such as states or provinces) participated in TIMSS. In total, more than 580,000 students participated in TIMSS 2015.

The TIMSS 2015 mathematics and science assessments are based on comprehensive frameworks developed collaboratively with the participating countries. For each curriculum area at each grade, the frameworks are organized around two dimensions: a content dimension specifying the content to be assessed and a cognitive dimension specifying the thinking processes to be assessed. The TIMSS assessments contain nearly 800 assessment items, about 200 per grade for each curriculum area. The majority of TIMSS items assess students' applying and reasoning skills.

New for TIMSS 2015, a home questionnaire was completed by fourth grade students' parents or caregivers, in addition to the questionnaires routinely given at both fourth and eighth grades to students, teachers, school principals, and curriculum specialists. The questionnaire data primarily are reported in the form of indices created using IRT scaling methods, and results are presented for three regions of the scales (most to least desirable). When possible, scales were developed in parallel to provide comparisons between mathematics and science as well as the fourth and eighth grades.

TIMSS has the goal of helping countries make informed decisions about how to improve teaching and learning in mathematics and science. With its strong curricular focus and emphasis on policy relevant information about the home, school, and classroom contexts for learning, TIMSS is a valuable tool that countries can use to evaluate achievement goals and standards and monitor students' achievement trends in an international context. The *TIMSS 2015 Encyclopedia* complements the quantitative information in the international reports with a chapter by each country summarizing mathematics and science curricula, instructional practices, and teacher education requirements.

## Countries Participating in TIMSS 2015

Exhibit 1 lists the 57 countries participating in TIMSS 2015, including some distinct educational systems within countries that have always participated separately throughout IEA's long history (e.g., the Dutch-speaking part of Belgium and Hong Kong Special Administrative Region (SAR) of the People's Republic of China). In addition, TIMSS had 7 benchmarking participants including a variety of educational entities.

Armenia  
Australia  
Bahrain  
Belgium (Flemish)  
Botswana  
Bulgaria  
Canada  
Chile  
Chinese Taipei  
Croatia  
Cyprus  
Czech Republic  
Denmark  
Egypt  
England  
Finland  
France  
Georgia  
Germany  
Hong Kong SAR  
Hungary  
Indonesia  
Iran, Islamic Rep. of  
Ireland  
Israel  
Italy

Japan  
Jordan  
Kazakhstan  
Korea, Rep. of  
Kuwait  
Lebanon  
Lithuania  
Malaysia  
Malta  
Morocco  
Netherlands  
New Zealand  
Northern Ireland  
Norway  
Oman  
Poland  
Portugal  
Qatar  
Russian Federation  
Saudi Arabia  
Serbia  
Singapore  
Slovak Republic  
Slovenia  
South Africa  
Spain

Sweden  
Thailand  
Turkey  
United Arab Emirates  
United States

### Benchmarking Participants

Buenos Aires, Argentina  
Ontario, Canada  
Quebec, Canada  
Abu Dhabi, UAE  
Dubai, UAE  
Florida, US

Countries and benchmarking participants could elect to participate in the fourth grade assessment, the eighth grade assessment, or both. Also, countries where students were expected to find the TIMSS assessments too difficult at the fourth grade could participate in the newly developed TIMSS Numeracy assessment, a less difficult version of the fourth grade mathematics assessment. Fifty countries and the 7 benchmarking participants administered the fourth grade assessments. Of those, 7 countries and 1 benchmarking entity participated in the Numeracy assessment, including Bahrain, Indonesia, Iran, Kuwait, Jordan, Morocco, and South Africa as well as Buenos Aires. Each of these participants gave both the fourth grade assessments in mathematics and science as well as the Numeracy assessment, except Jordan and South Africa that participated in Numeracy only. Thirty-nine countries and the 7 benchmarking participants administered the eighth grade mathematics and science assessments. Norway chose to assess fifth and ninth grades to obtain better comparisons with Sweden and Finland (but also collected benchmark data at fourth and eighth grades). Botswana and South Africa assessed ninth grade to better match their curricula and to maintain trend measurement. Exhibit 2 provides more information about the students assessed in TIMSS 2015, including average ages as well as policies for age of entry, promotion, and retention.

In each grade, nationally representative samples of approximately 4,000 students from 150-200 schools participated in TIMSS 2015. Including the mathematics, numeracy, and science assessments and questionnaires, more than 312,000 students, 250,000 parents, 20,000 teachers, and 10,000 schools participated in the fourth grade assessments, and a further 270,000 students, 31,000 teachers, and 8,000 schools in the eighth grade assessments.

**Exhibit 2: Information About the Students Assessed in TIMSS 2015**

Reported by National Research Coordinators, except Average Ages are from TIMSS 2015 Data

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Australia	Year 4	10.0	Year 8	14.0	Varies by state, but generally children must begin school by age 6.	Most children begin school when they are 4.5–5 years old, but some wait until the compulsory age, either on advice from preschool staff or on the judgment of parents, usually because of maturity.
Bahrain	Grade 4	9.9	Grade 8	14.0	Children must be 6 years old to begin school in September.	Follows policy
Belgium (Flemish)	Grade 4	10.1			Children must begin school in September during the calendar year of their 6th birthday.	Parents can keep their child in kindergarten until age 7, with approval from an independent counseling center. Homeschooling is also practiced. Children with serious disabilities can be exempt from compulsory education.
Botswana (9)			Grade 9	15.6	Children must be 6 years old by the end of June to begin in January of the same calendar year.	Children from remote areas or disadvantaged children may begin later than age 6. Children enter private schools at age 5.
Bulgaria	Grade 4	10.8			Children must begin school during the calendar year of their 7th birthday.	Children may begin at the age of 6 with parental/guardian discretion.
Canada	Grade 4	9.9	Grade 8	14.0	Varies by province, but most children begin school at the age of 6.	Practice varies by province, but generally parents have the option of accelerating or delaying enrollment by one year. Some parents opt to homeschool their children.
Chile	Basic 4	10.2	Basic 8	14.3	Children must be 6 years old by March 31 of the year they begin school.	Principals are allowed some discretion regarding the admission of children who will turn 6 after March 31 but before June 30.
Chinese Taipei	Grade 4	10.2	Grade 8	14.3	Children must be 6 years old to begin school in September.	Parents can apply for early enrollment to elementary schools. Legal representatives can apply to delay enrollment to elementary schools for children with disabilities.
Croatia	Grade 4	10.6			Children can begin school during the calendar year of their 6th birthday.	Children typically begin primary school at age 7 because their parents feel they will benefit from being more mature.
Cyprus	Grade 4	9.8			Children can begin school if they are 5.75 years old before September 1.	Parents can apply to delay enrollment of children for one year with the approval of the Director of Primary Education.
Czech Republic	Grade 4	10.4			Children must be 6 years old to begin school in September.	On one hand, parents may request that children born after September 1 be allowed to enroll at age 5 with pedagogical and psychological certification. On the other hand, about 22% of students every year receive permission to postpone enrollment for one year.
Denmark	Grade 4	10.9			Children can begin school during the calendar year of their 6th birthday.	Parents may request early enrollment for mature children whose 5th birthdays are before October 1 from the school principal. Parents may also request a one-year postponement of enrollment for developmentally challenged children from the municipal council.
Egypt			–	14.1	Children must be 6 years old by the end of September to begin school.	Follows policy
England	Year 5	10.1	Year 9	14.1	Children must begin school during the calendar year of their 5th birthday.	Most children begin school the September after their 4th birthday. Parents may request that their child's entry to school is deferred until later in the school year and up until the compulsory school age.
Finland	Grade 4	10.8			Children must begin school during the calendar year of their 7th birthday.	It is possible for parents to enroll children one year earlier or one year later than the official policy.
France	CM1	9.9			Children must begin school in September of the calendar year of their 6th birthday.	In rare cases it is possible for parents and/or teachers to request early enrollment for academically advanced and mature children or to request a one-year delay in enrollment for immature children.

\* The TIMSS target population is the grade that represents four years or eight years of schooling counting from the first year of ISCED Level 1. However, IEA has a policy that students do not fall under the minimum average age of 9.5 years old (Grade 4) or 13.5 years old (Grade 8) at the time of testing, so England, Malta, and New Zealand assessed students in their fifth year or ninth year of formal schooling.

A dash (-) indicates comparable data not available.



**Exhibit 2: Information About the Students Assessed in TIMSS 2015**  
**(Continued)**

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Georgia	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old to begin school.	Follows policy
Germany	Grade 4	10.4			Varies by state, but generally children must have reached their 6th birthday before a statutory qualifying date (usually between June 30 and September 30) to begin school on August 1.	Varies by state, but generally, parents may request early enrollment from the local primary school or request deferred enrollment from the school administration for children with demonstrated physical or mental disabilities.
Hong Kong SAR	Primary 4	10.1	Secondary 2	14.2	Children begin school if they are 5.75 years old before September 1.	Some parents choose not to enroll their children according to policy.
Hungary	Grade 4	10.7	Grade 8	14.7	Children must be 6 years old before August 31 to begin school that year.	Children may remain in preschool for an extra year upon recommendation from a committee of experts.
Indonesia	Grade 4	10.4			Children must be 6 years old to begin school in August.	Parents may request early enrollment for mature students. In rural areas, it is common for children to enroll at age 7.
Iran, Islamic Rep. of	Grade 4	10.2	Grade 8	14.2	Children must be 6 years old by September 21 to begin school that year.	Parents may enroll their children at age 7.
Ireland	Fourth Class	10.4	Second Year	14.4	Children can begin school (ISCED 0) at age 4, but must begin school by age 6.	Most children begin primary school at age 4–5, the first two years of which are pre-primary grades.
Israel			Grade 8	14.0	Children begin school the calendar year of their 6th birthday.	Parents may apply for delayed enrollment and have the final say in enrollment decisions.
Italy	Primary Grade 4	9.7	Lower Secondary Grade 3	13.8	Children begin school the calendar year of their 6th birthday.	Parents have discretion over early or delayed enrollment.
Japan	Grade 4	10.5	Grade 8	14.5	Children must be 6 years old by April 1 to begin school.	Follows policy
Jordan	Grade 4	9.8	Grade 8	13.8	Children must be at least 5.75 years old by September 1 to begin school.	Follows policy
Kazakhstan	Grade 4	10.3	Grade 8	14.3	Children must begin school at age 6.	Parents can delay enrollment for one year.
Korea, Rep. of	Elementary School Grade 4	10.5	Middle School Grade 2	14.4	Children must be 6 years old by the end of December to begin school the following March.	Parents can decide to enroll academically advanced children one year earlier or postpone enrollment for one year for health reasons with the permission of the school superintendent.
Kuwait	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old by March 15 to begin school that calendar year.	Follows policy
Lebanon			Grade 8	14.2	Children must be 6 years old by the end of June to begin school the following September.	Parental discretion is not allowed in private schools. In public schools there may be special cases authorized by the Ministry of Education.
Lithuania	Grade 4	10.7	Grade 8	14.7	Children begin school during the calendar year of their 7th birthday.	Parents can request early enrollment or request to delay enrollment by one year.
Malaysia			Form 2	14.3	Children must be at least 6 years old to begin school.	Follows policy
Malta			Year 9	13.8	Children begin school during the calendar year of their 5th birthday.	Follows policy
Morocco	Grade 4	10.3	Middle School Year 2	14.5	Children must be 6 years old to begin school.	Follows policy
Netherlands	Group 6	10.0			Children must start kindergarten on the first day of the month after their 5th birthday.	Most children begin kindergarten when they are 4 years old and begin primary school when they are 6 years old. Some children start primary school later if the school thinks that the child would benefit from being more mature. Parents are involved in this decision, but the school has the final say.
New Zealand	Year 5	10.0	Year 9	14.1	Children can begin school at age 5, but must be enrolled in primary school by their 6th birthday.	Most children begin school on or soon after their 5th birthday.
Northern Ireland	Year 6	10.4			Children must be 4 years old by July 1 to begin school in September.	Follows policy

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2: Information About the Students Assessed in TIMSS 2015**  
**(Continued)**

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
Norway (5, 9)	Grade 5	10.7	Grade 9	14.7	Children must begin school during the calendar year of their 6th birthday.	Follows policy
Oman	Grade 4	9.6	Grade 8	14.0	Children begin school during the calendar year of their 6th birthday.	Follows policy
Poland	Grade 4	10.7			Children must begin school during the calendar year of their 6th birthday.	From 2012–2015, parents could decide whether to send their children to school at age 6 or age 7.
Portugal	Grade 4	9.9			Children must be 6 years old by September 15 to begin school in that calendar year.	Parents or legal guardians can request that children who will be 6 years old between September 16 and December 31 be allowed to enroll in primary education in the school year of their 6th birthday.
Qatar	Grade 4	10.1	Grade 8	14.1	Children must be 6 years old by the end of December to begin school in September.	Follows policy
Russian Federation	Grade 4	10.8	Grade 8	14.7	Children begin school when they are at least 6.5 years old by September 1 of that school year.	Children under 6.5 years old may begin school with consent of the parents and school principal. Parents may delay entry until age 7 or older if they want the child to be more mature, or for health reasons.
Saudi Arabia	Grade 4	10.0	Grade 8	14.1	Children must be 6 years old by the end of August to begin school in September.	Follows policy
Serbia	Grade 4	10.7			Children must be 6.5–7 years old to begin school.	Schools may recommend one year of continued preparatory preschool for children not considered school ready. If the child is over 7.5 years old, and due to illness or other differences did not enroll in first grade, he or she may enroll in the first or other appropriate grade based on the results of testing.
Singapore	Primary 4	10.4	Secondary 2	14.4	According to the Compulsory Education Act, children must begin school in the calendar year of their 7th birthday.	Parents may seek a deferral of registration for medical reasons or if the child is homeschooled.
Slovak Republic	Grade 4	10.4			Children must begin school on September 1 if their 6th birthday is before August 31.	Children may begin school early or after an approved delay based on psychological tests and professional recommendations.
Slovenia	Grade 4	9.8	Grade 8	13.8	Children begin school during the calendar year of their 6th birthday.	Parents can request early enrollment for children who have their 6th birthday in January of the next calendar year or request a one-year delay in enrollment for medical or developmental reasons.
South Africa (5, 9)	Grade 5	11.5	Grade 9	15.7	Children must be 5 years old and have their 6th birthday by June 30 of the next year to begin school mid-January.	Follows policy
Spain	Grade 4	9.9			Children must begin school during the calendar year of their 6th birthday.	Almost all children begin kindergarten at age 3, even though it is not compulsory.
Sweden	Grade 4	10.8	Grade 8	14.7	Children begin school during the calendar year of their 7th birthday.	In special cases students may begin school when they are 6 or 8 years old.
Thailand			Grade 8	14.4	Children must be 6 years old by May 16 to begin school the following academic year.	Follows policy
Turkey	Grade 4	9.9	Grade 8	13.9	Children must be 5.5 years old to begin school in September.	If parents prefer, children ages 5.5–5.75 can delay enrollment for one year. Children ages 5.75–6 can delay enrollment for one year for medical or developmental reasons.
United Arab Emirates	Grade 4	9.8	Grade 8	13.9	Children can begin school during the calendar year of their 6th birthday, but must begin by age 8.	Parents may delay enrollment, but students may not be older than 8 years old on December 31 of their entry year.
United States	Grade 4	10.2	Grade 8	14.2	Each state requires parents to send their children to school between set ages. Required entry is often between 5 to 7 years old, exact age varies by state.	Children typically begin kindergarten at age 5.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2: Information About the Students Assessed in TIMSS 2015  
(Continued)**

Country	Grade 4		Grade 8		Information About Policy on Students' Age of Entry to Primary School	Information About Students' Age of Entry to Primary School in Practice
	Country's Name for Fourth Year of Formal Schooling*	Average Age at Time of Testing	Country's Name for Eighth Year of Formal Schooling*	Average Age at Time of Testing		
<b>Benchmarking Participants</b>						
Buenos Aires, Argentina	Grade 4	9.8	Secondary 1	14.1	Children must be 6 years old by the end of June to begin school in March of the same year.	Follows policy
Ontario, Canada	Grade 4	9.8	Grade 8	13.8	Students can begin school in September if they have their 6th birthday before December 31.	Parents may enroll their children in junior kindergarten at age 4 or senior kindergarten at age 5. Some students may start school at the junior kindergarten level at 3 years old if their birthday is between September 1 and December 31. In addition, some parents homeschool their children.
Quebec, Canada	Grade 4	10.1	Secondary 2	14.3	Children must be 6 years old by September 30 to begin in September of that calendar year.	Follows policy
Norway (4, 8)	Grade 4	9.7	Grade 8	13.7	Children must be 6 years old by September 30 to begin in September of that calendar year.	Follows policy
Abu Dhabi, UAE	Grade 4	9.8	Grade 8	13.9	Children begin school during the calendar year of their 6th birthday.	Follows policy
Dubai, UAE	Grade 4	9.8	Grade 8	13.9	Children begin school during the calendar year of their 6th birthday.	Follows policy
Florida, US	Grade 4	10.4	Grade 8	14.4	Children must begin school if they have their 6th birthday by February 1 of that school year.	Children who are 5 years old on or before September 1 of the school year are eligible for admission to public kindergarten during that school year, based on rules prescribed by the school board. Parents may choose whether or not to enroll their children in kindergarten. School superintendents may authorize certificates of exemptions from school attendance requirements in certain situations.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

## TIMSS Advanced 2015

With the current emphasis on college and career readiness and increasing global competitiveness in STEM (science, technology, engineering, and mathematics) fields, in 2015 TIMSS Advanced once again was joined with TIMSS. First conducted in 1995 and then again in 2008, TIMSS Advanced is the only international assessment that provides essential information about students' achievement in advanced mathematics and physics. It assesses students in their final year of secondary school (often 12<sup>th</sup> grade) who are engaged in advanced mathematics and physics studies that prepare them to enter STEM programs in higher education.

TIMSS Advanced 2015 was offered together with TIMSS to provide 20 years of trends at three important points in students' schooling (4<sup>th</sup> grade, 8<sup>th</sup> grade, and final grade) and provide information about how the foundations established in primary school can influence students' educational career through lower secondary and impact achievement in students' final year of secondary school.

## Quality Assurance

TIMSS 2015 made every effort to attend to the quality and comparability of the data through careful planning and documentation, cooperation among participating countries, standardized procedures, and rigorous attention to quality control throughout. The assessments were administered to nationally representative and well-documented probability samples of students in each country. Staff from Statistics Canada and the IEA Data Processing and Research Center (DPC) worked with National Research Coordinators on all phases of sampling activities to ensure compliance with sampling and participation requirements, with the few exceptions from compliance annotated in the data exhibits. The IEA Secretariat worked with the TIMSS & PIRLS International Study Center to manage an extensive series of verification checks to ensure the comparability of translations of the assessment items and questionnaires, and to conduct an international quality assurance program of school visits to monitor and report on the administration of the assessment. IEA DPC staff worked closely with National Research Coordinators all through the project to organize data collection operations and to check all data for accuracy and consistency within and across countries.

## TIMSS 2015 Results

The international results for TIMSS 2015 are reported on this website and the results for TIMSS Advanced 2015 also can be accessed from here.

The TIMSS 2015 results are presented separately for mathematics and science, and within each subject separately for fourth grade and eighth grade. Each of the two reports contains 10 chapters or sections providing overviews in the form of infographics and numerous exhibits summarizing

fourth and eighth grade student achievement distributions, performance at the TIMSS International Benchmarks, achievement trends over time, and achievement in relation to students' home, school, and classroom educational contexts for learning mathematics and science. The exhibits can be downloaded and printed from the [Download Center](#).

The website includes links to:

- [TIMSS 2015 Assessment Frameworks](#) presents the mathematics and science assessment frameworks that describe in some detail the major content and cognitive domains to be assessed at the fourth and eighth grades as well as the framework describing the types of learning situations and factors that will be investigated via the questionnaire data and an overview of the assessment design.
- [TIMSS 2015 Encyclopedia: Education Policy and Curriculum in Mathematics and Science](#) describes national contexts for mathematics and science teaching and learning. It contains selected data about the countries' curricula together with a chapter written by each participant summarizing the structure of its education system, the mathematics and science curricula and instruction in primary and secondary grades, the teacher education requirements, and the types of examinations and assessments employed.
- [Methods and Procedures in TIMSS 2015](#) describes the methods and procedures used to develop, implement, and analyze the results from the TIMSS 2015 assessments.





# CHAPTER 1: STUDENT ACHIEVEMENT

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

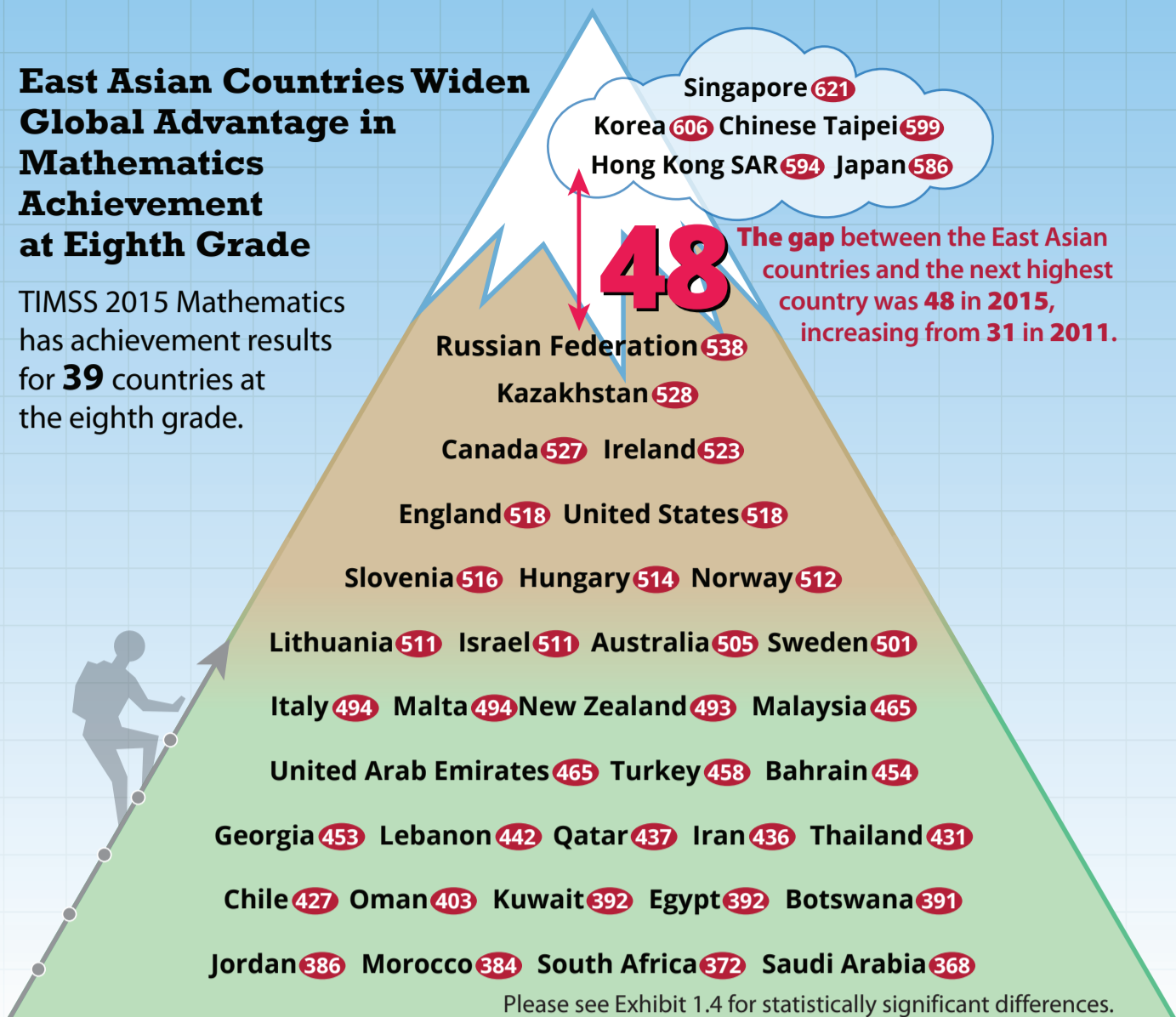
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## International Mathematics Achievement

### East Asian Countries Widen Global Advantage in Mathematics Achievement at Eighth Grade

TIMSS 2015 Mathematics has achievement results for **39** countries at the eighth grade.



## Trends at Eighth Grade Show Increases in Mathematics Achievement Around the World

### Trends 2011-2015: 34 Countries

#### 18 Countries Higher Average Achievement

Bahrain, Chile, Georgia, Iran, Japan, Kazakhstan, Lithuania, Malaysia, Morocco, Norway, Oman, Qatar, Singapore, Slovenia, South Africa, Sweden, United Arab Emirates, the United States

#### 13 Countries Same Average Achievement

Australia, Botswana, England, Hong Kong SAR, Hungary, Israel, Italy, Korea, Lebanon, New Zealand, Russian Federation, Thailand, Turkey

#### 3 Countries Lower Average Achievement

Chinese Taipei, Jordan, Saudi Arabia

### Trends 1995-2015: 16 Countries

#### 9 Countries Higher Average Achievement

England, Hong Kong SAR, Iran, Korea, Lithuania, Russian Federation, Singapore, Slovenia, the United States

#### 4 Countries Same Average Achievement

Australia, Ireland, Japan, New Zealand

#### 3 Countries Lower Average Achievement

Hungary, Norway, Sweden

## Little Difference in Mathematics Achievement by Gender

### Of the 39 TIMSS 2015 Countries:

- 26 countries had no difference between girls and boys in higher achievement.
- Girls had higher achievement in 7 countries, with an average difference of 17 points.
- Boys had higher average achievement in 6 countries, with an average achievement of 9 points.



## Mathematics Achievement Trends by Gender Show Little Change

### Trends 2011-2015: 34 Countries

For 25 of the 34 countries with comparable data in 2011 and 2015, the gender gaps did not change.

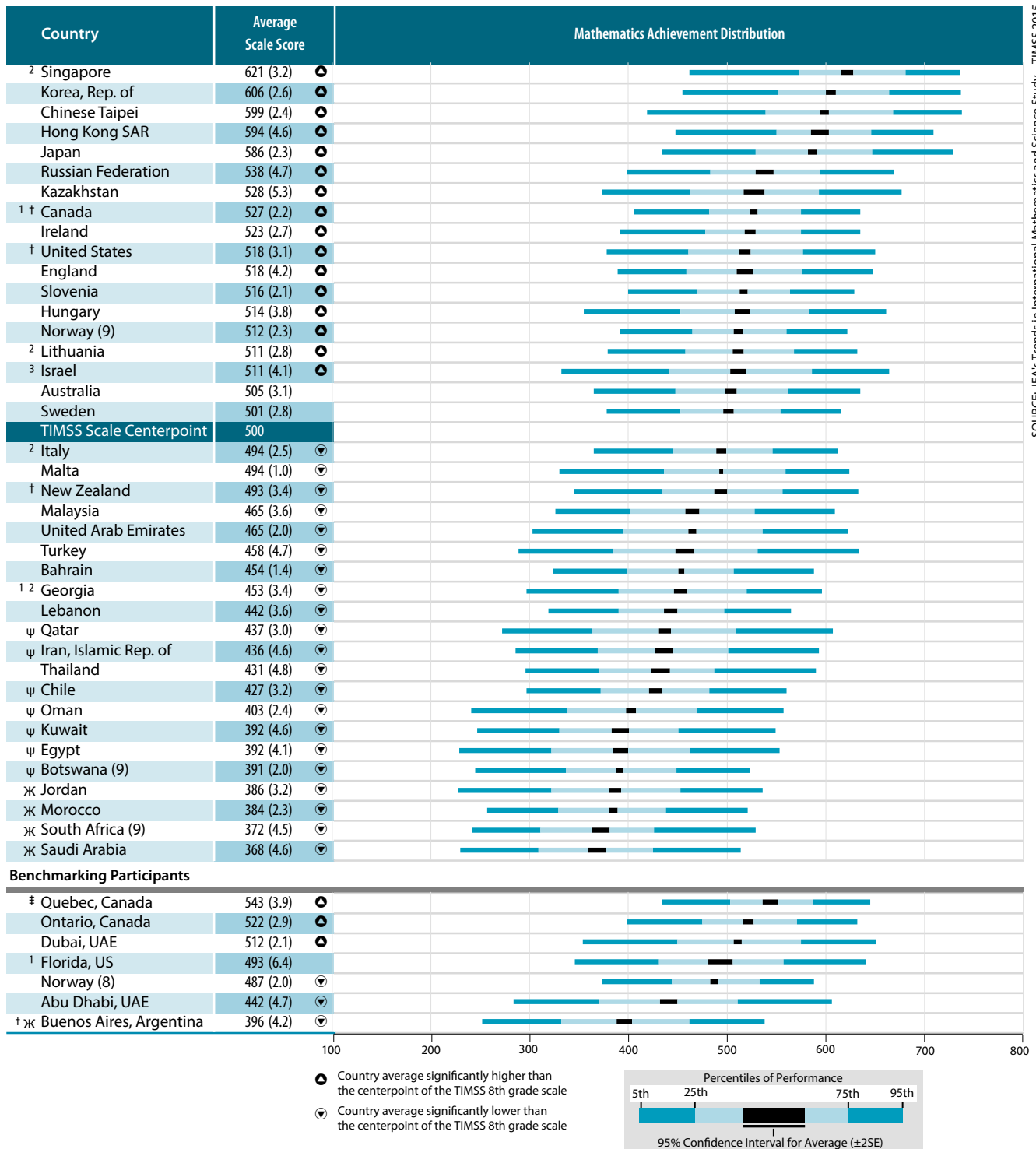
- 16 countries had no difference in average mathematics achievement between girls and boys in either 2011 or 2015.
- In 7 countries girls had higher achievement in both assessments compared to 2 countries for boys.

### Trends 1995-2015: 16 Countries

- In 1995, boys had higher achievement than girls in 4 countries with an average achievement advantage of 17 points. There was no difference in 12 countries.
- In 2015, boys had higher achievement than girls in 3 countries, with an average achievement advantage of 9 points. Girls had higher achievement in Singapore, with an average achievement advantage of 10 points.



**Exhibit 1.2: Distribution of Mathematics Achievement**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

The TIMSS achievement scale was established in 1995 based on the combined achievement distribution of all countries that participated in TIMSS 1995. To provide a point of reference for country comparisons, the scale centerpoint of 500 was located at the mean of the combined achievement distribution. The units of the scale were chosen so that 100 scale score points corresponded to the standard deviation of the distribution.

⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.



### Exhibit 1.4: Multiple Comparisons of Average Mathematics Achievement

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	Russian Federation	Kazakhstan	Canada	Ireland	United States	England	Slovenia	Hungary	Norway (9)	Lithuania	Israel	Australia	Sweden	Italy	Malta	New Zealand	Malaysia	United Arab Emirates	Turkey	Bahrain	Georgia	Lebanon	Qatar	Iran, Islamic Rep. of	Thailand
Singapore	621 (3.2)		◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	
Korea, Rep. of	606 (2.6)	◐																													
Chinese Taipei	599 (2.4)	◐																													
Hong Kong SAR	594 (4.6)	◐	◐																												
Japan	586 (2.3)	◐	◐	◐																											
Russian Federation	538 (4.7)	◐	◐	◐	◐																										
Kazakhstan	528 (5.3)	◐	◐	◐	◐	◐																									
Canada	527 (2.2)	◐	◐	◐	◐	◐	◐																								
Ireland	523 (2.7)	◐	◐	◐	◐	◐	◐	◐																							
United States	518 (3.1)	◐	◐	◐	◐	◐	◐	◐	◐																						
England	518 (4.2)	◐	◐	◐	◐	◐	◐	◐	◐																						
Slovenia	516 (2.1)	◐	◐	◐	◐	◐	◐	◐	◐																						
Hungary	514 (3.8)	◐	◐	◐	◐	◐	◐	◐	◐	◐																					
Norway (9)	512 (2.3)	◐	◐	◐	◐	◐	◐	◐	◐	◐																					
Lithuania	511 (2.8)	◐	◐	◐	◐	◐	◐	◐	◐	◐																					
Israel	511 (4.1)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐																				
Australia	505 (3.1)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐																			
Sweden	501 (2.8)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐																		
Italy	494 (2.5)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐																	
Malta	494 (1.0)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐																
New Zealand	493 (3.4)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐															
Malaysia	465 (3.6)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐														
United Arab Emirates	465 (2.0)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐													
Turkey	458 (4.7)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐												
Bahrain	454 (1.4)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐											
Georgia	453 (3.4)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐										
Lebanon	442 (3.6)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐									
Qatar	437 (3.0)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐								
Iran, Islamic Rep. of	436 (4.6)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐							
Thailand	431 (4.8)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐						
Chile	427 (3.2)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐						
Oman	403 (2.4)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐					
Kuwait	392 (4.6)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐				
Egypt	392 (4.1)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐			
Botswana (9)	391 (2.0)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐			
Jordan	386 (3.2)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐		
Morocco	384 (2.3)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐		
South Africa (9)	372 (4.5)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐		
Saudi Arabia	368 (4.6)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Quebec, Canada	543 (3.9)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Ontario, Canada	522 (2.9)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Dubai, UAE	512 (2.1)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Florida, US	493 (6.4)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Norway (8)	487 (2.0)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Abu Dhabi, UAE	442 (4.7)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Buenos Aires, Argentina	396 (4.2)	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐

- ◐ Average achievement significantly higher than comparison country
- ◑ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone.  
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 1.4: Multiple Comparisons of Average Mathematics Achievement (Continued)

Country	Average Scale Score	Average Scale Score										Benchmarking Participants					
		Chile	Oman	Kuwait	Egypt	Botswana (9)	Jordan	Morocco	South Africa (9)	Saudi Arabia	Quebec, Canada	Ontario, Canada	Dubai, UAE	Florida, US	Norway (8)	Abu Dhabi, UAE	Buenos Aires, Argentina
Singapore	621 (3.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Korea, Rep. of	606 (2.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chinese Taipei	599 (2.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hong Kong SAR	594 (4.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Japan	586 (2.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Russian Federation	538 (4.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Kazakhstan	528 (5.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Canada	527 (2.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ireland	523 (2.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United States	518 (3.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
England	518 (4.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Slovenia	516 (2.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hungary	514 (3.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Norway (9)	512 (2.3)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lithuania	511 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Israel	511 (4.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Australia	505 (3.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Sweden	501 (2.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Italy	494 (2.5)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Malta	494 (1.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
New Zealand	493 (3.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Malaysia	465 (3.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United Arab Emirates	465 (2.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Turkey	458 (4.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Bahrain	454 (1.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Georgia	453 (3.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lebanon	442 (3.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Qatar	437 (3.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Iran, Islamic Rep. of	436 (4.6)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Thailand	431 (4.8)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chile	427 (3.2)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Oman	403 (2.4)	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Kuwait	392 (4.6)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Egypt	392 (4.1)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Botswana (9)	391 (2.0)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Jordan	386 (3.2)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Morocco	384 (2.3)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
South Africa (9)	372 (4.5)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Saudi Arabia	368 (4.6)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	

Benchmarking Participants																	
Country	Average Scale Score	Chile	Oman	Kuwait	Egypt	Botswana (9)	Jordan	Morocco	South Africa (9)	Saudi Arabia	Quebec, Canada	Ontario, Canada	Dubai, UAE	Florida, US	Norway (8)	Abu Dhabi, UAE	Buenos Aires, Argentina
Quebec, Canada	543 (3.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario, Canada	522 (2.9)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▲	▲	▲	▲	▲	▲
Dubai, UAE	512 (2.1)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▲	▲	▲	▲	▲
Florida, US	493 (6.4)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▲	▲	▲	▲	▲
Norway (8)	487 (2.0)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▲	▲	▲	▲	▲
Abu Dhabi, UAE	442 (4.7)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	▲	▲	▲	▲	▲
Buenos Aires, Argentina	396 (4.2)	▼	▼	▲	▲	▲	▲	▲	▲	▲	▼	▼	▲	▲	▲	▲	▲

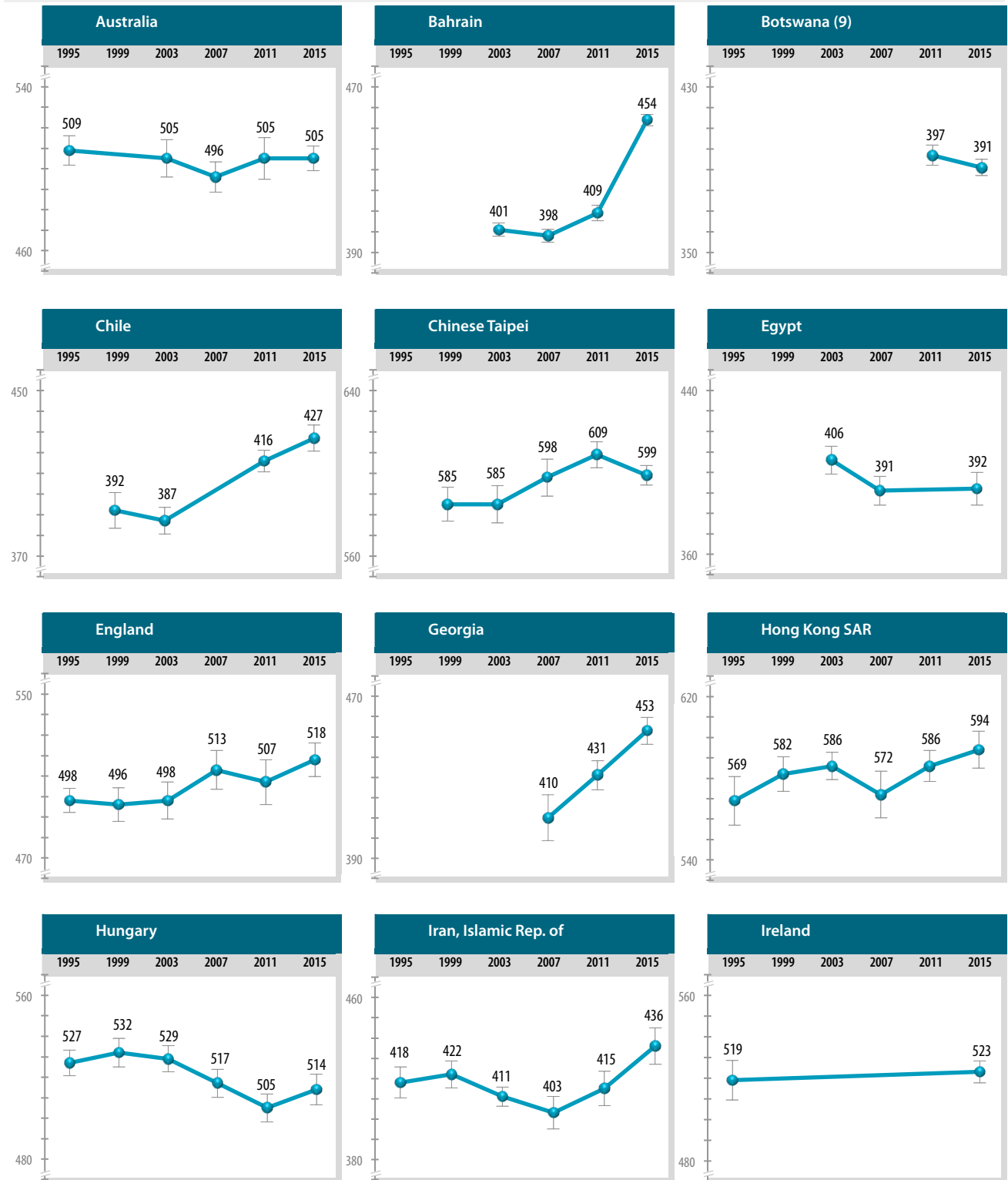
- ▲ Average achievement significantly higher than comparison country
- ▼ Average achievement significantly lower than comparison country

Significance tests were not adjusted for multiple comparisons. Five percent of the comparisons would be statistically significant by chance alone. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Exhibit 1.6: Trends in Mathematics Achievement**

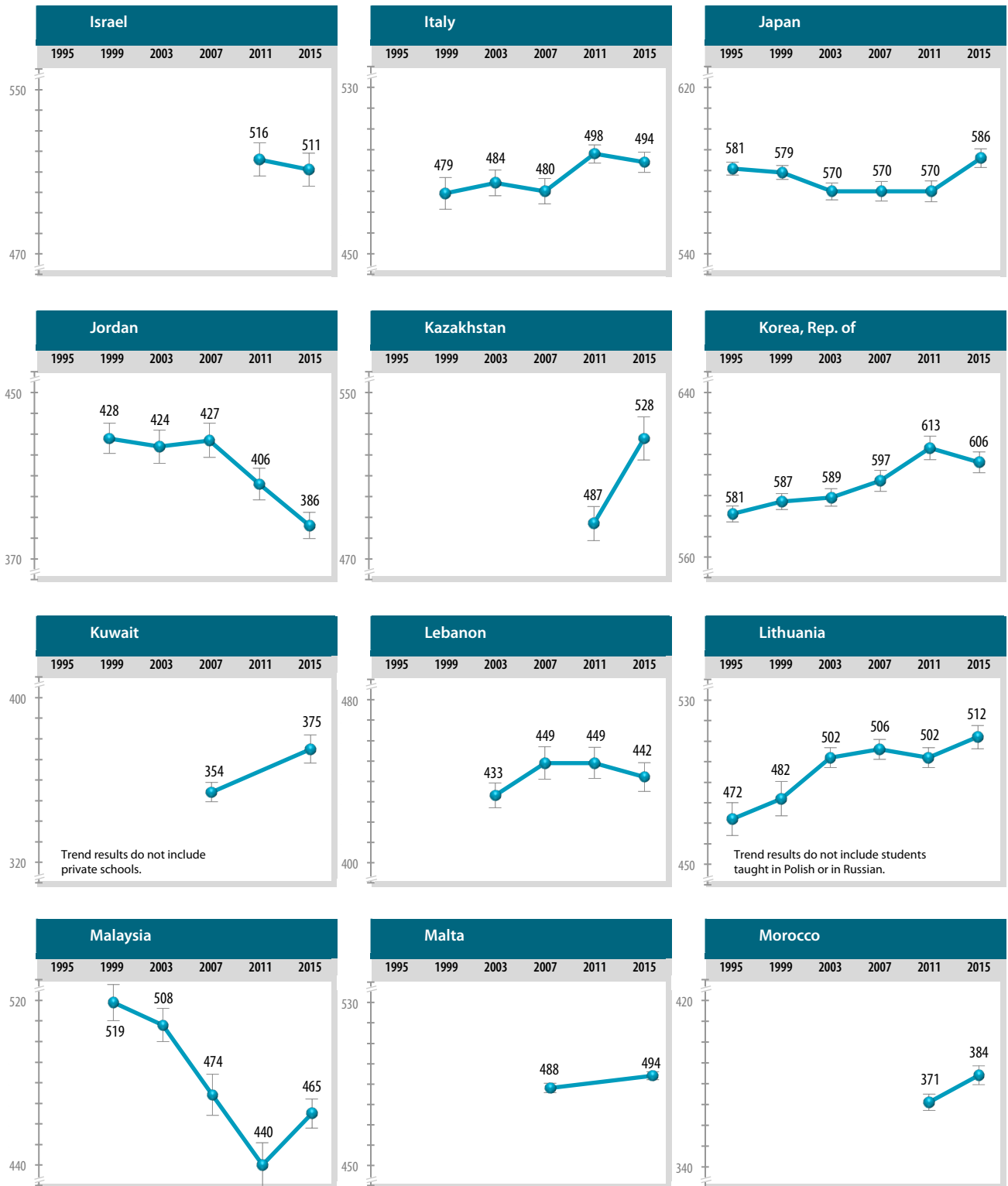
Displays changes in achievement for the countries and benchmarking participants that have comparable data from previous TIMSS assessments. The same scale is used for each country (10-point intervals), but the part of the scale shown differs according to each country's average achievement. The accompanying table (Exhibit 1.8) provides details, including statistical significance.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

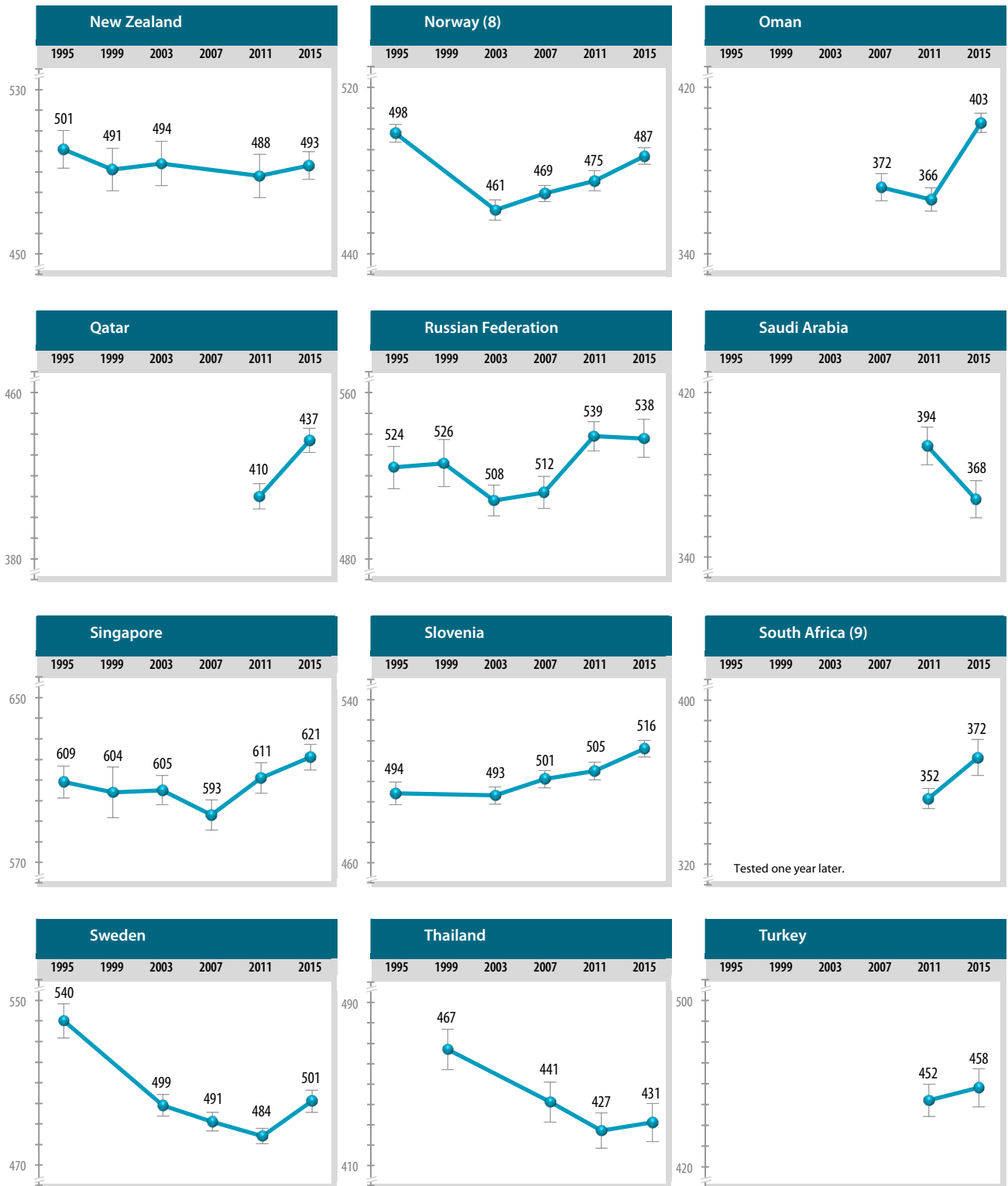
Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement. The gray bars represent the 95% confidence interval.

**Exhibit 1.6: Trends in Mathematics Achievement (Continued)**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.6: Trends in Mathematics Achievement (Continued)**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



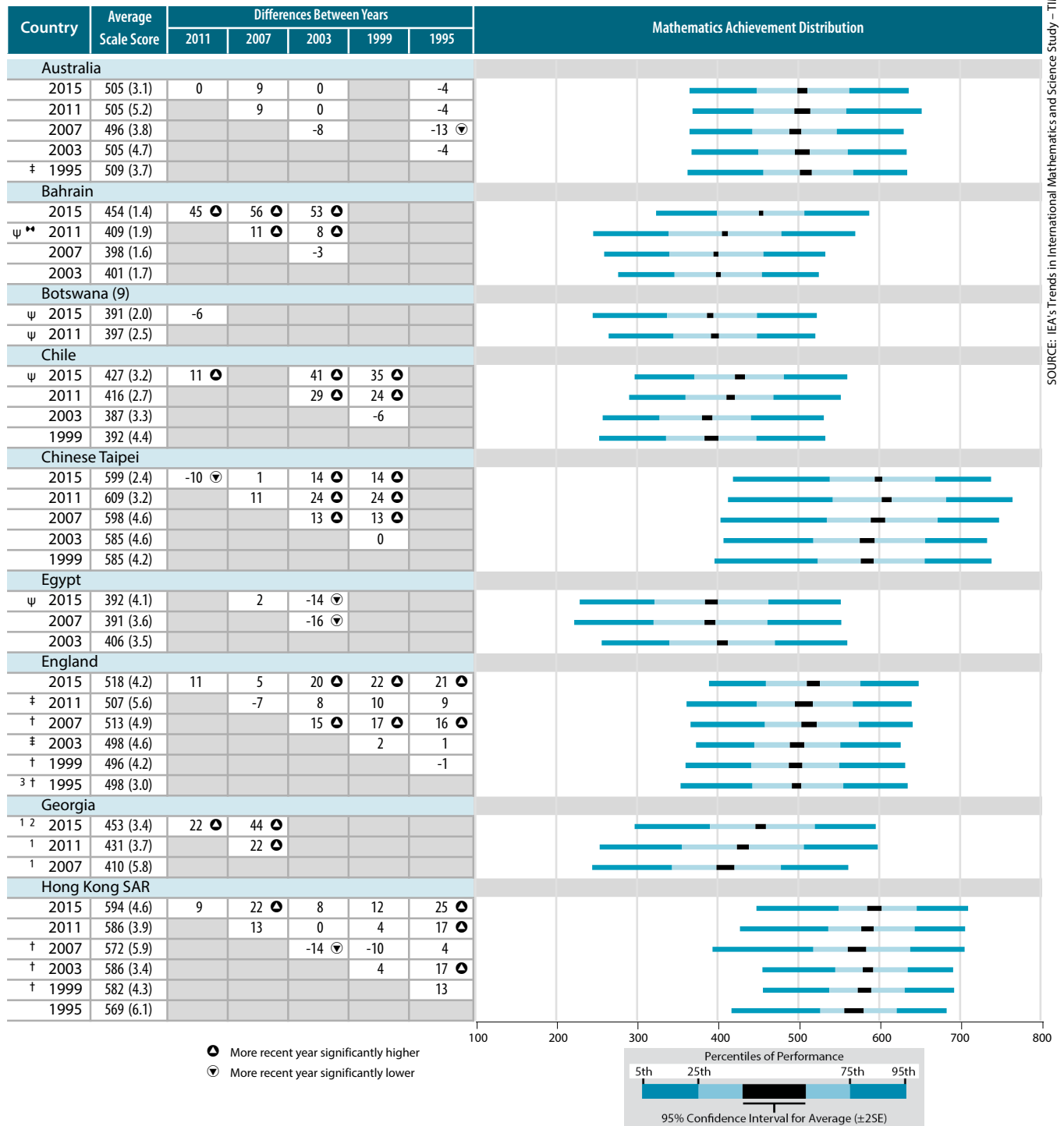
**Exhibit 1.6: Trends in Mathematics Achievement (Continued)**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

\* Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

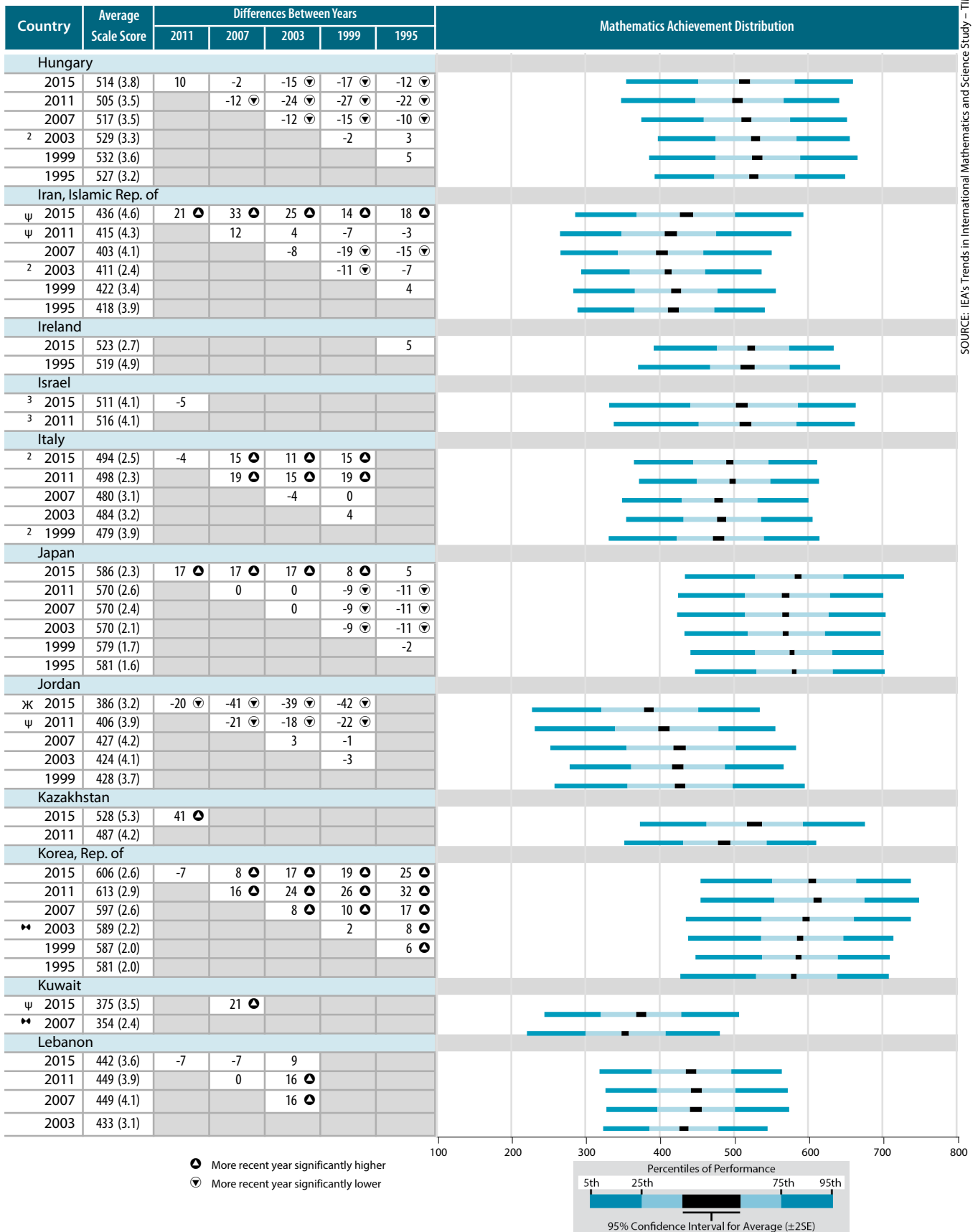
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

‡ Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years (Continued)**

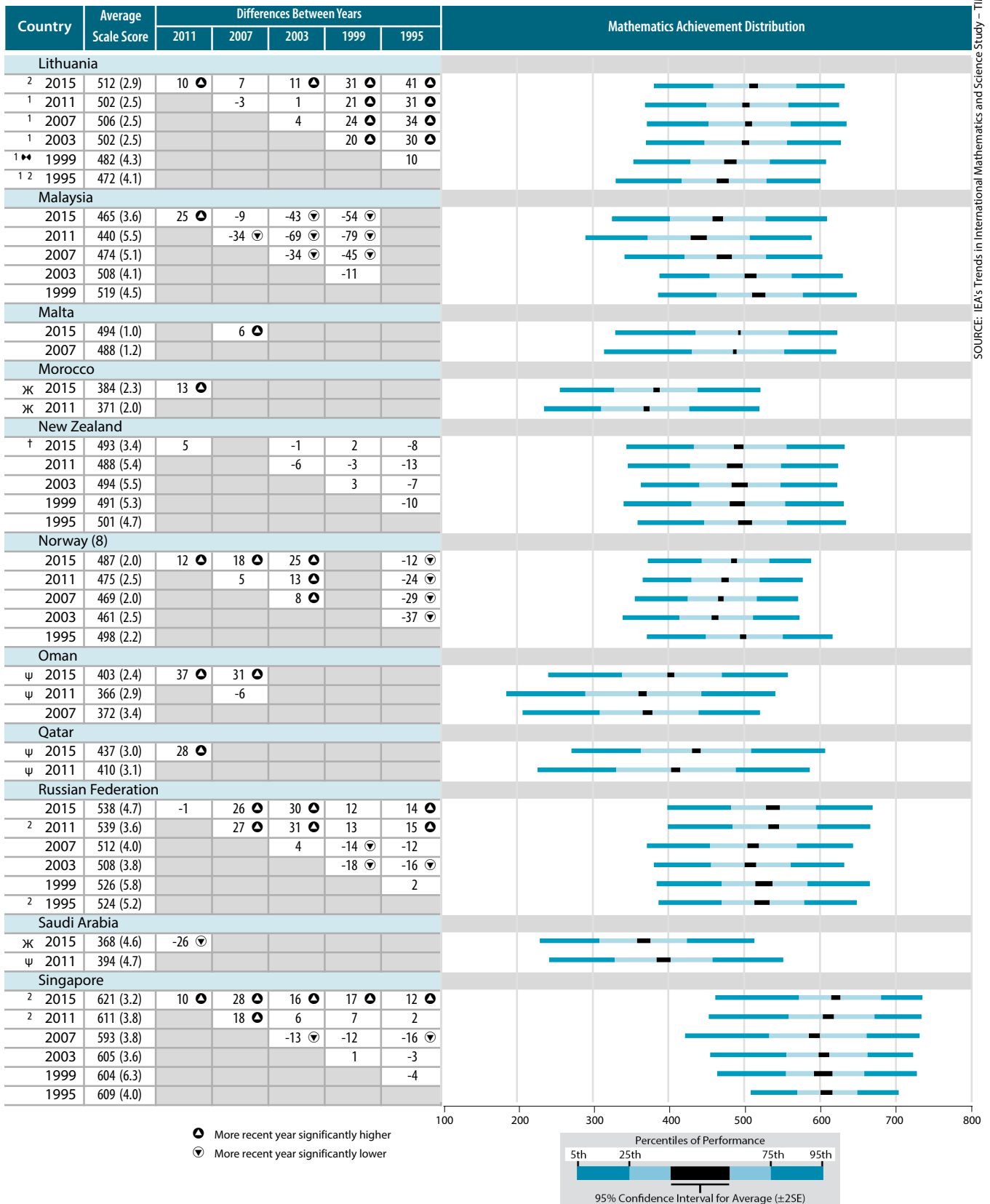
Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years**  
**(Continued)**

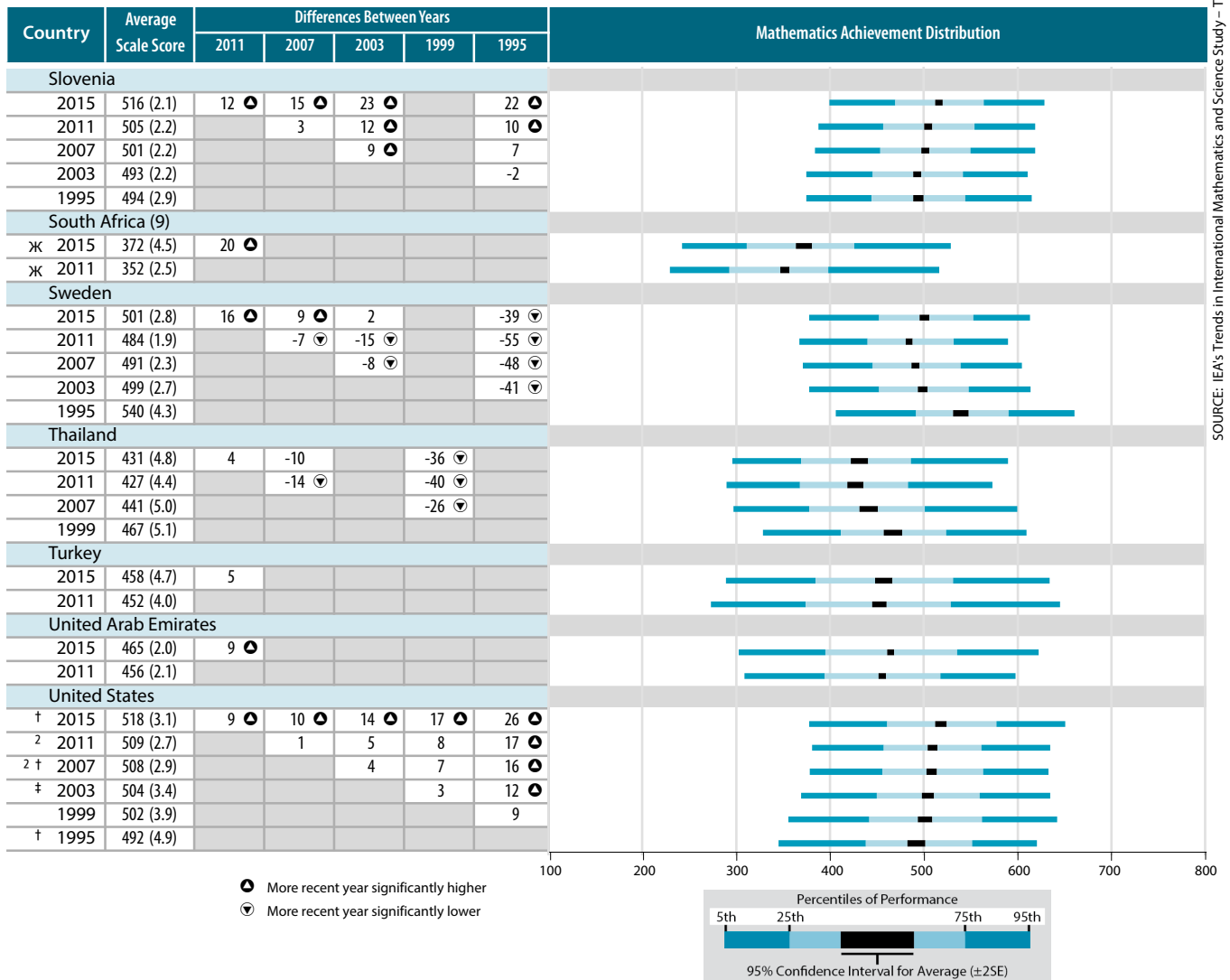
Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years (Continued)**

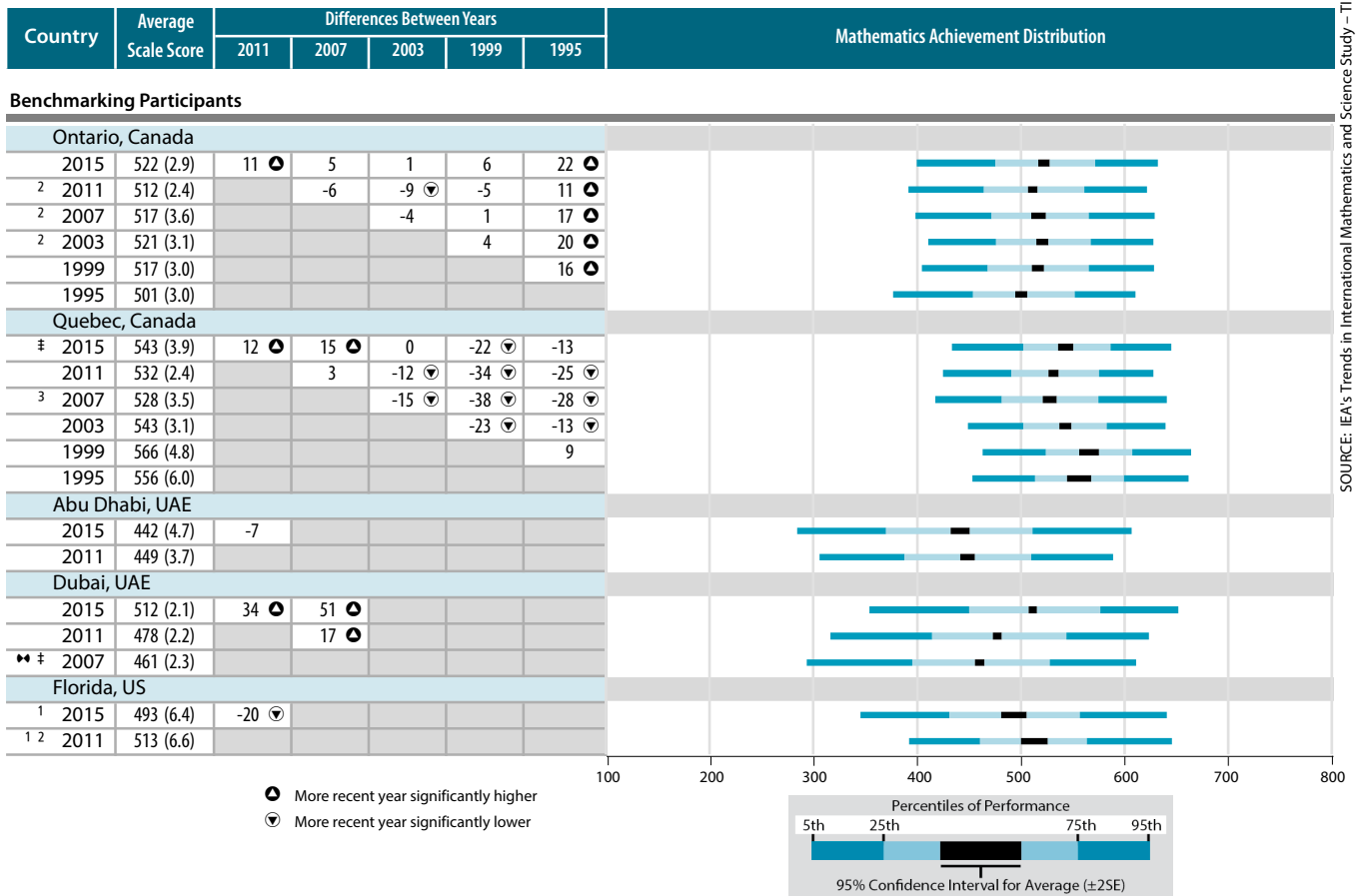
Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.9: Relative Achievement of 2011 Fourth Grade Cohort as Eighth Grade Students in 2015 – Countries Assessed Both Grades in Both Assessment Years**

Follow the blue arrow pointing diagonally downwards to compare relative performance among the TIMSS countries at the fourth grade in 2011 (upper-left panel) to relative performance at the eighth grade in 2015 (lower-right panel).

2011 - Fourth Grade			2015 - Fourth Grade		
Country	Achievement Difference from TIMSS Scale Centerpoint (500)		Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Singapore	106 (3.2)	▲	Singapore	118 (3.8)	▲
Korea, Rep. of	105 (1.9)	▲	Hong Kong SAR	115 (2.9)	▲
Hong Kong SAR	102 (3.4)	▲	Korea, Rep. of	108 (2.2)	▲
Chinese Taipei	91 (2.0)	▲	Chinese Taipei	97 (1.9)	▲
Japan	85 (1.7)	▲	Japan	93 (2.0)	▲
England	42 (3.5)	▲	Russian Federation	64 (3.4)	▲
Russian Federation	42 (3.7)	▲	England	46 (2.8)	▲
United States	41 (1.9)	▲	Kazakhstan	44 (4.5)	▲
Lithuania	34 (2.4)	▲	United States	39 (2.3)	▲
Australia	16 (3.0)	▲	Lithuania	36 (2.7)	▲
Hungary	15 (3.4)	▲	Hungary	29 (3.2)	▲
Slovenia	13 (2.1)	▲	Slovenia	20 (1.9)	▲
Italy	8 (2.6)	▲	Sweden	19 (2.8)	▲
Sweden	4 (2.1)	▲	Australia	17 (3.1)	▲
Kazakhstan	1 (4.5)		Italy	7 (2.6)	▲
Norway (4)	-5 (2.8)		Norway (4)	-7 (2.3)	▼
New Zealand	-14 (2.6)	▼	New Zealand	-9 (2.3)	▼
Turkey	-31 (4.7)	▼	Turkey	-17 (3.1)	▼
Chile	-38 (2.3)	▼	Georgia	-37 (3.6)	▼
Georgia	-50 (3.7)	▼	Chile	-41 (2.4)	▼
Bahrain	-64 (3.2)	▼	United Arab Emirates	-48 (2.4)	▼
United Arab Emirates	-66 (2.0)	▼	Bahrain	-49 (1.6)	▼
Iran, Islamic Rep. of	-69 (3.5)	▼	Qatar	-61 (3.4)	▼
Qatar	-87 (3.4)	▼	Iran, Islamic Rep. of	-69 (3.2)	▼
Saudi Arabia	-90 (5.2)	▼	Oman	-75 (2.5)	▼
Oman	-115 (2.9)	▼	Saudi Arabia	-117 (4.1)	▼
Morocco	-165 (4.0)	▼	Morocco	-123 (3.4)	▼

2011 - Eighth Grade			2015 - Eighth Grade		
Country	Achievement Difference from TIMSS Scale Centerpoint (500)		Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
Korea, Rep. of	113 (2.9)	▲	Singapore	121 (3.2)	▲
Singapore	111 (3.8)	▲	Korea, Rep. of	106 (2.6)	▲
Chinese Taipei	109 (3.2)	▲	Chinese Taipei	99 (2.4)	▲
Hong Kong SAR	86 (3.9)	▲	Hong Kong SAR	94 (4.6)	▲
Japan	70 (2.6)	▲	Japan	86 (2.3)	▲
Russian Federation	39 (3.6)	▲	Russian Federation	38 (4.7)	▲
United States	9 (2.7)	▲	Kazakhstan	28 (5.3)	▲
England	7 (5.6)		United States	18 (3.1)	▲
Hungary	5 (3.5)		England	18 (4.2)	▲
Australia	5 (5.2)		Slovenia	16 (2.1)	▲
Slovenia	5 (2.2)	▲	Hungary	14 (3.8)	▲
Lithuania	2 (2.5)		Lithuania	12 (2.9)	▲
Italy	-2 (2.3)		Australia	5 (3.1)	
New Zealand	-12 (5.4)	▼	Sweden	1 (2.8)	
Kazakhstan	-13 (4.2)	▼	Italy	-6 (2.5)	▼
Sweden	-16 (1.9)	▼	New Zealand	-7 (3.4)	▼
Norway (8)	-25 (2.5)	▼	Norway (8)	-13 (2.0)	▼
United Arab Emirates	-44 (2.1)	▼	United Arab Emirates	-35 (2.0)	▼
Turkey	-48 (4.0)	▼	Turkey	-42 (4.7)	▼
Georgia	-69 (3.7)	▼	Bahrain	-46 (1.4)	▼
Chile	-84 (2.7)	▼	Georgia	-47 (3.4)	▼
Iran, Islamic Rep. of	-85 (4.3)	▼	Qatar	-63 (3.0)	▼
Qatar	-90 (3.1)	▼	Iran, Islamic Rep. of	-64 (4.6)	▼
Bahrain	-91 (1.9)	▼	Chile	-73 (3.2)	▼
Saudi Arabia	-106 (4.7)	▼	Oman	-97 (2.4)	▼
Morocco	-129 (2.0)	▼	Morocco	-116 (2.3)	▼
Oman	-134 (2.9)	▼	Saudi Arabia	-132 (4.6)	▼

- ▲ Country average significantly higher than the centerpoint of the TIMSS scale
- ▼ Country average significantly lower than the centerpoint of the TIMSS scale

Trend results for Lithuania do not include students taught in Polish or in Russian.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 1.9: Relative Achievement of 2011 Fourth Grade Cohort as Eighth Grade Students in 2015 – Countries Assessed Both Grades in Both Assessment Years (Continued)**

2011 - Fourth Grade			2015 - Fourth Grade		
Country	Achievement Difference from TIMSS Scale Centerpoint (500)		Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
<b>Benchmarking Participants</b>			<b>Benchmarking Participants</b>		
Florida, US	45 (3.0)	▲	Florida, US	46 (4.7)	▲
Quebec, Canada	33 (2.5)	▲	Quebec, Canada	36 (4.0)	▲
Ontario, Canada	18 (3.0)	▲	Ontario, Canada	12 (2.3)	▲
Dubai, UAE	-32 (1.7)	▼	Dubai, UAE	11 (1.4)	▲
Abu Dhabi, UAE	-83 (4.6)	▼	Abu Dhabi, UAE	-81 (4.7)	▼

2011 - Eighth Grade			2015 - Eighth Grade		
Country	Achievement Difference from TIMSS Scale Centerpoint (500)		Country	Achievement Difference from TIMSS Scale Centerpoint (500)	
<b>Benchmarking Participants</b>			<b>Benchmarking Participants</b>		
Quebec, Canada	32 (2.4)	▲	Quebec, Canada	43 (3.9)	▲
Florida, US	13 (6.6)	▲	Ontario, Canada	22 (2.9)	▲
Ontario, Canada	12 (2.4)	▲	Dubai, UAE	12 (2.1)	▲
Dubai, UAE	-22 (2.2)	▼	Florida, US	-7 (6.4)	▼
Abu Dhabi, UAE	-51 (3.7)	▼	Abu Dhabi, UAE	-58 (4.7)	▼

- ▲ Country average significantly higher than the centerpoint of the TIMSS scale
- ▼ Country average significantly lower than the centerpoint of the TIMSS scale

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 1.11: Average Mathematics Achievement by Gender

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
ψ Oman	48 (1.7)	420 (2.9)	52 (1.7)	388 (3.5)	32 (4.6)		
ψ Botswana (9)	51 (0.6)	400 (2.5)	49 (0.6)	381 (2.5)	19 (2.9)		
⌘ Jordan	50 (2.6)	395 (4.0)	50 (2.6)	376 (5.4)	19 (7.0)		
Thailand	54 (1.5)	440 (5.2)	46 (1.5)	422 (5.7)	18 (5.5)		
Bahrain	48 (0.9)	462 (2.4)	52 (0.9)	446 (2.2)	16 (3.6)		
⌘ Saudi Arabia	51 (1.6)	375 (5.1)	49 (1.6)	360 (7.1)	14 (8.2)		
United Arab Emirates	50 (2.5)	471 (3.5)	50 (2.5)	459 (4.0)	12 (6.4)		
Malaysia	50 (1.8)	470 (3.8)	50 (1.8)	461 (3.8)	9 (2.8)		
<sup>2</sup> Singapore	49 (0.6)	626 (3.4)	51 (0.6)	616 (3.8)	9 (3.5)		
ψ Egypt	53 (2.3)	397 (5.5)	47 (2.3)	387 (5.1)	9 (6.7)		
⌘ South Africa (9)	51 (1.1)	376 (5.3)	49 (1.1)	369 (4.6)	7 (4.1)		
ψ Kuwait	50 (2.5)	396 (4.6)	50 (2.5)	389 (7.1)	7 (7.5)		
ψ Qatar	50 (3.0)	440 (3.2)	50 (3.0)	434 (4.5)	7 (4.9)		
Turkey	48 (0.8)	461 (4.8)	52 (0.8)	455 (5.3)	6 (3.6)		
Kazakhstan	49 (0.9)	531 (5.8)	51 (0.9)	525 (5.3)	6 (3.7)		
ψ Iran, Islamic Rep. of	48 (0.9)	438 (5.0)	52 (0.9)	435 (7.5)	3 (8.9)		
England	51 (1.6)	520 (5.2)	49 (1.6)	517 (4.8)	3 (5.6)		
Malta	49 (0.3)	495 (1.8)	51 (0.3)	492 (1.6)	3 (2.8)		
† New Zealand	51 (2.0)	494 (3.2)	49 (2.0)	491 (4.6)	3 (4.2)		
Japan	51 (1.0)	588 (3.1)	49 (1.0)	585 (3.0)	2 (4.2)		
⌘ Morocco	46 (0.7)	385 (2.3)	54 (0.7)	384 (2.6)	2 (2.0)		
<sup>1 2</sup> Georgia	47 (0.9)	454 (3.9)	53 (0.9)	453 (4.0)	1 (4.0)		
Chinese Taipei	49 (0.8)	599 (2.6)	51 (0.8)	599 (3.0)	0 (2.8)		
Korea, Rep. of	47 (0.5)	605 (2.6)	53 (0.5)	606 (3.1)	1 (2.7)		
Norway (9)	50 (0.7)	511 (2.5)	50 (0.7)	512 (2.7)	1 (2.6)		
† United States	50 (0.6)	517 (3.3)	50 (0.6)	519 (3.2)	2 (2.0)		
Australia	51 (1.6)	504 (3.8)	49 (1.6)	506 (3.5)	2 (4.0)		
<sup>3</sup> Israel	49 (1.2)	510 (4.3)	51 (1.2)	512 (4.8)	2 (3.9)		
Slovenia	48 (0.7)	515 (2.4)	52 (0.7)	518 (2.5)	2 (2.4)		
Lebanon	53 (1.6)	441 (3.7)	47 (1.6)	444 (4.5)	3 (3.9)		
<sup>2</sup> Lithuania	50 (0.8)	510 (3.4)	50 (0.8)	513 (3.1)	3 (3.4)		
<sup>1 †</sup> Canada	51 (1.0)	525 (2.0)	49 (1.0)	530 (2.7)	4 (2.0)		
Ireland	50 (1.1)	521 (2.6)	50 (1.1)	526 (4.0)	5 (3.9)		
Hong Kong SAR	47 (2.1)	591 (4.7)	53 (2.1)	597 (6.0)	5 (5.7)		
<sup>2</sup> Italy	49 (0.8)	491 (3.0)	51 (0.8)	498 (2.8)	7 (2.8)		
Sweden	48 (1.0)	497 (3.3)	52 (1.0)	504 (3.1)	7 (3.2)		
Hungary	50 (0.9)	510 (4.3)	50 (0.9)	519 (4.0)	9 (3.4)		
Russian Federation	49 (0.9)	533 (5.1)	51 (0.9)	543 (4.6)	9 (2.9)		
ψ Chile	48 (1.8)	418 (3.7)	52 (1.8)	436 (4.2)	18 (4.9)		
<b>International Avg.</b>	<b>50 (0.2)</b>	<b>483 (0.6)</b>	<b>50 (0.2)</b>	<b>480 (0.7)</b>			

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Benchmarking Participants

Abu Dhabi, UAE	49 (4.4)	457 (6.0)	51 (4.4)	427 (7.7)	29 (10.7)		
<sup>1</sup> Florida, US	48 (1.3)	494 (7.2)	52 (1.3)	493 (6.5)	1 (4.7)		
Norway (8)	50 (0.7)	486 (2.4)	50 (0.7)	487 (2.3)	1 (2.5)		
Ontario, Canada	50 (1.2)	521 (2.9)	50 (1.2)	523 (3.3)	2 (2.6)		
Dubai, UAE	52 (3.7)	510 (3.7)	48 (3.7)	514 (4.3)	4 (6.9)		
† ⌘ Buenos Aires, Argentina	51 (1.7)	391 (4.8)	49 (1.7)	401 (5.4)	11 (5.8)		
‡ Quebec, Canada	53 (1.9)	538 (3.8)	47 (1.9)	550 (5.1)	12 (4.6)		

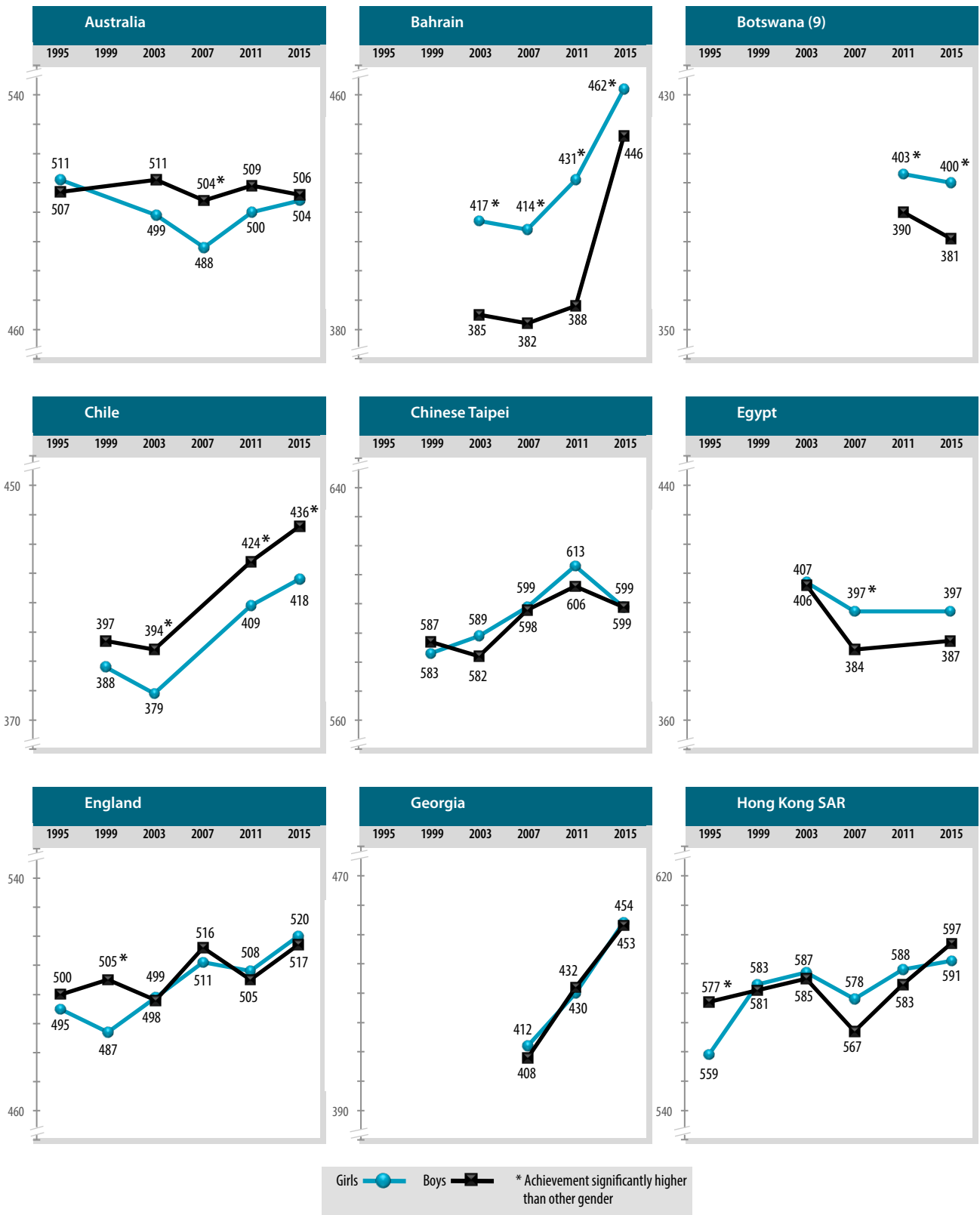
⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and £.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

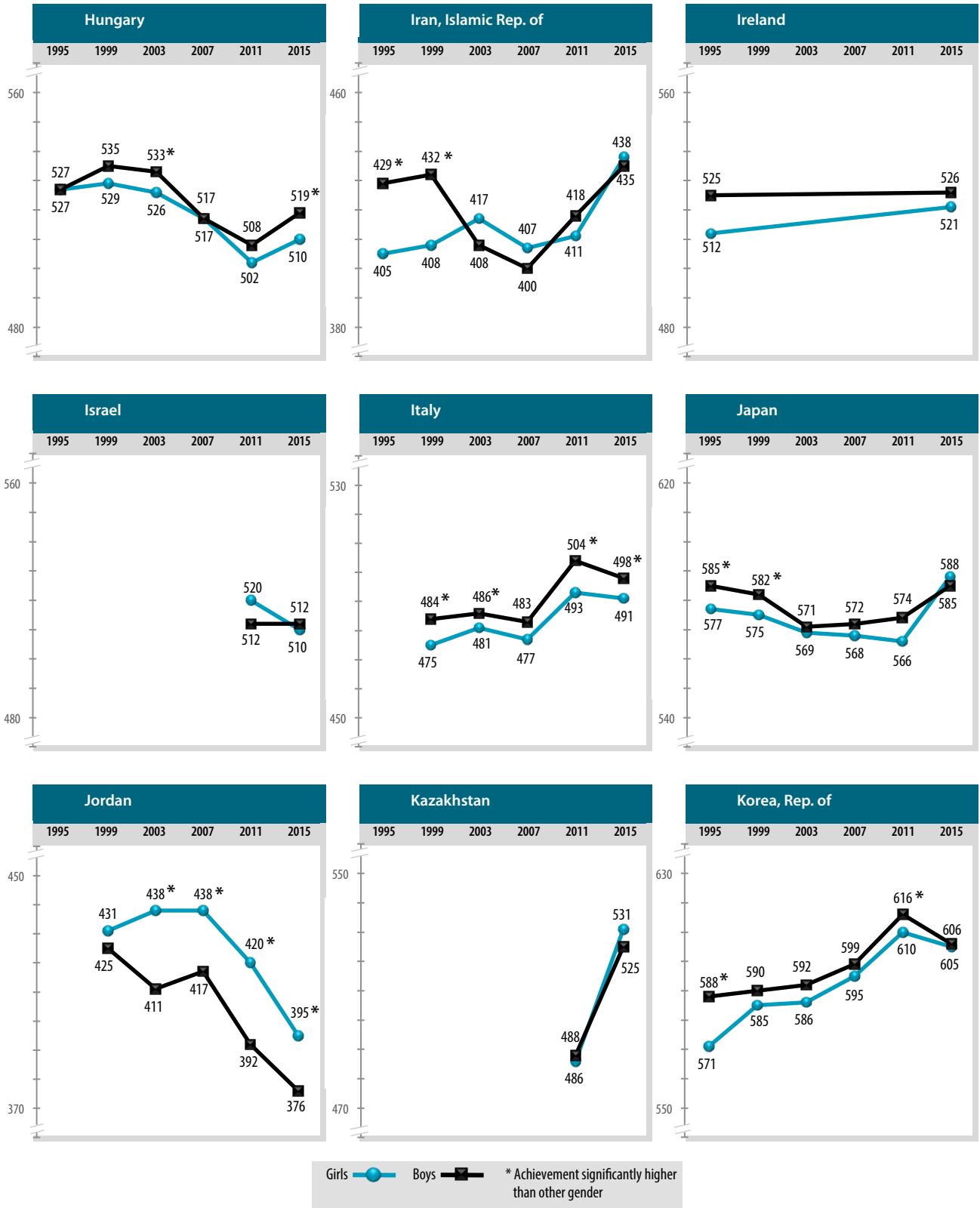
**Exhibit 1.13: Trends in Mathematics Achievement by Gender**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

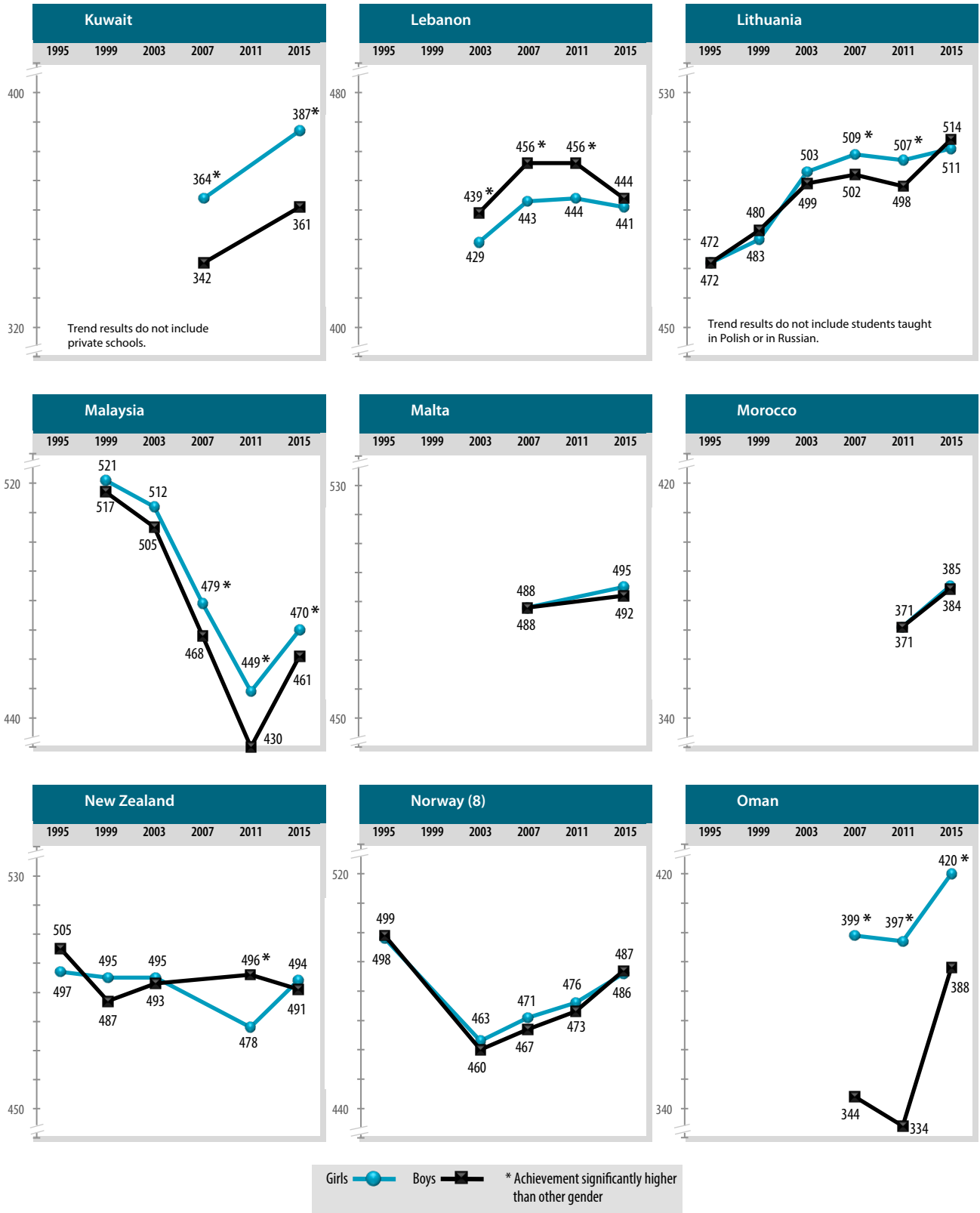
Scale interval is 10 points for each country, but the part of the scale shown differs according to each country's average achievement.

**Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)**



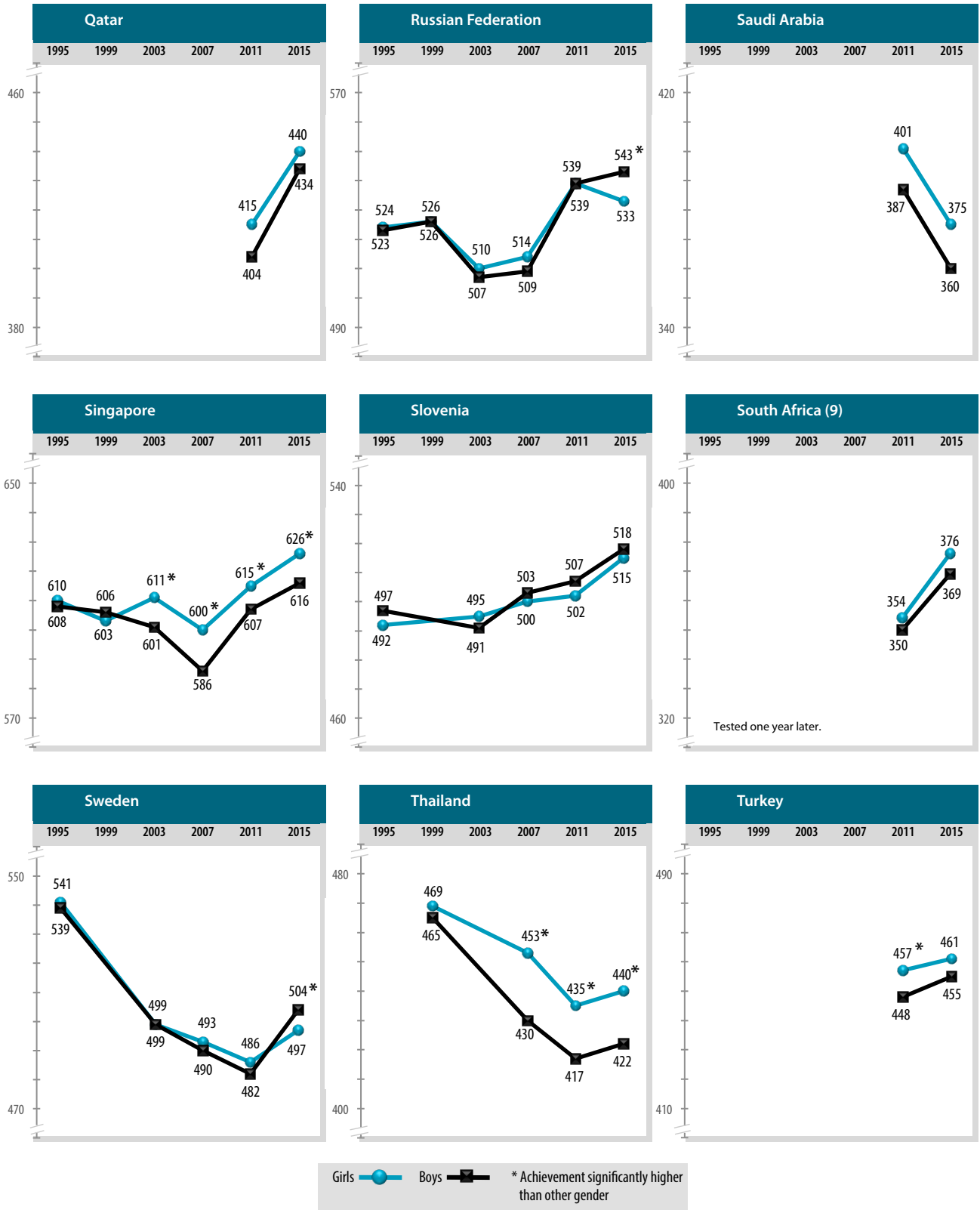
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)**



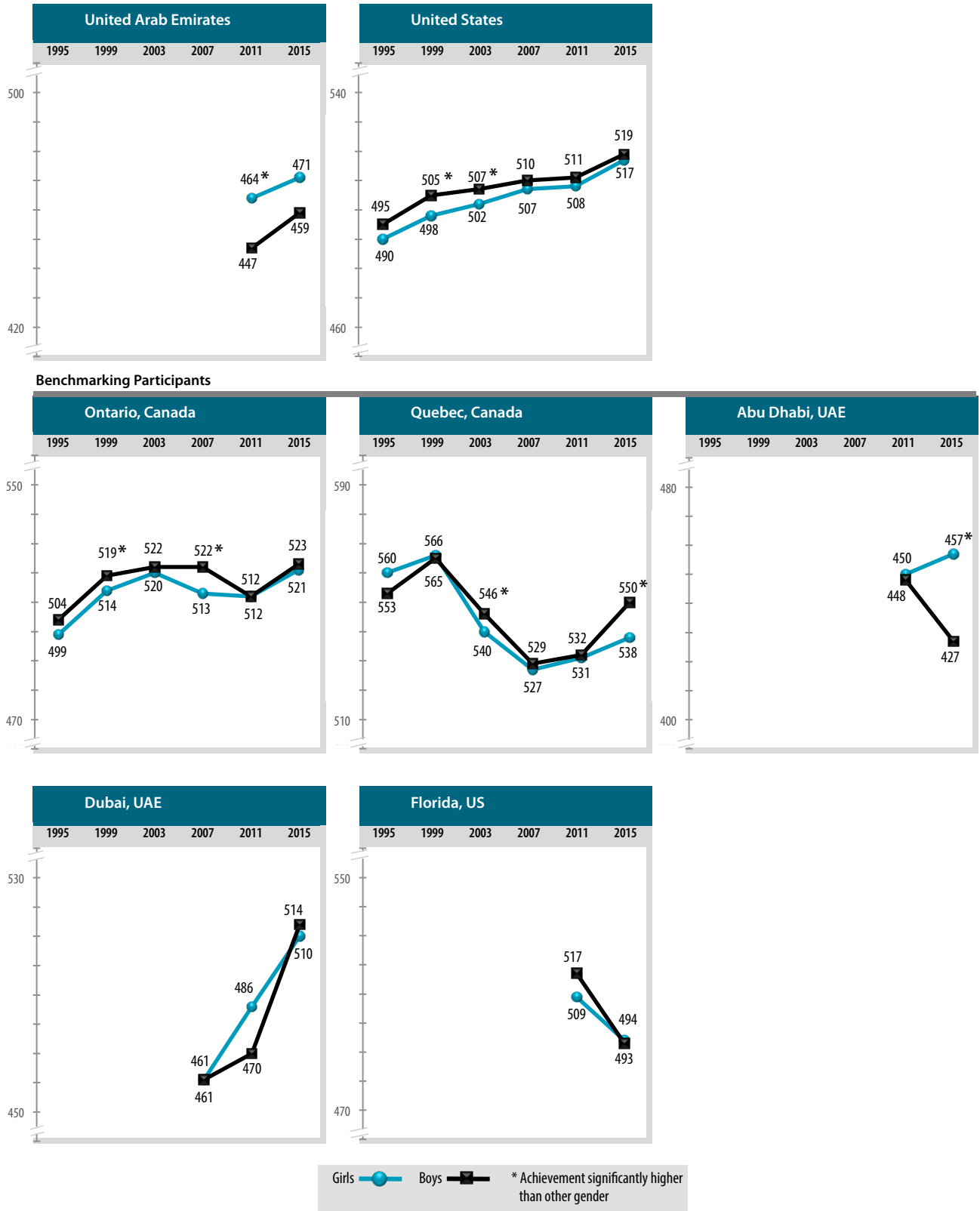
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 1.13: Trends in Mathematics Achievement by Gender (Continued)**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**TIMSS**  
**2015**

# CHAPTER 2: PERFORMANCE AT INTERNATIONAL BENCHMARKS

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

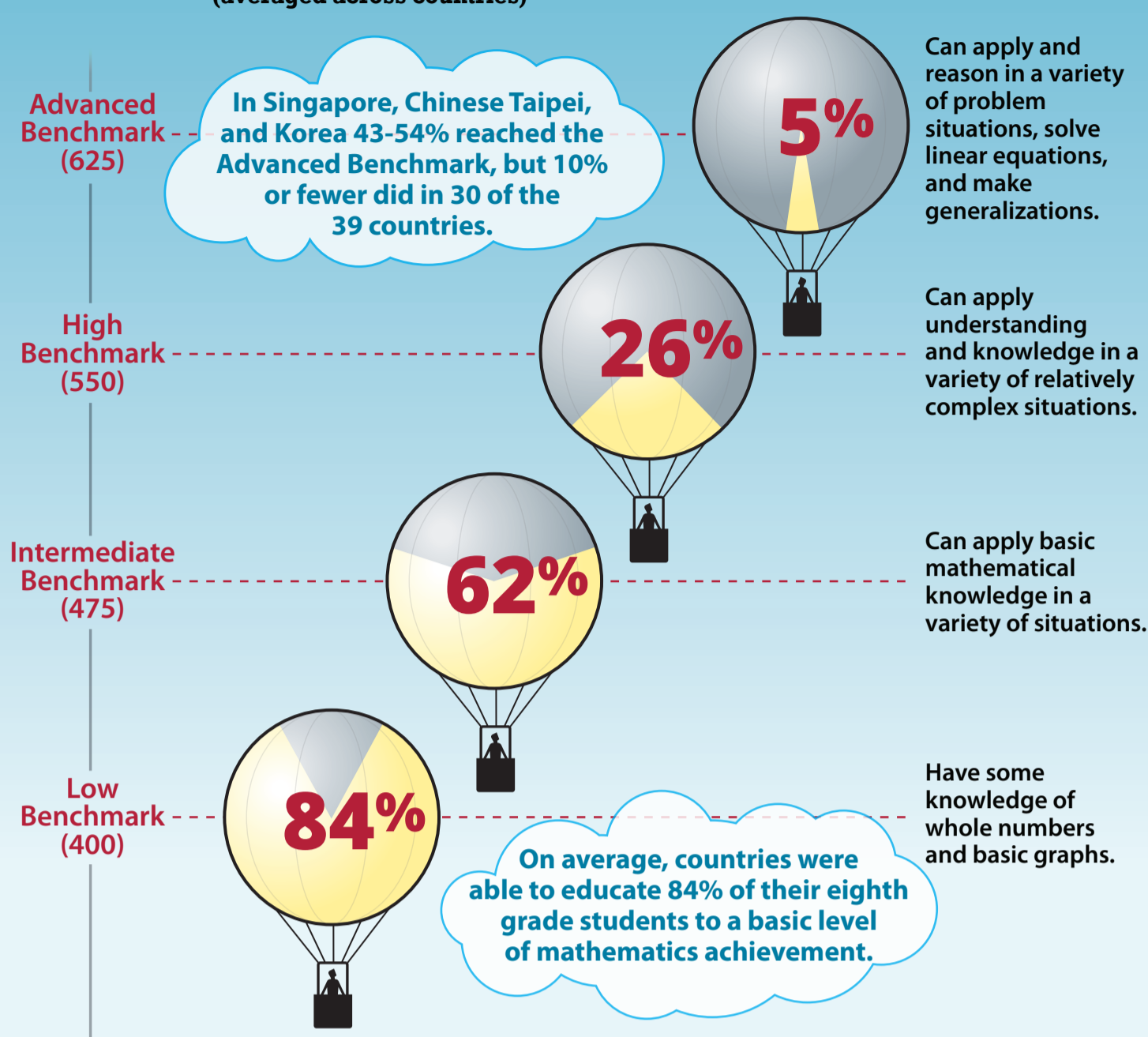
**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



### Achievement at TIMSS International Benchmarks

TIMSS describes achievement at four International Benchmarks along the mathematics achievement scale: Advanced, High, Intermediate, and Low.

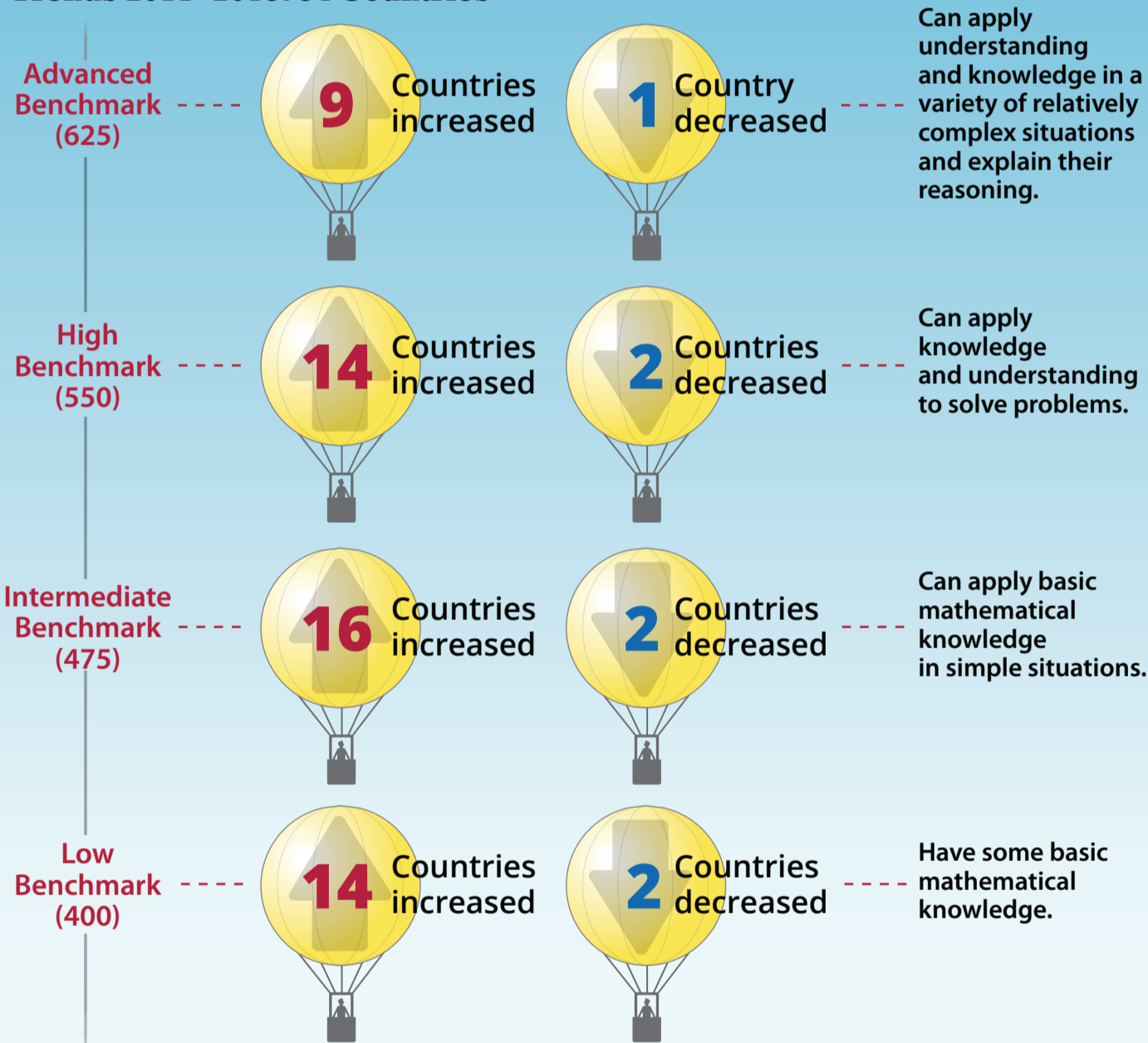
#### Percentage of Students Reaching Benchmarks (averaged across countries)



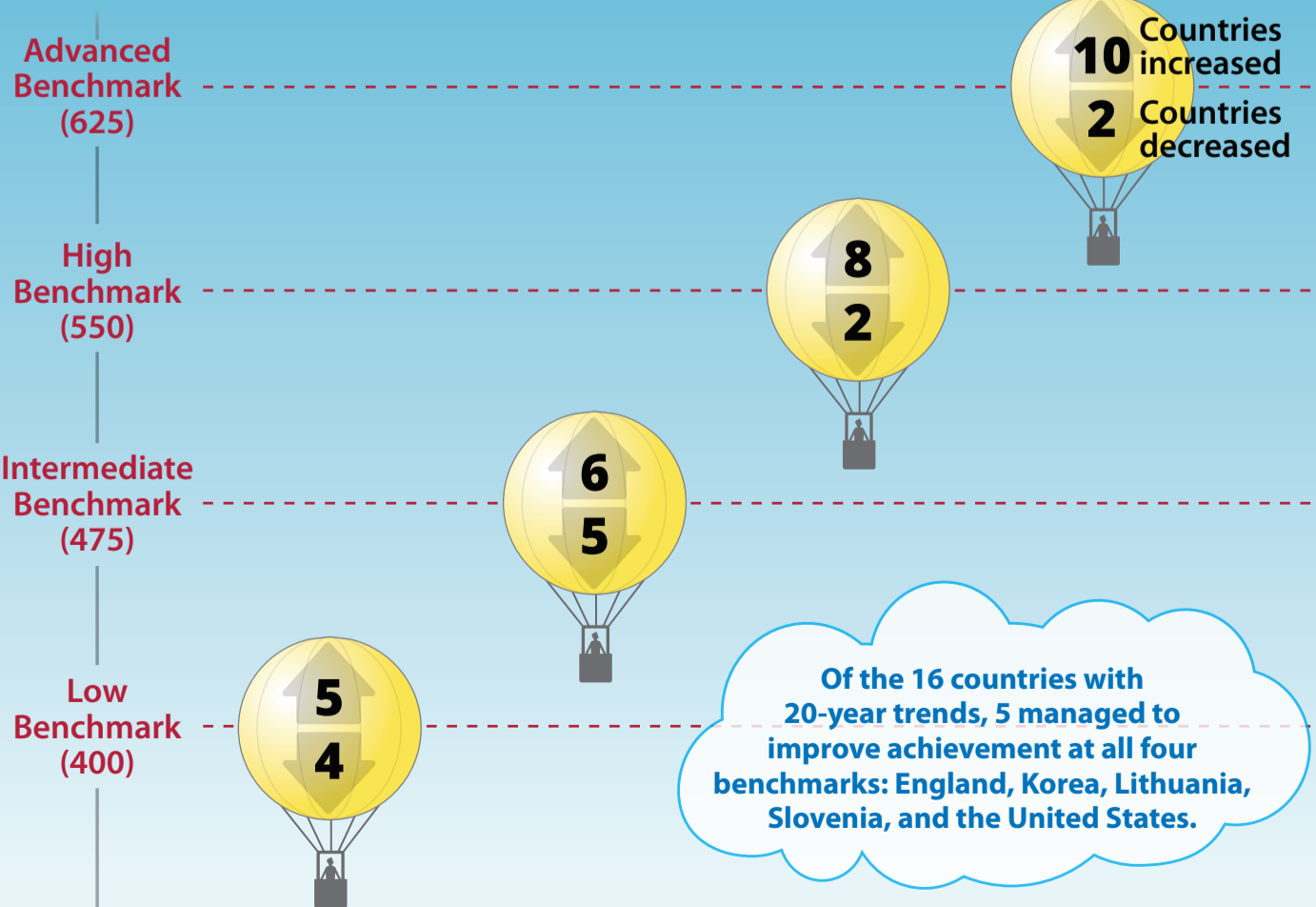
#### Trends at the TIMSS International Benchmarks

In general, there were more improvements across the International Benchmarks in 2015 than there were declines.

##### Trends 2011- 2015: 34 Countries



##### Trends 1995-2015: 16 Countries



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>

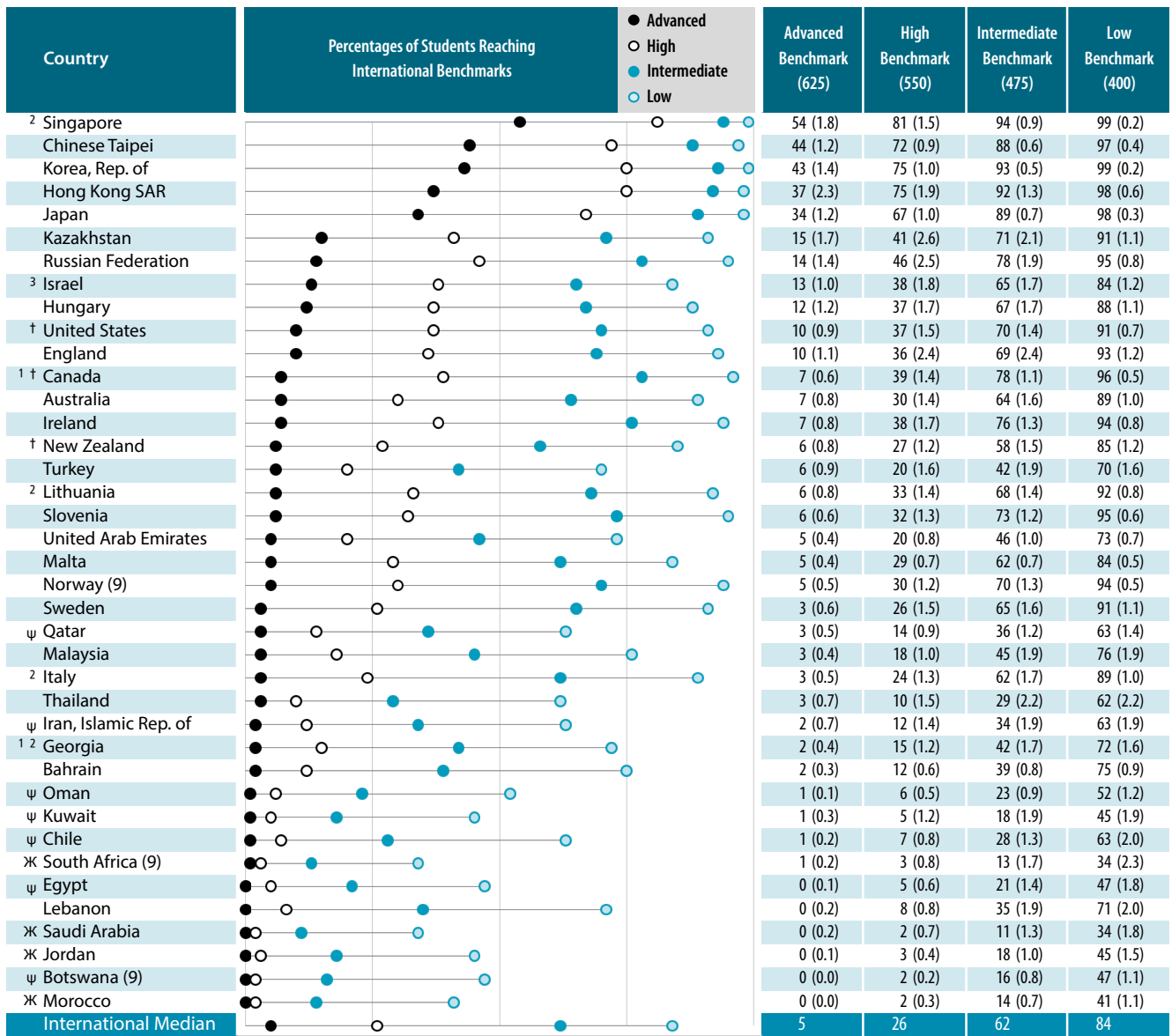


**Exhibit 2.8: Descriptions of the TIMSS 2015 International Benchmarks of Mathematics Achievement**

<b>625</b>	<b>Advanced International Benchmark</b>	●
	<p><i>Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations. They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can use their knowledge of geometric figures to solve a wide range of problems about area. They demonstrate understanding of the meaning of averages and can solve problems involving expected values.</i></p>	
<b>550</b>	<b>High International Benchmark</b>	○
	<p><i>Students can apply their understanding and knowledge in a variety of relatively complex situations. They can use information to solve problems involving different types of numbers and operations. They can relate fractions, decimals, and percentages to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can solve a variety of problems with angles including those involving triangles, parallel lines, rectangles, and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities.</i></p>	
<b>475</b>	<b>Intermediate International Benchmark</b>	●
	<p><i>Students can apply basic mathematical knowledge in a variety of situations. They can solve problems involving negative numbers, decimals, percentages, and proportions. Students have some knowledge of linear expressions and two- and three-dimensional shapes. They can read and interpret data in graphs and tables. They have some basic knowledge of chance.</i></p>	
<b>400</b>	<b>Low International Benchmark</b>	○
	<p><i>Students have some knowledge of whole numbers and basic graphs.</i></p>	

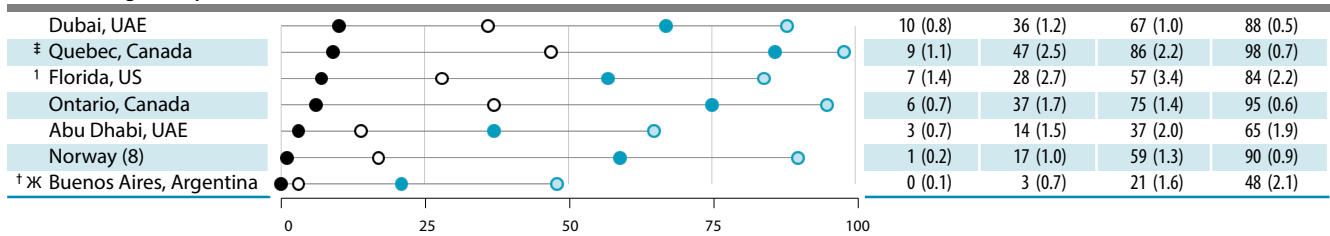
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.9: Performance at the International Benchmarks of Mathematics Achievement**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**



<sup>⌘</sup> Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

<sup>ψ</sup> Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.

(.) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Exhibit 2.10: Percentages of Students Reaching the International Benchmarks of Mathematics Achievement Across Assessment Years**

Country	Advanced International Benchmark (625)						High International Benchmark (550)					
	Percent of Students						Percent of Students					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Singapore	54	48 ▲	40 ▲	44 ▲	42 ▲	40 ▲	81	78	70 ▲	77	77	84
Chinese Taipei	44	49 ▼	45	38 ▲	37 ▲		72	73	71	66 ▲	67 ▲	
Korea, Rep. of	43	47	40	35 ▲	32 ▲	31 ▲	75	77	71 ▲	70 ▲	70 ▲	67 ▲
Hong Kong SAR	37	34	31 ▲	31 ▲	28 ▲	23 ▲	75	71	64 ▲	73	70	65 ▲
Japan	34	27 ▲	26 ▲	24 ▲	29 ▲	29 ▲	67	61 ▲	61 ▲	62 ▲	66	67
Kazakhstan	15	3 ▲					41	23 ▲				
Russian Federation	14	14	8 ▲	6 ▲	12	9 ▲	46	47	33 ▲	30 ▲	39 ▲	38 ▲
Israel	13	12					38	40				
Hungary	12	8 ▲	10	11	13	10	37	32 ▲	36	41	43 ▼	40
United States	10	7 ▲	6 ▲	7 ▲	7	4 ▲	37	30 ▲	31 ▲	29 ▲	30 ▲	26 ▲
England	10	8	8	5 ▲	6 ▲	6 ▲	36	32	35	26 ▲	25 ▲	27 ▲
Australia	7	9	6	7		7	30	29	24 ▲	29		33
Ireland	7					8	38					37
Lithuania	6	5	6	5	3 ▲	2 ▲	34	29 ▲	30 ▲	28 ▲	18 ▲	17 ▲
New Zealand	6	5		5	6	6	27	24		24	26	28
Turkey	6	7					20	20				
Slovenia	6	4 ▲	4	3 ▲		4 ▲	32	27 ▲	25 ▲	21 ▲		22 ▲
United Arab Emirates	5	2 ▲					20	14 ▲				
Malta	5		5				29		26 ▲			
Sweden	3	1 ▲	2	3		12 ▼	26	16 ▲	20 ▲	24		46 ▼
ψ Qatar	3	2					14	10 ▲				
Malaysia	3	2 ▲	2	6 ▼	10 ▼		18	12 ▲	18	30 ▼	36 ▼	
Italy	3	3	3	3	4		24	24	17 ▲	19 ▲	21	
Thailand	3	2	3		3		10	8	12		17 ▼	
ψ Iran, Islamic Rep. of	2	2	1 ▲	0 ▲	1 ▲	0 ▲	12	8 ▲	5 ▲	3 ▲	6 ▲	4 ▲
Georgia	2	3	1 ▲				15	13	7 ▲			
Bahrain	2	1	0 ▲	0 ▲			12	8 ▲	3 ▲	2 ▲		
Norway (8)	1	1	0 ▲	0		4 ▼	17	12 ▲	11 ▲	10 ▲		26 ▼
ψ Oman	1	0	0 ▲				6	4 ▲	2 ▲			
ψ Chile	1	1		0	1		7	5		3 ▲	4 ▲	
✕ South Africa (9)	1	1					3	3				
ψ Egypt	0		1	1			5		5	6		
Lebanon	0	1	1	0			8	9	10	4 ▲		
✕ Saudi Arabia	0	1					2	5 ▼				
✕ Jordan	0	0	1 ▼	1 ▼	3 ▼		3	6 ▼	11 ▼	8 ▼	12 ▼	
ψ Kuwait	0		0				1		0 ▲			
ψ Botswana (9)	0	0					2	2				
✕ Morocco	0	0					2	2				

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Dubai, UAE	10	5 ▲	3 ▲				36	23 ▲	17 ▲			
Quebec, Canada	9	6 ▲	8	8	18 ▼	14	47	40 ▲	37 ▲	45	60 ▼	54
Florida, US	7	8					28	31				
Ontario, Canada	6	4 ▲	6	6	6	3 ▲	37	31 ▲	33	34	32	26 ▲
Abu Dhabi, UAE	3	2					14	12				

- ▲ 2015 percent significantly higher
- ▼ 2015 percent significantly lower

An empty cell indicates a country did not participate in that year's assessment.

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish and Russian. South Africa (9) tested one year later.

✕ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.



**Exhibit 2.10: Percentages of Students Reaching the International Benchmarks of Mathematics Achievement Across Assessment Years (Continued)**

Country	Intermediate International Benchmark (475)						Low International Benchmark (400)					
	Percent of Students						Percent of Students					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Singapore	94	92	88 ▲	93	94	98 ▼	99	99	97 ▲	99	99	100 ▼
Chinese Taipei	88	88	86	85 ▲	85 ▲		97	96	95	96	95 ▲	
Korea, Rep. of	93	93	90 ▲	90 ▲	91	89 ▲	99	99	98 ▲	98 ▲	99	97 ▲
Hong Kong SAR	92	89	85 ▲	93	92	88	98	97	94 ▲	98	98	96
Japan	89	87 ▲	87 ▲	88	90	91	98	97	97	98	98	98
Kazakhstan	71	57 ▲					91	85 ▲				
Russian Federation	78	78	68 ▲	66 ▲	73	73	95	95	91 ▲	92 ▲	93	93
Israel	65	68					84	87				
Hungary	67	65	69	75 ▼	75 ▼	74 ▼	88	88	91	95 ▼	93 ▼	94 ▼
United States	70	68	67	64 ▲	62 ▲	61 ▲	91	92	92	90	87 ▲	86 ▲
England	69	65	69	61 ▲	60 ▲	61 ▲	93	88 ▲	90	90	88 ▲	87 ▲
Australia	64	63	61	65		68	89	89	89	90		90
Ireland	76					73	94					91
Lithuania	69	64 ▲	65	63 ▲	53 ▲	50 ▲	92	90	90	90	85 ▲	81 ▲
New Zealand	58	57		59	57	64 ▼	85	84		88	84	89 ▼
Turkey	42	40					70	67				
Slovenia	73	67 ▲	65 ▲	60 ▲		60 ▲	95	93 ▲	92 ▲	90 ▲		90 ▲
United Arab Emirates	46	42 ▲					73	73				
Malta	62		60				84		83 ▲			
Sweden	65	57 ▲	60 ▲	64		81 ▼	91	89 ▲	90	91		96 ▼
ψ Qatar	36	29 ▲					63	54 ▲				
Malaysia	45	36 ▲	50	66 ▼	70 ▼		76	65 ▲	82 ▼	93 ▼	93 ▼	
Italy	62	64	54 ▲	56 ▲	53 ▲		89	90	85 ▲	86 ▲	82 ▲	
Thailand	29	28	34		45 ▼		62	62	66		79 ▼	
ψ Iran, Islamic Rep. of	34	26 ▲	20 ▲	20 ▲	26 ▲	24 ▲	63	55 ▲	51 ▲	55 ▲	61	59
Georgia	42	36 ▲	26 ▲				72	62 ▲	56 ▲			
Bahrain	39	26 ▲	19 ▲	17 ▲			75	53 ▲	49 ▲	51 ▲		
Norway (8)	59	51 ▲	48 ▲	44 ▲		64 ▼	90	87 ▲	85 ▲	81 ▲		90
ψ Oman	23	16 ▲	14 ▲				52	39 ▲	41 ▲			
ψ Chile	28	23 ▲		15 ▲	16 ▲		63	57 ▲		41 ▲	46 ▲	
✕ South Africa (9)	13	9 ▲					34	24 ▲				
ψ Egypt	21		21	24			47		47	52 ▼		
Lebanon	35	38	36	27 ▲			71	73	74	68		
✕ Saudi Arabia	11	20 ▼					34	47 ▼				
✕ Jordan	18	26 ▼	35 ▼	30 ▼	33 ▼		45	55 ▼	61 ▼	60 ▼	61 ▼	
ψ Kuwait	11		6 ▲				37		29 ▲			
ψ Botswana (9)	16	15					47	50				
✕ Morocco	14	12 ▲					41	36 ▲				

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Dubai, UAE	67	53 ▲	47 ▲				88	79 ▲	74 ▲			
Quebec, Canada	86	82	78 ▲	88	93 ▼	90	98	98	97	99	99	99
Florida, US	57	68 ▼					84	94 ▼				
Ontario, Canada	75	71 ▲	74	75	72	65 ▲	95	94	95	97 ▼	96	91 ▲
Abu Dhabi, UAE	37	39					65	71 ▼				

- ▲ 2015 percent significantly higher
- ▼ 2015 percent significantly lower

**Exhibit 2.11: Description of the TIMSS 2015 Low International Benchmark (400) of Mathematics Achievement**

400 Low International Benchmark

**Summary**

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

The few items at this level provide some evidence that students have an elementary understanding of whole numbers. They can match tables to bar graphs and pictographs.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.11.1: Low International Benchmark – Example Item 1**

Country	Percent Full Credit
Hong Kong SAR	85 (1.4) ▲
<sup>2</sup> Singapore	83 (1.2) ▲
Slovenia	81 (1.7) ▲
<sup>2</sup> Lithuania	81 (2.1) ▲
Japan	79 (1.9) ▲
Malta	76 (1.9) ▲
Chinese Taipei	76 (1.8) ▲
Australia	74 (1.4) ▲
Korea, Rep. of	71 (2.2) ▲
Hungary	70 (2.0) ▲
Russian Federation	70 (2.6) ▲
Norway (9)	69 (2.3) ▲
Lebanon	69 (2.2) ▲
Bahrain	67 (1.9) ▲
United Arab Emirates	67 (1.1) ▲
† United States	64 (1.4) ▲
Kazakhstan	64 (2.1) ▲
<sup>3</sup> Israel	64 (1.8) ▲
Thailand	64 (2.1) ▲
<b>International Avg.</b>	<b>64 (0.3)</b>
Malaysia	63 (2.0) ▲
Turkey	62 (1.9) ▲
Qatar	62 (1.9) ▲
Morocco	61 (1.2) ▲
Oman	61 (2.2) ▲
<sup>2</sup> Italy	60 (2.3) ▲
<sup>1</sup> † Canada	59 (1.5) ▼
Kuwait	59 (2.8) ▼
England	58 (2.1) ▼
Sweden	57 (2.6) ▼
Chile	56 (2.2) ▼
Iran, Islamic Rep. of	56 (1.4) ▼
Egypt	53 (1.9) ▼
Ireland	53 (2.2) ▼
South Africa (9)	52 (1.7) ▼
<sup>1</sup> <sup>2</sup> Georgia	52 (2.6) ▼
† New Zealand	51 (1.8) ▼
Saudi Arabia	49 (2.5) ▼
Botswana (9)	44 (2.2) ▼
Jordan	42 (1.9) ▼

**Content Domain: Data and Chance**  
**Cognitive Domain: Applying**  
**Description: Uses information in a table to complete a bar graph**

The heights of 100 students in a school were measured to the nearest 5 cm. This table shows the results.

Height (cm)	145	150	155	160
Number	16	40	25	19

Complete this bar chart to show the same information.

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
<b>Benchmarking Participants</b>	
Dubai, UAE	75 (1.3) ▲
Norway (8)	71 (1.8) ▲
<sup>1</sup> Florida, US	62 (3.4)
Abu Dhabi, UAE	60 (2.4)
Ontario, Canada	59 (1.7) ▼
‡ Quebec, Canada	56 (2.1) ▼
† Buenos Aires, Argentina	36 (2.9) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.





SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

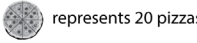
**Exhibit 2.11.2: Low International Benchmark – Example Item 2**

Country	Percent Correct
<sup>2</sup> Singapore	96 (0.6) ▲
Hong Kong SAR	95 (0.9) ▲
Korea, Rep. of	95 (0.9) ▲
Chinese Taipei	95 (0.9) ▲
Japan	93 (1.1) ▲
England	92 (1.2) ▲
Slovenia	90 (1.4) ▲
Ireland	90 (1.2) ▲
<sup>2</sup> Lithuania	89 (1.5) ▲
Australia	87 (1.3) ▲
Hungary	86 (1.7) ▲
<sup>1 †</sup> Canada	86 (1.3) ▲
† New Zealand	85 (1.4) ▲
<sup>2</sup> Italy	85 (1.7) ▲
† United States	84 (1.0) ▲
Norway (9)	84 (1.8) ▲
Russian Federation	84 (1.8) ▲
Malta	83 (1.5) ▲
<sup>1 2</sup> Georgia	81 (2.1)
Thailand	81 (1.9)
United Arab Emirates	79 (0.9)
<sup>3</sup> Israel	78 (1.5)
<b>International Avg.</b>	<b>78 (0.3)</b>
Sweden	78 (1.8)
Bahrain	75 (1.9)
Malaysia	75 (1.6)
Turkey	75 (2.4)
Kazakhstan	73 (2.0) ▼
Iran, Islamic Rep. of	70 (1.8) ▼
Chile	70 (1.9) ▼
Qatar	69 (1.8) ▼
Kuwait	66 (2.1) ▼
Lebanon	64 (2.6) ▼
Oman	61 (1.5) ▼
Morocco	60 (1.5) ▼
Botswana (9)	59 (1.6) ▼
Jordan	58 (1.9) ▼
South Africa (9)	57 (1.7) ▼
Saudi Arabia	56 (2.6) ▼
Egypt	55 (1.9) ▼

**Content Domain: Data and Chance**  
**Cognitive Domain: Knowing**  
**Description: Identifies the table that matches the information shown in a pictograph**

The pictograph shows how many pizzas a shop sold in four months.

January    
 February    
 March    
 April 

 represents 20 pizzas

One of these tables shows the same information, which one?

(A) 

Month	Pizzas Sold
January	60
February	80
March	60
April	60

(B) 

Month	Pizzas Sold
January	70
February	80
March	60
April	70

(C) 

Month	Pizzas Sold
January	70
February	140
March	60
April	70

(D) 

Month	Pizzas Sold
January	60
February	80
March	70
April	60

Country	Percent Correct
---------	-----------------

**Benchmarking Participants**

‡ Quebec, Canada	90 (2.1) ▲
Dubai, UAE	87 (1.3) ▲
Ontario, Canada	84 (1.9) ▲
<sup>1</sup> Florida, US	82 (2.0) ▲
Norway (8)	80 (1.8)
Abu Dhabi, UAE	74 (1.9) ▼
† Buenos Aires, Argentina	56 (2.6) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.11.3: Low International Benchmark – Example Item 3**

Country	Percent Correct	Content Domain: Number Cognitive Domain: Knowing Description: Evaluates the power of a whole number
Korea, Rep. of	95 (0.8) ▲	<p>What is the value of <math>3^3</math>?</p> <p>(A) 6</p> <p>(B) 9</p> <p><input checked="" type="radio"/> 27</p> <p>(D) 33</p>
Slovenia	93 (1.2) ▲	
<sup>2</sup> Singapore	90 (1.1) ▲	
Hong Kong SAR	89 (1.3) ▲	
<sup>2</sup> Italy	87 (1.6) ▲	
† United States	87 (1.0) ▲	
Chinese Taipei	86 (1.3) ▲	
Japan	86 (1.3) ▲	
Russian Federation	84 (2.2) ▲	
Lebanon	81 (1.9) ▲	
Kazakhstan	80 (2.0) ▲	
Ireland	79 (2.0) ▲	
Hungary	77 (2.3) ▲	
<sup>1</sup> † Canada	76 (1.4) ▲	
Malaysia	75 (1.8) ▲	
<sup>2</sup> Lithuania	75 (2.3) ▲	
Chile	75 (2.2) ▲	
Egypt	73 (1.9)	
United Arab Emirates	72 (1.4)	
<b>International Avg.</b>	<b>70 (0.3)</b>	
<sup>3</sup> Israel	70 (1.9)	
Bahrain	70 (1.8)	
Malta	69 (1.8)	
England	69 (2.5)	
Turkey	69 (2.1)	
Iran, Islamic Rep. of	68 (2.1)	
Australia	66 (1.8) ▼	
<sup>1</sup> <sup>2</sup> Georgia	64 (2.9) ▼	
Qatar	63 (2.3) ▼	
South Africa (9)	62 (2.1) ▼	
Oman	60 (1.7) ▼	
Thailand	59 (2.5) ▼	
Jordan	57 (2.2) ▼	
† New Zealand	57 (1.9) ▼	
Norway (9)	57 (2.2) ▼	
Kuwait	52 (2.7) ▼	
Sweden	50 (2.4) ▼	
Saudi Arabia	47 (2.4) ▼	
Botswana (9)	39 (2.0) ▼	
Morocco	35 (1.6) ▼	

Country	Percent Correct
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**Benchmarking Participants**

‡ Quebec, Canada	88 (2.2) ▲
<sup>1</sup> Florida, US	87 (2.9) ▲
Dubai, UAE	85 (1.5) ▲
† Buenos Aires, Argentina	75 (2.7)
Ontario, Canada	73 (1.9)
Abu Dhabi, UAE	64 (2.5) ▼
Norway (8)	33 (2.8) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.12: Description of the TIMSS 2015 Intermediate International Benchmark (475) of Mathematics Achievement**

**475 Intermediate International Benchmark**

**Summary**

*Students can apply basic mathematical knowledge in a variety of situations. They can solve problems involving negative numbers, decimals, percentages, and proportions. Students have some knowledge of linear expressions and two- and three-dimensional shapes. They can read and interpret data in graphs and tables. They have some basic knowledge of chance.*

Students can solve problems involving negative numbers, decimals, percentages, and proportions. For example, they can calculate unit prices to solve a problem.

Students at this level can evaluate and solve simple linear equations.

Students have some basic knowledge about two- and three-dimensional shapes.

Students can locate and interpret data presented in tables, bar graphs, pie charts, and compare data from two line graphs to solve a problem. They have some basic knowledge of chance.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.12.1: Intermediate International Benchmark – Example Item 1**

Country	Percent Full Credit
Chinese Taipei	85 (1.4) ▲
Hong Kong SAR	85 (1.7) ▲
<sup>2</sup> Singapore	82 (1.5) ▲
Russian Federation	77 (2.2) ▲
Slovenia	76 (1.9) ▲
Korea, Rep. of	75 (2.0) ▲
Japan	73 (1.7) ▲
Hungary	72 (2.2) ▲
Kazakhstan	70 (2.3) ▲
<sup>1</sup> † Canada	68 (1.7) ▲
<sup>2</sup> Italy	65 (2.2) ▲
† United States	64 (1.7) ▲
<sup>3</sup> Israel	63 (1.8) ▲
Ireland	63 (1.9) ▲
<sup>2</sup> Lithuania	62 (2.3) ▲
Sweden	59 (2.9)
Lebanon	56 (2.2)
<sup>1</sup> <sup>2</sup> Georgia	56 (2.7)
<b>International Avg.</b>	<b>55 (0.3)</b>
Australia	55 (2.0)
United Arab Emirates	54 (1.1)
Norway (9)	54 (2.4)
Malta	53 (2.0)
England	50 (2.7)
Qatar	49 (2.0) ▼
† New Zealand	48 (2.0) ▼
Malaysia	44 (1.9) ▼
Iran, Islamic Rep. of	42 (2.2) ▼
Morocco	42 (1.5) ▼
Turkey	41 (2.4) ▼
Bahrain	41 (1.8) ▼
Oman	40 (1.6) ▼
Egypt	40 (2.0) ▼
Thailand	39 (2.6) ▼
Kuwait	39 (2.1) ▼
Chile	38 (2.4) ▼
Jordan	34 (1.9) ▼
Saudi Arabia	30 (2.6) ▼
Botswana (9)	29 (1.7) ▼
South Africa (9)	23 (1.9) ▼

**Content Domain: Number**  
**Cognitive Domain: Knowing**  
**Description: Recognizes the commutative property**

For every whole number  $n$ , are these statements **true** or **false**?  
Fill in one circle for each statement.

	True		False
$n + 4 = 4 + n$ -----	<input checked="" type="radio"/>	-----	<input type="radio"/> (B)
$n - 5 = 5 - n$ -----	<input type="radio"/> (A)	-----	<input checked="" type="radio"/>
$n \times 6 = 6 \times n$ -----	<input checked="" type="radio"/>	-----	<input type="radio"/> (B)
$n \div 7 = 7 \div n$ -----	<input type="radio"/> (A)	-----	<input checked="" type="radio"/>

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
<b>Benchmarking Participants</b>	
‡ Quebec, Canada	74 (2.4) ▲
Dubai, UAE	69 (1.6) ▲
Ontario, Canada	65 (2.1) ▲
<sup>1</sup> Florida, US	59 (2.9)
Abu Dhabi, UAE	46 (2.2) ▼
† Buenos Aires, Argentina	42 (2.6) ▼
Norway (8)	40 (2.2) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 2.12.2: Intermediate International Benchmark – Example Item 2**

Country	Percent Correct	Content Domain: Number
		Cognitive Domain: Knowing
		Description: Identifies the decimal number closest in size to a given fraction
<sup>2</sup> Singapore	95 (0.8) ▲	<p>Which number is closest in size to <math>\frac{3}{4}</math>?</p> <p>(A) 0.34</p> <p>(B) 0.43</p> <p>● 0.74</p> <p>(D) 0.79</p>
Hong Kong SAR	91 (1.5) ▲	
Korea, Rep. of	88 (1.5) ▲	
Ireland	86 (1.8) ▲	
<sup>†</sup> United States	85 (1.3) ▲	
Chinese Taipei	80 (1.4) ▲	
<sup>1 †</sup> Canada	80 (1.7) ▲	
England	76 (2.0) ▲	
Lebanon	75 (2.7) ▲	
Japan	75 (1.8) ▲	
Kazakhstan	75 (2.2) ▲	
Russian Federation	75 (2.4) ▲	
Malta	74 (1.6) ▲	
Norway (9)	71 (2.2) ▲	
Australia	71 (1.6) ▲	
Sweden	69 (2.8) ▲	
Slovenia	66 (2.2) ▲	
<sup>†</sup> New Zealand	66 (1.9) ▲	
<sup>2</sup> Lithuania	66 (2.4)	
United Arab Emirates	65 (1.5) ▲	
<sup>3</sup> Israel	65 (2.0)	
Malaysia	63 (2.1)	
<b>International Avg.</b>	<b>62 (0.3)</b>	
<sup>2</sup> Italy	59 (2.5)	
Qatar	59 (2.1)	
Hungary	57 (2.4) ▼	
Bahrain	52 (2.3) ▼	
Egypt	52 (2.2) ▼	
Morocco	52 (1.6) ▼	
Botswana (9)	51 (2.0) ▼	
Kuwait	44 (2.6) ▼	
Oman	41 (1.5) ▼	
<sup>1 2</sup> Georgia	41 (2.9) ▼	
Turkey	39 (2.1) ▼	
South Africa (9)	37 (2.0) ▼	
Chile	36 (2.3) ▼	
Thailand	36 (2.8) ▼	
Iran, Islamic Rep. of	35 (2.1) ▼	
Saudi Arabia	35 (2.6) ▼	
Jordan	29 (1.8) ▼	

Country	Percent Correct
---------	-----------------

**Benchmarking Participants**

<sup>‡</sup> Quebec, Canada	87 (2.2) ▲
<sup>1</sup> Florida, US	85 (2.8) ▲
Ontario, Canada	77 (2.2) ▲
Dubai, UAE	72 (2.6) ▲
Abu Dhabi, UAE	62 (2.6)
Norway (8)	60 (2.2)
<sup>†</sup> Buenos Aires, Argentina	35 (2.4) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.12.3: Intermediate International Benchmark – Example Item 3**

Country	Percent Full Credit
<sup>2</sup> Singapore	86 (1.4) ▲
Korea, Rep. of	84 (1.4) ▲
Hong Kong SAR	84 (1.9) ▲
Japan	81 (1.5) ▲
Chinese Taipei	73 (1.7) ▲
Slovenia	73 (2.1) ▲
Norway (9)	72 (2.1) ▲
<sup>1</sup> † Canada	71 (1.6) ▲
<sup>2</sup> Lithuania	71 (2.0) ▲
England	70 (2.2) ▲
Sweden	70 (2.1) ▲
Russian Federation	70 (2.3) ▲
Ireland	70 (1.9) ▲
Hungary	68 (2.5) ▲
<sup>3</sup> Israel	66 (1.8) ▲
Kazakhstan	63 (2.7) ▲
† New Zealand	62 (1.9) ▲
Australia	62 (1.9) ▲
† United States	58 (1.6) ▲
<sup>2</sup> Italy	57 (2.5) ▲
<b>International Avg.</b>	<b>53 (0.3)</b>
Malta	53 (2.1) ▲
<sup>1 2</sup> Georgia	49 (2.6) ▼
Lebanon	48 (2.7) ▼
United Arab Emirates	43 (1.4) ▼
Morocco	42 (1.5) ▼
Turkey	41 (2.0) ▼
Iran, Islamic Rep. of	39 (2.2) ▼
Chile	38 (2.3) ▼
Qatar	37 (2.5) ▼
Egypt	34 (2.1) ▼
Malaysia	34 (1.7) ▼
Thailand	34 (2.3) ▼
Bahrain	27 (1.9) ▼
Jordan	27 (1.6) ▼
Kuwait	24 (2.2) ▼
Oman	23 (1.5) ▼
South Africa (9)	22 (1.6) ▼
Saudi Arabia	21 (2.0) ▼
Botswana (9)	18 (1.5) ▼

**Content Domain: Number**  
**Cognitive Domain: Knowing**  
**Description: Completes a table of equivalent proportions**

This table shows the number of pieces of paper in a stack and the height of the stack.

Complete the table.

Number of pieces of paper in the stack	100	150	200
Height of the stack (mm)	8	12	16

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
---------	---------------------

**Benchmarking Participants**

‡ Quebec, Canada	79 (3.3) ▲
Ontario, Canada	67 (2.3) ▲
Norway (8)	66 (2.0) ▲
Dubai, UAE	61 (2.0) ▲
<sup>1</sup> Florida, US	49 (4.1) ▼
† Buenos Aires, Argentina	35 (2.7) ▼
Abu Dhabi, UAE	34 (2.3) ▼

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

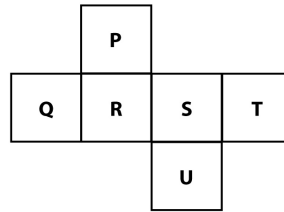
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.12.4: Intermediate International Benchmark – Example Item 4**

Country	Percent Correct
Korea, Rep. of	94 (1.1) ▲
Japan	92 (1.0) ▲
Chinese Taipei	90 (1.1) ▲
<sup>2</sup> Singapore	88 (1.1) ▲
Hong Kong SAR	88 (1.3) ▲
<sup>†</sup> New Zealand	78 (1.4) ▲
Australia	77 (1.6) ▲
Hungary	77 (2.0) ▲
Ireland	76 (2.1) ▲
England	75 (1.9) ▲
<sup>2</sup> Italy	73 (2.1) ▲
<sup>1 †</sup> Canada	71 (1.5) ▲
<sup>2</sup> Lithuania	68 (2.3) ▲
Norway (9)	67 (2.3) ▲
Slovenia	64 (2.3) ▲
Sweden	63 (2.0)
Chile	62 (2.1)
Turkey	60 (2.2)
Russian Federation	60 (2.7)
<b>International Avg.</b>	<b>60 (0.3)</b>
<sup>†</sup> United States	60 (1.5)
Iran, Islamic Rep. of	57 (1.9)
Malaysia	57 (1.8)
Kazakhstan	56 (2.8)
<sup>3</sup> Israel	56 (2.1)
Malta	56 (1.8) ▼
Bahrain	55 (2.0) ▼
Qatar	53 (1.9) ▼
Thailand	53 (2.2) ▼
United Arab Emirates	53 (1.4) ▼
<sup>1 2</sup> Georgia	50 (2.5) ▼
Morocco	48 (1.5) ▼
Oman	38 (1.3) ▼
Kuwait	36 (2.1) ▼
Jordan	36 (2.0) ▼
South Africa (9)	32 (2.0) ▼
Lebanon	32 (2.3) ▼
Saudi Arabia	32 (2.5) ▼
Egypt	30 (2.0) ▼
Botswana (9)	27 (2.0) ▼

**Content Domain: Geometry**  
**Cognitive Domain: Reasoning**  
**Description: Identifies opposite faces of a cube given its net**



Liza constructed a cube by folding the net shown above. Which square face is opposite face Q?

- (A) P
- (B) S
- (C) T
- (D) U

Country	Percent Correct
---------	-----------------

**Benchmarking Participants**

<sup>‡</sup> Quebec, Canada	73 (2.6) ▲
Ontario, Canada	69 (2.2) ▲
Norway (8)	61 (2.3)
Dubai, UAE	61 (2.3)
<sup>1</sup> Florida, US	54 (2.4) ▼
<sup>†</sup> Buenos Aires, Argentina	53 (3.0) ▼
Abu Dhabi, UAE	52 (2.5) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.12.5: Intermediate International Benchmark – Example Item 5**

Country	Percent Correct
Korea, Rep. of	83 (1.5) ▲
Japan	83 (1.3) ▲
Chinese Taipei	80 (1.5) ▲
<sup>2</sup> Singapore	80 (1.4) ▲
Hong Kong SAR	78 (2.0) ▲
<sup>2</sup> Italy	73 (2.2) ▲
Russian Federation	72 (2.9) ▲
England	70 (2.0) ▲
<sup>1</sup> † Canada	70 (1.8) ▲
Ireland	68 (2.3) ▲
<sup>2</sup> Lithuania	67 (2.2) ▲
Turkey	66 (1.8) ▲
† New Zealand	66 (1.5) ▲
Thailand	65 (2.1)
Hungary	65 (2.1)
Malaysia	65 (1.8)
Kazakhstan	64 (3.1)
† United States	64 (1.7)
Norway (9)	64 (2.2)
Australia	63 (1.5)
<sup>3</sup> Israel	62 (1.6)
Chile	62 (2.0)
<b>International Avg.</b>	<b>62 (0.3)</b>
United Arab Emirates	61 (1.1)
Slovenia	60 (2.1)
Sweden	60 (2.6)
Malta	56 (2.3) ▼
Qatar	55 (2.5) ▼
Oman	54 (1.7) ▼
Lebanon	54 (2.7) ▼
<sup>1 2</sup> Georgia	54 (2.8) ▼
Botswana (9)	54 (1.8) ▼
South Africa (9)	52 (1.4) ▼
Bahrain	51 (2.4) ▼
Kuwait	50 (2.3) ▼
Iran, Islamic Rep. of	48 (2.2) ▼
Saudi Arabia	46 (2.5) ▼
Jordan	46 (1.9) ▼
Egypt	42 (1.9) ▼
Morocco	39 (1.7) ▼

**Content Domain: Data and Chance**  
**Cognitive Domain: Knowing**  
**Description: Reads values from two line graphs to solve a problem**

**Temperature Chart of a Week in Zedland**

The graph above shows the daily high and low temperatures for a week at a place in Zedland. On which day was the difference between the highest and lowest temperatures 10 °C?

(A) Wednesday  
 (B) Thursday  
 (C) Friday  
 (D) Saturday

Country	Percent Correct
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**Benchmarking Participants**

‡ Quebec, Canada	77 (2.4) ▲
Ontario, Canada	68 (2.4) ▲
Dubai, UAE	67 (1.5) ▲
<sup>1</sup> Florida, US	62 (3.5)
Norway (8)	61 (2.1)
Abu Dhabi, UAE	58 (2.2)
† Buenos Aires, Argentina	40 (2.8) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.13: Description of the TIMSS 2015 High International Benchmark (550) of Mathematics Achievement**

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**550 High International Benchmark**

**Summary**

*Students can apply their understanding and knowledge in a variety of relatively complex situations. They can use information to solve problems involving different types of numbers and operations. They can relate fractions, decimals, and percentages to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can solve a variety of problems with angles including those involving triangles, parallel lines, rectangles, and similar figures. Students can interpret data in a variety of graphs and solve simple problems involving outcomes and probabilities.*

Students can use information to solve problems involving different types of numbers and operations. They can relate fractions, decimals, ratios, and percentages to each other. They can solve problems with fractions, proportions, and percentages.

Students at this level show basic procedural knowledge related to algebraic expressions. They can evaluate a variety of expressions and formulas. They can identify algebraic expressions that correspond to situations. Students can identify the solutions of linear equations and a pair of simultaneous linear equations, and identify the values that satisfy two inequalities. They can determine a specific term of a numerical or geometric pattern.

Students can solve a variety of problems with angles including those involving triangles, parallel lines, rectangles, and similar figures. They can draw an angle to meet given specifications and the reflection of a shape. They can visualize rectangular solids.

Students can interpret data from pie charts, line graphs, bar graphs, and pictographs to solve problems and provide explanations. They can calculate means. They can solve simple problems involving outcomes and probabilities.

Exhibit 2.13.1: High International Benchmark – Example Item 1

Country	Percent Full Credit
<sup>2</sup> Singapore	70 (1.6) ⬆
Chinese Taipei	66 (1.8) ⬆
Korea, Rep. of	63 (2.2) ⬆
Hong Kong SAR	63 (2.6) ⬆
Japan	62 (1.8) ⬆
Ireland	55 (2.2) ⬆
<sup>1</sup> † Canada	55 (2.1) ⬆
<sup>2</sup> Lithuania	52 (2.3) ⬆
<sup>3</sup> Israel	51 (2.3) ⬆
Norway (9)	50 (2.4) ⬆
Sweden	48 (2.3) ⬆
England	48 (2.5) ⬆
Hungary	48 (2.7) ⬆
Russian Federation	48 (2.2) ⬆
† United States	47 (1.8) ⬆
† New Zealand	40 (2.0) ⬆
<sup>2</sup> Italy	40 (2.7) ⬆
Slovenia	39 (1.9) ⬆
Australia	38 (1.7) ⬆
Malta	37 (1.9) ⬆
<b>International Avg.</b>	<b>31 (0.3)</b>
Malaysia	21 (1.4) ⬇
Turkey	21 (1.8) ⬇
Kazakhstan	20 (2.2) ⬇
United Arab Emirates	20 (1.0) ⬇
<sup>1 2</sup> Georgia	18 (2.0) ⬇
Qatar	17 (1.7) ⬇
Thailand	14 (1.6) ⬇
Chile	14 (1.5) ⬇
Bahrain	11 (1.5) ⬇
Oman	8 (0.9) ⬇
Kuwait	8 (1.9) ⬇
Iran, Islamic Rep. of	6 (1.1) ⬇
Botswana (9)	5 (0.8) ⬇
Lebanon	4 (1.1) ⬇
South Africa (9)	4 (0.9) ⬇
Egypt	4 (0.6) ⬇
Morocco	4 (0.6) ⬇
Jordan	3 (0.6) ⬇
Saudi Arabia	2 (0.5) ⬇

Content Domain: Number  
Cognitive Domain: Applying  
Description: Part B - Selects and combines information from two sources to solve a multi-step word problem

Mobile Telephone

Kate was going to buy a new Supertext mobile phone. She looked at these two advertisements.

Company X	Company Y
The New Supertext Mobile Phone Get this great phone free!	The New Supertext Mobile Phone Cheap rates for calls and texts!
250 zeds monthly charge Calls 3 zeds per minute Text messages 2 zeds each	Buy the phone for 2500 zeds Only 50 zeds monthly charge Calls only 2 zeds per minute Text messages only 1 zed each

Kate decided to compare how much it would cost to have the phone for a year without making any calls or sending any text messages.

A. Work out the cost of having the Supertext phone for a year from Company X and from Company Y.

Costs: Company X 3000 Company Y 3100

B. Kate then estimated how much she was likely to use the phone. She thought she would talk on the phone for 500 minutes in the first year and send 200 text messages. Find out how much she would pay for the phone in the first year from each company. Do not forget the monthly charge and other costs.

Costs: Company X 4900 Company Y 4300

The answer shown for part B illustrates the type of response that would receive full credit (2 points).

Country	Percent Full Credit
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Benchmarking Participants

<sup>‡</sup> Quebec, Canada	64 (3.1) ⬆
Ontario, Canada	53 (2.4) ⬆
Norway (8)	40 (1.9) ⬆
<sup>1</sup> Florida, US	37 (3.7)
Dubai, UAE	34 (1.9)
Abu Dhabi, UAE	16 (2.1) ⬇
† Buenos Aires, Argentina	11 (1.6) ⬇

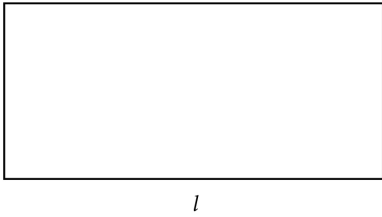
- ⬆ Percent significantly higher than international average
- ⬇ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Exhibit 2.13.2: High International Benchmark – Example Item 2**

Country	Percent Correct
<sup>2</sup> Singapore	82 (1.6) ▲
Hong Kong SAR	78 (1.9) ▲
Korea, Rep. of	77 (1.9) ▲
Chinese Taipei	76 (1.4) ▲
Russian Federation	75 (1.7) ▲
Japan	74 (1.8) ▲
Kazakhstan	70 (2.3) ▲
<sup>1</sup> † Canada	64 (1.6) ▲
† United States	60 (1.5) ▲
<sup>2</sup> Lithuania	59 (2.6) ▲
Ireland	57 (2.2) ▲
England	56 (1.9) ▲
Malta	56 (2.1) ▲
<sup>3</sup> Israel	53 (2.1)
Australia	52 (1.9)
<b>International Avg.</b>	<b>51 (0.3)</b>
<sup>1</sup> <sup>2</sup> Georgia	51 (2.8)
Bahrain	50 (2.5)
Iran, Islamic Rep. of	50 (2.1)
United Arab Emirates	50 (1.4)
† New Zealand	49 (2.1)
Hungary	48 (2.1)
<sup>2</sup> Italy	48 (2.2)
Turkey	47 (2.5)
Norway (9)	47 (2.6)
Lebanon	46 (2.9)
Qatar	46 (1.6) ▼
Slovenia	45 (2.1) ▼
Egypt	45 (2.3) ▼
Sweden	44 (2.4) ▼
Kuwait	41 (2.5) ▼
Morocco	39 (1.2) ▼
Jordan	39 (2.1) ▼
Thailand	38 (2.4) ▼
Malaysia	36 (1.7) ▼
Botswana (9)	35 (1.9) ▼
Oman	32 (1.7) ▼
South Africa (9)	29 (1.3) ▼
Chile	29 (1.8) ▼
Saudi Arabia	26 (2.0) ▼

**Content Domain: Algebra**  
**Cognitive Domain: Applying**  
**Description: Identifies the formula that represents a situation involving area**



The shape above is a rectangle, with length  $l$ , and width  $w$ .

If the length is doubled and the width stays the same, which formula gives the area ( $A$ ) of the new rectangle?

(A)  $A = 2l + 2w$   
 (B)  $A = 2l + 4w$   
 (C)  $A = 2lw$   
 (D)  $A = 4lw$

Country	Percent Correct
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**Benchmarking Participants**

‡ Quebec, Canada	70 (3.1) ▲
Dubai, UAE	63 (1.6) ▲
Ontario, Canada	62 (2.0) ▲
<sup>1</sup> Florida, US	54 (3.5)
Abu Dhabi, UAE	43 (2.5) ▼
Norway (8)	33 (2.1) ▼
† Buenos Aires, Argentina	19 (2.0) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.13.3: High International Benchmark – Example Item 3**

Country	Percent Full Credit	Content Domain: Algebra	
		Cognitive Domain: Knowing	Description: Finds the value of an algebraic expression involving parentheses and negative terms
<sup>2</sup> Singapore	77 (1.9) ⬆	<p><math>a = 5</math> and <math>b = 2</math>. What is the value of <math>a^2b - 3(a - b)</math>?</p> <p>Answer: <u>41</u></p> <p>The answer shown illustrates the type of response that would receive full credit (1 point).</p>	
Hong Kong SAR	75 (2.2) ⬆		
Chinese Taipei	73 (1.9) ⬆		
Korea, Rep. of	69 (2.0) ⬆		
Kazakhstan	57 (2.7) ⬆		
Russian Federation	57 (2.3) ⬆		
Japan	55 (1.8) ⬆		
† United States	51 (1.5) ⬆		
Slovenia	48 (2.2) ⬆		
Lebanon	43 (2.6) ⬆		
<sup>1</sup> † Canada	38 (1.7) ⬆		
United Arab Emirates	37 (1.2) ⬆		
<sup>3</sup> Israel	37 (2.1) ⬆		
Hungary	36 (2.3) ⬆		
Malta	36 (1.9) ⬆		
Ireland	35 (2.2) ⬆		
<sup>1</sup> <sup>2</sup> Georgia	35 (2.7) ⬆		
<sup>2</sup> Italy	33 (2.3) ⬆		
<sup>2</sup> Lithuania	32 (2.1) ⬆		
<b>International Avg.</b>	<b>32 (0.3)</b>		
Australia	28 (2.0) ⬇		
Malaysia	28 (1.6) ⬇		
England	26 (2.0) ⬇		
Egypt	23 (1.9) ⬇		
Bahrain	22 (2.2) ⬇		
Qatar	21 (1.8) ⬇		
† New Zealand	20 (1.8) ⬇		
Turkey	20 (1.8) ⬇		
Oman	19 (1.4) ⬇		
Iran, Islamic Rep. of	17 (1.4) ⬇		
Jordan	16 (1.4) ⬇		
Chile	13 (1.7) ⬇		
Saudi Arabia	13 (1.7) ⬇		
Thailand	12 (1.7) ⬇		
South Africa (9)	10 (1.4) ⬇		
Norway (9)	10 (1.4) ⬇		
Kuwait	10 (1.5) ⬇		
Sweden	8 (1.2) ⬇		
Morocco	8 (0.8) ⬇		
Botswana (9)	6 (0.9) ⬇		

Country	Percent Full Credit
<b>Benchmarking Participants</b>	
Dubai, UAE	47 (2.0) ⬆
<sup>‡</sup> Quebec, Canada	41 (3.0) ⬆
Ontario, Canada	38 (2.1) ⬆
<sup>†</sup> Florida, US	35 (2.9) ⬆
Abu Dhabi, UAE	29 (2.4) ⬆
<sup>†</sup> Buenos Aires, Argentina	14 (2.0) ⬇
Norway (8)	2 (0.5) ⬇

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.  
(.) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

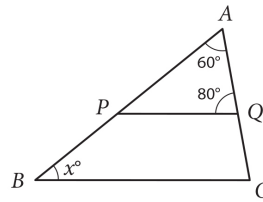
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 2.13.4: High International Benchmark – Example Item 4**

Country	Percent Full Credit
Korea, Rep. of	87 (1.5) ▲
Japan	86 (1.4) ▲
<sup>2</sup> Singapore	85 (1.2) ▲
Hong Kong SAR	80 (2.3) ▲
Chinese Taipei	74 (1.5) ▲
Russian Federation	64 (2.7) ▲
Kazakhstan	62 (2.8) ▲
<sup>3</sup> Israel	53 (2.0) ▲
Lebanon	51 (2.6) ▲
England	49 (2.5) ▲
<sup>1</sup> † Canada	49 (2.0) ▲
Hungary	47 (2.6) ▲
Ireland	47 (2.5) ▲
Slovenia	45 (2.4) ▲
Malta	44 (2.2) ▲
<b>International Avg.</b>	<b>43 (0.3)</b>
† United States	42 (1.6) ▲
Norway (9)	41 (2.4) ▲
<sup>2</sup> Lithuania	41 (2.7) ▲
Egypt	40 (2.0) ▲
Iran, Islamic Rep. of	39 (1.9) ▼
Turkey	37 (1.7) ▼
Sweden	36 (2.8) ▼
<sup>2</sup> Italy	36 (2.2) ▼
United Arab Emirates	34 (1.5) ▼
† New Zealand	34 (2.0) ▼
Morocco	33 (1.7) ▼
Malaysia	32 (1.8) ▼
Australia	32 (2.0) ▼
Qatar	31 (1.9) ▼
Oman	30 (1.8) ▼
Jordan	30 (2.0) ▼
Thailand	30 (2.1) ▼
<sup>1</sup> <sup>2</sup> Georgia	29 (2.8) ▼
Botswana (9)	27 (1.5) ▼
Kuwait	24 (2.2) ▼
Chile	22 (1.8) ▼
South Africa (9)	22 (1.7) ▼
Bahrain	20 (1.3) ▼
Saudi Arabia	13 (1.9) ▼

**Content Domain: Geometry**  
**Cognitive Domain: Applying**  
**Description: Solves a problem involving angles of a triangle and parallel lines**



Lines  $PQ$  and  $BC$  are parallel.  
What is the value of  $x$ ?

Answer: 40

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
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**Benchmarking Participants**

‡ Quebec, Canada	58 (3.2) ▲
Ontario, Canada	48 (2.3) ▲
Dubai, UAE	47 (3.0) ▲
Norway (8)	36 (2.0) ▼
<sup>1</sup> Florida, US	35 (3.3) ▼
Abu Dhabi, UAE	30 (2.2) ▼
† Buenos Aires, Argentina	15 (2.0) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.13.5: High International Benchmark – Example Item 5**

Country	Percent Correct
Japan	75 (1.8) ▲
Chinese Taipei	74 (1.9) ▲
Hong Kong SAR	71 (2.1) ▲
<sup>2</sup> Singapore	71 (1.5) ▲
Australia	70 (1.6) ▲
Korea, Rep. of	70 (2.0) ▲
<sup>1</sup> † Canada	69 (1.4) ▲
England	68 (2.2) ▲
Norway (9)	67 (2.4) ▲
Hungary	67 (2.2) ▲
Ireland	65 (2.6) ▲
† United States	64 (1.2) ▲
† New Zealand	62 (2.3) ▲
Sweden	60 (2.4) ▲
<sup>2</sup> Italy	57 (2.6) ▲
Slovenia	57 (2.3) ▲
Malta	57 (2.1) ▲
Bahrain	55 (1.6) ▲
<sup>2</sup> Lithuania	54 (2.5)
<sup>3</sup> Israel	53 (1.7)
<b>International Avg.</b>	<b>51 (0.3)</b>
United Arab Emirates	49 (1.3) ▼
Turkey	48 (2.1) ▼
Chile	47 (1.6) ▼
Russian Federation	46 (2.5) ▼
Thailand	46 (2.1) ▼
Iran, Islamic Rep. of	44 (1.8) ▼
Qatar	43 (1.8) ▼
Jordan	39 (2.1) ▼
Kazakhstan	39 (2.6) ▼
Egypt	36 (1.9) ▼
Malaysia	36 (2.1) ▼
Saudi Arabia	35 (2.3) ▼
Oman	33 (1.7) ▼
Morocco	33 (1.2) ▼
Kuwait	32 (2.2) ▼
Botswana (9)	30 (1.6) ▼
South Africa (9)	30 (1.4) ▼
Lebanon	27 (2.2) ▼
<sup>1 2</sup> Georgia	25 (2.1) ▼

**Content Domain: Data and Chance**  
**Cognitive Domain: Applying**  
**Description: Compares the chances of two outcomes**

**Rita's spinner**

**Ben's spinner**

Suppose Rita and Ben spin their spinners.

Which of the following is true?

- (A) Red is more likely on Ben's spinner than on Rita's
- (B) Red is more likely on Rita's spinner than on Ben's
- (C) Red is impossible on both spinners
- Red is equally likely on both spinners

Country	Percent Correct
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**Benchmarking Participants**

‡ Quebec, Canada	74 (2.8) ▲
Ontario, Canada	66 (2.0) ▲
Norway (8)	58 (2.6) ▲
Dubai, UAE	56 (2.0) ▲
<sup>1</sup> Florida, US	56 (3.3)
Abu Dhabi, UAE	48 (2.3)
† Buenos Aires, Argentina	42 (2.8) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14: Description of the TIMSS 2015 Advanced International Benchmark (625) of Mathematics Achievement**

625 Advanced International Benchmark

**Summary**

*Students can apply and reason in a variety of problem situations, solve linear equations, and make generalizations. They can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can use their knowledge of geometric figures to solve a wide range of problems about area. They demonstrate understanding of the meaning of averages and can solve problems involving expected values.*

Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. They can reason with different types of numbers in abstract and non-routine problems.

Students can write and solve linear equations in one or two variables. They can identify properties of linear functions from tables, graphs, and equations, including slopes and y-intercepts. Students can express generalizations either algebraically or in words, such as expressing the  $n^{\text{th}}$  term in number patterns. They can simplify algebraic expressions.

Students can use their knowledge of geometric figures to solve a wide range of problems about area and surface area. They can use the Pythagorean theorem to find the area of a triangle, the distance between two points on a coordinate grid, and the perimeter of a trapezoid. Students can find points on a coordinate grid in problems involving geometric figures.

Students demonstrate understanding of the meaning of averages and can calculate means and medians. They can solve problems involving expected values.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14.1: Advanced International Benchmark – Example Item 1**

Country	Percent Full Credit
Japan	58 (1.9) ⬤
<sup>2</sup> Singapore	54 (2.0) ⬤
Chinese Taipei	50 (2.1) ⬤
Korea, Rep. of	48 (2.1) ⬤
Norway (9)	40 (2.0) ⬤
Hong Kong SAR	39 (2.5) ⬤
England	33 (1.8) ⬤
<sup>1 †</sup> Canada	32 (1.7) ⬤
Ireland	32 (2.1) ⬤
Slovenia	30 (2.0) ⬤
Hungary	27 (1.9) ⬤
<sup>3</sup> Israel	27 (1.8) ⬤
Kazakhstan	26 (1.8) ⬤
<sup>†</sup> New Zealand	24 (1.4) ⬤
Australia	24 (1.5) ⬤
Sweden	23 (2.2)
Malta	23 (1.7)
<sup>†</sup> United States	22 (1.3)
Russian Federation	21 (1.6)
<b>International Avg.</b>	<b>20 (0.2)</b>
Turkey	20 (1.8)
<sup>2</sup> Italy	16 (1.3) ⬇
<sup>2</sup> Lithuania	15 (1.7) ⬇
<sup>1 2</sup> Georgia	14 (1.9) ⬇
Lebanon	10 (1.3) ⬇
United Arab Emirates	10 (0.8) ⬇
Chile	9 (1.1) ⬇
Qatar	8 (1.0) ⬇
Malaysia	7 (0.9) ⬇
Bahrain	7 (0.9) ⬇
Iran, Islamic Rep. of	5 (1.2) ⬇
Kuwait	5 (0.9) ⬇
Egypt	4 (0.8) ⬇
Thailand	4 (0.9) ⬇
South Africa (9)	4 (0.8) ⬇
Oman	4 (0.5) ⬇
Saudi Arabia	4 (1.0) ⬇
Jordan	3 (0.7) ⬇
Botswana (9)	3 (0.5) ⬇
Morocco	2 (0.3) ⬇

**Content Domain: Number**  
**Cognitive Domain: Reasoning**  
**Description: Reasons about fractional parts of a whole in a word problem and explains answer**

Tom and his brother Peter received the same amount of money.

Tom spent  $\frac{1}{3}$  of his money on books. He spent  $\frac{3}{5}$  of the remaining money to buy a new pair of shoes.

Peter spent  $\frac{3}{5}$  of his money to buy a new pair of shoes.

Who spent more for shoes?

(Check one box.)

Tom spent more money for shoes.

Peter spent more money for shoes.

They both spent the same amount for shoes.

Explain your answer.

$$\frac{2}{3} \times \frac{3}{5} = \frac{2}{5}$$

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
---------	---------------------

**Benchmarking Participants**

<sup>‡</sup> Quebec, Canada	35 (2.3) ⬤
Norway (8)	34 (2.4) ⬤
Ontario, Canada	31 (1.9) ⬤
<sup>1</sup> Florida, US	16 (2.3)
Dubai, UAE	14 (1.1) ⬇
Abu Dhabi, UAE	9 (1.5) ⬇
<sup>†</sup> Buenos Aires, Argentina	5 (1.1) ⬇

- ⬤ Percent significantly higher than international average
- ⬇ Percent significantly lower than international average

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.  
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14.2: Advanced International Benchmark – Example Item 2**

Country	Percent Correct	Content Domain: Algebra Cognitive Domain: Applying Description: Identifies a linear equation given the y-intercept
Japan	66 (2.0) ▲	<p>Janet described the graph of a function:</p> <ul style="list-style-type: none"> <li>• The graph is a straight line.</li> <li>• The graph intercepts the <math>y</math>-axis at 3.</li> </ul> <p>Which could be the function of Janet's graph?</p> <p>(A) <math>y = x^2 + 3</math></p> <p>(B) <math>y = 3x + 1</math></p> <p>(C) <math>y = 3x^2 - 1</math></p> <p><input checked="" type="radio"/> <math>y = x + 3</math></p>
Korea, Rep. of	63 (2.1) ▲	
Russian Federation	60 (2.1) ▲	
<sup>2</sup> Singapore	58 (1.9) ▲	
<sup>3</sup> Israel	56 (1.9) ▲	
Chinese Taipei	56 (1.7) ▲	
Hungary	55 (2.4) ▲	
Kazakhstan	54 (3.0) ▲	
† United States	54 (1.5) ▲	
Ireland	51 (2.1) ▲	
<sup>2</sup> Lithuania	50 (2.4) ▲	
Bahrain	47 (1.8) ▲	
Malta	47 (2.0) ▲	
<sup>1 2</sup> Georgia	47 (2.8)	
Jordan	45 (2.2)	
Lebanon	43 (2.8)	
United Arab Emirates	43 (1.1)	
South Africa (9)	43 (1.7)	
International Avg.	42 (0.3)	
England	39 (2.1)	
Botswana (9)	39 (1.5) ▼	
Qatar	39 (2.5)	
<sup>2</sup> Italy	39 (2.4)	
Egypt	39 (2.0)	
<sup>1 †</sup> Canada	38 (1.6) ▼	
Morocco	38 (1.5) ▼	
Oman	38 (1.5) ▼	
Kuwait	34 (2.8) ▼	
Slovenia	34 (2.2) ▼	
Hong Kong SAR	34 (2.5) ▼	
Malaysia	33 (1.6) ▼	
Australia	33 (1.6) ▼	
† New Zealand	33 (2.1) ▼	
Turkey	32 (1.8) ▼	
Thailand	30 (1.9) ▼	
Saudi Arabia	29 (2.3) ▼	
Norway (9)	28 (2.1) ▼	
Chile	26 (2.0) ▼	
Iran, Islamic Rep. of	26 (1.9) ▼	
Sweden	26 (2.5) ▼	

Country	Percent Correct
<b>Benchmarking Participants</b>	
Dubai, UAE	50 (1.8) ▲
‡ Quebec, Canada	47 (3.0)
<sup>1</sup> Florida, US	46 (3.0)
Abu Dhabi, UAE	39 (2.0)
Ontario, Canada	35 (2.2) ▼
Norway (8)	21 (1.9) ▼
† Buenos Aires, Argentina	20 (2.0) ▼

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

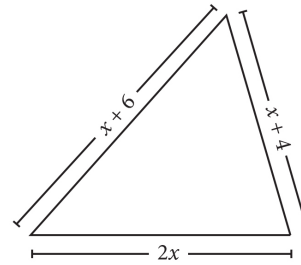
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14.3: Advanced International Benchmark – Example Item 3**

Country	Percent Full Credit
Korea, Rep. of	69 (1.8) ⬆
Chinese Taipei	67 (2.0) ⬆
<sup>2</sup> Singapore	65 (1.8) ⬆
Hong Kong SAR	62 (2.7) ⬆
Russian Federation	47 (2.6) ⬆
<sup>3</sup> Israel	43 (2.2) ⬆
Kazakhstan	41 (3.2) ⬆
Japan	41 (2.2) ⬆
Hungary	38 (2.4) ⬆
<sup>2</sup> Lithuania	32 (2.8) ⬆
<sup>1 2</sup> Georgia	29 (2.3) ⬆
Sweden	27 (2.3) ⬆
Malta	26 (1.6) ⬆
† United States	25 (1.5)
<sup>1 †</sup> Canada	24 (1.4)
Ireland	23 (1.9)
<b>International Avg.</b>	<b>22 (0.3)</b>
Turkey	18 (1.8) ⬇
Iran, Islamic Rep. of	16 (1.7) ⬇
Qatar	15 (1.6) ⬇
England	15 (1.8) ⬇
Lebanon	15 (1.9) ⬇
United Arab Emirates	13 (0.7) ⬇
Norway (9)	13 (1.4) ⬇
Oman	11 (1.1) ⬇
Australia	11 (1.1) ⬇
<sup>2</sup> Italy	10 (1.6) ⬇
Bahrain	10 (1.0) ⬇
Egypt	10 (1.4) ⬇
Malaysia	9 (1.0) ⬇
Slovenia	9 (1.2) ⬇
† New Zealand	8 (1.1) ⬇
Thailand	8 (1.4) ⬇
Jordan	7 (1.1) ⬇
Chile	6 (1.1) ⬇
Morocco	4 (0.6) ⬇
Kuwait	4 (0.7) ⬇
South Africa (9)	2 (0.6) ⬇
Saudi Arabia	2 (0.7) ⬇
Botswana (9)	1 (0.3) ⬇

**Content Domain: Algebra**  
**Cognitive Domain: Applying**  
**Description: Constructs and uses the solution of a linear equation to solve a word problem**



The sum of the lengths of the sides of this triangle is 30 cm.

A. Write an equation that would enable you to find the value of  $x$ .

Equation:  $4x + 10 = 30$

B. What is the length of the LONGEST side of the triangle in centimeters?

Answer: 11 cm

The answer shown illustrates the type of response that would receive full credit (2 points).

Country	Percent Full Credit
---------	---------------------

**Benchmarking Participants**

‡ Quebec, Canada	44 (3.7) ⬆
Dubai, UAE	23 (1.8)
<sup>1</sup> Florida, US	22 (3.2)
Ontario, Canada	15 (1.5) ⬇
† Buenos Aires, Argentina	11 (1.9) ⬇
Abu Dhabi, UAE	7 (1.4) ⬇
Norway (8)	5 (1.0) ⬇

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

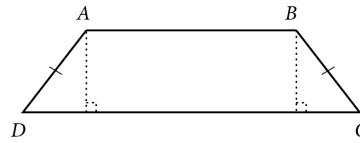
See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14.4: Advanced International Benchmark – Example Item 4**

Country	Percent Correct
Chinese Taipei	72 (1.6) ●
<sup>2</sup> Singapore	68 (1.8) ●
Hong Kong SAR	55 (2.5) ●
Korea, Rep. of	48 (2.3) ●
Kazakhstan	47 (2.9) ●
<sup>2</sup> Italy	46 (2.4) ●
Japan	45 (2.3) ●
Russian Federation	43 (2.5) ●
<sup>3</sup> Israel	40 (2.1) ●
Hungary	38 (2.4) ●
Turkey	38 (1.8) ●
<sup>2</sup> Lithuania	34 (2.3) ●
† United States	33 (1.6)
<b>International Avg.</b>	<b>32 (0.3)</b>
<sup>1</sup> † Canada	31 (1.6)
England	31 (2.0)
Malaysia	31 (1.8)
<sup>1</sup> <sup>2</sup> Georgia	29 (2.7)
Oman	28 (1.5) ▼
Iran, Islamic Rep. of	28 (2.1) ▼
Egypt	28 (1.7) ▼
Australia	27 (1.6) ▼
United Arab Emirates	26 (1.3) ▼
Slovenia	26 (1.8) ▼
† New Zealand	26 (1.7) ▼
Morocco	25 (1.4) ▼
Jordan	25 (1.8) ▼
Norway (9)	25 (2.0) ▼
Malta	25 (1.8) ▼
Ireland	25 (2.0) ▼
Thailand	24 (1.7) ▼
Chile	24 (1.9) ▼
Qatar	23 (1.6) ▼
Bahrain	23 (1.5) ▼
Botswana (9)	22 (1.6) ▼
Kuwait	21 (2.3) ▼
Saudi Arabia	20 (2.0) ▼
South Africa (9)	20 (1.3) ▼
Lebanon	18 (1.9) ▼
Sweden	18 (1.9) ▼

**Content Domain: Geometry**  
**Cognitive Domain: Reasoning**  
**Description: Uses the Pythagorean theorem in finding the perimeter of a trapezoid**



$ABCD$  is a trapezoid with  $AB = 10$  cm and  $CD = 16$  cm.  $AD = BC$ . The distance between the parallel lines,  $AB$  and  $CD$ , is 4 cm. What is its perimeter?

- 36 cm
- (B) 34 cm
- (C) 32 cm
- (D) 30 cm

Country	Percent Correct
---------	-----------------

**Benchmarking Participants**

Dubai, UAE	32 (1.8)
‡ Quebec, Canada	32 (2.9)
Ontario, Canada	30 (2.1)
<sup>1</sup> Florida, US	24 (3.0) ▼
Abu Dhabi, UAE	22 (2.1) ▼
Norway (8)	19 (1.7) ▼
† Buenos Aires, Argentina	16 (1.6) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 2.14.5: Advanced International Benchmark – Example Item 5**

Country	Percent Full Credit
<sup>2</sup> Singapore	64 (1.8) ▲
Hong Kong SAR	59 (2.6) ▲
<sup>2</sup> Lithuania	59 (2.4) ▲
Korea, Rep. of	59 (2.0) ▲
Chinese Taipei	55 (1.7) ▲
Japan	45 (2.0) ▲
Norway (9)	43 (2.4) ▲
Ireland	39 (2.1) ▲
Hungary	39 (2.3) ▲
<sup>2</sup> Italy	38 (2.3) ▲
<sup>3</sup> Israel	38 (1.9) ▲
Slovenia	37 (2.0) ▲
Turkey	35 (2.4) ▲
<sup>1</sup> † Canada	34 (1.8) ▲
Russian Federation	27 (2.6)
Kazakhstan	27 (2.1)
† United States	26 (1.4)
<b>International Avg.</b>	<b>25 (0.3)</b>
England	25 (2.0)
Australia	23 (1.5)
<sup>1 2</sup> Georgia	23 (2.0)
Sweden	22 (2.0)
† New Zealand	19 (1.9) ▼
Malta	17 (1.3) ▼
Iran, Islamic Rep. of	16 (1.7) ▼
United Arab Emirates	14 (1.0) ▼
Chile	11 (1.2) ▼
Qatar	10 (1.0) ▼
Bahrain	10 (1.4) ▼
Lebanon	9 (1.5) ▼
Thailand	8 (1.3) ▼
Malaysia	8 (0.8) ▼
Kuwait	6 (1.8) ▼
Oman	5 (0.8) ▼
Egypt	4 (0.8) ▼
Morocco	4 (0.6) ▼
Jordan	4 (0.6) ▼
Saudi Arabia	3 (0.9) ▼
South Africa (9)	3 (0.5) ▼
Botswana (9)	2 (0.5) ▼

**Content Domain: Data and Chance**  
**Cognitive Domain: Reasoning**  
**Description: Uses understanding of average to solve a problem**

Ahmed had the following scores out of 10 on his first 4 mathematics tests: 9, 7, 8, 8. Ahmed has 1 more test with a maximum of 10 points and says he wants to get an overall average of 9. Is it possible for him to do this?

Explain your answer.

*No, Ahmed would have to score 13 to do this.*

The answer shown illustrates the type of response that would receive full credit (1 point).

Country	Percent Full Credit
---------	---------------------

**Benchmarking Participants**

‡ Quebec, Canada	40 (3.5) ▲
Norway (8)	34 (2.1) ▲
Ontario, Canada	33 (2.2) ▲
Dubai, UAE	25 (2.1)
† Buenos Aires, Argentina	20 (2.3) ▼
<sup>1</sup> Florida, US	19 (2.3) ▼
Abu Dhabi, UAE	9 (1.9) ▼

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

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †. (.) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**TIMSS**  
**2015**

# **CHAPTER 3: ACHIEVEMENT IN CONTENT AND COGNITIVE DOMAINS**

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

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



### Achievement by Content Domains

Within mathematics, TIMSS at the eighth grade provided results for four content domains—Number, Algebra, Geometry, and Data and Chance. Most countries demonstrated strengths in one or two content domains compared to achievement overall, and weaknesses in one or two content domains.

**TIMSS 2015: 39 Countries**

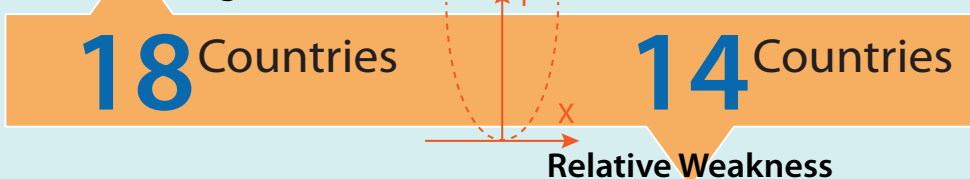
#### Number

Relative Strength



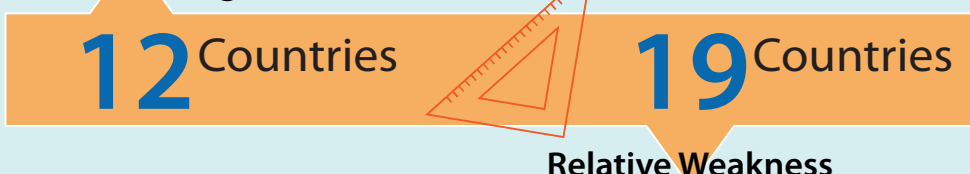
#### Algebra

Relative Strength



#### Geometry

Relative Strength



#### Data and Chance

Relative Strength



#### Trends 2011–2015: 34 Countries

Countries Improved | Countries Declined

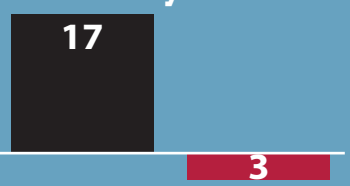
#### Number



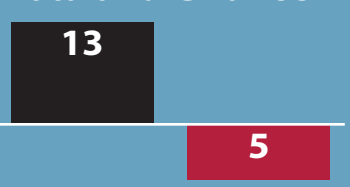
#### Algebra



#### Geometry



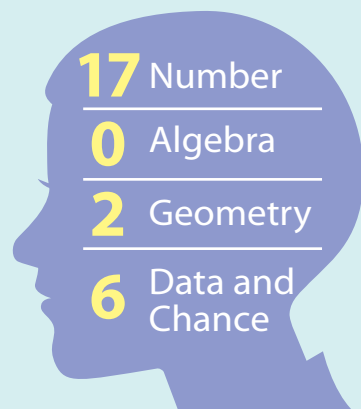
#### Data and Chance



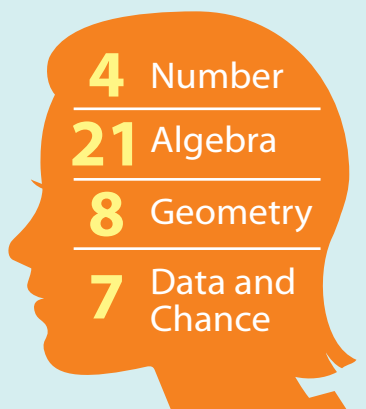
### Differences in Achievement by Gender in the Content Domains

Achievement differences in content domains by gender showed a large advantage for boys in Number. Girls had a large advantage in Algebra and also did better in Geometry.

**Number of Countries Where Boys Outperformed Girls in the Content Domains**



**Number of Countries Where Girls Outperformed Boys in the Content Domains**



### Achievement by Cognitive Domains

TIMSS at the eighth grade provided results for three cognitive domains—Knowing, Applying, and Reasoning. Although there was some balance in achievement across cognitive domains, most countries had at least one strength and one weakness compared to mathematics achievement overall.

**TIMSS 2015: 39 Countries**

#### Knowing

Relative Strength



#### Applying

Relative Strength



#### Reasoning

Relative Strength



#### Trends 2011–2015: 34 Countries

Countries Improved | Countries Declined

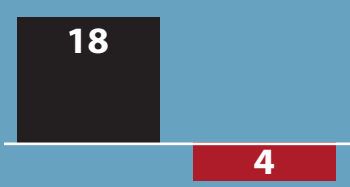
#### Knowing



#### Applying



#### Reasoning



### Differences in Achievement by Gender in the Cognitive Domains

Differences in the cognitive domains by gender show an advantage for girls in the Reasoning domain.

**Number of Countries Where Boys Outperformed Girls in the Cognitive Domains**



**Number of Countries Where Girls Outperformed Boys in the Cognitive Domains**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>



**Exhibit 3.2: Achievement in Mathematics Content Domains**

Country	Overall Mathematics Average Scale Score	Number (64 items)		Algebra (61 items)	
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score
<sup>2</sup> Singapore	621 (3.2)	629 (3.2)	8 (1.3) ●	623 (3.4)	2 (1.2)
Korea, Rep. of	606 (2.6)	601 (2.4)	-5 (1.1) ▼	612 (2.9)	6 (1.2) ●
Chinese Taipei	599 (2.4)	590 (2.4)	-9 (1.0) ▼	613 (2.8)	14 (1.0) ●
Hong Kong SAR	594 (4.6)	594 (4.9)	0 (1.9)	593 (4.7)	-1 (1.3)
Japan	586 (2.3)	572 (2.4)	-14 (1.3) ▼	596 (2.8)	9 (1.5) ●
Russian Federation	538 (4.7)	533 (4.5)	-5 (1.1) ▼	558 (5.2)	20 (1.3) ●
Kazakhstan	528 (5.3)	516 (5.1)	-11 (1.5) ▼	555 (5.6)	27 (1.4) ●
<sup>1</sup> † Canada	527 (2.2)	537 (2.4)	10 (0.7) ●	513 (2.2)	-14 (0.6) ▼
Ireland	523 (2.7)	544 (3.3)	21 (1.7) ●	501 (2.8)	-22 (1.1) ▼
† United States	518 (3.1)	520 (3.1)	1 (0.7) ●	525 (3.1)	7 (0.9) ●
England	518 (4.2)	528 (4.5)	9 (1.4) ●	492 (4.7)	-26 (1.6) ▼
Slovenia	516 (2.1)	524 (2.4)	7 (1.3) ●	498 (2.5)	-18 (1.5) ▼
Hungary	514 (3.8)	518 (4.0)	3 (1.1) ●	503 (4.1)	-12 (1.6) ▼
Norway (9)	512 (2.3)	529 (2.6)	17 (1.1) ●	471 (2.7)	-40 (1.3) ▼
<sup>2</sup> Lithuania	511 (2.8)	511 (2.8)	0 (1.4)	497 (3.3)	-14 (1.2) ▼
<sup>3</sup> Israel	511 (4.1)	518 (4.0)	7 (1.6) ●	517 (4.7)	6 (1.7) ●
Australia	505 (3.1)	511 (3.2)	6 (0.7) ●	491 (3.4)	-14 (1.3) ▼
Sweden	501 (2.8)	513 (2.9)	12 (1.6) ●	482 (3.2)	-19 (1.2) ▼
<sup>2</sup> Italy	494 (2.5)	494 (2.7)	0 (1.3)	481 (3.0)	-13 (1.8) ▼
Malta	494 (1.0)	501 (1.6)	7 (1.7) ●	492 (1.8)	-1 (1.4)
† New Zealand	493 (3.4)	500 (3.5)	7 (1.5) ●	475 (3.5)	-18 (1.3) ▼
Malaysia	465 (3.6)	472 (3.6)	6 (0.7) ●	467 (3.4)	2 (1.2)
United Arab Emirates	465 (2.0)	464 (1.9)	-1 (0.9)	485 (2.0)	20 (0.7) ●
Turkey	458 (4.7)	447 (4.6)	-10 (1.5) ▼	459 (4.6)	1 (1.5)
Bahrain	454 (1.4)	436 (2.0)	-18 (1.5) ▼	483 (2.1)	29 (2.0) ●
<sup>1 2</sup> Georgia	453 (3.4)	457 (3.4)	4 (1.3) ●	469 (3.8)	16 (1.4) ●
Lebanon	442 (3.6)	440 (4.1)	-2 (2.2)	466 (4.0)	23 (2.0) ●
ψ Qatar	437 (3.0)	435 (2.9)	-2 (1.6)	452 (2.6)	15 (2.0) ●
ψ Iran, Islamic Rep. of	436 (4.6)	432 (4.7)	-5 (1.7) ▼	437 (5.1)	1 (2.8)
Thailand	431 (4.8)	430 (5.0)	-1 (1.6)	429 (5.1)	-2 (1.5)
ψ Chile	427 (3.2)	427 (3.3)	0 (1.1)	413 (3.4)	-14 (1.3) ▼
ψ Oman	403 (2.4)	389 (2.6)	-14 (2.1) ▼	426 (2.7)	23 (1.3) ●
ψ Kuwait	392 (4.6)	395 (4.8)	2 (1.9)	384 (4.8)	-8 (2.4) ▼
ψ Egypt	392 (4.1)	393 (3.7)	1 (1.8)	420 (4.3)	27 (1.0) ●
ψ Botswana (9)	391 (2.0)	393 (3.2)	3 (2.0)	400 (2.3)	9 (1.2) ●
✕ Jordan	386 (3.2)	380 (3.2)	-5 (1.3) ▼	418 (3.5)	32 (1.3) ●
✕ Morocco	384 (2.3)	382 (2.1)	-2 (1.1)	372 (2.3)	-12 (1.0) ▼
✕ South Africa (9)	372 (4.5)	368 (4.7)	-4 (0.9) ▼	394 (4.3)	21 (1.1) ●
✕ Saudi Arabia	368 (4.6)	352 (4.5)	-16 (2.1) ▼	391 (4.4)	23 (1.7) ●
<b>Benchmarking Participants</b>					
‡ Quebec, Canada	543 (3.9)	557 (4.3)	14 (1.4) ●	530 (4.4)	-13 (2.6) ▼
Ontario, Canada	522 (2.9)	530 (3.0)	7 (0.8) ●	507 (3.0)	-15 (1.4) ▼
Dubai, UAE	512 (2.1)	509 (2.5)	-3 (1.5) ▼	528 (2.7)	17 (1.8) ●
<sup>1</sup> Florida, US	493 (6.4)	498 (6.6)	5 (1.6) ●	502 (6.8)	9 (1.4) ●
Norway (8)	487 (2.0)	504 (2.2)	17 (1.2) ●	423 (2.7)	-63 (1.6) ▼
Abu Dhabi, UAE	442 (4.7)	443 (4.4)	1 (1.7)	462 (4.5)	20 (1.5) ●
† ‡ Buenos Aires, Argentina	396 (4.2)	415 (4.2)	19 (1.9) ●	371 (5.1)	-25 (2.0) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

- Subscale score significantly higher than overall mathematics score
- ▼ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2015 eighth grade mathematics assessment items included in scaling.

✕ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Exhibit 3.2: Achievement in Mathematics Content Domains (Continued)**

Country	Geometry (43 items)			Data and Chance (41 items)		
	Average Scale Score	Difference from Overall Mathematics Score		Average Scale Score	Difference from Overall Mathematics Score	
<sup>2</sup> Singapore	617 (3.5)	-4 (1.4)	▼	617 (3.4)	-4 (0.8)	▼
Korea, Rep. of	612 (3.4)	6 (2.0)	▲	600 (2.4)	-6 (1.4)	▼
Chinese Taipei	607 (2.6)	8 (1.6)	▲	588 (2.5)	-11 (1.0)	▼
Hong Kong SAR	602 (5.1)	8 (1.6)	▲	597 (5.9)	3 (2.9)	▲
Japan	598 (2.6)	11 (1.1)	▲	589 (2.3)	3 (1.2)	▲
Russian Federation	536 (5.6)	-2 (1.8)	▼	507 (5.0)	-31 (2.2)	▼
Kazakhstan	529 (6.4)	1 (1.7)	▲	492 (5.5)	-36 (1.9)	▼
<sup>1</sup> † Canada	527 (2.5)	-1 (1.0)	▼	534 (2.9)	7 (1.6)	▲
Ireland	503 (3.1)	-20 (1.4)	▼	534 (3.8)	10 (2.3)	▲
† United States	500 (3.2)	-18 (1.0)	▼	522 (3.5)	4 (0.8)	▲
England	514 (4.1)	-4 (1.4)	▼	541 (4.7)	23 (2.3)	▲
Slovenia	522 (2.8)	6 (1.9)	▲	525 (2.7)	8 (1.4)	▲
Hungary	518 (4.2)	4 (1.4)	▲	519 (3.9)	4 (1.2)	▲
Norway (9)	498 (2.5)	-14 (1.2)	▼	542 (3.2)	31 (2.1)	▲
<sup>2</sup> Lithuania	515 (3.1)	3 (1.2)	▲	521 (2.7)	10 (1.4)	▲
<sup>3</sup> Israel	487 (4.6)	-24 (1.5)	▼	503 (4.9)	-8 (2.5)	▼
Australia	500 (3.1)	-5 (1.1)	▼	519 (3.1)	14 (1.2)	▲
Sweden	478 (3.4)	-23 (2.3)	▼	512 (3.7)	11 (2.1)	▲
<sup>2</sup> Italy	504 (3.5)	10 (2.2)	▲	496 (2.7)	2 (1.3)	▲
Malta	484 (1.7)	-10 (1.4)	▼	487 (2.6)	-7 (2.3)	▼
† New Zealand	488 (3.2)	-5 (1.5)	▼	509 (3.7)	16 (1.8)	▲
Malaysia	455 (3.9)	-10 (1.0)	▼	451 (3.8)	-14 (1.0)	▼
United Arab Emirates	447 (2.4)	-17 (1.0)	▼	449 (2.5)	-16 (1.1)	▼
Turkey	463 (4.9)	5 (2.0)	▲	467 (5.2)	9 (2.0)	▲
Bahrain	449 (2.5)	-5 (2.1)	▼	453 (2.2)	-1 (1.8)	▼
<sup>1</sup> <sup>2</sup> Georgia	441 (3.9)	-13 (1.7)	▼	421 (3.7)	-32 (1.5)	▼
Lebanon	444 (4.0)	1 (2.3)	▲	395 (4.6)	-47 (2.6)	▼
ψ Qatar	433 (3.0)	-4 (2.3)	▼	417 (3.9)	-20 (1.7)	▼
ψ Iran, Islamic Rep. of	448 (4.7)	11 (2.4)	▲	417 (5.0)	-19 (1.7)	▼
Thailand	429 (4.9)	-2 (1.5)	▼	425 (4.6)	-7 (1.5)	▼
ψ Chile	428 (3.4)	0 (2.8)	▲	429 (3.8)	2 (1.7)	▲
ψ Oman	415 (2.8)	11 (1.7)	▲	376 (3.0)	-27 (1.7)	▼
ψ Kuwait	382 (5.3)	-11 (2.9)	▼	377 (5.0)	-15 (3.3)	▼
ψ Egypt	393 (4.1)	1 (1.2)	▲	338 (4.4)	-54 (1.4)	▼
ψ Botswana (9)	377 (2.5)	-14 (1.8)	▼	374 (3.1)	-17 (2.3)	▼
✕ Jordan	381 (3.4)	-5 (2.0)	▼	346 (4.0)	-39 (2.3)	▼
✕ Morocco	410 (3.0)	26 (2.0)	▲	353 (2.9)	-31 (2.0)	▼
✕ South Africa (9)	364 (4.5)	-9 (1.1)	▼	357 (4.9)	-15 (1.8)	▼
✕ Saudi Arabia	342 (5.3)	-25 (2.9)	▼	361 (4.9)	-6 (2.9)	▼
<b>Benchmarking Participants</b>						
‡ Quebec, Canada	540 (4.3)	-3 (1.1)	▼	546 (5.0)	3 (2.0)	▲
Ontario, Canada	524 (3.5)	2 (1.6)	▲	531 (3.9)	9 (2.5)	▲
Dubai, UAE	496 (2.6)	-16 (1.8)	▼	504 (3.0)	-8 (2.1)	▼
<sup>1</sup> Florida, US	470 (6.5)	-24 (2.6)	▼	489 (8.1)	-4 (4.0)	▼
Norway (8)	477 (2.4)	-9 (1.2)	▼	519 (3.0)	33 (2.0)	▲
Abu Dhabi, UAE	425 (5.4)	-16 (1.7)	▼	426 (5.5)	-16 (2.6)	▼
† ✕ Buenos Aires, Argentina	358 (5.0)	-38 (2.2)	▼	373 (5.3)	-23 (2.2)	▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

▲ Subscale score significantly higher than overall mathematics score  
▼ Subscale score significantly lower than overall mathematics score

**Exhibit 3.4: Achievement in Mathematics Cognitive Domains**

Country	Overall Mathematics Average Scale Score	Knowing (69 items)		Applying (94 items)		Reasoning (46 items)		
		Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	Average Scale Score	Difference from Overall Mathematics Score	
<sup>2</sup> Singapore	621 (3.2)	633 (3.4)	12 (0.7) ▲	619 (3.2)	-2 (1.6)	616 (3.7)	-5 (1.6) ▼	
Korea, Rep. of	606 (2.6)	607 (2.8)	1 (1.2)	606 (2.8)	0 (1.1)	608 (2.7)	2 (1.3)	
Chinese Taipei	599 (2.4)	598 (2.9)	-1 (1.2)	602 (2.5)	3 (0.7) ▲	602 (2.5)	3 (1.1) ▲	
Hong Kong SAR	594 (4.6)	600 (5.1)	5 (2.1) ▲	595 (4.5)	1 (1.1)	591 (5.1)	-3 (1.4) ▼	
Japan	586 (2.3)	578 (2.6)	-9 (1.2) ▼	592 (2.3)	5 (0.8) ▲	591 (2.6)	4 (1.5) ▲	
Russian Federation	538 (4.7)	543 (5.6)	5 (1.4) ▲	541 (4.6)	3 (0.8) ▲	528 (5.0)	-10 (1.2) ▼	
Kazakhstan	528 (5.3)	533 (6.3)	5 (2.0) ▲	527 (5.4)	-1 (1.1)	525 (5.5)	-3 (1.5) ▼	
<sup>1</sup> † Canada	527 (2.2)	520 (2.3)	-7 (0.9) ▼	528 (2.2)	1 (0.7)	534 (2.4)	7 (1.0) ▲	
Ireland	523 (2.7)	527 (3.0)	4 (1.8) ▲	520 (3.0)	-3 (1.1) ▼	521 (3.1)	-2 (1.9)	
† United States	518 (3.1)	528 (3.5)	10 (1.2) ▲	515 (3.2)	-4 (0.6) ▼	514 (3.1)	-4 (0.8) ▼	
England	518 (4.2)	513 (4.1)	-5 (0.9) ▼	519 (4.1)	1 (1.0)	522 (4.4)	4 (1.9) ▲	
Slovenia	516 (2.1)	518 (2.4)	2 (1.3)	514 (2.1)	-2 (0.8) ▼	516 (2.7)	0 (1.5)	
Hungary	514 (3.8)	511 (3.9)	-3 (1.3) ▼	516 (3.8)	2 (1.1)	515 (3.9)	1 (1.4)	
Norway (9)	512 (2.3)	500 (2.3)	-11 (1.2) ▼	516 (2.3)	5 (1.1) ▲	516 (2.5)	4 (1.5) ▲	
<sup>2</sup> Lithuania	511 (2.8)	502 (3.1)	-9 (2.0) ▼	520 (2.6)	9 (1.0) ▲	501 (3.0)	-10 (1.5) ▼	
<sup>3</sup> Israel	511 (4.1)	511 (4.2)	0 (1.2)	512 (4.0)	1 (0.8)	510 (4.4)	-1 (1.5) ▼	
Australia	505 (3.1)	504 (3.1)	-1 (1.5)	502 (3.0)	-3 (1.0) ▼	512 (3.1)	7 (1.2) ▲	
Sweden	501 (2.8)	484 (2.8)	-16 (1.0) ▼	507 (2.8)	6 (1.2) ▲	509 (3.5)	9 (2.3) ▲	
<sup>2</sup> Italy	494 (2.5)	489 (2.7)	-6 (1.4) ▼	495 (2.6)	1 (1.2)	500 (2.8)	6 (1.2) ▲	
Malta	494 (1.0)	499 (1.5)	5 (1.0) ▲	493 (1.5)	0 (1.4)	484 (2.2)	-9 (1.9) ▼	
† New Zealand	493 (3.4)	488 (3.4)	-5 (1.1) ▼	493 (3.3)	0 (1.3)	499 (3.5)	6 (1.6) ▲	
Malaysia	465 (3.6)	472 (3.8)	7 (0.7) ▲	463 (3.6)	-2 (1.0) ▼	453 (3.7)	-12 (1.3) ▼	
United Arab Emirates	465 (2.0)	476 (2.2)	11 (1.0) ▲	457 (2.1)	-7 (0.9) ▼	461 (2.2)	-4 (1.1) ▼	
Turkey	458 (4.7)	447 (4.9)	-11 (1.6) ▼	460 (4.3)	2 (1.4)	472 (4.8)	15 (1.5) ▲	
Bahrain	454 (1.4)	463 (2.3)	9 (2.0) ▲	445 (1.7)	-9 (1.2) ▼	452 (2.2)	-2 (2.0)	
<sup>1</sup> <sup>2</sup> Georgia	453 (3.4)	456 (4.1)	3 (1.8)	454 (3.6)	1 (1.5)	441 (4.5)	-13 (2.1) ▼	
Lebanon	442 (3.6)	456 (3.8)	13 (1.3) ▲	439 (3.9)	-4 (1.4) ▼	406 (4.5)	-37 (2.1) ▼	
ψ Qatar	437 (3.0)	440 (3.1)	3 (1.8)	435 (2.9)	-2 (2.0)	431 (2.8)	-6 (2.0) ▼	
ψ Iran, Islamic Rep. of	436 (4.6)	435 (4.9)	-1 (2.2)	434 (4.4)	-2 (1.8)	436 (4.7)	0 (1.8)	
Thailand	431 (4.8)	425 (5.1)	-6 (1.2) ▼	431 (4.7)	0 (1.5)	435 (4.8)	4 (1.7) ▲	
ψ Chile	427 (3.2)	423 (3.4)	-5 (2.3) ▼	427 (3.3)	-1 (2.4)	432 (3.3)	4 (2.3)	
ψ Oman	403 (2.4)	401 (3.1)	-2 (1.9) ▼	401 (2.5)	-2 (1.2) ▼	402 (3.1)	-1 (1.8)	
ψ Kuwait	392 (4.6)	398 (4.7)	5 (2.0) ▲	389 (4.5)	-3 (2.3)	374 (4.5)	-19 (2.1) ▼	
ψ Egypt	392 (4.1)	399 (4.3)	7 (1.2) ▲	385 (3.9)	-7 (1.0) ▼	379 (4.3)	-13 (1.8) ▼	
ψ Botswana (9)	391 (2.0)	394 (3.0)	3 (1.9)	385 (2.3)	-5 (1.3) ▼	389 (2.0)	-2 (1.0)	
⌘ Jordan	386 (3.2)	391 (3.2)	5 (1.4) ▲	378 (3.2)	-7 (1.2) ▼	380 (3.3)	-6 (1.9) ▼	
⌘ Morocco	384 (2.3)	382 (2.4)	-2 (1.9)	385 (2.2)	1 (1.5)	374 (2.8)	-10 (1.9) ▼	
⌘ South Africa (9)	372 (4.5)	371 (5.2)	-1 (1.1)	362 (4.6)	-10 (1.3) ▼	383 (4.2)	11 (1.4) ▲	
⌘ Saudi Arabia	368 (4.6)	359 (4.9)	-8 (1.6) ▼	364 (4.2)	-4 (2.4)	374 (4.0)	6 (2.0) ▲	
<b>Benchmarking Participants</b>								
‡ Quebec, Canada	543 (3.9)	541 (4.2)	-3 (1.8)	546 (4.0)	3 (1.4) ▲	538 (4.2)	-5 (2.1) ▼	
Ontario, Canada	522 (2.9)	513 (3.0)	-9 (1.3) ▼	522 (2.8)	0 (1.3)	534 (3.1)	12 (1.2) ▲	
Dubai, UAE	512 (2.1)	521 (2.3)	9 (1.3) ▲	505 (2.5)	-7 (1.3) ▼	509 (2.8)	-2 (2.0)	
<sup>1</sup> Florida, US	493 (6.4)	501 (7.3)	8 (2.9) ▲	488 (6.7)	-5 (1.7) ▼	491 (6.6)	-3 (2.8)	
Norway (8)	487 (2.0)	476 (2.6)	-10 (2.2) ▼	492 (2.3)	5 (1.7) ▲	488 (2.3)	1 (1.4)	
Abu Dhabi, UAE	442 (4.7)	453 (4.8)	12 (1.6) ▲	434 (4.7)	-8 (1.1) ▼	440 (4.7)	-2 (1.4)	
† ⌘ Buenos Aires, Argentina	396 (4.2)	397 (4.4)	1 (1.6)	392 (4.8)	-4 (2.2)	383 (5.3)	-14 (2.3) ▼	

▲ Subscale score significantly higher than overall mathematics score  
▼ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2015 eighth grade mathematics assessment items included in scaling.

⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 3.6: Differences in Achievement for Mathematics Content Domains Across Assessment Years**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Number Average Scale Score	Number		Algebra Average Scale Score	Algebra		Geometry Average Scale Score	Geometry		Data and Chance Average Scale Score	Data and Chance		
		Differences Between Years			Differences Between Years			Differences Between Years			Differences Between Years		
		2011	2007		2011	2007		2011	2007		2011	2007	
<b>Australia</b>													
2015	511 (3.2)	-1	8	491 (3.4)	2	16 ▲	500 (3.1)	1	12 ▲	519 (3.1)	-16 ▼	-7	
2011	513 (5.5)		9	489 (5.3)		15 ▲	499 (5.3)		11	534 (6.0)		8	
2007	504 (4.0)			474 (4.2)			488 (4.0)			526 (4.4)			
<b>Bahrain</b>													
2015	436 (2.0)	39 ▲	54 ▲	483 (2.1)	58 ▲	86 ▲	449 (2.5)	51 ▲	46 ▲	453 (2.2)	46 ▲	53 ▲	
ψ **	2011	397 (1.7)		15 ▲	424 (1.7)		28 ▲	398 (2.5)		-5	407 (2.5)		8 ▲
	2007	381 (2.5)			397 (1.7)			403 (2.9)			400 (2.6)		
<b>Botswana (9)</b>													
ψ	2015	393 (3.2)	1		400 (2.3)	-7		377 (2.5)	-4		374 (3.1)	-17 ▼	
ψ	2011	392 (3.2)			407 (3.2)			381 (3.1)			391 (3.0)		
<b>Chile</b>													
ψ	2015	427 (3.3)	15 ▲		413 (3.4)	11 ▲		428 (3.4)	9		429 (3.8)	4	
	2011	413 (2.9)			403 (3.6)			419 (3.0)			426 (3.0)		
<b>Chinese Taipei</b>													
2015	590 (2.4)	-8	4	613 (2.8)	-15 ▼	-16 ▼	607 (2.6)	-18 ▼	2	588 (2.5)	4	9	
2011	598 (3.2)		12 ▲	628 (3.8)		-1	625 (3.7)		20 ▲	584 (2.9)		5	
2007	586 (4.3)			629 (5.9)			605 (5.7)			579 (4.6)			
<b>Egypt</b>													
ψ	2015	393 (3.7)		8	420 (4.3)		15 ▲	393 (4.1)		-4	338 (4.4)		-20 ▼
	2007	386 (3.6)			405 (3.5)			397 (3.7)			358 (3.9)		
<b>England</b>													
2015	528 (4.5)	15 ▲	17 ▲	492 (4.7)	3	-4	514 (4.1)	16 ▲	1	541 (4.7)	-2	-11	
‡	2011	512 (5.9)		1	489 (5.8)		-7	498 (5.9)		-15 ▼	543 (7.0)		-9
†	2007	511 (5.4)			496 (5.1)			513 (5.2)			552 (6.2)		
<b>Georgia</b>													
<sup>1 2</sup>	2015	457 (3.4)	22 ▲	40 ▲	469 (3.8)	18 ▲	52 ▲	441 (3.9)	34 ▲	39 ▲	421 (3.7)	30 ▲	71 ▲
<sup>1</sup>	2011	435 (3.5)		19 ▲	450 (3.9)		34 ▲	406 (4.3)		5	392 (4.5)		42 ▲
<sup>1</sup>	2007	416 (5.9)			416 (7.6)			402 (7.1)			350 (5.1)		
<b>Hong Kong SAR</b>													
2015	594 (4.9)	6	19 ▲	593 (4.7)	10	18 ▲	602 (5.1)	4	22 ▲	597 (5.9)	16 ▲	37 ▲	
2011	588 (3.7)		13	583 (4.0)		8	597 (4.4)		18 ▲	581 (4.1)		21 ▲	
†	2007	575 (6.0)			575 (6.1)		580 (6.1)			560 (5.9)			
<b>Hungary</b>													
2015	518 (4.0)	8	-3	503 (4.1)	6	-5	518 (4.2)	17 ▲	8	519 (3.9)	2	-8	
2011	510 (3.8)		-11	496 (4.0)		-11 ▼	501 (4.1)		-9	517 (4.2)		-10	
2007	520 (3.8)			508 (3.8)			510 (4.0)			527 (3.9)			
<b>Iran, Islamic Rep. of</b>													
ψ	2015	432 (4.7)	30 ▲	44 ▲	437 (5.1)	15 ▲	33 ▲	448 (4.7)	10	33 ▲	417 (5.0)	24 ▲	21 ▲
ψ	2011	402 (5.0)		14 ▲	422 (4.4)		18 ▲	437 (4.7)		23 ▲	393 (4.9)		-3
	2007	388 (4.4)			405 (4.2)			414 (4.7)			396 (3.8)		
<b>Israel</b>													
<sup>3</sup>	2015	518 (4.0)	0		517 (4.7)	-4		487 (4.6)	-9		503 (4.9)	-12	
<sup>3</sup>	2011	518 (4.1)			521 (4.7)			496 (4.4)			515 (4.7)		
<b>Italy</b>													
<sup>2</sup>	2015	494 (2.7)	-2	14 ▲	481 (3.0)	-10 ▼	21 ▲	504 (3.5)	-8	13 ▲	496 (2.7)	-3	12 ▲
	2011	496 (2.8)		16 ▲	491 (2.6)		30 ▲	512 (3.5)		21 ▲	499 (3.1)		15 ▲
	2007	480 (3.1)			460 (3.7)			491 (3.6)			485 (3.6)		
<b>Japan</b>													
2015	572 (2.4)	15 ▲	14 ▲	596 (2.8)	26 ▲	29 ▲	598 (2.6)	12 ▲	14 ▲	589 (2.3)	10 ▲	-2	
2011	557 (3.0)		-2	570 (3.1)		3	586 (3.6)		2	579 (3.1)		-11 ▼	
2007	558 (2.4)			567 (2.9)			584 (2.5)			591 (2.7)			

▲ More recent year significantly higher  
▼ More recent year significantly lower

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

\* Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.

\*\* Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 3.6: Differences in Achievement for Mathematics Content Domains Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Number Average Scale Score	Number		Algebra Average Scale Score	Algebra		Geometry Average Scale Score	Geometry		Data and Chance Average Scale Score	Data and Chance		
		Differences Between Years			Differences Between Years			Differences Between Years			Differences Between Years		
		2011	2007		2011	2007		2011	2007		2011	2007	
<b>Jordan</b>													
ⵛ	2015	380 (3.2)	-10 ▼	-32 ▼	418 (3.5)	-14 ▼	-28 ▼	381 (3.4)	-26 ▼	-48 ▼	346 (4.0)	-33 ▼	-60 ▼
ⵛ	2011	390 (3.8)		-22 ▼	432 (3.9)		-14 ▼	407 (3.7)		-22 ▼	379 (3.9)		-27 ▼
	2007	412 (4.8)			445 (4.3)			429 (4.2)			406 (4.3)		
<b>Kazakhstan</b>													
	2015	516 (5.1)	37 ▲		555 (5.6)	49 ▲		529 (6.4)	39 ▲		492 (5.5)	48 ▲	
	2011	479 (4.1)			506 (4.5)			491 (4.5)			444 (4.4)		
<b>Korea, Rep. of</b>													
	2015	601 (2.4)	-17 ▼	9 ▲	612 (2.9)	-4	4	612 (3.4)	0	12 ▲	600 (2.4)	-15 ▼	-1
	2011	618 (2.7)		25 ▲	617 (3.3)		9	612 (2.8)		12 ▲	616 (2.6)		14 ▲
	2007	592 (2.5)			608 (3.3)			600 (2.7)			602 (2.6)		
<b>Kuwait</b>													
ⵛ	2015	376 (4.0)		38 ▲	364 (3.9)		23 ▲	366 (4.2)		-11 ▼	361 (4.3)		22 ▲
ⵛ	2007	338 (2.8)			341 (3.6)			377 (3.0)			339 (5.1)		
<b>Lebanon</b>													
	2015	440 (4.1)	-11 ▼	-13 ▼	466 (4.0)	-5	-2	444 (4.0)	-4	-12 ▼	395 (4.6)	2	7
	2011	451 (3.8)		-1	471 (3.8)		3	447 (3.8)		-8	393 (5.2)		5
	2007	453 (3.9)			468 (3.6)			455 (4.2)			388 (5.3)		
<b>Lithuania</b>													
²	2015	512 (2.9)	11 ▲	5	498 (3.5)	6	10 ▲	516 (3.2)	16 ▲	7	524 (2.8)	9 ▲	-1
¹	2011	501 (2.5)		-6	492 (2.8)		5	500 (3.2)		-9 ▼	515 (2.8)		-10 ▼
¹	2007	507 (2.8)			487 (2.9)			509 (3.1)			526 (2.9)		
<b>Malaysia</b>													
	2015	472 (3.6)	21 ▲	-22 ▼	467 (3.4)	37 ▲	11	455 (3.9)	23 ▲	-19 ▼	451 (3.8)	22 ▲	-7
	2011	451 (5.8)		-43 ▼	430 (5.2)		-26 ▼	432 (6.4)		-42 ▼	429 (5.4)		-30 ▼
	2007	494 (5.5)			455 (4.9)			474 (6.3)			459 (5.0)		
<b>Malta</b>													
	2015	501 (1.6)		2	492 (1.8)		18 ▲	484 (1.7)		-10 ▼	487 (2.6)		5
	2007	499 (1.1)			475 (1.5)			494 (1.4)			482 (2.1)		
<b>Morocco</b>													
ⵛ	2015	382 (2.1)	3		372 (2.3)	16 ▲		410 (3.0)	20 ▲		353 (2.9)	21 ▲	
ⵛ	2011	379 (2.5)			357 (2.6)			390 (2.5)			332 (1.9)		
<b>New Zealand</b>													
†	2015	500 (3.5)	7		475 (3.5)	3		488 (3.2)	5		509 (3.7)	-5	
	2011	492 (6.0)			472 (5.6)			483 (5.6)			513 (6.9)		
<b>Norway (8)</b>													
	2015	504 (2.2)	11 ▲	19 ▲	423 (2.7)	-9 ▼	-1	477 (2.4)	17 ▲	20 ▲	519 (3.0)	6	17 ▲
	2011	492 (2.7)		8 ▲	432 (2.6)		8 ▲	461 (3.4)		3	513 (3.6)		11 ▲
	2007	485 (2.1)			424 (2.7)			458 (2.5)			502 (2.9)		
<b>Oman</b>													
ⵛ	2015	389 (2.6)	38 ▲	35 ▲	426 (2.7)	43 ▲	43 ▲	415 (2.8)	38 ▲	38 ▲	376 (3.0)	34 ▲	11 ▲
ⵛ	2011	351 (2.9)		-4	383 (2.7)		0	377 (2.6)		0	342 (3.0)		-23 ▼
	2007	354 (3.1)			384 (3.5)			377 (3.5)			365 (4.0)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 3.6: Differences in Achievement for Mathematics Content Domains Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Number Average Scale Score	Number		Algebra Average Scale Score	Algebra		Geometry Average Scale Score	Geometry		Data and Chance Average Scale Score	Data and Chance		
		Differences Between Years			Differences Between Years			Differences Between Years			Differences Between Years		
		2011	2007		2011	2007		2011	2007		2011	2007	
<b>Qatar</b>													
ψ	2015	435 (2.9)	27 ▲		452 (2.6)	27 ▲		433 (3.0)	45 ▲		417 (3.9)	27 ▲	
ψ	2011	408 (3.6)			425 (2.8)			387 (3.4)			390 (3.6)		
<b>Russian Federation</b>													
	2015	533 (4.5)	-1	23 ▲	558 (5.2)	2	33 ▲	536 (5.6)	3	25 ▲	507 (5.0)	-4	24 ▲
²	2011	534 (3.4)		25 ▲	556 (3.8)		31 ▲	533 (4.0)		23 ▲	511 (4.0)		28 ▲
	2007	510 (4.1)			525 (4.6)			510 (4.8)			483 (4.5)		
<b>Saudi Arabia</b>													
Ж	2015	352 (4.5)	-41 ▼		391 (4.4)	-8		342 (5.3)	-22 ▼		361 (4.9)	-25 ▼	
ψ	2011	393 (4.8)			399 (4.9)			364 (5.4)			387 (5.3)		
<b>Singapore</b>													
²	2015	629 (3.2)	18 ▲	24 ▲	623 (3.4)	8	31 ▲	617 (3.5)	8	27 ▲	617 (3.4)	10	28 ▲
²	2011	611 (3.7)		6	614 (4.1)		23 ▲	609 (4.0)		19 ▲	607 (4.4)		18 ▲
	2007	605 (3.8)			591 (4.0)			590 (4.1)			589 (5.2)		
<b>Slovenia</b>													
	2015	524 (2.4)	13 ▲	20 ▲	498 (2.5)	5	8 ▲	522 (2.8)	18 ▲	22 ▲	525 (2.7)	7	16 ▲
	2011	511 (2.5)		7	493 (2.7)		2	504 (3.1)		4	518 (3.3)		9 ▲
	2007	504 (2.6)			491 (2.6)			500 (2.9)			509 (2.9)		
<b>South Africa (9)</b>													
Ж	2015	368 (4.7)	10		394 (4.3)	32 ▲		364 (4.5)	48 ▲		357 (4.9)	24 ▲	
Ж	2011	359 (2.6)			361 (2.6)			315 (3.1)			333 (3.5)		
<b>Sweden</b>													
	2015	513 (2.9)	9 ▲	7 ▲	482 (3.2)	23 ▲	23 ▲	478 (3.4)	22 ▲	5	512 (3.7)	8	-14 ▼
	2011	504 (1.8)		-2	459 (2.2)		0	456 (2.3)		-17 ▼	504 (2.8)		-22 ▼
	2007	505 (1.9)			459 (2.7)			472 (2.8)			526 (3.9)		
<b>Thailand</b>													
	2015	430 (5.0)	6	-12	429 (5.1)	4	-1	429 (4.9)	14	-8	425 (4.6)	-6	-14 ▼
	2011	425 (4.7)		-18 ▼	425 (4.4)		-5	415 (5.4)		-22 ▼	431 (4.1)		-8
	2007	443 (5.3)			431 (5.6)			437 (5.9)			438 (4.9)		
<b>Turkey</b>													
	2015	447 (4.6)	13 ▲		459 (4.6)	4		463 (4.9)	8		467 (5.2)	-1	
	2011	435 (4.0)			455 (4.3)			454 (4.4)			467 (4.0)		
<b>United Arab Emirates</b>													
	2015	464 (1.9)	5		485 (2.0)	17 ▲		447 (2.4)	17 ▲		449 (2.5)	9 ▲	
	2011	459 (2.3)			468 (2.2)			431 (2.4)			440 (2.4)		
<b>United States</b>													
†	2015	520 (3.1)	6	6	525 (3.1)	13 ▲	18 ▲	500 (3.2)	15 ▲	20 ▲	522 (3.5)	-5	-11 ▼
²	2011	514 (3.0)		0	512 (2.6)		5	485 (2.7)		5	527 (3.3)		-5
² †	2007	514 (2.9)			507 (3.1)			480 (2.9)			533 (3.4)		
<b>Benchmarking Participants</b>													
<b>Ontario, Canada</b>													
	2015	530 (3.0)	11 ▲	2	507 (3.0)	11 ▲	11 ▲	524 (3.5)	12 ▲	13 ▲	531 (3.9)	0	-16 ▼
²	2011	519 (2.8)		-9	497 (2.4)		1	512 (2.8)		1	531 (4.2)		-17 ▼
²	2007	528 (4.2)			496 (3.9)			510 (4.5)			547 (5.1)		
<b>Quebec, Canada</b>													
‡	2015	557 (4.3)	14 ▲	19 ▲	530 (4.4)	15 ▲	18 ▲	540 (4.3)	12 ▲	13 ▲	546 (5.0)	-2	6
	2011	543 (2.4)		5	516 (2.9)		4	529 (2.6)		1	549 (3.0)		8
³	2007	537 (3.7)			512 (3.6)			527 (3.5)			540 (3.8)		
<b>Abu Dhabi, UAE</b>													
	2015	443 (4.4)	-10		462 (4.5)	3		425 (5.4)	1		426 (5.5)	-8	
	2011	452 (4.0)			459 (3.9)			424 (4.5)			434 (4.3)		
<b>Dubai, UAE</b>													
	2015	509 (2.5)	29 ▲	50 ▲	528 (2.7)	40 ▲	53 ▲	496 (2.6)	44 ▲	51 ▲	504 (3.0)	36 ▲	59 ▲
	2011	479 (2.4)		21 ▲	489 (2.4)		13 ▲	453 (3.1)		7	468 (2.9)		23 ▲
♦ ‡	2007	458 (3.3)			476 (2.6)			445 (3.6)			444 (3.5)		
<b>Florida, US</b>													
¹	2015	498 (6.6)	-19 ▼		502 (6.8)	-11		470 (6.5)	-29 ▼		489 (8.1)	-39 ▼	
¹ ²	2011	517 (7.0)			513 (6.6)			499 (6.9)			528 (8.8)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 3.8: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning	
		Differences Between Years			Differences Between Years			Differences Between Years	
		2011	2007		2011	2007		2011	2007
<b>Australia</b>									
2015	504 (3.1)	0	15 ▲	502 (3.0)	-4	4	512 (3.1)	6	9
2011	504 (5.2)		14 ▲	506 (4.9)		8	506 (5.2)		3
2007	490 (3.9)			498 (3.8)			503 (4.0)		
<b>Bahrain</b>									
2015	463 (2.3)	52 ▲	74 ▲	445 (1.7)	45 ▲	45 ▲	452 (2.2)	37 ▲	46 ▲
ψ**	2011	411 (2.4)		23 ▲	400 (2.4)		0	415 (2.1)	9 ▲
	2007	389 (1.8)			400 (2.4)			406 (2.4)	
<b>Botswana (9)</b>									
ψ	2015	394 (3.0)	-10 ▼		385 (2.3)	2		389 (2.0)	-9 ▼
ψ	2011	404 (2.7)			383 (2.8)			398 (2.4)	
<b>Chile</b>									
ψ	2015	423 (3.4)	17 ▲		427 (3.3)	2		432 (3.3)	10 ▲
	2011	405 (2.9)			425 (2.6)			422 (2.9)	
<b>Chinese Taipei</b>									
2015	598 (2.9)	-13 ▼	-6	602 (2.5)	-12 ▼	5	602 (2.5)	-7	0
2011	611 (3.6)		7	614 (3.4)		17 ▲	609 (3.4)		7
2007	604 (5.0)			597 (4.8)			602 (4.4)		
<b>Egypt</b>									
ψ	2015	399 (4.3)		14 ▲	385 (3.9)		-6	379 (4.3)	-7
	2007	385 (3.7)			391 (3.9)			386 (3.7)	
<b>England</b>									
2015	513 (4.1)	12	5	519 (4.1)	11	6	522 (4.4)	12	4
‡	2011	501 (5.5)		-6	508 (5.6)		-5	510 (5.6)	-8
†	2007	508 (4.7)			514 (5.1)			518 (5.1)	
<b>Georgia</b>									
<sup>1 2</sup>	2015	456 (4.1)	18 ▲	37 ▲	454 (3.6)	30 ▲	55 ▲	441 (4.5)	27 ▲
<sup>1</sup>	2011	438 (4.1)		19 ▲	425 (3.8)		26 ▲	414 (4.0)	30 ▲
<sup>1</sup>	2007	419 (6.1)			399 (5.9)			383 (6.1)	
<b>Hong Kong SAR</b>									
2015	600 (5.1)	9	17 ▲	595 (4.5)	8	23 ▲	591 (5.1)	11	24 ▲
2011	591 (4.1)		8	587 (3.8)		15 ▲	580 (4.0)		13
†	2007	583 (6.0)			572 (6.2)			567 (6.1)	
<b>Hungary</b>									
2015	511 (3.9)	4	-10	516 (3.8)	11 ▲	3	515 (3.9)	13 ▲	0
2011	507 (3.9)		-15 ▼	505 (3.6)		-9	502 (3.8)		-13 ▼
2007	522 (3.7)			513 (3.5)			515 (3.7)		
<b>Iran, Islamic Rep. of</b>									
ψ	2015	435 (4.9)	25 ▲	38 ▲	434 (4.4)	23 ▲	35 ▲	436 (4.7)	8
ψ	2011	410 (4.4)		13 ▲	411 (4.6)		12	428 (4.3)	11
	2007	397 (4.3)			399 (4.4)			417 (3.9)	
<b>Israel</b>									
<sup>3</sup>	2015	511 (4.2)	-5		512 (4.0)	-1		510 (4.4)	-10
<sup>3</sup>	2011	516 (4.2)			513 (4.4)			520 (4.2)	
<b>Italy</b>									
<sup>2</sup>	2015	489 (2.7)	-5	15 ▲	495 (2.6)	-8 ▼	13 ▲	500 (2.8)	4
	2011	494 (2.7)		20 ▲	503 (2.3)		20 ▲	496 (2.6)	14 ▲
	2007	474 (3.4)			482 (3.0)			482 (3.4)	
<b>Japan</b>									
2015	578 (2.6)	20 ▲	9 ▲	592 (2.3)	17 ▲	23 ▲	591 (2.6)	12 ▲	14 ▲
2011	558 (2.8)		-11 ▼	574 (2.5)		6	579 (3.0)		2
2007	569 (2.9)			568 (2.3)			577 (2.6)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

\* Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.

\*\* Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 3.8: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning		
		Differences Between Years			Differences Between Years			Differences Between Years		
		2011	2007		2011	2007		2011	2007	
<b>Jordan</b>										
ⵛ	2015	391 (3.2)	-14 ▼	-35 ▼	378 (3.2)	-19 ▼	-43 ▼	380 (3.3)	-36 ▼	-55 ▼
ⵛ	2011	405 (4.2)		-20 ▼	397 (3.7)		-24 ▼	416 (4.0)		-19 ▼
	2007	425 (4.5)			421 (4.5)			434 (4.1)		
<b>Kazakhstan</b>										
	2015	533 (6.3)	44 ▲		527 (5.4)	43 ▲		525 (5.5)	42 ▲	
	2011	489 (4.4)			484 (4.3)			482 (4.9)		
<b>Korea, Rep. of</b>										
	2015	607 (2.8)	-9 ▼	-1	606 (2.8)	-10 ▼	6	608 (2.7)	-5	15 ▲
	2011	616 (3.1)		8	617 (2.8)		16 ▲	612 (2.6)		20 ▲
	2007	608 (3.1)			600 (2.8)			592 (2.5)		
<b>Kuwait</b>										
ⵛ	2015	381 (3.8)		37 ▲	371 (4.1)		13 ▲	353 (4.2)		11 ▲
ⵛ	2007	344 (3.4)			358 (2.5)			342 (3.5)		
<b>Lebanon</b>										
	2015	456 (3.8)	-8	-1	439 (3.9)	3	-8	406 (4.5)	-20 ▼	-17 ▼
	2011	464 (3.9)		7	436 (4.1)		-11	426 (4.6)		3
	2007	457 (4.2)			447 (4.5)			423 (4.7)		
<b>Lithuania</b>										
<sup>2</sup>	2015	503 (3.2)	1	-6	521 (2.8)	14 ▲	10 ▲	502 (3.2)	10 ▲	15 ▲
<sup>1</sup>	2011	502 (2.6)		-8 ▼	508 (2.4)		-3	493 (2.6)		6
<sup>1</sup>	2007	509 (2.7)			511 (2.5)			487 (2.8)		
<b>Malaysia</b>										
	2015	472 (3.8)	28 ▲	-1	463 (3.6)	24 ▲	-14 ▼	453 (3.7)	27 ▲	-13 ▼
	2011	444 (5.8)		-29 ▼	439 (5.3)		-38 ▼	426 (5.6)		-40 ▼
	2007	473 (5.4)			477 (5.2)			466 (4.6)		
<b>Malta</b>										
	2015	499 (1.5)		9 ▲	493 (1.5)		3	484 (2.2)		10 ▲
	2007	490 (2.2)			491 (1.3)			474 (1.2)		
<b>Morocco</b>										
ⵛ	2015	382 (2.4)	19 ▲		385 (2.2)	7 ▲		374 (2.8)	17 ▲	
ⵛ	2011	363 (2.3)			378 (2.0)			357 (2.8)		
<b>New Zealand</b>										
†	2015	488 (3.4)	7		493 (3.3)	2		499 (3.5)	5	
	2011	481 (5.7)			491 (5.2)			494 (5.5)		
<b>Norway (8)</b>										
	2015	476 (2.6)	12 ▲	19 ▲	492 (2.3)	12 ▲	17 ▲	488 (2.3)	10 ▲	14 ▲
	2011	465 (2.4)		8 ▲	480 (2.7)		5	478 (3.0)		4
	2007	457 (2.0)			475 (2.5)			474 (2.5)		
<b>Oman</b>										
ⵛ	2015	401 (3.1)	37 ▲	36 ▲	401 (2.5)	41 ▲	36 ▲	402 (3.1)	33 ▲	14 ▲
ⵛ	2011	365 (3.0)		-1	360 (3.0)		-5	369 (3.0)		-20 ▼
	2007	366 (3.6)			365 (3.1)			389 (3.1)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 3.8: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning		
		Differences Between Years			Differences Between Years			Differences Between Years		
		2011	2007		2011	2007		2011	2007	
<b>Qatar</b>										
ψ	2015	440 (3.1)	22 ▲		435 (2.9)	39 ▲		431 (2.8)	25 ▲	
ψ	2011	418 (3.0)			396 (3.4)			406 (3.6)		
<b>Russian Federation</b>										
	2015	543 (5.6)	-5	22 ▲	541 (4.6)	3	31 ▲	528 (5.0)	-4	28 ▲
²	2011	548 (3.8)		28 ▲	538 (3.6)		28 ▲	531 (3.8)		32 ▲
	2007	521 (4.5)			510 (3.9)			499 (4.0)		
<b>Saudi Arabia</b>										
Ж	2015	359 (4.9)	-42 ▼		364 (4.2)	-11		374 (4.0)	-13 ▼	
ψ	2011	402 (4.8)			375 (4.8)			388 (4.9)		
<b>Singapore</b>										
²	2015	633 (3.4)	16 ▲	41 ▲	619 (3.2)	7	22 ▲	616 (3.7)	12 ▲	27 ▲
²	2011	617 (3.9)		25 ▲	613 (4.0)		16 ▲	604 (4.3)		15 ▲
	2007	592 (3.7)			597 (3.9)			589 (4.5)		
<b>Slovenia</b>										
	2015	518 (2.4)	10 ▲	17 ▲	514 (2.1)	12 ▲	12 ▲	516 (2.7)	16 ▲	19 ▲
	2011	508 (2.4)		7 ▲	502 (2.1)		0	500 (2.7)		3
	2007	501 (2.5)			502 (2.2)			497 (2.8)		
<b>South Africa (9)</b>										
Ж	2015	371 (5.2)	19 ▲		362 (4.6)	26 ▲		383 (4.2)	20 ▲	
Ж	2011	352 (2.3)			336 (2.7)			363 (2.5)		
<b>Sweden</b>										
	2015	484 (2.8)	7	4	507 (2.8)	17 ▲	12 ▲	509 (3.5)	32 ▲	17 ▲
	2011	478 (2.0)		-2	489 (2.2)		-6	478 (2.4)		-15 ▼
	2007	480 (2.2)			495 (2.2)			493 (2.8)		
<b>Thailand</b>										
	2015	425 (5.1)	2	-6	431 (4.7)	3	-13	435 (4.8)	6	-16 ▼
	2011	423 (4.6)		-8	428 (4.0)		-16 ▼	429 (4.2)		-23 ▼
	2007	432 (5.2)			444 (4.8)			452 (5.0)		
<b>Turkey</b>										
	2015	447 (4.9)	7		460 (4.3)	1		472 (4.8)	7	
	2011	441 (4.2)			459 (4.0)			465 (3.7)		
<b>United Arab Emirates</b>										
	2015	476 (2.2)	9 ▲		457 (2.1)	16 ▲		461 (2.2)	12 ▲	
	2011	467 (2.2)			442 (2.3)			449 (2.2)		
<b>United States</b>										
†	2015	528 (3.5)	9 ▲	11 ▲	515 (3.2)	12 ▲	13 ▲	514 (3.1)	11 ▲	8
²	2011	519 (2.7)		2	503 (2.9)		1	503 (2.7)		-3
² †	2007	517 (2.9)			502 (3.1)			506 (2.8)		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

<b>Ontario, Canada</b>										
	2015	513 (3.0)	10 ▲	4	522 (2.8)	12 ▲	4	534 (3.1)	10 ▲	9
²	2011	503 (2.6)		-6	510 (2.3)		-8	524 (2.7)		-1
²	2007	509 (3.6)			518 (4.0)			526 (3.8)		
<b>Quebec, Canada</b>										
‡	2015	541 (4.2)	13 ▲	16 ▲	546 (4.0)	11 ▲	17 ▲	538 (4.2)	9	10
	2011	528 (2.9)		4	536 (2.7)		6	529 (2.7)		1
³	2007	524 (3.1)			529 (3.3)			528 (3.5)		
<b>Abu Dhabi, UAE</b>										
	2015	453 (4.8)	-6		434 (4.7)	-1		440 (4.7)	-2	
	2011	459 (3.8)			434 (4.3)			442 (4.2)		
<b>Dubai, UAE</b>										
	2015	521 (2.3)	33 ▲	56 ▲	505 (2.5)	40 ▲	51 ▲	509 (2.8)	40 ▲	50 ▲
	2011	488 (2.4)		23 ▲	465 (2.5)		11 ▲	470 (2.7)		10 ▲
♦ ‡	2007	465 (2.6)			454 (3.2)			460 (3.0)		
<b>Florida, US</b>										
¹	2015	501 (7.3)	-22 ▼		488 (6.7)	-16		491 (6.6)	-14	
¹ ²	2011	524 (6.9)			504 (7.4)			505 (6.9)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

**Exhibit 3.10: Achievement in Mathematics Content Domains by Gender**

Country	Number		Algebra		Geometry		Data and Chance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Australia	506 (4.1)	517 (3.5) ▲	492 (4.3)	489 (3.7)	500 (4.0)	500 (3.6)	518 (4.1)	520 (3.6)
Bahrain	437 (3.3)	434 (2.2)	492 (2.2) ▲	474 (3.0)	459 (3.9) ▲	440 (3.7)	462 (3.6) ▲	444 (3.4)
ψ Botswana (9)	404 (3.9) ▲	382 (3.7)	410 (3.0) ▲	389 (2.5)	374 (3.2)	380 (4.0)	386 (3.5) ▲	361 (4.8)
<sup>1</sup> † Canada	532 (2.4)	542 (2.9) ▲	512 (2.2)	514 (2.8)	525 (2.4)	528 (3.2)	532 (2.9)	536 (3.5)
ψ Chile	413 (3.9)	440 (4.1) ▲	411 (3.8)	415 (4.5)	419 (4.7)	435 (4.3) ▲	419 (4.4)	439 (4.9) ▲
Chinese Taipei	585 (2.7)	594 (3.0) ▲	617 (2.8)	610 (3.8)	610 (2.9)	604 (3.3)	586 (3.3)	590 (3.0)
ψ Egypt	394 (5.2)	392 (4.2)	427 (5.6) ▲	412 (5.4)	398 (6.0)	387 (4.6)	344 (6.2)	332 (6.0)
England	524 (5.9)	531 (5.3)	497 (5.8)	488 (5.5)	519 (5.1)	509 (5.0)	544 (5.5)	539 (5.7)
<sup>1</sup> 2 Georgia	453 (3.7)	460 (4.2)	474 (4.6)	464 (4.8)	441 (4.1)	440 (4.8)	422 (4.4)	421 (5.7)
Hong Kong SAR	590 (5.2)	598 (6.3)	593 (4.7)	593 (6.2)	601 (5.2)	602 (6.6)	593 (6.7)	601 (7.1)
Hungary	508 (4.6)	527 (4.5) ▲	503 (4.5)	502 (4.5)	517 (4.8)	520 (4.6)	513 (4.7)	525 (4.4) ▲
ψ Iran, Islamic Rep. of	426 (5.3)	437 (7.6)	447 (6.2)	428 (8.3)	455 (5.5)	441 (7.7)	416 (5.5)	418 (8.4)
Ireland	540 (3.2)	549 (4.7) ▲	502 (2.8)	500 (4.0)	500 (3.1)	507 (4.3)	530 (4.1)	538 (5.1)
<sup>3</sup> Israel	510 (4.6)	525 (4.5) ▲	521 (4.9)	513 (5.4)	492 (5.3)	483 (5.3)	499 (5.4)	507 (5.5)
<sup>2</sup> Italy	484 (3.5)	503 (2.9) ▲	485 (3.4) ▲	478 (3.2)	508 (4.4)	500 (3.6)	491 (3.4)	501 (3.4) ▲
Japan	569 (3.4)	576 (3.4)	601 (3.9) ▲	590 (3.6)	600 (3.9)	595 (3.2)	591 (3.4)	587 (3.5)
⌘ Jordan	381 (4.6)	380 (5.0)	438 (4.2) ▲	397 (5.7)	392 (4.5) ▲	369 (5.4)	353 (5.0)	339 (6.4)
Kazakhstan	516 (5.6)	517 (5.5)	564 (6.0) ▲	546 (5.8)	533 (6.9)	526 (6.7)	493 (6.2)	491 (6.0)
Korea, Rep. of	594 (2.7)	608 (2.9) ▲	616 (3.1) ▲	608 (3.6)	613 (3.4)	611 (4.3)	599 (2.7)	601 (3.2)
ψ Kuwait	392 (4.5)	398 (7.1)	390 (5.2)	379 (7.6)	390 (4.9)	374 (9.0)	385 (5.2) ▲	369 (7.6)
Lebanon	437 (4.4)	444 (5.0)	468 (3.8)	463 (5.1)	442 (4.3)	445 (6.1)	394 (4.9)	397 (6.1)
<sup>2</sup> Lithuania	506 (3.4)	516 (3.8) ▲	502 (3.9) ▲	493 (4.0)	516 (3.9)	513 (4.2)	517 (3.1)	526 (3.5) ▲
Malaysia	474 (3.9)	469 (3.9)	476 (3.8) ▲	458 (3.6)	457 (4.1)	453 (4.3)	456 (4.5) ▲	447 (4.3)
Malta	498 (2.2)	503 (2.1) ▲	498 (1.8) ▲	487 (2.7)	486 (2.4)	482 (2.6)	488 (3.7)	485 (3.3)
⌘ Morocco	383 (2.4)	382 (2.6)	380 (2.4) ▲	366 (2.8)	407 (3.5)	412 (2.9) ▲	353 (3.1)	354 (3.2)
<sup>†</sup> New Zealand	496 (3.4)	503 (5.1)	479 (3.4)	470 (4.9)	489 (3.2)	488 (4.8)	511 (3.8)	506 (5.0)
Norway (9)	523 (3.1)	534 (2.9) ▲	470 (3.3)	472 (3.3)	500 (3.2)	495 (2.9)	544 (3.6)	541 (4.1)
ψ Oman	397 (3.4) ▲	382 (3.6)	449 (3.6) ▲	406 (3.8)	430 (3.9) ▲	401 (3.9)	395 (4.5) ▲	359 (4.4)
ψ Qatar	430 (3.4)	440 (4.2)	460 (3.2) ▲	444 (4.6)	441 (3.5) ▲	424 (4.5)	421 (4.1)	413 (6.0)
Russian Federation	523 (5.1)	542 (4.4) ▲	559 (5.7)	558 (5.0)	534 (6.3)	537 (5.5)	500 (5.1)	514 (5.5) ▲
⌘ Saudi Arabia	351 (5.0)	353 (7.1)	398 (4.8)	384 (7.0)	353 (6.5) ▲	331 (8.1)	370 (5.5)	352 (7.9)
<sup>2</sup> Singapore	633 (3.5) ▲	625 (3.8)	630 (3.4) ▲	615 (4.5)	621 (3.7)	613 (4.3)	621 (3.7)	614 (4.2)
Slovenia	516 (2.8)	531 (2.8) ▲	503 (3.5) ▲	494 (2.4)	522 (3.5)	523 (3.4)	525 (3.2)	524 (3.2)
⌘ South Africa (9)	369 (5.7)	368 (4.6)	400 (5.2) ▲	387 (4.1)	366 (5.3)	362 (4.7)	362 (5.9) ▲	351 (5.0)
Sweden	505 (3.2)	520 (3.2) ▲	482 (3.4)	482 (3.9)	479 (4.5)	477 (3.2)	508 (4.1)	516 (4.2) ▲
Thailand	437 (5.5) ▲	423 (5.8)	441 (5.3) ▲	416 (6.4)	438 (5.2) ▲	419 (6.5)	433 (5.4) ▲	415 (5.7)
Turkey	443 (4.7)	452 (5.2) ▲	469 (4.7) ▲	450 (4.9)	472 (4.8) ▲	454 (5.6)	470 (5.5)	464 (6.2)
United Arab Emirates	464 (3.5)	464 (3.8)	495 (3.5) ▲	475 (3.9)	456 (4.1) ▲	439 (4.2)	455 (4.0)	443 (4.7)
<sup>†</sup> United States	515 (3.3)	524 (3.2) ▲	529 (3.3) ▲	521 (3.3)	499 (3.5)	501 (3.3)	520 (3.8)	523 (3.7)
<b>International Avg.</b>	<b>478 (0.7)</b>	<b>484 (0.7) ▲</b>	<b>489 (0.7) ▲</b>	<b>478 (0.7)</b>	<b>481 (0.7) ▲</b>	<b>475 (0.8)</b>	<b>475 (0.7) ▲</b>	<b>472 (0.8)</b>

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Benchmarking Participants**

<sup>†</sup> ⌘ Buenos Aires, Argentina	404 (4.6)	425 (5.1) ▲	373 (6.0)	368 (6.4)	357 (5.5)	360 (6.3)	367 (6.7)	379 (8.1)
Ontario, Canada	526 (3.2)	534 (3.6) ▲	508 (3.2)	507 (3.4)	524 (3.3)	524 (4.1)	531 (4.1)	532 (4.3)
‡ Quebec, Canada	549 (3.9)	566 (5.6) ▲	527 (4.3)	535 (5.5)	535 (4.0)	546 (5.7) ▲	540 (4.9)	553 (6.7) ▲
Norway (8)	500 (2.8)	508 (2.5) ▲	424 (3.4)	422 (3.1)	481 (3.5)	474 (2.7)	523 (3.9)	516 (3.3)
Abu Dhabi, UAE	450 (6.0)	435 (7.3)	479 (6.0) ▲	446 (7.3)	443 (6.6) ▲	408 (8.2)	440 (6.9) ▲	412 (8.9)
Dubai, UAE	501 (3.8)	516 (4.4) ▲	531 (3.9)	526 (4.8)	496 (4.3)	496 (5.0)	501 (4.7)	506 (5.1)
<sup>1</sup> Florida, US	494 (7.5)	501 (6.8)	505 (8.1)	500 (6.6)	469 (8.0)	470 (6.4)	493 (9.3)	486 (8.1)

▲ Average significantly higher than other gender

⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and †.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Exhibit 3.12: Achievement in Mathematics Cognitive Domains by Gender**

Country	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Australia	505 (3.8)	504 (3.4)	500 (3.9)	504 (3.6)	511 (3.8)	513 (3.7)
Bahrain	469 (3.3) ▲	458 (3.1)	453 (2.5) ▲	438 (2.5)	463 (2.8) ▲	442 (3.1)
ψ Botswana (9)	404 (3.3) ▲	382 (3.5)	394 (3.3) ●	376 (3.4)	396 (2.5) ●	381 (2.9)
<sup>1</sup> † Canada	518 (2.4)	523 (2.8) ●	526 (2.1)	531 (2.7) ▲	532 (2.3)	536 (2.9)
ψ Chile	414 (3.9)	430 (4.3) ●	416 (3.7)	436 (4.4) ▲	423 (4.4)	440 (4.2) ●
Chinese Taipei	598 (3.0)	598 (3.5)	601 (2.5)	603 (3.4)	604 (2.9)	601 (3.5)
ψ Egypt	404 (6.1)	394 (5.3)	386 (5.6)	384 (4.4)	386 (5.8) ●	370 (5.4)
England	517 (5.2)	509 (4.8)	520 (5.1)	519 (4.8)	524 (5.2)	521 (5.2)
<sup>1 2</sup> Georgia	457 (4.5)	455 (4.9)	452 (3.8)	456 (4.5)	443 (4.7)	439 (5.3)
Hong Kong SAR	599 (5.2)	601 (6.5)	593 (4.5)	597 (6.0)	587 (5.2)	595 (6.5)
Hungary	508 (4.5)	514 (4.4)	510 (4.4)	522 (4.1) ●	512 (4.5)	518 (4.2)
ψ Iran, Islamic Rep. of	437 (5.2)	434 (8.2)	435 (4.7)	434 (7.4)	438 (5.3)	435 (7.7)
Ireland	526 (2.9)	529 (4.2)	517 (2.7)	524 (4.4)	520 (3.4)	523 (4.3)
<sup>3</sup> Israel	511 (4.4)	511 (5.1)	509 (4.3)	515 (4.8)	509 (4.7)	510 (5.0)
<sup>2</sup> Italy	487 (3.2)	490 (3.1)	492 (3.3)	498 (2.8) ●	496 (3.3)	503 (3.4)
Japan	579 (3.7)	576 (3.3)	592 (3.3)	591 (3.1)	593 (3.6)	588 (3.5)
⌘ Jordan	399 (4.2) ●	382 (5.3)	385 (4.2)	372 (5.3)	393 (4.1) ●	366 (5.7)
Kazakhstan	539 (6.7) ▲	528 (6.7)	528 (5.9)	526 (5.5)	530 (5.8) ●	519 (5.9)
Korea, Rep. of	608 (2.9)	606 (3.6)	605 (2.8)	607 (3.7)	606 (3.3)	609 (3.7)
ψ Kuwait	399 (5.0)	396 (7.3)	391 (4.6)	388 (6.8)	379 (6.3)	369 (7.2)
Lebanon	454 (4.1)	458 (4.8)	437 (4.3)	440 (5.0)	406 (5.1)	405 (5.8)
<sup>2</sup> Lithuania	502 (3.9)	502 (3.3)	518 (3.1)	521 (3.3)	501 (3.5)	502 (3.6)
Malaysia	482 (4.0) ●	462 (4.2)	465 (3.9)	461 (4.0)	454 (3.9)	452 (4.2)
Malta	501 (2.3)	497 (1.9)	494 (2.1)	493 (1.8)	486 (2.5)	483 (2.7)
⌘ Morocco	384 (2.9)	380 (2.8)	385 (2.8)	385 (2.3)	374 (3.3)	374 (3.0)
† New Zealand	487 (3.2)	489 (4.7)	494 (3.1)	492 (4.8)	501 (3.3)	496 (5.0)
Norway (9)	500 (2.7)	501 (2.6)	515 (3.0)	517 (2.5)	515 (3.2)	517 (2.8)
ψ Oman	419 (3.9) ●	385 (4.0)	413 (3.1) ●	389 (3.6)	422 (3.5) ●	385 (4.2)
ψ Qatar	440 (3.2)	440 (5.3)	437 (3.0)	433 (4.6)	441 (3.1) ●	422 (4.7)
Russian Federation	538 (6.2)	548 (5.5) ●	535 (5.2)	546 (4.5) ▲	522 (5.6)	533 (5.0) ●
⌘ Saudi Arabia	361 (5.9)	358 (7.8)	369 (5.5)	358 (6.3)	389 (5.5) ●	358 (6.2)
<sup>2</sup> Singapore	641 (3.8) ●	626 (3.9)	623 (3.5) ●	616 (3.7)	621 (4.4) ●	612 (4.2)
Slovenia	518 (2.8)	518 (2.8)	512 (2.7)	516 (2.5)	515 (3.0)	516 (3.2)
⌘ South Africa (9)	377 (5.9) ●	365 (5.8)	363 (5.5)	361 (4.6)	387 (5.2) ●	379 (4.1)
Sweden	480 (3.4)	489 (3.4) ●	503 (3.1)	510 (3.2) ▲	508 (4.3)	511 (3.8)
Thailand	435 (5.6) ●	415 (6.0)	439 (5.1) ●	423 (5.4)	443 (5.1) ●	426 (5.8)
Turkey	450 (5.2)	444 (5.2)	461 (4.5)	458 (4.7)	477 (5.0) ●	467 (5.1)
United Arab Emirates	482 (3.8)	469 (4.1)	461 (3.7)	453 (4.4)	470 (3.7) ●	452 (4.2)
† United States	529 (3.7)	527 (3.6)	513 (3.4)	516 (3.4)	512 (3.1)	516 (3.4)
<b>International Avg.</b>	<b>483 (0.7) ▲</b>	<b>479 (0.8)</b>	<b>481 (0.6)</b>	<b>480 (0.7)</b>	<b>482 (0.7) ▲</b>	<b>477 (0.7)</b>

**Benchmarking Participants**

<sup>1</sup> ⌘ Buenos Aires, Argentina	392 (5.1)	402 (5.8)	386 (5.4)	398 (5.8) ●	379 (5.7)	385 (6.8)
Ontario, Canada	512 (3.2)	514 (3.4)	521 (3.0)	523 (3.3)	534 (3.5)	535 (3.5)
‡ Quebec, Canada	534 (4.0)	548 (5.7) ●	541 (3.7)	553 (5.4) ●	532 (3.9)	545 (5.8) ●
Norway (8)	475 (2.7)	478 (2.9)	492 (2.9)	492 (2.5)	489 (3.1)	486 (3.3)
Abu Dhabi, UAE	467 (6.4) ●	440 (7.8)	445 (6.5) ●	422 (7.8)	456 (6.3) ●	425 (7.6)
Dubai, UAE	520 (4.1)	523 (4.4)	502 (4.0)	509 (4.8)	510 (4.1)	508 (4.8)
<sup>1</sup> Florida, US	501 (8.8)	501 (7.0)	488 (7.6)	489 (7.1)	492 (7.4)	490 (6.7)

▲ Average significantly higher than other gender

⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015







# CHAPTER 4: HOME ENVIRONMENT SUPPORT

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



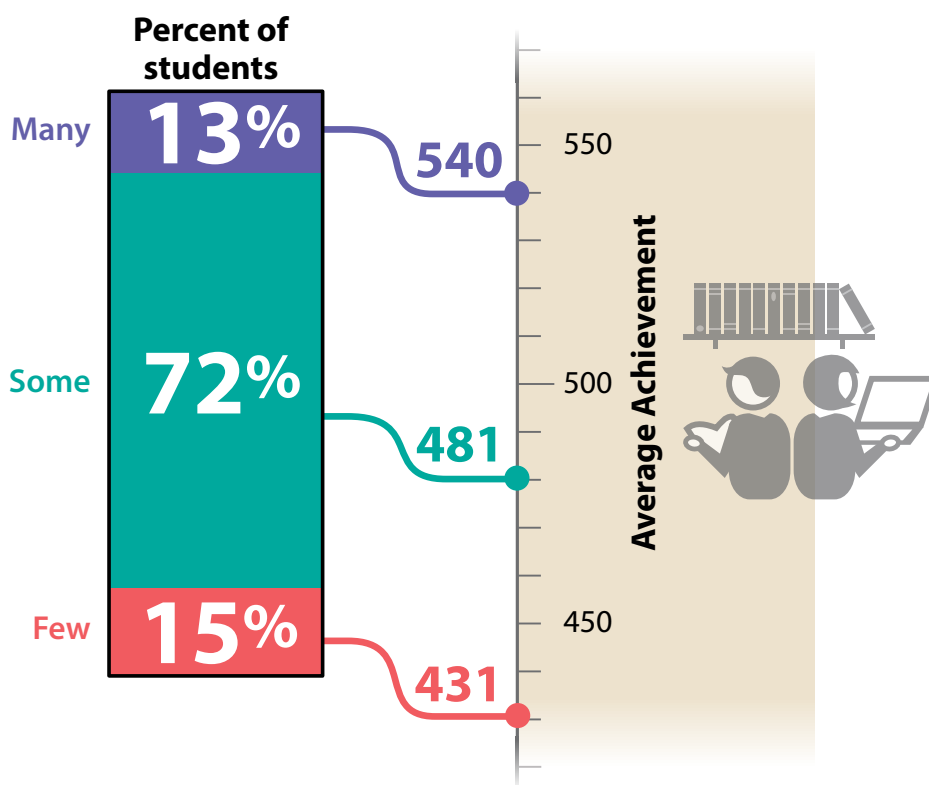
**IEA**

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



### Home Educational Resources

Students who reported many home educational resources had much higher achievement than students who reported some or few resources.



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>



**Exhibit 4.2: Home Educational Resources**

Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.4, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home, both of the home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.3, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score	Difference in Average Scale Score from 2011	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Korea, Rep. of	37 (1.3)	638 (3.3)	60 (1.2)	589 (2.4)	3 (0.2)	524 (8.1)	11.6 (0.05)	0.3 (0.07)	▲
Norway (9)	29 (1.2)	546 (3.3)	69 (1.1)	499 (2.0)	1 (0.2)	~ ~	11.5 (0.05)	◊ ◊	
Georgia	23 (1.1)	492 (4.4)	70 (1.1)	448 (3.9)	7 (0.6)	392 (8.7)	10.9 (0.06)	0.4 (0.08)	▲
Sweden	23 (1.1)	543 (3.2)	74 (1.2)	491 (2.6)	3 (0.5)	449 (9.8)	11.1 (0.04)	-0.2 (0.06)	▼
Australia	23 (0.9)	548 (3.1)	73 (0.9)	497 (3.1)	4 (0.4)	439 (10.6)	11.1 (0.04)	0.0 (0.07)	
Hungary	22 (1.5)	590 (4.4)	70 (1.3)	503 (3.0)	7 (0.7)	397 (7.8)	10.8 (0.07)	0.0 (0.09)	
United States	22 (0.9)	567 (3.7)	71 (0.9)	509 (2.9)	7 (0.5)	469 (4.7)	10.9 (0.04)	0.0 (0.06)	
Canada	21 (0.9)	563 (3.1)	76 (0.8)	520 (2.0)	2 (0.3)	~ ~	11.1 (0.04)	◊ ◊	
Ireland	20 (0.9)	567 (3.6)	74 (0.8)	518 (2.5)	6 (0.6)	450 (10.4)	10.9 (0.05)	◊ ◊	
Japan	19 (0.9)	638 (3.2)	77 (0.8)	577 (2.1)	4 (0.3)	515 (6.4)	11.0 (0.04)	0.2 (0.06)	▲
England	19 (1.0)	584 (4.7)	76 (1.0)	507 (4.2)	5 (0.4)	462 (7.1)	10.9 (0.05)	0.1 (0.07)	
New Zealand	19 (0.7)	550 (3.3)	75 (0.6)	486 (3.2)	6 (0.5)	416 (6.6)	10.9 (0.04)	0.0 (0.07)	
Israel	r 16 (0.7)	581 (4.5)	82 (0.7)	512 (4.5)	2 (0.3)	~ ~	11.1 (0.04)	r 0.1 (0.07)	
Chinese Taipei	15 (0.9)	658 (3.7)	73 (0.9)	600 (2.3)	12 (0.6)	521 (4.3)	10.4 (0.04)	0.0 (0.06)	
Lithuania	14 (1.1)	564 (5.2)	81 (1.2)	506 (2.5)	5 (0.4)	447 (9.5)	10.7 (0.05)	0.2 (0.06)	▲
Qatar	14 (0.6)	498 (4.3)	78 (0.8)	435 (3.0)	8 (0.5)	362 (6.1)	10.6 (0.03)	-0.1 (0.05)	
Slovenia	14 (0.7)	553 (3.6)	83 (0.7)	513 (2.0)	3 (0.4)	455 (8.0)	10.8 (0.04)	-0.1 (0.05)	
Malta	13 (0.5)	551 (3.3)	75 (0.7)	494 (1.2)	12 (0.5)	436 (3.9)	10.5 (0.03)	◊ ◊	
Italy	13 (0.9)	540 (3.6)	72 (1.0)	497 (2.3)	15 (0.9)	444 (5.5)	10.2 (0.05)	-0.1 (0.07)	
Russian Federation	12 (0.6)	567 (5.3)	83 (0.6)	535 (4.8)	5 (0.4)	512 (10.4)	10.7 (0.04)	-0.1 (0.06)	
United Arab Emirates	12 (0.4)	519 (4.2)	77 (0.4)	465 (1.9)	11 (0.4)	406 (3.3)	10.4 (0.03)	0.1 (0.04)	
Hong Kong SAR	12 (1.0)	634 (5.6)	74 (1.0)	595 (4.4)	15 (0.9)	560 (6.5)	10.2 (0.07)	0.3 (0.08)	▲
Singapore	12 (0.4)	668 (2.7)	77 (0.6)	622 (3.2)	11 (0.5)	565 (5.4)	10.3 (0.03)	0.0 (0.05)	
Kazakhstan	11 (1.1)	554 (11.3)	79 (1.1)	528 (4.9)	11 (0.9)	502 (11.3)	10.3 (0.07)	0.3 (0.10)	▲
Iran, Islamic Rep. of	9 (0.8)	514 (8.1)	55 (1.2)	449 (4.9)	36 (1.5)	397 (4.1)	9.3 (0.08)	0.7 (0.12)	▲
Bahrain	8 (0.4)	490 (5.8)	78 (0.7)	456 (1.6)	13 (0.6)	429 (3.8)	10.1 (0.03)	0.0 (0.04)	
Lebanon	7 (0.6)	471 (6.7)	73 (1.0)	448 (3.8)	20 (0.9)	418 (4.6)	9.9 (0.04)	0.5 (0.08)	▲
Turkey	7 (0.8)	575 (8.5)	54 (1.2)	476 (4.1)	40 (1.7)	414 (4.6)	9.1 (0.09)	0.7 (0.12)	▲
Chile	6 (0.5)	490 (6.6)	78 (0.9)	432 (3.1)	16 (0.9)	385 (4.8)	9.9 (0.04)	0.2 (0.06)	
Oman	6 (0.3)	451 (5.6)	66 (0.8)	409 (2.5)	28 (1.0)	383 (3.5)	9.5 (0.04)	0.5 (0.06)	▲
Saudi Arabia	6 (0.6)	409 (10.5)	69 (1.3)	373 (4.7)	25 (1.4)	346 (5.2)	9.6 (0.06)	0.2 (0.10)	
Jordan	5 (0.4)	430 (8.7)	73 (1.0)	395 (3.1)	22 (1.1)	350 (4.1)	9.6 (0.05)	0.1 (0.07)	
Kuwait	5 (0.7)	450 (20.8)	82 (1.0)	395 (4.8)	13 (0.8)	360 (4.6)	10.0 (0.05)	◊ ◊	
Egypt	5 (0.3)	426 (6.9)	67 (1.0)	404 (4.3)	28 (1.0)	365 (4.9)	9.4 (0.04)	◊ ◊	
Malaysia	4 (0.3)	535 (5.2)	72 (1.0)	473 (3.7)	24 (1.0)	431 (4.5)	9.5 (0.04)	0.4 (0.08)	▲
Thailand	3 (0.5)	539 (16.0)	60 (1.1)	440 (5.5)	37 (1.2)	408 (4.3)	9.1 (0.05)	0.6 (0.08)	▲
South Africa (9)	3 (0.4)	477 (20.5)	66 (1.1)	380 (5.2)	31 (1.2)	349 (3.1)	9.1 (0.06)	0.4 (0.07)	▲
Botswana (9)	2 (0.2)	~ ~	51 (1.1)	402 (2.7)	47 (1.2)	379 (2.1)	8.6 (0.05)	0.1 (0.06)	
Morocco	2 (0.2)	~ ~	43 (0.9)	396 (3.1)	55 (1.0)	374 (2.0)	8.2 (0.05)	0.2 (0.07)	
International Avg.	13 (0.1)	540 (1.3)	72 (0.2)	481 (0.6)	15 (0.1)	431 (1.1)			

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

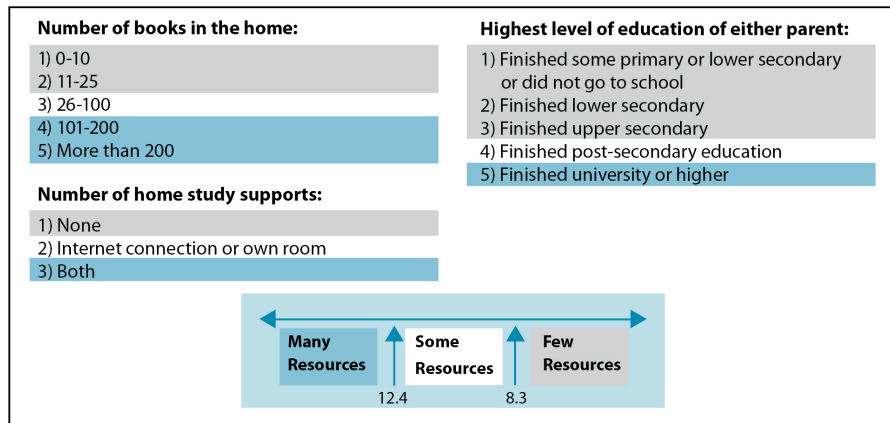
An "r" indicates data are available for at least 70% but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 4.2: Home Educational Resources (Continued)**

Country	Many Resources		Some Resources		Few Resources		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Norway (8)	25 (1.1)	519 (2.7)	74 (1.1)	478 (1.9)	1 (0.2)	~ ~	11.4 (0.05)	-0.2 (0.06) ▼
Ontario, Canada	24 (1.3)	560 (3.9)	74 (1.2)	513 (2.4)	2 (0.3)	~ ~	11.3 (0.05)	-0.1 (0.08)
Dubai, UAE	18 (0.6)	555 (4.4)	77 (0.7)	508 (2.0)	6 (0.5)	439 (7.0)	10.8 (0.03)	0.2 (0.04) ▲
Quebec, Canada	18 (1.0)	580 (4.7)	80 (1.1)	539 (3.5)	3 (0.6)	504 (14.3)	10.9 (0.06)	-0.1 (0.07)
Florida, US	13 (1.4)	558 (8.7)	77 (1.2)	490 (6.2)	10 (1.4)	446 (6.8)	10.4 (0.10)	-0.2 (0.13)
Abu Dhabi, UAE	11 (1.0)	504 (11.3)	77 (1.0)	442 (4.2)	12 (0.8)	387 (5.1)	10.3 (0.06)	0.0 (0.08)
Buenos Aires, Argentina	9 (0.9)	464 (7.3)	72 (1.3)	401 (4.2)	18 (1.3)	340 (5.9)	10.0 (0.07)	0 0

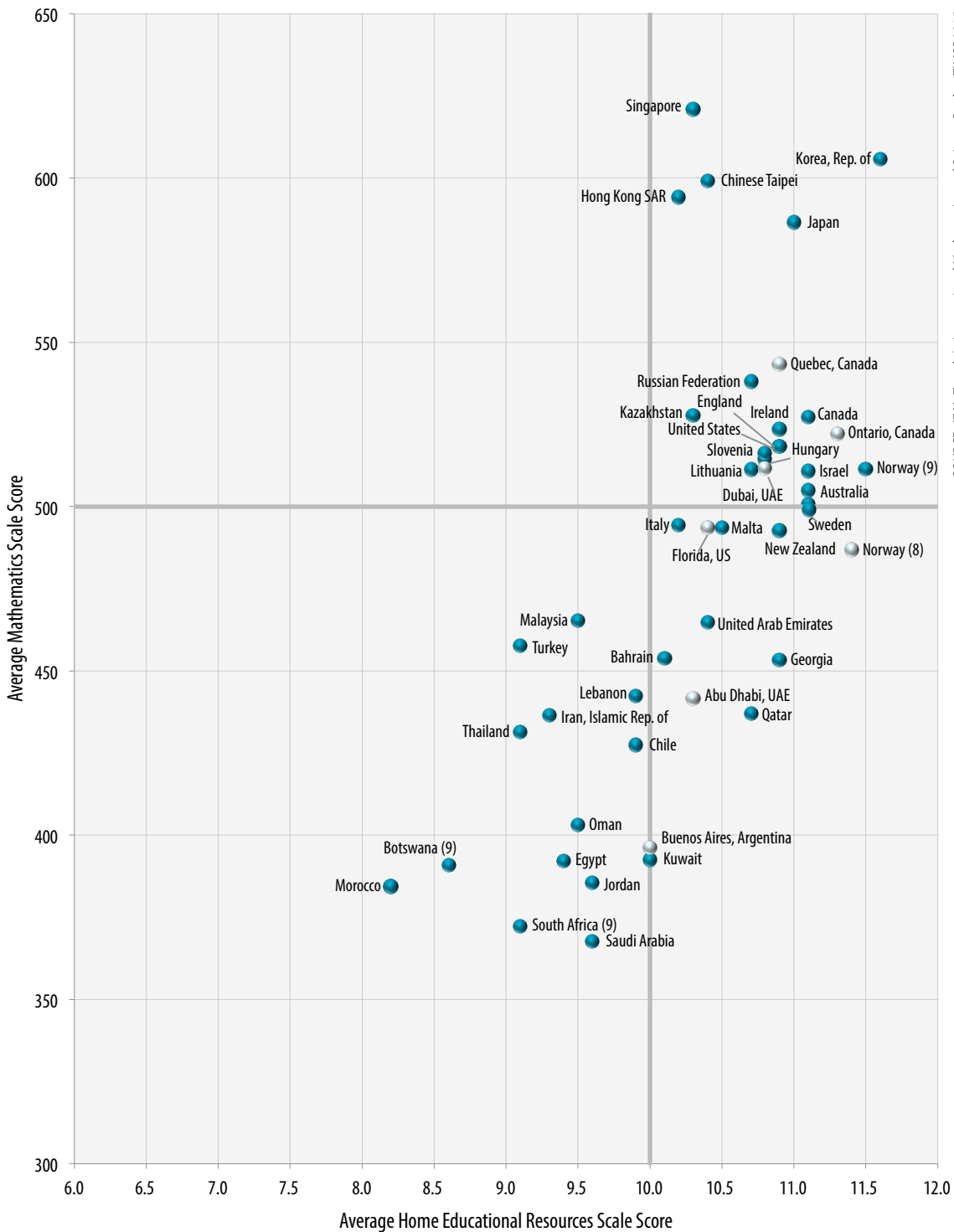
▲ Significantly higher than 2011  
▼ Significantly lower than 2011



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 4.2: Home Educational Resources (Continued)**

**Mathematics Achievement by Home Educational Resources**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 4.4: Students Speak the Language of the Test at Home**

Reported by Students

Country	Always		Almost Always		Sometimes		Never	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	82 (1.3)	504 (2.6)	11 (0.8)	514 (5.8)	6 (0.7)	516 (9.7)	1 (0.1)	~ ~
Bahrain	55 (0.7)	444 (2.0)	19 (0.7)	479 (4.2)	21 (0.7)	464 (3.1)	5 (0.4)	437 (6.6)
Botswana (9)	5 (0.3)	383 (7.3)	8 (0.5)	424 (6.3)	79 (0.8)	392 (2.0)	9 (0.5)	361 (5.6)
Canada	66 (1.4)	524 (2.2)	21 (0.8)	536 (2.9)	10 (0.6)	534 (3.8)	3 (0.4)	547 (7.5)
Chile	87 (0.7)	430 (3.3)	8 (0.4)	439 (4.8)	3 (0.4)	367 (9.6)	1 (0.3)	~ ~
Chinese Taipei	57 (1.1)	604 (2.8)	34 (0.8)	610 (3.1)	9 (0.6)	530 (5.8)	0 (0.1)	~ ~
Egypt	64 (1.6)	388 (4.8)	13 (0.8)	414 (5.7)	19 (1.0)	398 (4.4)	4 (0.5)	375 (8.4)
England	85 (1.2)	517 (4.3)	9 (0.8)	536 (6.9)	4 (0.5)	514 (8.7)	1 (0.1)	~ ~
Georgia	84 (1.3)	453 (3.5)	11 (0.7)	478 (7.1)	5 (0.8)	414 (9.8)	1 (0.2)	~ ~
Hong Kong SAR	75 (1.7)	590 (4.2)	9 (0.5)	596 (6.9)	13 (1.4)	617 (7.4)	3 (0.4)	598 (16.1)
Hungary	87 (0.7)	512 (3.8)	11 (0.6)	535 (5.8)	1 (0.2)	~ ~	0 (0.1)	~ ~
Iran, Islamic Rep. of	51 (1.8)	445 (5.7)	16 (0.9)	467 (7.1)	20 (1.2)	412 (5.0)	13 (1.0)	401 (7.5)
Ireland	82 (0.8)	525 (2.9)	7 (0.5)	523 (4.5)	7 (0.5)	505 (6.6)	4 (0.3)	506 (9.1)
Israel	78 (1.0)	512 (4.1)	15 (0.6)	519 (6.4)	6 (0.6)	498 (11.2)	1 (0.2)	~ ~
Italy	71 (1.4)	504 (2.7)	18 (0.9)	487 (3.6)	9 (0.8)	448 (7.0)	2 (0.3)	~ ~
Japan	96 (0.3)	588 (2.3)	3 (0.3)	566 (9.8)	1 (0.1)	~ ~	0 (0.1)	~ ~
Jordan	77 (1.3)	385 (3.3)	11 (0.6)	417 (5.0)	8 (0.7)	369 (5.6)	4 (0.6)	363 (16.7)
Kazakhstan	80 (1.1)	526 (5.3)	13 (0.7)	545 (7.8)	6 (0.6)	522 (14.2)	0 (0.1)	~ ~
Korea, Rep. of	89 (0.5)	605 (2.6)	11 (0.5)	618 (4.6)	0 (0.1)	~ ~	0 (0.0)	~ ~
Kuwait	10 (1.0)	378 (8.7)	10 (0.7)	410 (12.8)	47 (1.5)	402 (5.5)	33 (1.3)	378 (5.2)
Lebanon	10 (0.8)	444 (6.8)	17 (0.7)	456 (4.8)	59 (1.2)	442 (4.3)	14 (0.9)	430 (5.7)
Lithuania	79 (0.9)	510 (3.1)	18 (0.7)	520 (4.6)	3 (0.3)	491 (8.5)	0 (0.1)	~ ~
Malaysia	34 (1.5)	491 (4.5)	22 (0.8)	472 (4.0)	38 (1.4)	443 (5.2)	6 (0.7)	437 (8.0)
Malta	10 (0.5)	511 (5.1)	15 (0.6)	507 (3.8)	55 (0.8)	493 (1.7)	20 (0.5)	479 (3.3)
Morocco	25 (1.1)	369 (3.5)	14 (0.6)	387 (3.6)	46 (1.1)	391 (2.7)	15 (0.9)	389 (3.4)
New Zealand	79 (1.4)	495 (2.9)	14 (0.9)	491 (5.6)	6 (0.6)	476 (10.5)	1 (0.1)	~ ~
Norway (9)	81 (1.2)	516 (2.1)	12 (0.7)	497 (4.8)	5 (0.6)	484 (5.8)	1 (0.2)	~ ~
Oman	49 (1.4)	403 (3.0)	18 (0.7)	413 (4.8)	27 (0.9)	403 (3.6)	7 (0.4)	389 (5.4)
Qatar	50 (0.7)	411 (3.3)	19 (0.8)	470 (4.8)	26 (0.6)	465 (5.1)	4 (0.3)	440 (8.0)
Russian Federation	83 (1.6)	539 (4.4)	12 (0.6)	544 (7.0)	5 (1.3)	512 (27.6)	1 (0.1)	~ ~
Saudi Arabia	64 (1.7)	364 (4.7)	10 (0.6)	396 (7.5)	17 (1.2)	368 (7.6)	10 (1.0)	367 (11.3)
Singapore	33 (0.7)	631 (3.2)	32 (0.7)	630 (3.2)	31 (0.6)	603 (4.3)	4 (0.2)	601 (7.7)
Slovenia	70 (1.3)	524 (2.3)	21 (1.0)	512 (3.1)	7 (0.6)	468 (5.5)	3 (0.4)	474 (9.2)
South Africa (9)	16 (1.2)	409 (7.2)	14 (0.8)	424 (6.9)	63 (1.5)	356 (4.1)	6 (0.4)	325 (5.6)
Sweden	75 (1.5)	508 (2.9)	16 (1.0)	491 (4.5)	7 (0.7)	457 (8.2)	1 (0.2)	~ ~
Thailand	64 (1.9)	441 (5.5)	15 (0.8)	436 (6.3)	19 (1.7)	397 (5.2)	2 (0.2)	~ ~
Turkey	82 (1.6)	468 (4.6)	9 (0.5)	471 (8.2)	8 (1.0)	365 (10.4)	2 (0.5)	~ ~
United Arab Emirates	43 (0.9)	443 (2.7)	21 (0.6)	505 (2.9)	31 (0.8)	473 (3.3)	5 (0.3)	449 (6.2)
United States	74 (1.1)	521 (3.0)	17 (0.6)	518 (4.7)	8 (0.5)	504 (5.5)	1 (0.1)	~ ~
International Avg.	62 (0.2)	482 (0.7)	15 (0.1)	494 (0.9)	19 (0.1)	458 (1.4)	5 (0.1)	437 (1.9)
<b>Benchmarking Participants</b>								
Buenos Aires, Argentina	86 (0.8)	396 (4.4)	10 (0.6)	400 (8.8)	3 (0.4)	363 (14.7)	1 (0.2)	~ ~
Ontario, Canada	67 (1.6)	517 (2.8)	20 (1.1)	536 (4.1)	11 (0.7)	533 (4.9)	2 (0.4)	~ ~
Quebec, Canada	62 (2.6)	545 (3.2)	24 (1.5)	540 (5.2)	10 (1.5)	549 (6.6)	4 (0.9)	556 (12.4)
Norway (8)	80 (1.1)	490 (2.0)	14 (0.8)	478 (4.5)	5 (0.4)	471 (5.1)	1 (0.2)	~ ~
Abu Dhabi, UAE	50 (2.0)	422 (5.2)	17 (1.4)	484 (6.5)	28 (1.5)	456 (7.1)	5 (0.6)	419 (10.8)
Dubai, UAE	33 (0.9)	501 (2.6)	31 (0.8)	534 (3.3)	32 (0.9)	503 (3.2)	4 (0.4)	509 (7.8)
Florida, US	62 (3.6)	495 (6.7)	22 (1.8)	505 (8.7)	14 (1.9)	479 (12.0)	2 (0.5)	~ ~

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015





# CHAPTER 5: SCHOOL COMPOSITION AND RESOURCES

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



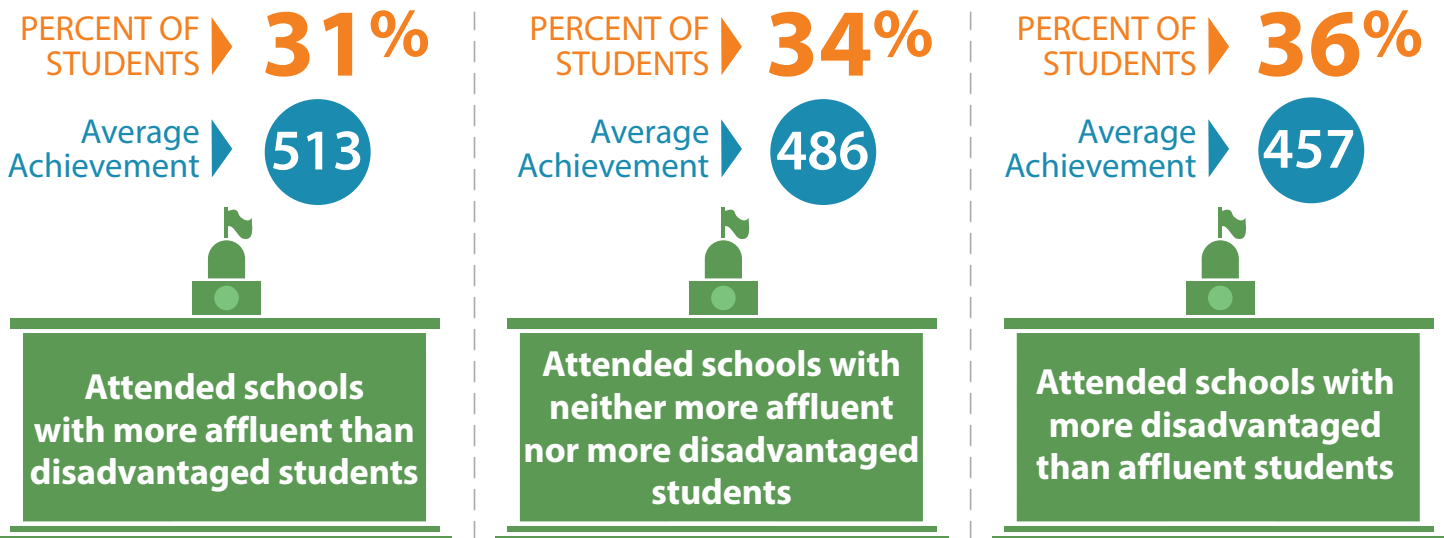
**IEA**

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



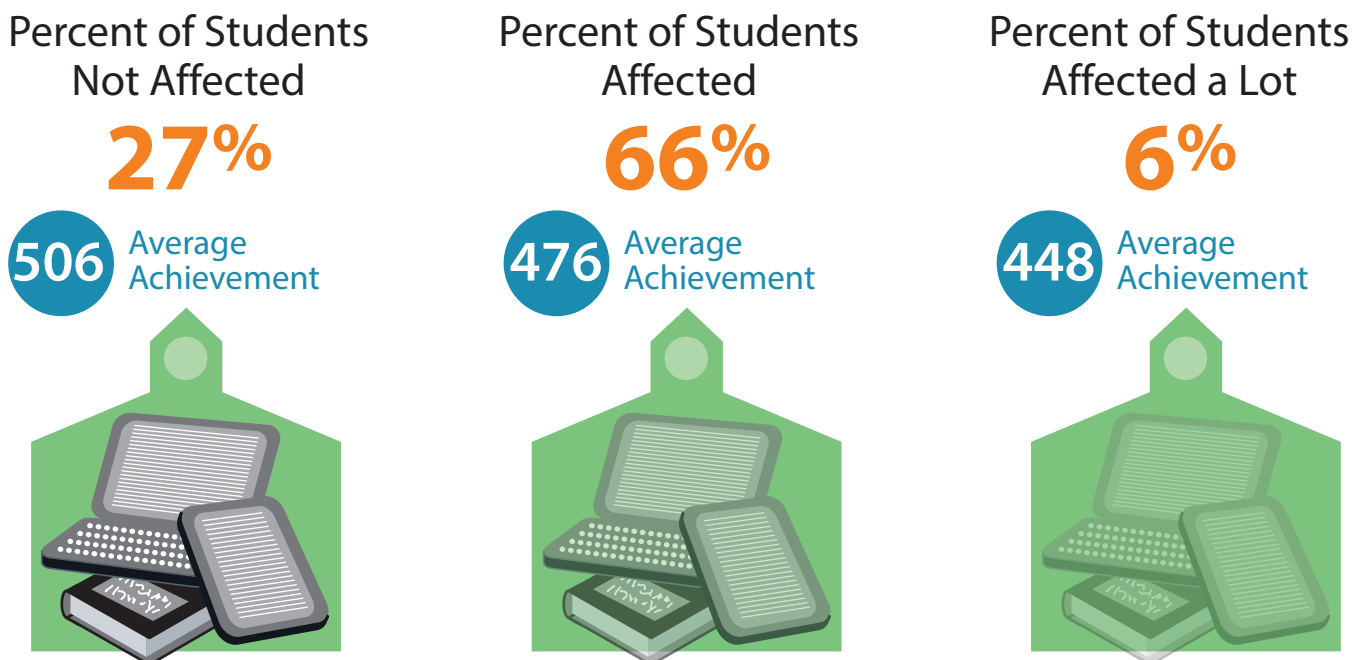
# School Composition and Resources

## Socioeconomic Composition of Schools



In nearly all the TIMSS 2015 countries, students attending schools with more affluent than disadvantaged students had higher average mathematics achievement.

## Instruction Affected by Mathematics Resource Shortages – Principals' Reports



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>



**Exhibit 5.2: School Composition by Economic Background of the Student Body**

Reported by Principals

Country	More Affluent - Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes		Neither More Affluent Nor More Disadvantaged		More Disadvantaged - Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	30 (3.6)	545 (4.8)	39 (4.1)	504 (4.2)	30 (3.6)	474 (6.3)
Bahrain	31 (0.3)	480 (3.6)	47 (0.3)	445 (2.1)	22 (0.2)	446 (3.3)
Botswana (9)	10 (2.7)	432 (7.1)	25 (4.6)	401 (5.1)	65 (4.8)	381 (3.2)
Canada	43 (3.9)	541 (3.0)	32 (3.6)	524 (4.3)	25 (3.1)	512 (4.9)
Chile	r 14 (2.5)	490 (9.4)	18 (4.0)	457 (12.0)	68 (4.0)	409 (5.1)
Chinese Taipei	18 (2.6)	630 (10.0)	69 (3.3)	601 (2.9)	13 (2.3)	549 (5.9)
Egypt	r 18 (3.3)	409 (11.7)	32 (3.9)	400 (7.9)	49 (4.1)	379 (6.5)
England	r 33 (3.6)	576 (7.4)	38 (4.4)	515 (7.8)	29 (3.8)	487 (7.8)
Georgia	20 (3.4)	470 (7.7)	29 (4.5)	453 (6.7)	51 (4.5)	445 (5.6)
Hong Kong SAR	19 (3.2)	630 (8.7)	35 (4.1)	604 (8.0)	46 (4.2)	562 (6.6)
Hungary	23 (3.3)	562 (7.2)	36 (4.3)	530 (6.3)	41 (3.9)	470 (6.4)
Iran, Islamic Rep. of	22 (2.7)	483 (10.0)	23 (2.9)	461 (8.9)	55 (2.6)	409 (4.4)
Ireland	27 (4.1)	546 (4.4)	39 (4.6)	533 (3.3)	34 (4.0)	500 (4.6)
Israel	24 (3.3)	560 (8.4)	34 (3.4)	529 (6.5)	43 (3.2)	471 (8.0)
Italy	36 (4.0)	502 (6.2)	46 (4.7)	496 (4.5)	18 (3.9)	475 (7.9)
Japan	44 (3.6)	604 (4.2)	46 (3.9)	577 (3.2)	10 (2.5)	558 (6.0)
Jordan	r 15 (2.5)	414 (9.8)	21 (3.4)	401 (8.2)	65 (3.8)	370 (4.6)
Kazakhstan	65 (3.8)	536 (7.4)	29 (3.6)	519 (8.3)	5 (1.8)	504 (30.8)
Korea, Rep. of	14 (2.8)	643 (6.7)	56 (4.4)	607 (3.2)	30 (3.7)	587 (3.4)
Kuwait	r 17 (3.2)	433 (21.8)	38 (3.8)	386 (6.8)	45 (4.6)	383 (6.6)
Lebanon	r 19 (3.9)	452 (11.9)	29 (4.1)	470 (6.9)	53 (4.5)	426 (6.3)
Lithuania	50 (3.6)	528 (4.2)	34 (3.6)	499 (4.4)	15 (2.9)	484 (6.4)
Malaysia	6 (1.2)	546 (8.4)	26 (3.5)	478 (9.4)	68 (3.4)	451 (4.3)
Malta	32 (0.1)	508 (1.8)	64 (0.1)	489 (1.4)	5 (0.1)	432 (4.1)
Morocco	r 7 (1.6)	438 (12.2)	12 (2.2)	395 (11.0)	81 (2.4)	377 (2.4)
New Zealand	30 (4.7)	529 (5.0)	42 (4.9)	493 (4.6)	28 (2.3)	449 (5.8)
Norway (9)	57 (4.5)	519 (3.2)	35 (4.1)	504 (3.5)	8 (2.2)	493 (4.1)
Oman	37 (3.3)	421 (4.6)	37 (3.8)	398 (4.0)	26 (3.5)	387 (7.0)
Qatar	76 (0.7)	444 (3.8)	14 (0.3)	402 (4.2)	10 (0.7)	440 (10.8)
Russian Federation	68 (3.7)	541 (5.5)	22 (3.4)	531 (6.3)	10 (2.3)	537 (14.7)
Saudi Arabia	r 38 (4.4)	380 (6.2)	46 (5.2)	355 (5.9)	16 (3.6)	349 (11.3)
Singapore	33 (0.0)	657 (4.6)	53 (0.0)	617 (4.7)	14 (0.0)	551 (8.7)
Slovenia	38 (3.9)	523 (2.7)	43 (4.2)	518 (3.9)	19 (3.2)	500 (3.7)
South Africa (9)	r 8 (2.1)	487 (13.1)	13 (3.0)	437 (20.5)	79 (3.3)	353 (4.6)
Sweden	64 (4.6)	512 (3.3)	27 (4.6)	492 (5.8)	9 (2.8)	449 (9.8)
Thailand	16 (2.9)	489 (16.7)	21 (3.2)	436 (11.6)	63 (3.8)	412 (5.6)
Turkey	23 (3.5)	501 (13.9)	24 (3.0)	477 (8.2)	53 (3.9)	433 (4.4)
United Arab Emirates	r 50 (2.0)	482 (4.3)	19 (1.7)	472 (6.6)	31 (1.5)	437 (4.0)
United States	20 (2.5)	561 (6.2)	24 (3.2)	534 (5.2)	56 (3.4)	497 (4.1)
International Avg.	31 (0.5)	513 (1.4)	34 (0.6)	486 (1.2)	36 (0.5)	457 (1.3)

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

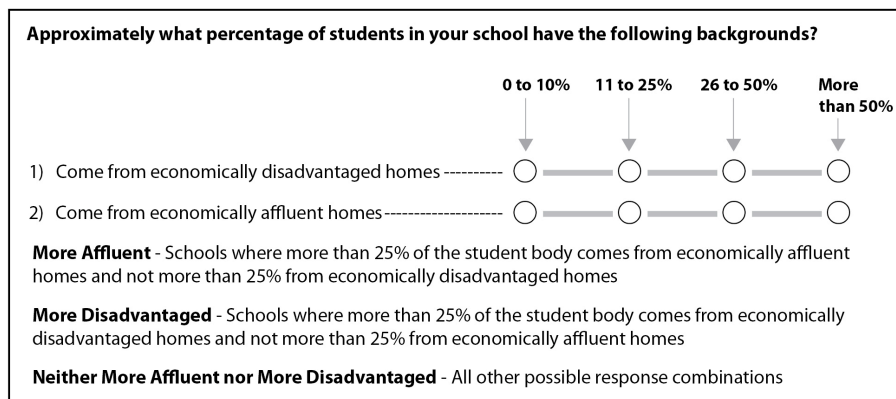
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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 5.2: School Composition by Economic Background of the Student Body (Continued)**

Country	More Affluent - Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes		Neither More Affluent Nor More Disadvantaged		More Disadvantaged - Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Benchmarking Participants</b>						
Buenos Aires, Argentina	47 (5.5)	427 (8.1)	14 (3.7)	391 (14.5)	39 (5.4)	358 (8.6)
Ontario, Canada	40 (5.0)	534 (3.7)	34 (5.0)	518 (5.3)	26 (4.0)	505 (5.6)
Quebec, Canada	48 (6.0)	559 (4.1)	26 (6.0)	554 (5.9)	26 (5.6)	526 (8.2)
Norway (8)	57 (4.5)	496 (2.8)	35 (4.2)	481 (3.2)	8 (2.2)	461 (9.1)
Abu Dhabi, UAE	53 (4.2)	450 (9.7)	16 (3.4)	448 (17.5)	32 (3.1)	424 (6.6)
Dubai, UAE	57 (0.4)	530 (3.6)	22 (0.3)	522 (3.5)	21 (0.2)	476 (4.8)
Florida, US	9 (5.3)	523 (44.8)	31 (9.0)	524 (9.7)	60 (8.4)	478 (13.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 5.4: Schools with Students Having the Language of the Test as Their Native Language**

Reported by Principals

Country	School has More than 90% of Students with Language of Test as Their Native Language		School has 51-90% of Students with Language of Test as Their Native Language		School has 50% or Less of Students with Language of Test as Their Native Language	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	62 (4.0)	506 (3.8)	27 (3.5)	513 (8.1)	11 (2.1)	497 (12.7)
Bahrain	74 (0.2)	442 (1.7)	8 (0.1)	484 (6.9)	18 (0.2)	491 (3.5)
Botswana (9)	6 (1.9)	379 (12.1)	2 (1.2)	~ ~	93 (2.3)	391 (2.3)
Canada	43 (2.9)	530 (3.2)	40 (3.1)	526 (3.6)	18 (2.6)	529 (6.5)
Chile	100 (0.3)	428 (3.7)	0 (0.3)	~ ~	0 (0.0)	~ ~
Chinese Taipei	66 (3.5)	610 (3.6)	28 (3.5)	583 (5.5)	5 (1.3)	546 (7.6)
Egypt	99 (0.7)	392 (4.2)	1 (0.7)	~ ~	0 (0.0)	~ ~
England	66 (4.4)	523 (6.9)	24 (3.9)	544 (11.2)	10 (2.7)	515 (18.2)
Georgia	89 (2.7)	455 (3.7)	10 (2.8)	442 (12.4)	1 (0.7)	~ ~
Hong Kong SAR	48 (4.7)	579 (6.3)	6 (2.1)	573 (23.8)	46 (5.0)	607 (7.2)
Hungary	100 (0.0)	513 (3.9)	0 (0.0)	~ ~	0 (0.0)	~ ~
Iran, Islamic Rep. of	50 (2.9)	459 (6.9)	11 (2.3)	439 (11.3)	40 (3.1)	408 (5.4)
Ireland	70 (4.1)	528 (3.0)	26 (3.8)	509 (8.4)	4 (1.7)	525 (10.2)
Israel	66 (3.0)	514 (5.6)	28 (3.2)	506 (7.4)	7 (1.9)	509 (20.9)
Italy	63 (3.8)	489 (3.4)	36 (3.8)	502 (4.7)	1 (0.9)	~ ~
Japan	99 (0.9)	587 (2.3)	1 (0.6)	~ ~	1 (0.7)	~ ~
Jordan	99 (0.5)	385 (3.2)	0 (0.4)	~ ~	0 (0.3)	~ ~
Kazakhstan	55 (3.1)	521 (7.4)	26 (3.4)	539 (11.7)	20 (2.9)	534 (12.9)
Korea, Rep. of	100 (0.0)	606 (2.6)	0 (0.0)	~ ~	0 (0.0)	~ ~
Kuwait	84 (2.5)	384 (4.7)	4 (1.5)	345 (13.4)	11 (2.0)	461 (26.6)
Lebanon	4 (1.6)	423 (22.4)	9 (2.6)	465 (14.9)	87 (3.1)	442 (3.9)
Lithuania	88 (2.6)	510 (3.2)	10 (2.4)	519 (8.4)	2 (0.9)	~ ~
Malaysia	48 (3.9)	469 (5.5)	24 (3.8)	460 (6.8)	28 (4.1)	464 (8.6)
Malta	4 (0.0)	527 (6.2)	6 (0.1)	550 (3.2)	90 (0.1)	487 (1.1)
Morocco	74 (2.8)	385 (2.6)	10 (2.0)	387 (7.3)	16 (2.1)	383 (5.6)
New Zealand	68 (4.2)	496 (4.0)	29 (4.1)	485 (8.6)	3 (1.7)	449 (36.6)
Norway (9)	77 (3.4)	515 (2.7)	19 (2.8)	504 (3.7)	4 (1.8)	492 (4.5)
Oman	86 (1.9)	398 (2.6)	3 (1.3)	390 (11.7)	11 (1.2)	446 (9.5)
Qatar	51 (0.7)	393 (3.5)	9 (0.3)	478 (6.2)	40 (0.7)	485 (5.0)
Russian Federation	80 (2.6)	538 (4.6)	15 (2.4)	546 (7.5)	5 (1.7)	522 (34.5)
Saudi Arabia	93 (2.4)	369 (4.9)	3 (1.3)	359 (19.0)	4 (2.0)	353 (8.9)
Singapore	0 (0.0)	~ ~	0 (0.0)	~ ~	100 (0.0)	621 (3.2)
Slovenia	71 (3.6)	519 (2.8)	27 (3.6)	514 (4.5)	2 (1.0)	~ ~
South Africa (9)	12 (2.3)	421 (14.5)	8 (1.7)	448 (17.7)	80 (2.7)	361 (5.5)
Sweden	47 (4.4)	509 (4.3)	43 (4.5)	499 (3.9)	10 (2.4)	469 (11.7)
Thailand	86 (2.8)	436 (5.2)	7 (2.2)	391 (12.7)	7 (1.8)	411 (14.9)
Turkey	80 (2.5)	470 (5.1)	7 (1.6)	447 (17.0)	12 (2.1)	383 (11.1)
United Arab Emirates	48 (1.2)	426 (3.3)	5 (0.9)	522 (8.7)	47 (1.4)	495 (3.7)
United States	58 (2.8)	533 (3.8)	28 (2.8)	503 (5.8)	14 (2.5)	493 (8.9)
<b>International Avg.</b>	<b>64 (0.4)</b>	<b>478 (1.0)</b>	<b>14 (0.4)</b>	<b>483 (1.9)</b>	<b>22 (0.3)</b>	<b>475 (2.6)</b>

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	95 (2.6)	400 (5.8)	4 (2.2)	364 (17.5)	1 (1.3)	~ ~
Ontario, Canada	37 (3.9)	520 (4.3)	45 (4.5)	519 (4.3)	18 (3.4)	526 (8.4)
Quebec, Canada	49 (5.5)	551 (3.4)	32 (4.9)	550 (8.7)	19 (5.3)	539 (9.6)
Norway (8)	75 (3.5)	491 (2.3)	21 (3.0)	484 (4.1)	4 (1.8)	459 (10.5)
Abu Dhabi, UAE	59 (2.8)	414 (6.0)	4 (1.6)	523 (27.7)	37 (3.2)	469 (8.3)
Dubai, UAE	24 (0.3)	465 (3.0)	7 (0.2)	551 (8.3)	69 (0.4)	526 (2.7)
Florida, US	31 (8.2)	529 (7.3)	45 (8.4)	481 (12.9)	24 (7.9)	491 (21.7)

( ) Standard errors appear in parentheses. Because of rounding some results 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 5.7: Instruction Affected by Mathematics Resource Shortages – Principals' Reports**

*Reported by Principals*

Students were scored according to their principals' responses concerning thirteen school and classroom resources on the *Mathematics Resource Shortages* scale. Students in schools where instruction was **Not Affected** by resource shortages had a score on the scale of at least 11.1, which corresponds to their principals reporting that shortages affected instruction "not at all" for seven of the thirteen resources and "a little" for the other six, on average. Students in schools where instruction was **Affected A Lot** had a score no higher than 7.5, which corresponds to their principals reporting that shortages affected instruction "a lot" for seven of the thirteen resources and "some" for the other six, on average. All other students attended schools where instruction was **Affected** by resource shortages.

Country	Not Affected		Affected		Affected A Lot		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Singapore	74 (0.0)	623 (3.9)	20 (0.0)	613 (8.2)	6 (0.0)	622 (12.6)	12.0 (0.00)	0.2 (0.00) ▲
Korea, Rep. of	62 (3.8)	605 (3.3)	37 (3.9)	607 (4.0)	1 (0.7)	~ ~	11.6 (0.15)	0.1 (0.23)
Slovenia	56 (4.6)	517 (2.9)	44 (4.6)	516 (3.9)	0 (0.0)	~ ~	11.5 (0.12)	-0.4 (0.18)
Malta	55 (0.2)	501 (1.3)	45 (0.2)	482 (1.5)	0 (0.0)	~ ~	11.4 (0.00)	◊ ◊
Australia	51 (3.5)	520 (3.3)	48 (3.4)	493 (5.2)	1 (0.7)	~ ~	11.3 (0.11)	0.1 (0.19)
England	r 48 (4.6)	539 (6.2)	52 (4.6)	515 (6.9)	0 (0.0)	~ ~	11.3 (0.14)	r 0.0 (0.21)
Norway (9)	47 (4.1)	516 (3.8)	53 (4.1)	508 (2.5)	0 (0.0)	~ ~	11.1 (0.11)	◊ ◊
Japan	46 (3.3)	593 (4.2)	53 (3.4)	580 (3.1)	1 (0.6)	~ ~	10.9 (0.10)	0.0 (0.17)
Hong Kong SAR	46 (4.2)	600 (7.3)	51 (4.3)	586 (6.8)	3 (1.6)	582 (14.1)	10.9 (0.16)	0.0 (0.25)
Qatar	45 (0.4)	455 (3.1)	34 (0.4)	421 (4.0)	20 (0.4)	424 (8.5)	10.3 (0.03)	1.2 (0.06) ▲
Canada	45 (3.4)	538 (3.0)	54 (3.4)	519 (3.1)	0 (0.3)	~ ~	11.2 (0.11)	◊ ◊
Sweden	41 (4.1)	501 (4.3)	58 (4.0)	500 (4.0)	1 (0.9)	~ ~	10.9 (0.10)	r 0.0 (0.16)
New Zealand	39 (5.0)	500 (6.0)	61 (5.0)	486 (4.1)	0 (0.0)	~ ~	10.9 (0.15)	-0.4 (0.22)
United States	37 (3.1)	532 (5.9)	61 (3.1)	512 (3.7)	3 (0.9)	494 (9.0)	10.8 (0.12)	-0.2 (0.16)
Kazakhstan	32 (4.0)	524 (9.7)	63 (3.8)	533 (6.8)	5 (1.7)	498 (28.3)	10.2 (0.18)	0.1 (0.27)
United Arab Emirates	31 (2.2)	508 (4.8)	53 (2.3)	441 (3.9)	16 (1.7)	456 (7.2)	9.9 (0.12)	0.2 (0.15)
Georgia	29 (3.3)	449 (5.9)	70 (3.3)	454 (4.5)	1 (0.8)	~ ~	10.5 (0.10)	0.3 (0.15)
Chinese Taipei	29 (3.5)	613 (6.6)	71 (3.5)	594 (3.3)	1 (0.5)	~ ~	10.6 (0.11)	0.1 (0.20)
Chile	27 (3.5)	453 (6.7)	70 (3.8)	419 (4.9)	3 (1.6)	413 (19.4)	10.2 (0.13)	0.4 (0.18)
Ireland	27 (3.5)	526 (7.3)	71 (3.8)	522 (3.3)	2 (1.5)	~ ~	10.4 (0.12)	◊ ◊
Lithuania	23 (3.9)	519 (8.0)	74 (3.8)	509 (3.0)	2 (1.5)	~ ~	10.2 (0.13)	0.0 (0.17)
Russian Federation	19 (2.8)	550 (8.9)	80 (2.9)	536 (5.1)	1 (0.5)	~ ~	10.2 (0.09)	0.0 (0.16)
Hungary	17 (3.5)	526 (13.9)	80 (3.7)	510 (4.0)	2 (1.3)	~ ~	9.8 (0.11)	-0.7 (0.18) ▼
Kuwait	16 (3.4)	443 (22.9)	63 (3.2)	380 (4.4)	21 (3.6)	388 (9.4)	9.1 (0.20)	◊ ◊
Israel	16 (2.7)	559 (8.9)	76 (3.2)	508 (4.8)	8 (1.9)	431 (18.4)	9.6 (0.11)	-0.3 (0.21)
Bahrain	16 (0.2)	497 (3.8)	63 (0.3)	444 (1.8)	21 (0.2)	456 (3.3)	9.2 (0.01)	-0.3 (0.01) ▼
Oman	15 (2.1)	426 (7.3)	77 (2.6)	395 (2.8)	8 (1.5)	422 (10.2)	9.4 (0.10)	0.4 (0.13) ▲
Lebanon	14 (2.8)	479 (9.2)	78 (3.0)	436 (4.4)	8 (1.5)	443 (9.3)	9.6 (0.14)	-0.1 (0.22)
Saudi Arabia	13 (3.6)	365 (17.2)	74 (4.2)	363 (4.7)	13 (2.9)	396 (14.4)	9.1 (0.17)	-0.2 (0.21)
Jordan	7 (1.5)	431 (10.9)	80 (2.9)	376 (3.4)	13 (2.8)	418 (10.9)	9.0 (0.11)	-0.1 (0.16)
South Africa (9)	6 (1.4)	463 (19.1)	87 (2.3)	368 (4.8)	7 (2.1)	346 (8.7)	9.3 (0.09)	0.0 (0.13)
Italy	6 (1.9)	516 (11.2)	93 (2.0)	493 (2.8)	1 (0.8)	~ ~	9.7 (0.07)	-0.3 (0.10) ▼
Iran, Islamic Rep. of	6 (1.6)	511 (25.7)	82 (2.7)	432 (4.3)	12 (2.3)	428 (11.9)	9.1 (0.10)	0.2 (0.13)
Malaysia	6 (2.4)	431 (9.2)	70 (4.2)	465 (4.6)	24 (3.8)	474 (8.5)	8.4 (0.13)	-0.9 (0.20) ▼
Thailand	5 (1.7)	461 (21.2)	81 (2.8)	430 (5.0)	14 (2.7)	429 (15.7)	8.9 (0.12)	0.4 (0.18)
Morocco	3 (0.9)	413 (16.6)	95 (1.2)	383 (2.3)	1 (0.7)	~ ~	9.6 (0.05)	0.0 (0.08)
Turkey	2 (1.0)	~ ~	81 (3.0)	457 (4.7)	17 (3.1)	453 (9.9)	8.4 (0.11)	0.0 (0.14)
Egypt	1 (0.6)	~ ~	91 (2.0)	389 (4.4)	8 (2.0)	431 (14.5)	8.8 (0.07)	◊ ◊
Botswana (9)	1 (0.0)	~ ~	92 (2.4)	390 (2.4)	7 (2.4)	402 (14.8)	8.7 (0.07)	-0.2 (0.10)
International Avg.	27 (0.5)	506 (1.8)	66 (0.5)	476 (0.7)	6 (0.3)	448 (2.9)		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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.

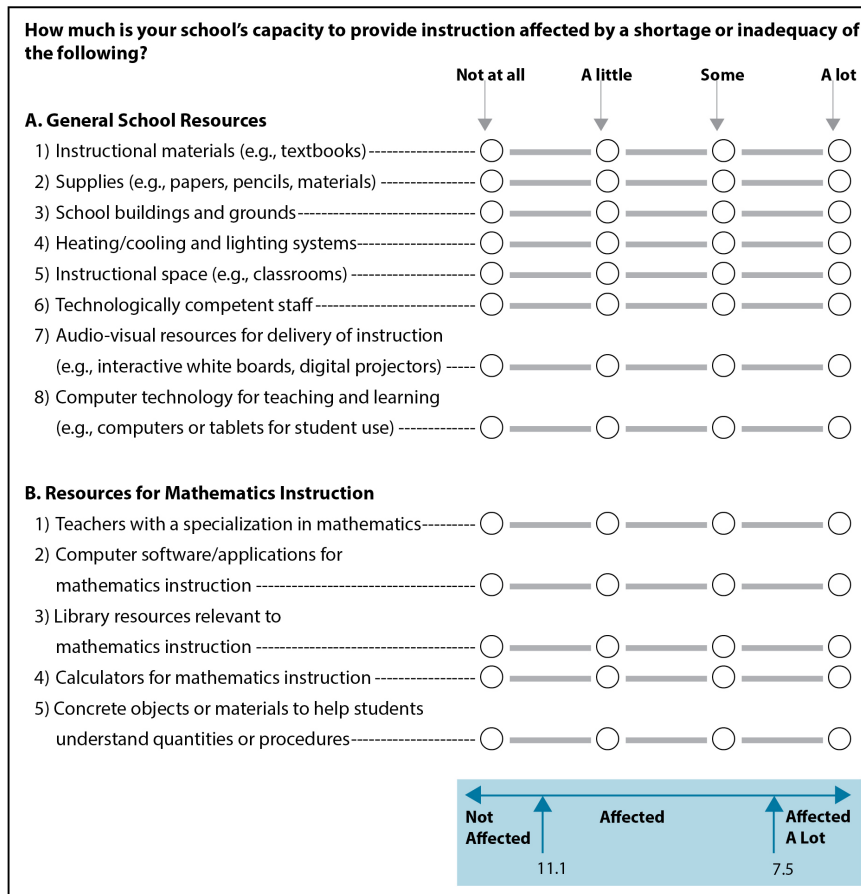


**Exhibit 5.7: Instruction Affected by Mathematics Resource Shortages – Principals' Reports (Continued)**

Country	Not Affected		Affected		Affected A Lot		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Quebec, Canada	78 (4.8)	550 (3.4)	22 (4.8)	544 (8.3)	0 (0.0)	~ ~	12.3 (0.17)	0.4 (0.22)
Dubai, UAE	56 (0.3)	537 (3.1)	30 (0.3)	478 (2.8)	13 (0.2)	497 (7.9)	11.1 (0.02)	0.7 (0.03) ●
Norway (8)	46 (4.0)	490 (3.3)	54 (4.0)	487 (2.9)	0 (0.0)	~ ~	11.1 (0.12)	0.0 (0.16)
Buenos Aires, Argentina	45 (4.7)	433 (5.7)	50 (4.7)	363 (8.4)	5 (2.7)	403 (14.9)	10.7 (0.19)	◇ ◇
Florida, US	31 (8.4)	510 (13.5)	69 (8.4)	492 (12.0)	0 (0.0)	~ ~	10.4 (0.27)	s -1.0 (0.44)
Ontario, Canada	27 (4.7)	531 (5.8)	72 (4.6)	517 (3.5)	1 (0.6)	~ ~	10.6 (0.16)	-0.2 (0.22)
Abu Dhabi, UAE	21 (3.8)	476 (14.0)	66 (4.3)	423 (7.1)	13 (2.9)	457 (13.1)	9.4 (0.22)	0.2 (0.28)

Significantly higher than 2011 ●  
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 5.9: Problems with School Conditions and Resources – Teachers' Reports**

*Reported by Teachers*

Students were scored according to their teachers' responses concerning seven conditions and resources on the *Problems with School Conditions and Resources* scale. Students whose teachers reported **Hardly Any Problems** with their school conditions and resources had a score on the scale of at least 10.9, which corresponds to their teachers reporting "not a problem" for four of seven conditions and resources and "minor problem" for the other three, on average. Students whose teachers reported **Moderate to Severe Problems** had a score no higher than 8.5, which corresponds to their teachers reporting "moderate problem" for four of seven conditions and resources and "minor problem" for the other three, on average. All other students had teachers that reported **Minor Problems** with their school conditions and resources.

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	69 (3.5)	429 (4.1)	23 (2.5)	457 (9.2)	8 (2.8)	438 (8.1)	11.7 (0.16)
United Arab Emirates	56 (2.6)	478 (3.6)	37 (2.4)	452 (5.1)	7 (1.3)	441 (8.7)	11.2 (0.10)
Bahrain	52 (3.1)	460 (2.9)	40 (3.2)	451 (3.0)	7 (1.8)	431 (8.5)	11.0 (0.10)
Singapore	50 (2.9)	621 (5.1)	44 (2.9)	621 (5.1)	5 (1.1)	598 (16.1)	10.9 (0.10)
Australia	50 (3.3)	519 (3.8)	44 (3.5)	496 (4.9)	6 (1.4)	500 (13.9)	10.9 (0.10)
England	49 (4.6)	523 (8.3)	44 (4.3)	514 (8.3)	7 (2.0)	498 (21.8)	10.8 (0.15)
United States	49 (2.8)	522 (4.5)	41 (2.3)	514 (4.7)	10 (2.1)	517 (9.4)	10.7 (0.12)
Chile	48 (3.8)	442 (5.5)	38 (3.5)	424 (8.1)	14 (2.8)	402 (7.2)	10.6 (0.17)
Ireland	45 (3.6)	527 (4.4)	42 (3.4)	519 (5.0)	12 (2.3)	521 (6.8)	10.6 (0.14)
Canada	45 (3.2)	535 (3.3)	46 (3.2)	525 (3.8)	9 (1.7)	534 (5.8)	10.6 (0.11)
Lebanon	45 (4.6)	451 (5.8)	37 (4.1)	438 (6.1)	19 (3.2)	426 (11.9)	10.4 (0.18)
Slovenia	45 (3.2)	518 (2.8)	43 (3.2)	515 (3.9)	13 (2.2)	514 (5.4)	10.7 (0.14)
New Zealand	41 (3.7)	497 (7.3)	49 (3.8)	495 (4.7)	10 (1.5)	470 (13.8)	10.5 (0.10)
Kuwait	40 (3.9)	394 (8.8)	37 (3.7)	393 (9.4)	23 (3.2)	386 (6.6)	10.2 (0.16)
Kazakhstan	40 (4.0)	533 (7.5)	37 (3.9)	534 (8.5)	23 (3.1)	507 (12.9)	10.3 (0.17)
Malta	39 (0.1)	502 (1.7)	48 (0.1)	493 (1.5)	13 (0.1)	475 (3.2)	10.5 (0.00)
Hong Kong SAR	39 (4.6)	597 (9.5)	52 (4.8)	595 (6.7)	9 (2.4)	569 (16.6)	10.7 (0.15)
Chinese Taipei	38 (3.7)	615 (5.1)	51 (4.1)	591 (4.1)	11 (2.5)	585 (9.2)	10.4 (0.12)
Oman	37 (3.3)	407 (5.5)	47 (3.5)	404 (3.6)	16 (2.4)	393 (6.8)	10.5 (0.15)
Russian Federation	34 (3.7)	544 (6.3)	50 (3.5)	537 (5.7)	16 (2.5)	530 (11.5)	10.1 (0.11)
Korea, Rep. of	33 (3.4)	612 (4.4)	51 (3.4)	603 (4.1)	16 (2.6)	603 (7.8)	10.3 (0.14)
Lithuania	30 (4.0)	515 (6.8)	59 (4.6)	511 (3.9)	10 (2.4)	495 (9.4)	10.2 (0.14)
Israel	29 (2.7)	509 (8.3)	46 (2.5)	519 (6.9)	25 (2.2)	497 (7.8)	9.8 (0.12)
Norway (9)	29 (3.2)	518 (5.0)	53 (3.9)	512 (2.7)	18 (3.2)	506 (3.2)	10.1 (0.12)
Iran, Islamic Rep. of	28 (3.4)	466 (10.1)	41 (3.5)	437 (7.3)	30 (2.9)	408 (5.8)	9.6 (0.13)
Thailand	27 (3.4)	438 (9.6)	59 (4.0)	433 (6.6)	14 (2.6)	414 (11.7)	10.0 (0.13)
Sweden	26 (3.8)	498 (6.2)	53 (4.4)	505 (4.1)	22 (3.3)	493 (6.0)	9.8 (0.14)
Jordan	25 (2.9)	412 (7.4)	37 (3.5)	385 (3.8)	38 (3.3)	369 (5.4)	9.4 (0.13)
Hungary	22 (3.2)	517 (12.1)	49 (3.7)	508 (6.1)	28 (3.4)	523 (6.9)	9.7 (0.13)
Georgia	22 (3.6)	463 (6.3)	44 (4.3)	452 (5.0)	34 (3.6)	448 (7.5)	9.5 (0.14)
Saudi Arabia	20 (3.6)	386 (8.5)	41 (4.3)	367 (6.9)	39 (4.6)	357 (6.6)	9.3 (0.19)
South Africa (9)	18 (3.1)	444 (11.4)	29 (3.4)	384 (9.0)	53 (3.9)	342 (3.3)	8.6 (0.18)
Italy	17 (3.0)	486 (8.3)	51 (4.1)	501 (4.1)	32 (3.5)	485 (5.5)	9.4 (0.12)
Japan	17 (2.6)	587 (6.0)	60 (3.5)	586 (3.4)	22 (2.9)	588 (5.1)	9.5 (0.10)
Turkey	16 (2.6)	481 (12.9)	36 (3.4)	461 (7.1)	48 (3.7)	447 (6.6)	8.8 (0.15)
Egypt	15 (2.3)	417 (6.5)	39 (3.5)	392 (7.5)	46 (3.4)	383 (5.8)	8.8 (0.11)
Malaysia	13 (2.9)	477 (13.9)	52 (4.4)	466 (5.6)	34 (4.3)	461 (6.7)	9.1 (0.14)
Morocco	12 (2.0)	405 (6.0)	41 (3.1)	387 (3.8)	47 (3.0)	377 (3.4)	8.9 (0.09)
Botswana (9)	2 (1.1)	~ ~	20 (3.2)	402 (5.9)	77 (3.4)	387 (2.5)	7.6 (0.11)
International Avg.	34 (0.5)	493 (1.2)	44 (0.6)	481 (0.9)	22 (0.5)	470 (1.5)	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

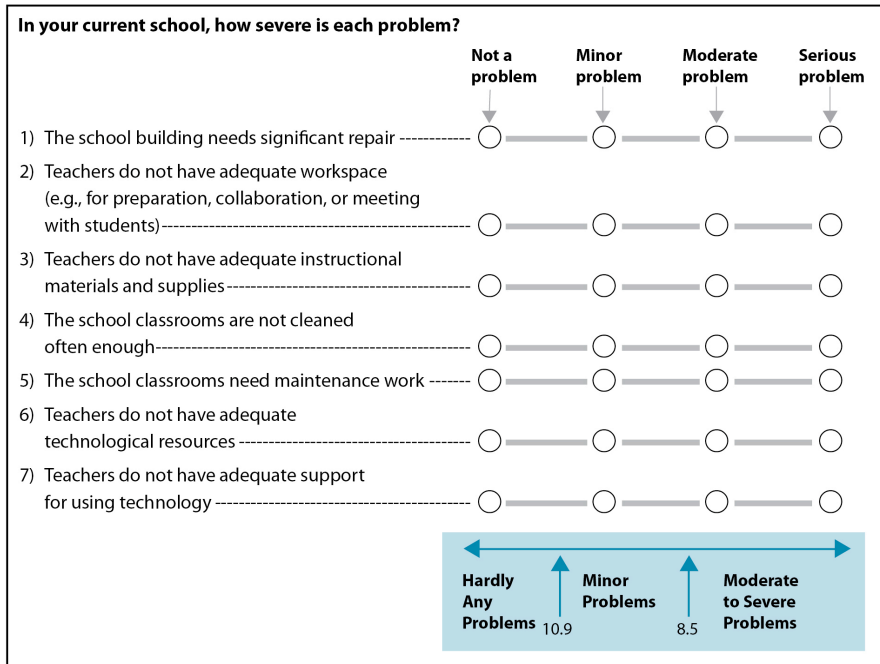
A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 5.9: Problems with School Conditions and Resources – Teachers' Reports (Continued)**

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Dubai, UAE	68 (2.1)	526 (3.3)	29 (2.1)	488 (5.1)	2 (0.5)	~ ~	11.8 (0.09)
Abu Dhabi, UAE	50 (4.7)	447 (8.8)	42 (4.8)	435 (12.2)	9 (2.6)	447 (16.9)	10.9 (0.18)
Quebec, Canada	50 (5.3)	554 (4.8)	40 (5.0)	545 (7.0)	11 (2.5)	545 (9.2)	11.0 (0.21)
Florida, US	45 (7.7)	512 (10.7)	47 (8.1)	498 (12.5)	8 (3.4)	455 (13.5)	10.7 (0.27)
Ontario, Canada	41 (4.5)	528 (3.9)	49 (4.3)	520 (5.0)	10 (2.6)	528 (7.0)	10.4 (0.15)
Norway (8)	34 (4.1)	488 (3.9)	53 (4.0)	488 (2.3)	13 (2.7)	481 (6.5)	10.2 (0.14)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015







# CHAPTER 6: SCHOOL CLIMATE

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

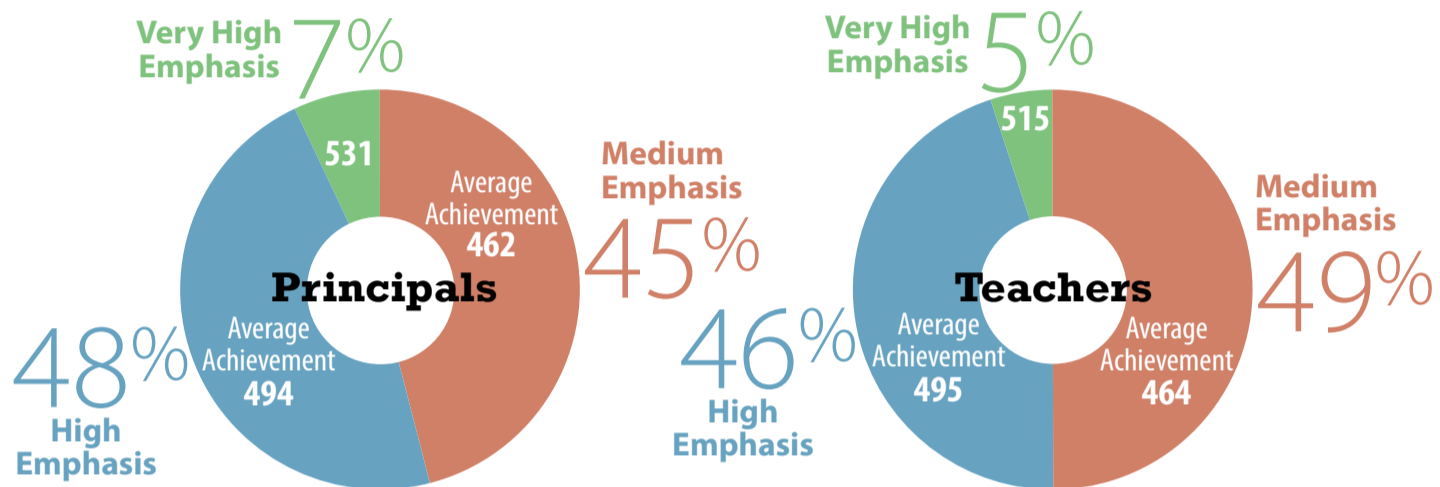
**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



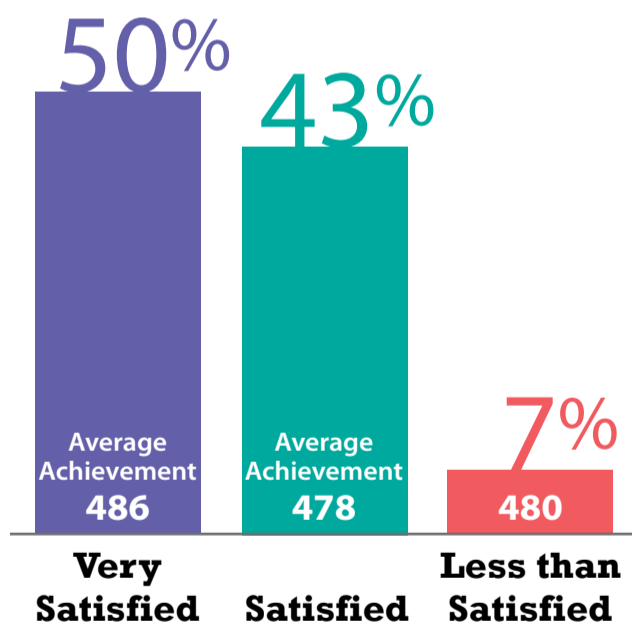
## Schools Have Positive Environments

Generally, eighth grade students were in positive school environments, according to their principals, teachers, and the students themselves.

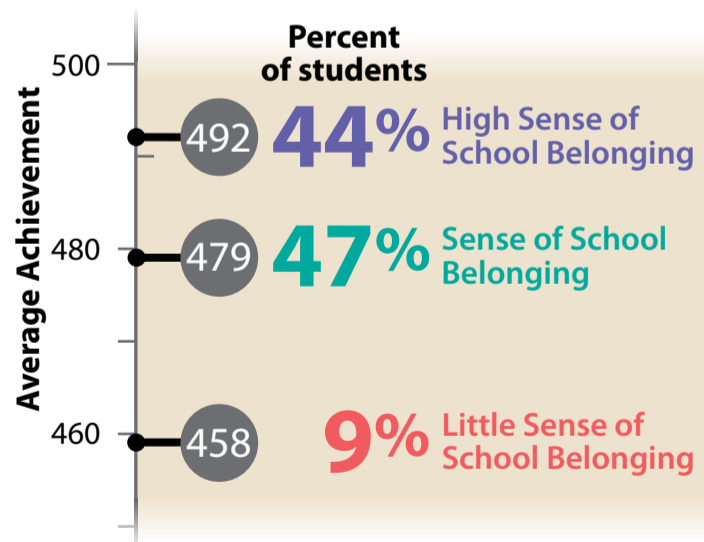
**PRINCIPALS and TEACHERS agree that the schools emphasize academic success.**



**TEACHERS of eighth grade mathematics reported a high degree of job satisfaction.**



**EIGHTH GRADE STUDENTS were positive about their schools, evenly divided between having a high sense and a sense of school belonging. A higher sense of school belonging was related to higher average mathematics achievement.**



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>





**Exhibit 6.3: School Emphasis on Academic Success – Principals’ Reports**

Reported by Principals

Students were scored according to their principals’ responses characterizing thirteen aspects on the *School Emphasis on Academic Success* scale. Students in schools where their principals reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.1, which corresponds to their principals characterizing seven of the thirteen aspects as “very high” and the other six as “high,” on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.6, which corresponds to their principals characterizing seven of the thirteen aspects as “medium” and the other six as “high,” on average. All other students attended schools with a **High Emphasis** on academic success.

SOURCE: IEA’s Trends in International Mathematics and Science Study – TIMSS 2015

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
England	26 (3.7)	574 (10.5)	53 (4.8)	521 (6.5)	22 (3.5)	485 (10.3)	11.6 (0.17)
Qatar	25 (0.4)	473 (5.3)	57 (0.5)	433 (3.6)	19 (0.4)	403 (5.4)	11.7 (0.02)
United Arab Emirates	19 (1.7)	520 (5.6)	59 (2.2)	466 (2.9)	22 (1.5)	406 (4.7)	11.2 (0.07)
Korea, Rep. of	17 (3.5)	622 (7.0)	65 (4.3)	607 (3.2)	18 (3.4)	585 (4.2)	11.2 (0.17)
Ireland	15 (2.9)	549 (6.8)	65 (4.0)	526 (2.9)	21 (3.1)	495 (8.1)	11.2 (0.15)
Australia	14 (2.3)	557 (7.4)	42 (3.5)	512 (5.1)	44 (3.0)	486 (4.6)	10.5 (0.11)
Canada	13 (2.1)	556 (6.1)	46 (3.2)	533 (2.9)	41 (3.3)	513 (3.5)	10.6 (0.15)
Bahrain	12 (0.2)	504 (6.0)	52 (0.2)	456 (2.0)	36 (0.2)	435 (2.3)	10.3 (0.01)
Malaysia	10 (2.1)	518 (12.7)	65 (3.6)	465 (4.9)	25 (3.9)	446 (6.9)	11.0 (0.12)
Singapore	10 (0.0)	684 (7.7)	64 (0.0)	626 (4.5)	26 (0.0)	587 (6.0)	10.7 (0.00)
New Zealand	9 (2.8)	523 (14.3)	69 (4.4)	496 (4.5)	22 (3.6)	460 (6.5)	11.0 (0.14)
Kazakhstan	9 (2.6)	538 (20.3)	72 (3.8)	528 (6.7)	19 (3.4)	521 (9.5)	11.0 (0.16)
Malta	8 (0.1)	525 (4.7)	57 (0.1)	506 (1.2)	35 (0.1)	463 (2.0)	10.4 (0.01)
United States	8 (2.0)	564 (10.7)	46 (3.5)	532 (4.3)	46 (3.2)	499 (5.0)	10.0 (0.13)
Chinese Taipei	7 (1.9)	661 (10.0)	46 (3.8)	610 (3.7)	47 (3.5)	579 (4.1)	10.0 (0.13)
Hong Kong SAR	6 (1.2)	629 (12.2)	39 (3.8)	624 (6.3)	56 (3.8)	567 (6.2)	9.7 (0.14)
Sweden	5 (1.9)	531 (9.2)	45 (4.4)	511 (4.1)	50 (4.2)	488 (4.2)	9.9 (0.13)
Saudi Arabia	5 (1.7)	397 (18.5)	43 (4.1)	385 (6.9)	52 (4.2)	352 (4.9)	9.8 (0.15)
Oman	5 (1.3)	425 (17.1)	57 (2.9)	409 (4.0)	38 (2.6)	390 (3.4)	10.2 (0.09)
Kuwait	5 (1.7)	442 (36.4)	53 (4.1)	407 (7.2)	42 (3.9)	369 (5.2)	10.0 (0.13)
Iran, Islamic Rep. of	5 (1.0)	533 (27.1)	43 (3.0)	455 (6.5)	53 (3.2)	412 (4.2)	9.6 (0.12)
Thailand	5 (1.5)	466 (34.6)	61 (4.0)	443 (6.3)	34 (3.8)	406 (5.6)	10.3 (0.14)
Israel	4 (1.6)	586 (17.4)	56 (3.6)	522 (6.0)	39 (3.3)	486 (8.2)	10.2 (0.11)
Turkey	4 (1.3)	600 (13.8)	29 (3.1)	486 (7.9)	67 (3.3)	437 (4.4)	8.9 (0.14)
Lebanon	4 (1.7)	496 (18.7)	53 (4.4)	456 (5.7)	43 (4.0)	422 (5.3)	10.0 (0.13)
Jordan	3 (1.0)	424 (17.4)	40 (3.7)	406 (4.9)	57 (3.7)	369 (4.2)	9.4 (0.12)
Egypt	3 (0.9)	431 (30.8)	33 (3.5)	401 (7.6)	64 (3.6)	385 (4.9)	9.5 (0.11)
Chile	2 (1.1)	~ ~	29 (3.4)	462 (7.6)	69 (3.6)	411 (4.3)	8.7 (0.16)
Japan	2 (1.2)	~ ~	53 (4.0)	600 (3.3)	45 (4.0)	568 (3.2)	9.8 (0.12)
Lithuania	2 (1.1)	~ ~	58 (3.7)	520 (4.0)	40 (3.8)	498 (3.9)	9.9 (0.10)
South Africa (9)	1 (0.5)	~ ~	27 (3.5)	397 (12.5)	72 (3.5)	361 (4.2)	8.7 (0.13)
Georgia	1 (0.6)	~ ~	57 (4.3)	456 (4.8)	42 (4.3)	450 (5.0)	9.9 (0.11)
Slovenia	1 (0.9)	~ ~	38 (4.6)	525 (4.1)	61 (4.5)	511 (2.7)	9.5 (0.11)
Hungary	1 (0.9)	~ ~	64 (3.9)	534 (4.4)	35 (3.9)	472 (7.4)	10.1 (0.10)
Norway (9)	1 (0.8)	~ ~	52 (4.1)	521 (3.3)	47 (4.0)	500 (2.6)	9.9 (0.12)
Botswana (9)	1 (0.0)	~ ~	12 (2.7)	429 (7.7)	88 (2.7)	385 (2.2)	7.7 (0.13)
Italy	1 (0.7)	~ ~	29 (3.6)	500 (5.4)	71 (3.7)	491 (3.3)	9.0 (0.12)
Morocco	0 (0.2)	~ ~	12 (1.8)	426 (10.2)	88 (1.8)	379 (2.3)	7.8 (0.10)
Russian Federation	0 (0.0)	~ ~	27 (3.1)	554 (6.0)	73 (3.1)	532 (5.8)	9.1 (0.08)
International Avg.	7 (0.3)	531 (3.2)	48 (0.6)	494 (0.9)	45 (0.5)	462 (0.8)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

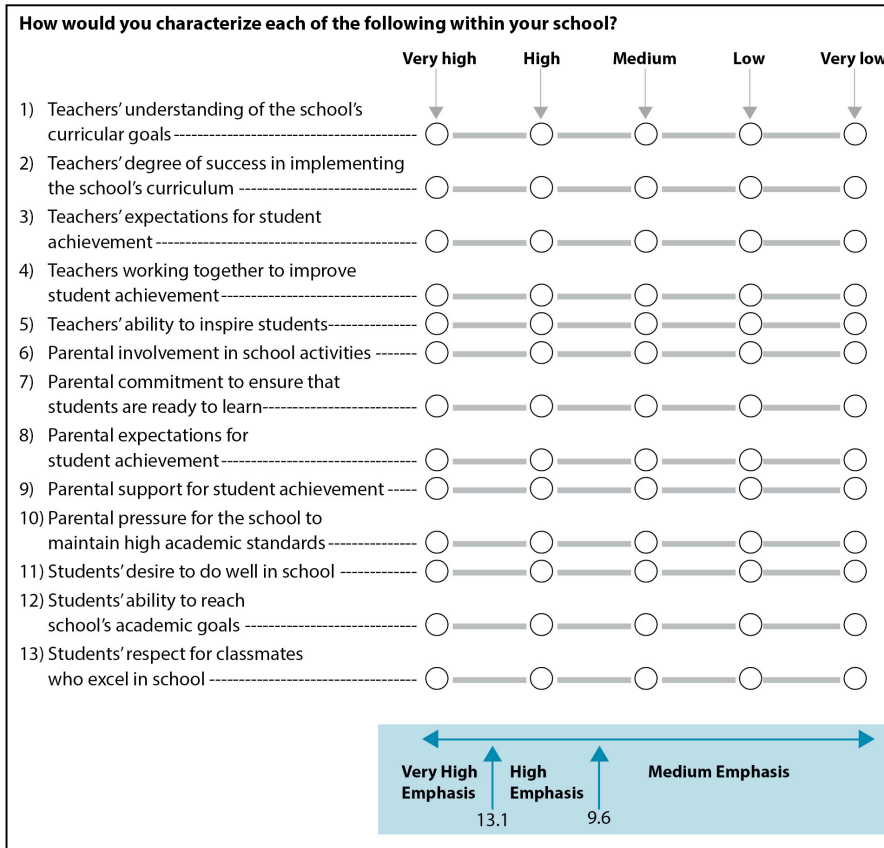
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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 6.3: School Emphasis on Academic Success – Principals’ Reports  
(Continued)**

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Dubai, UAE	42 (0.3)	540 (4.3)	48 (0.4)	506 (2.2)	10 (0.2)	437 (6.5)	12.5 (0.02)
Quebec, Canada	27 (4.2)	569 (5.1)	54 (5.6)	543 (4.3)	18 (4.4)	534 (8.9)	11.8 (0.23)
Florida, US	12 (6.0)	546 (23.8)	35 (9.7)	520 (13.9)	53 (8.8)	475 (13.0)	10.4 (0.44)
Abu Dhabi, UAE	8 (2.5)	484 (24.6)	58 (3.9)	456 (5.3)	34 (3.6)	398 (7.0)	10.4 (0.15)
Ontario, Canada	6 (2.2)	540 (4.5)	42 (4.1)	530 (3.6)	52 (4.2)	511 (4.1)	10.0 (0.19)
Norway (8)	1 (0.8)	~ ~	52 (4.0)	497 (2.8)	47 (3.9)	477 (2.4)	9.9 (0.12)
Buenos Aires, Argentina	1 (0.7)	~ ~	26 (4.5)	444 (10.2)	74 (4.6)	379 (6.4)	8.9 (0.16)



SOURCE: IEA’s Trends in International Mathematics and Science Study – TIMSS 2015

Exhibit 6.5: School Emphasis on Academic Success – Teachers' Reports

Reported by Teachers

Students were scored according to their teachers' responses characterizing fourteen aspects on the *School Emphasis on Academic Success* scale. Students in schools where their teachers reported a **Very High Emphasis** on academic success had a score on the scale of at least 13.4, which corresponds to their teachers characterizing seven of the fourteen aspects as "very high" and the other seven as "high," on average. Students in schools with a **Medium Emphasis** on academic success had a score no higher than 9.8, which corresponds to their teachers characterizing seven of the fourteen aspects as "medium" and the other seven as "high," on average. All other students attended schools with a **High Emphasis** on academic success.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Qatar	18 (3.2)	472 (10.0)	58 (3.7)	444 (4.1)	25 (2.2)	395 (6.1)	11.4 (0.12)
Korea, Rep. of	16 (2.8)	620 (5.7)	57 (3.8)	611 (3.6)	27 (3.2)	587 (4.7)	11.2 (0.16)
United Arab Emirates	15 (1.4)	513 (7.4)	61 (2.4)	468 (3.7)	25 (2.2)	431 (7.3)	11.2 (0.09)
Ireland	12 (1.9)	538 (8.1)	61 (3.0)	535 (3.2)	27 (2.5)	490 (6.4)	11.0 (0.12)
Canada	11 (2.1)	551 (5.3)	55 (3.1)	535 (2.8)	34 (2.6)	516 (4.5)	10.7 (0.12)
Kazakhstan	10 (2.4)	566 (12.4)	71 (3.3)	528 (6.4)	18 (2.9)	507 (10.2)	11.3 (0.15)
Malaysia	10 (2.0)	504 (16.5)	69 (3.6)	467 (5.2)	21 (3.2)	448 (9.7)	11.1 (0.10)
England	9 (2.4)	568 (15.2)	54 (4.0)	528 (6.6)	37 (3.5)	487 (7.7)	10.5 (0.15)
Lebanon	9 (2.5)	463 (12.7)	33 (3.5)	460 (5.7)	58 (3.8)	429 (5.3)	9.8 (0.16)
Oman	9 (1.9)	423 (10.7)	46 (3.0)	413 (3.7)	45 (2.7)	389 (3.7)	10.3 (0.12)
Australia	8 (1.7)	543 (10.5)	48 (3.1)	523 (4.2)	44 (2.9)	484 (4.0)	10.2 (0.15)
South Africa (9)	7 (1.7)	407 (16.2)	37 (3.1)	389 (9.5)	56 (3.3)	358 (4.9)	9.7 (0.15)
Kuwait	6 (2.7)	488 (30.1)	45 (4.7)	394 (5.5)	49 (3.9)	377 (6.0)	10.0 (0.14)
United States	6 (1.2)	558 (11.2)	39 (2.9)	537 (4.8)	55 (3.0)	501 (4.0)	9.8 (0.13)
Thailand	6 (1.1)	455 (34.8)	52 (3.3)	445 (6.8)	43 (3.3)	411 (5.9)	10.2 (0.13)
Iran, Islamic Rep. of	6 (1.6)	513 (19.3)	42 (3.3)	454 (6.9)	53 (3.2)	415 (4.8)	9.7 (0.14)
Malta	5 (0.1)	531 (3.9)	55 (0.1)	503 (1.5)	40 (0.1)	477 (1.7)	10.3 (0.01)
Bahrain	5 (0.7)	495 (19.4)	54 (3.3)	466 (2.8)	41 (3.3)	434 (2.9)	10.3 (0.11)
New Zealand	4 (1.2)	531 (15.0)	59 (2.7)	500 (5.5)	37 (2.6)	478 (5.3)	10.5 (0.10)
Israel	4 (0.9)	533 (10.5)	58 (2.8)	533 (5.6)	38 (2.8)	473 (7.8)	10.4 (0.10)
Singapore	4 (1.1)	643 (22.9)	49 (2.8)	639 (4.9)	47 (2.6)	598 (5.4)	10.1 (0.08)
Turkey	4 (1.3)	547 (24.7)	28 (3.3)	481 (8.1)	68 (3.4)	443 (5.2)	9.2 (0.12)
Lithuania	3 (1.9)	548 (12.8)	58 (4.3)	520 (4.3)	39 (4.0)	493 (4.3)	10.3 (0.11)
Georgia	3 (1.3)	446 (33.5)	57 (4.3)	463 (4.5)	40 (4.3)	440 (5.6)	10.3 (0.12)
Chile	3 (1.3)	495 (14.1)	35 (4.2)	450 (7.4)	62 (4.3)	415 (4.8)	9.2 (0.18)
Egypt	3 (1.2)	443 (32.8)	39 (3.5)	404 (6.6)	59 (3.6)	381 (5.5)	9.6 (0.14)
Chinese Taipei	2 (1.2)	~ ~	45 (3.7)	620 (4.2)	53 (3.5)	579 (3.8)	9.9 (0.13)
Saudi Arabia	2 (0.7)	~ ~	38 (4.4)	372 (7.7)	60 (4.5)	359 (4.7)	9.6 (0.17)
Morocco	2 (0.8)	~ ~	8 (1.5)	411 (8.7)	90 (1.7)	381 (2.3)	7.7 (0.12)
Botswana (9)	1 (0.7)	~ ~	17 (3.5)	419 (6.5)	82 (3.5)	384 (2.4)	8.6 (0.14)
Italy	1 (0.7)	~ ~	32 (3.5)	500 (5.5)	67 (3.6)	492 (2.9)	9.1 (0.11)
Hong Kong SAR	1 (0.8)	~ ~	40 (3.9)	626 (5.6)	59 (3.9)	572 (5.8)	9.5 (0.13)
Jordan	1 (0.9)	~ ~	36 (3.5)	402 (6.4)	63 (3.6)	376 (4.3)	9.4 (0.13)
Norway (9)	1 (0.9)	~ ~	50 (3.4)	520 (3.3)	49 (3.5)	505 (2.8)	9.9 (0.09)
Hungary	1 (0.8)	~ ~	36 (3.4)	550 (5.4)	63 (3.3)	492 (4.4)	9.4 (0.12)
Japan	1 (0.7)	~ ~	46 (3.5)	601 (2.9)	53 (3.5)	574 (3.4)	9.6 (0.11)
Slovenia	1 (0.2)	~ ~	42 (3.4)	519 (4.1)	58 (3.4)	514 (2.5)	9.7 (0.08)
Russian Federation	0 (0.4)	~ ~	35 (3.7)	552 (6.9)	64 (3.8)	529 (5.0)	9.5 (0.09)
Sweden	0 (0.3)	~ ~	42 (3.8)	513 (4.5)	58 (3.8)	491 (3.9)	9.6 (0.10)
International Avg.	5 (0.2)	515 (3.6)	46 (0.5)	495 (0.9)	49 (0.5)	464 (0.8)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

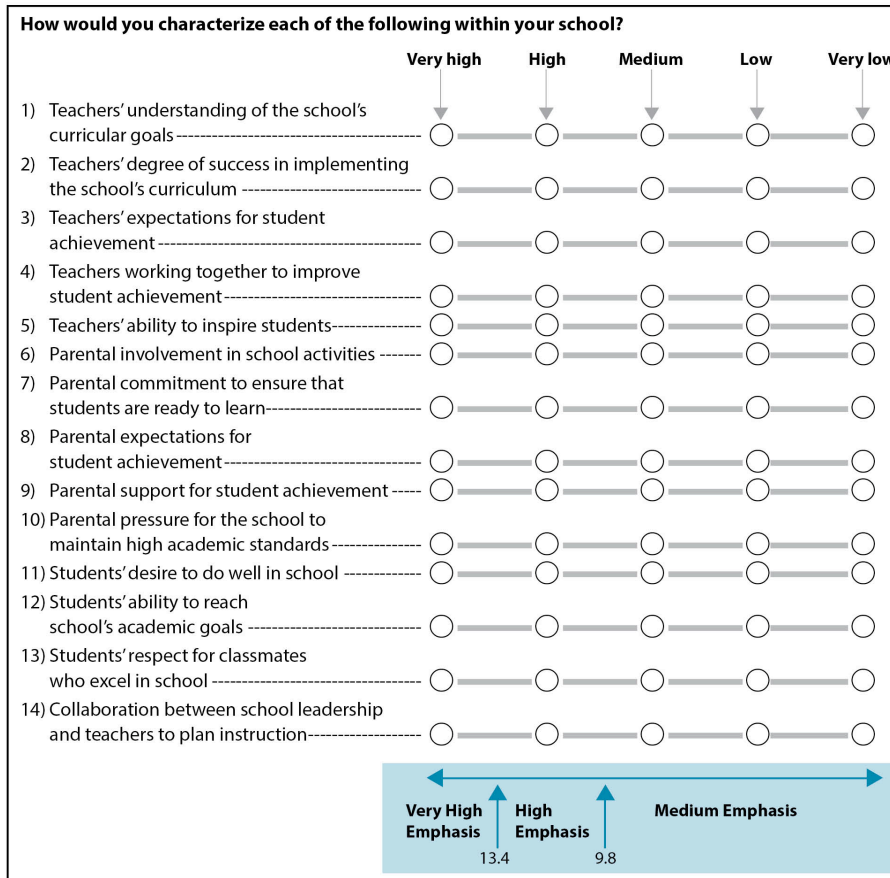
A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 6.5: School Emphasis on Academic Success – Teachers' Reports (Continued)**

Country	Very High Emphasis		High Emphasis		Medium Emphasis		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Dubai, UAE	30 (3.1)	547 (6.6)	57 (3.3)	508 (4.1)	13 (1.4)	457 (7.2)	12.1 (0.11)
Quebec, Canada	27 (4.6)	551 (6.4)	52 (5.7)	554 (5.0)	22 (4.2)	537 (8.4)	11.8 (0.25)
Abu Dhabi, UAE	5 (1.7)	454 (30.0)	59 (5.0)	451 (8.6)	36 (5.0)	423 (12.7)	10.5 (0.16)
Ontario, Canada	4 (2.4)	553 (8.0)	55 (4.1)	531 (3.4)	41 (3.8)	512 (4.7)	10.2 (0.14)
Florida, US	4 (1.9)	595 (39.1)	33 (6.5)	530 (14.9)	63 (6.7)	484 (8.4)	9.4 (0.30)
Norway (8)	2 (1.0)	~ ~	51 (3.7)	494 (3.2)	47 (3.6)	479 (2.6)	10.0 (0.10)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 6.7: Teacher Job Satisfaction**

Reported by Teachers

Students were scored according to how often their teachers responded positively to the seven statements on the *Teacher Job Satisfaction* scale. Students with **Very Satisfied** teachers had a score on the scale of at least 10.3, which corresponds to their teachers responding "very often" to four of the seven statements and responding "often" to the other three, on average. Students with **Less than Satisfied** teachers had a score no higher than 7.0, which corresponds to their teachers responding "sometimes" to four of the seven statements and "often" to the other three, on average. All other students had **Satisfied** teachers.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Country	Very Satisfied		Satisfied		Less than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Egypt	80 (3.4)	396 (4.5)	16 (3.0)	377 (10.4)	4 (1.4)	381 (24.1)	11.2 (0.13)
Qatar	74 (3.3)	437 (4.1)	23 (3.5)	428 (8.3)	3 (1.1)	518 (37.6)	11.2 (0.12)
Kuwait	69 (4.0)	393 (6.1)	29 (4.0)	392 (10.4)	1 (0.8)	~ ~	10.8 (0.13)
Chile	66 (4.1)	435 (4.8)	33 (4.0)	422 (6.3)	1 (0.8)	~ ~	10.7 (0.15)
Israel	66 (2.6)	514 (6.0)	31 (2.5)	505 (8.3)	3 (0.7)	493 (14.2)	10.8 (0.10)
Thailand	66 (3.5)	435 (5.9)	33 (3.4)	425 (7.2)	1 (0.9)	~ ~	10.7 (0.12)
United Arab Emirates	64 (2.6)	463 (3.6)	31 (2.5)	473 (6.0)	5 (1.0)	458 (13.2)	10.7 (0.10)
Lebanon	63 (4.2)	447 (4.8)	33 (4.2)	430 (7.2)	4 (1.6)	472 (19.2)	10.6 (0.13)
Georgia	62 (4.4)	458 (4.3)	37 (4.3)	447 (6.1)	2 (1.1)	~ ~	10.5 (0.15)
Bahrain	61 (3.3)	457 (2.8)	34 (3.5)	448 (4.8)	5 (1.7)	466 (15.7)	10.5 (0.12)
Oman	61 (3.3)	407 (3.7)	33 (3.2)	397 (4.9)	6 (1.7)	395 (8.1)	10.4 (0.12)
Kazakhstan	59 (4.1)	532 (6.7)	40 (4.1)	523 (8.4)	1 (0.4)	~ ~	10.6 (0.11)
Iran, Islamic Rep. of	58 (3.5)	437 (5.7)	36 (3.7)	440 (8.1)	6 (1.6)	409 (10.4)	10.4 (0.11)
Ireland	58 (2.9)	532 (4.1)	36 (2.5)	514 (5.0)	6 (1.4)	498 (12.8)	10.4 (0.12)
Canada	57 (2.8)	527 (2.5)	38 (2.7)	539 (3.3)	5 (1.1)	500 (13.2)	10.4 (0.10)
Saudi Arabia	56 (4.6)	370 (6.3)	41 (4.5)	363 (6.5)	3 (1.3)	365 (13.5)	10.4 (0.15)
Malaysia	56 (3.8)	465 (5.6)	43 (3.7)	468 (6.8)	1 (0.8)	~ ~	10.4 (0.13)
Jordan	50 (3.8)	389 (5.4)	42 (3.5)	386 (5.5)	8 (2.0)	364 (9.3)	10.0 (0.16)
Australia	50 (3.6)	514 (4.2)	39 (3.4)	504 (5.6)	11 (2.1)	496 (8.1)	9.9 (0.15)
South Africa (9)	48 (3.4)	380 (7.3)	43 (3.4)	363 (6.4)	9 (2.0)	373 (18.0)	9.9 (0.14)
Chinese Taipei	48 (4.0)	608 (4.4)	43 (4.0)	592 (4.7)	9 (2.3)	588 (12.3)	9.8 (0.16)
Norway (9)	47 (3.7)	512 (3.0)	47 (3.8)	512 (3.9)	6 (1.7)	514 (6.9)	10.1 (0.15)
Turkey	46 (3.7)	470 (6.4)	45 (3.9)	449 (7.2)	10 (1.6)	439 (10.8)	9.7 (0.12)
Malta	45 (0.1)	500 (1.5)	44 (0.1)	499 (1.7)	11 (0.1)	452 (3.1)	9.9 (0.01)
United States	44 (2.9)	520 (4.7)	42 (2.9)	516 (4.9)	14 (1.9)	518 (7.1)	9.8 (0.13)
New Zealand	43 (3.4)	494 (5.3)	47 (3.8)	497 (6.2)	10 (1.6)	472 (15.7)	9.7 (0.11)
Morocco	42 (3.4)	393 (3.3)	51 (3.3)	378 (3.0)	7 (1.6)	378 (7.6)	9.7 (0.13)
Slovenia	40 (2.9)	517 (3.2)	55 (2.8)	516 (3.1)	5 (1.3)	521 (8.3)	9.8 (0.10)
Russian Federation	39 (3.6)	548 (5.6)	55 (3.5)	535 (5.9)	6 (1.6)	502 (12.6)	9.7 (0.15)
Korea, Rep. of	38 (3.1)	604 (4.2)	53 (3.7)	606 (4.2)	10 (2.0)	609 (8.0)	9.5 (0.15)
Botswana (9)	36 (4.1)	395 (4.4)	51 (4.5)	388 (3.2)	13 (2.9)	394 (5.9)	9.3 (0.15)
Italy	34 (4.0)	501 (4.4)	56 (4.1)	487 (3.7)	10 (2.5)	502 (6.4)	9.4 (0.16)
Lithuania	33 (4.0)	522 (6.7)	53 (4.1)	503 (3.7)	13 (3.2)	511 (8.6)	9.3 (0.17)
Sweden	32 (4.1)	497 (5.2)	56 (4.1)	502 (4.0)	11 (3.5)	501 (6.4)	9.3 (0.19)
Hungary	31 (3.4)	528 (6.1)	59 (3.6)	510 (5.5)	10 (2.2)	497 (11.2)	9.3 (0.14)
Hong Kong SAR	31 (4.0)	612 (8.6)	60 (3.8)	587 (6.7)	10 (2.1)	562 (17.2)	9.4 (0.16)
Singapore	31 (2.4)	631 (7.6)	56 (2.8)	616 (4.7)	14 (1.9)	612 (11.1)	9.2 (0.11)
England	29 (4.0)	523 (9.2)	57 (4.5)	517 (7.4)	14 (2.7)	505 (14.2)	9.1 (0.15)
Japan	26 (3.4)	583 (4.6)	58 (3.7)	588 (3.3)	16 (2.9)	585 (6.2)	9.0 (0.16)
International Avg.	50 (0.6)	486 (0.8)	43 (0.6)	478 (1.0)	7 (0.3)	480 (2.4)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

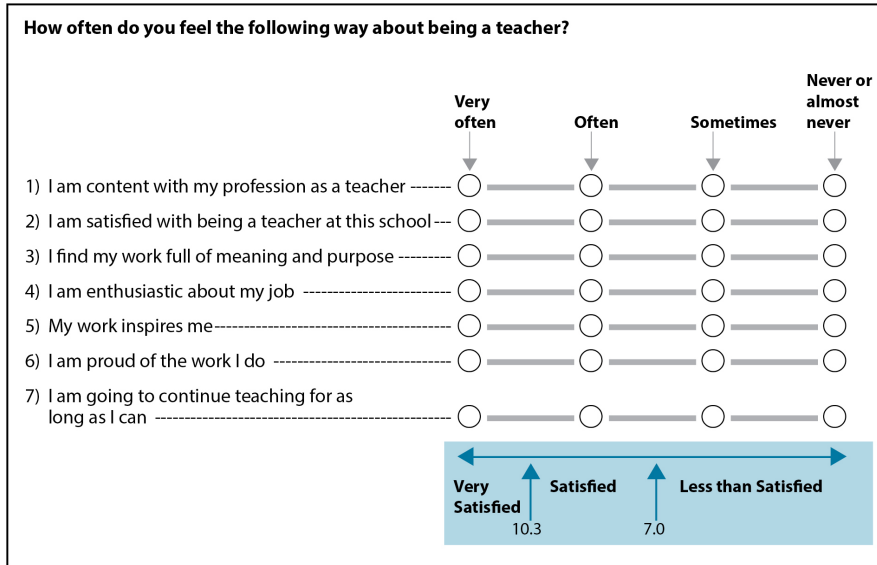
A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 6.7: Teacher Job Satisfaction (Continued)**

Country	Very Satisfied		Satisfied		Less than Satisfied		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Abu Dhabi, UAE	63 (4.7)	440 (8.8)	30 (4.4)	451 (12.9)	7 (2.3)	426 (16.3)	10.5 (0.18)
Ontario, Canada	62 (4.4)	524 (3.3)	32 (4.1)	530 (4.6)	6 (1.5)	494 (16.6)	10.4 (0.16)
Dubai, UAE	61 (2.3)	512 (3.7)	35 (2.4)	516 (4.9)	4 (0.9)	517 (27.7)	10.6 (0.08)
Norway (8)	49 (4.2)	489 (3.1)	47 (4.2)	487 (2.6)	4 (1.2)	466 (14.1)	10.0 (0.15)
Quebec, Canada	47 (4.8)	543 (3.6)	50 (4.7)	556 (5.0)	3 (1.7)	524 (26.5)	10.3 (0.18)
Florida, US	35 (6.4)	506 (14.3)	51 (7.2)	506 (11.3)	14 (4.3)	474 (21.8)	9.3 (0.24)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 6.9: Challenges Facing Teachers**

*Reported by Teachers*

Students were scored according to their teachers' responses concerning eight challenging conditions on the *Challenges Facing Teachers* scale. Students whose teachers faced **Few Challenges** had a score on the scale of at least 10.3, which corresponds to their teachers "disagreeing a little" with four of eight statements and "agreeing a little" with the other four, on average. Students whose teachers faced **Many Challenges** had a score no higher than 6.7, which corresponds to their teachers reporting "agreeing a lot" with four of eight statements and "agreeing a little" with the other four, on average. All other students had teachers that reported facing **Some Challenges**.

Country	Few Challenges		Some Challenges		Many Challenges		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Georgia	84 (3.4)	454 (3.9)	16 (3.4)	452 (8.0)	1 (0.6)	~ ~	11.6 (0.15)
Russian Federation	73 (3.4)	541 (4.6)	27 (3.4)	530 (8.4)	0 (0.0)	~ ~	11.0 (0.11)
Lithuania	72 (4.0)	509 (3.9)	27 (4.0)	515 (5.8)	1 (0.6)	~ ~	11.0 (0.12)
Turkey	72 (3.5)	456 (5.8)	27 (3.4)	462 (9.0)	1 (0.6)	~ ~	11.4 (0.15)
Lebanon	67 (4.1)	445 (5.4)	32 (4.1)	435 (6.9)	1 (0.5)	~ ~	11.6 (0.22)
Kazakhstan	67 (3.7)	533 (5.5)	33 (3.7)	518 (9.8)	0 (0.4)	~ ~	10.7 (0.10)
Qatar	65 (3.9)	440 (5.3)	33 (3.7)	430 (7.0)	2 (0.8)	~ ~	10.8 (0.15)
Italy	60 (3.4)	490 (3.8)	40 (3.4)	499 (4.6)	0 (0.4)	~ ~	10.5 (0.12)
Chinese Taipei	59 (3.8)	599 (3.9)	39 (3.9)	599 (5.1)	2 (0.9)	~ ~	10.5 (0.13)
Kuwait	58 (4.0)	395 (7.6)	40 (3.9)	390 (7.7)	2 (1.2)	~ ~	10.4 (0.16)
Japan	56 (3.5)	587 (3.5)	40 (3.4)	584 (4.4)	4 (1.4)	602 (5.8)	10.2 (0.11)
United Arab Emirates	52 (2.7)	475 (4.3)	45 (2.7)	454 (4.7)	3 (0.8)	469 (13.4)	10.5 (0.13)
Morocco	48 (3.1)	388 (3.5)	50 (3.1)	381 (2.9)	1 (0.6)	~ ~	10.2 (0.10)
Jordan	48 (3.1)	389 (4.9)	46 (3.2)	381 (4.0)	7 (1.9)	391 (21.3)	10.0 (0.12)
Israel	47 (2.6)	507 (6.0)	48 (2.6)	516 (7.7)	5 (1.2)	490 (19.1)	10.1 (0.12)
Oman	46 (3.7)	401 (5.4)	50 (3.6)	406 (4.3)	4 (1.2)	400 (6.9)	10.2 (0.14)
Bahrain	46 (4.3)	459 (3.3)	52 (4.3)	449 (3.0)	3 (1.2)	489 (29.0)	10.2 (0.14)
United States	44 (3.0)	516 (4.8)	48 (2.8)	518 (5.0)	7 (1.4)	539 (10.9)	9.9 (0.15)
Saudi Arabia	44 (4.4)	372 (7.1)	52 (4.3)	365 (6.2)	4 (1.5)	340 (23.5)	10.0 (0.15)
Canada	44 (3.3)	533 (3.1)	49 (3.3)	527 (3.8)	7 (1.6)	535 (5.9)	9.8 (0.13)
New Zealand	42 (3.0)	484 (5.3)	50 (3.2)	504 (5.8)	8 (2.1)	471 (12.3)	9.7 (0.12)
Egypt	40 (3.7)	401 (5.9)	57 (3.7)	386 (5.8)	4 (1.2)	397 (16.1)	10.0 (0.12)
Sweden	38 (4.1)	495 (5.2)	59 (4.2)	504 (3.5)	3 (1.4)	507 (19.9)	9.7 (0.13)
Thailand	37 (3.8)	442 (8.6)	54 (4.0)	422 (6.3)	9 (2.5)	446 (17.2)	9.6 (0.14)
Ireland	36 (2.8)	522 (5.1)	53 (2.9)	521 (4.3)	11 (2.1)	537 (6.7)	9.4 (0.12)
Malaysia	35 (3.8)	465 (6.0)	64 (3.8)	468 (5.0)	2 (0.9)	~ ~	9.7 (0.09)
Iran, Islamic Rep. of	34 (2.8)	426 (5.7)	60 (3.2)	442 (6.5)	6 (1.8)	436 (19.0)	9.7 (0.12)
Slovenia	33 (2.8)	518 (4.4)	61 (2.8)	517 (2.4)	5 (1.2)	508 (7.8)	9.6 (0.09)
Hong Kong SAR	33 (3.7)	602 (8.1)	63 (3.7)	589 (6.1)	3 (1.5)	612 (8.7)	9.7 (0.12)
England	32 (4.1)	530 (10.5)	57 (4.3)	511 (7.4)	12 (2.7)	510 (14.4)	9.2 (0.17)
Norway (9)	31 (4.1)	511 (4.6)	60 (4.4)	513 (2.7)	9 (2.3)	516 (7.4)	9.4 (0.16)
Australia	29 (2.9)	514 (6.1)	58 (3.3)	505 (3.7)	13 (2.1)	508 (8.0)	9.2 (0.13)
Korea, Rep. of	29 (3.4)	602 (5.2)	57 (3.5)	608 (3.5)	15 (2.6)	606 (6.8)	9.0 (0.14)
Malta	28 (0.1)	478 (2.3)	59 (0.2)	499 (1.5)	13 (0.1)	509 (2.1)	9.1 (0.01)
South Africa (9)	28 (3.1)	419 (10.8)	60 (3.5)	358 (4.4)	12 (2.5)	338 (7.1)	9.1 (0.14)
Hungary	27 (3.3)	521 (10.5)	64 (3.5)	507 (5.0)	9 (2.1)	543 (13.8)	9.3 (0.15)
Chile	20 (3.6)	435 (9.2)	68 (4.4)	430 (4.7)	12 (2.8)	418 (13.3)	9.1 (0.16)
Botswana (9)	17 (3.5)	398 (6.0)	77 (3.3)	390 (2.7)	6 (2.3)	386 (14.1)	9.1 (0.13)
Singapore	--	--	--	--	--	--	--
International Avg.	45 (0.6)	480 (1.0)	49 (0.6)	476 (0.9)	5 (0.3)	481 (2.8)	--

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data 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 "x" indicates data are available for less than 50% of students.

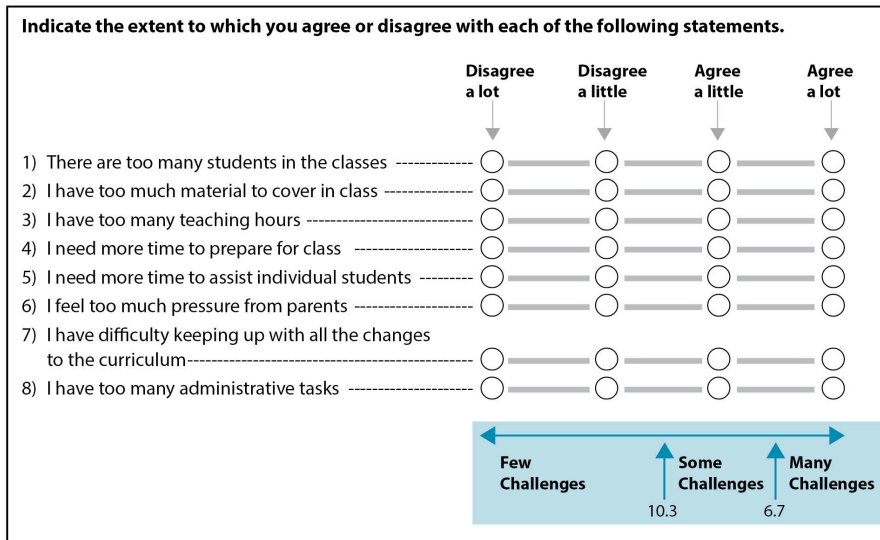
SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 6.9: Challenges Facing Teachers (Continued)**

Country	Few Challenges		Some Challenges		Many Challenges		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Dubai, UAE	59 (3.6)	523 (3.2)	37 (3.5)	496 (4.4)	4 (1.5)	523 (19.6)	10.8 (0.14)
Abu Dhabi, UAE	51 (5.2)	446 (9.3)	46 (5.3)	438 (9.9)	3 (1.1)	424 (20.8)	10.3 (0.22)
Quebec, Canada	45 (5.2)	555 (4.5)	50 (4.9)	544 (5.6)	5 (1.4)	546 (9.4)	9.9 (0.15)
Ontario, Canada	42 (4.0)	525 (3.9)	49 (4.1)	522 (5.1)	9 (2.7)	532 (8.8)	9.6 (0.17)
Florida, US	27 (5.4)	517 (16.3)	60 (5.2)	494 (10.8)	13 (4.3)	504 (21.1)	8.9 (0.21)
Norway (8)	27 (3.2)	484 (3.6)	64 (3.3)	488 (2.6)	9 (2.2)	492 (6.5)	9.3 (0.14)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015





**Exhibit 6.11: Students' Sense of School Belonging**

Reported by Students

Students were scored according to their agreement to seven statements about their *Sense of School Belonging*. Students with a **High Sense of School Belonging** had a score on the scale of at least 10.3, which corresponds to their "agreeing a lot" to four of the seven statements and "agreeing a little" to each of the other three statements, on average. Students with **Little Sense of School Belonging** had a score no higher than 7.5, which corresponds to their "disagreeing a little" to four of the seven statements and "agreeing a little" to each of the other three statements, on average. All other students had a **Sense of School Belonging**.

Country	High Sense of School Belonging		Sense of School Belonging		Little Sense of School Belonging		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Morocco	73 (0.9)	385 (2.1)	24 (0.8)	386 (3.5)	3 (0.3)	383 (6.6)	11.3 (0.05)
Jordan	66 (1.1)	388 (3.2)	28 (0.8)	389 (4.5)	6 (0.5)	381 (8.6)	11.0 (0.06)
Kazakhstan	66 (1.4)	533 (5.5)	33 (1.3)	519 (6.1)	1 (0.2)	~ ~	11.1 (0.06)
Egypt	63 (1.3)	400 (4.2)	30 (1.1)	386 (5.4)	7 (0.5)	388 (7.8)	10.9 (0.07)
Oman	62 (0.9)	412 (2.7)	33 (0.8)	395 (2.8)	5 (0.5)	381 (7.7)	10.8 (0.04)
South Africa (9)	60 (1.1)	376 (4.6)	36 (0.9)	371 (5.8)	4 (0.3)	378 (9.7)	10.7 (0.05)
Turkey	59 (1.1)	457 (4.9)	35 (0.9)	458 (5.4)	6 (0.4)	467 (8.8)	10.6 (0.05)
Thailand	58 (1.2)	433 (4.7)	40 (1.2)	432 (5.6)	2 (0.2)	~ ~	10.6 (0.05)
Kuwait	53 (1.5)	400 (5.4)	39 (1.2)	389 (6.0)	8 (0.6)	369 (8.2)	10.3 (0.07)
Botswana (9)	53 (0.8)	406 (2.3)	42 (0.8)	383 (2.9)	5 (0.4)	374 (7.3)	10.4 (0.03)
Lebanon	53 (1.3)	445 (3.8)	40 (1.2)	444 (3.8)	8 (0.5)	433 (5.8)	10.4 (0.06)
Norway (9)	52 (1.5)	521 (2.3)	41 (1.2)	506 (2.9)	7 (0.5)	475 (5.5)	10.4 (0.06)
Chile	50 (1.6)	435 (3.9)	39 (1.1)	425 (3.6)	11 (0.7)	406 (4.8)	10.2 (0.08)
Saudi Arabia	49 (1.5)	370 (5.2)	41 (1.2)	373 (5.2)	10 (0.8)	344 (7.4)	10.2 (0.06)
Israel	49 (1.4)	514 (4.6)	41 (1.0)	515 (4.3)	10 (0.7)	490 (6.5)	10.2 (0.07)
Malaysia	46 (1.3)	466 (4.2)	50 (1.1)	468 (3.8)	4 (0.5)	427 (7.6)	10.1 (0.05)
Iran, Islamic Rep. of	45 (1.3)	436 (5.8)	47 (1.1)	439 (4.4)	7 (0.5)	424 (6.7)	10.0 (0.05)
Canada	45 (1.1)	538 (2.0)	48 (0.9)	525 (2.3)	7 (0.5)	495 (4.3)	10.1 (0.05)
Georgia	44 (1.0)	463 (3.7)	51 (1.0)	448 (4.2)	5 (0.5)	443 (8.6)	10.1 (0.05)
New Zealand	43 (1.2)	509 (3.8)	49 (1.0)	488 (3.5)	8 (0.5)	449 (5.8)	10.0 (0.04)
Ireland	42 (1.3)	537 (2.7)	48 (1.0)	519 (3.1)	10 (0.7)	491 (5.9)	9.9 (0.06)
Bahrain	41 (0.8)	466 (2.7)	46 (0.9)	453 (2.1)	13 (1.0)	431 (4.4)	9.8 (0.05)
Australia	41 (1.1)	528 (3.4)	48 (0.9)	499 (2.8)	11 (0.5)	460 (5.0)	9.8 (0.05)
Qatar	39 (1.3)	458 (3.7)	46 (1.2)	436 (3.6)	15 (0.6)	398 (4.8)	9.7 (0.05)
Lithuania	38 (1.4)	512 (4.3)	54 (1.2)	513 (2.6)	8 (0.7)	498 (6.1)	9.8 (0.05)
United States	37 (0.9)	538 (3.9)	49 (0.7)	514 (2.9)	14 (0.6)	485 (3.6)	9.6 (0.05)
Singapore	37 (0.7)	638 (3.2)	55 (0.7)	615 (3.5)	9 (0.4)	589 (5.9)	9.8 (0.03)
Russian Federation	36 (1.2)	544 (5.9)	55 (1.1)	536 (4.6)	9 (0.6)	526 (6.2)	9.7 (0.05)
England	35 (1.3)	542 (4.4)	54 (1.0)	513 (4.4)	11 (0.6)	478 (5.5)	9.6 (0.05)
Sweden	35 (1.4)	515 (3.7)	56 (1.3)	498 (2.7)	9 (0.6)	468 (5.4)	9.7 (0.06)
Malta	33 (0.8)	520 (2.3)	51 (0.8)	492 (1.6)	16 (0.6)	452 (3.6)	9.5 (0.03)
Hong Kong SAR	31 (1.6)	616 (5.1)	55 (1.3)	591 (4.2)	14 (0.8)	560 (7.1)	9.4 (0.07)
Hungary	30 (1.2)	532 (5.6)	57 (1.0)	511 (4.1)	13 (0.7)	489 (5.4)	9.4 (0.06)
United Arab Emirates	29 (0.8)	504 (3.7)	44 (0.7)	461 (2.1)	27 (0.7)	431 (2.9)	9.1 (0.04)
Japan	27 (1.1)	599 (3.9)	60 (0.9)	586 (2.3)	13 (0.7)	565 (4.6)	9.4 (0.05)
Italy	27 (0.9)	500 (3.8)	61 (0.8)	495 (2.8)	12 (0.8)	479 (4.4)	9.3 (0.04)
Chinese Taipei	27 (0.9)	617 (3.4)	63 (0.7)	597 (2.4)	10 (0.5)	568 (6.0)	9.4 (0.04)
Korea, Rep. of	24 (0.9)	621 (3.9)	69 (0.8)	605 (2.6)	7 (0.5)	568 (6.2)	9.4 (0.04)
Slovenia	12 (0.7)	527 (4.7)	66 (0.9)	519 (2.3)	22 (1.0)	502 (2.9)	8.5 (0.04)
International Avg.	44 (0.2)	492 (0.7)	47 (0.2)	479 (0.6)	9 (0.1)	458 (1.0)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

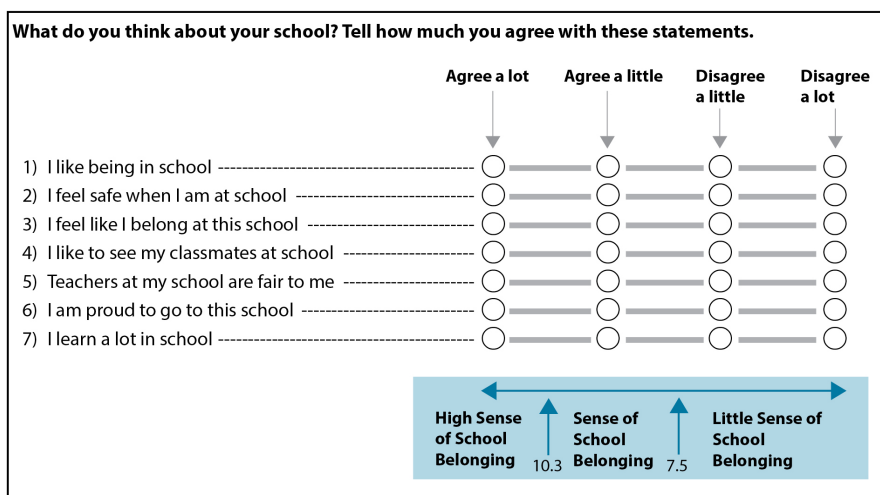
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 6.11: Students' Sense of School Belonging (Continued)**

Country	High Sense of School Belonging		Sense of School Belonging		Little Sense of School Belonging		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Norway (8)	61 (1.4)	495 (2.0)	33 (1.2)	481 (2.8)	5 (0.5)	444 (5.7)	10.8 (0.06)
Buenos Aires, Argentina	52 (1.4)	404 (5.0)	40 (1.1)	390 (5.1)	8 (0.7)	375 (10.9)	10.3 (0.06)
Ontario, Canada	48 (1.6)	533 (2.6)	44 (1.3)	519 (2.9)	8 (0.8)	488 (5.3)	10.2 (0.07)
Dubai, UAE	44 (0.7)	534 (3.0)	43 (0.7)	507 (2.5)	13 (0.3)	457 (3.4)	10.0 (0.03)
Quebec, Canada	38 (1.4)	559 (3.3)	58 (1.3)	539 (4.2)	5 (0.4)	521 (6.4)	9.8 (0.05)
Florida, US	27 (2.0)	513 (8.5)	52 (1.3)	496 (6.1)	21 (1.6)	466 (7.0)	9.1 (0.09)
Abu Dhabi, UAE	21 (2.0)	484 (11.0)	42 (1.3)	441 (4.9)	36 (1.6)	420 (4.1)	8.7 (0.10)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015





# CHAPTER 7: SCHOOL SAFETY

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

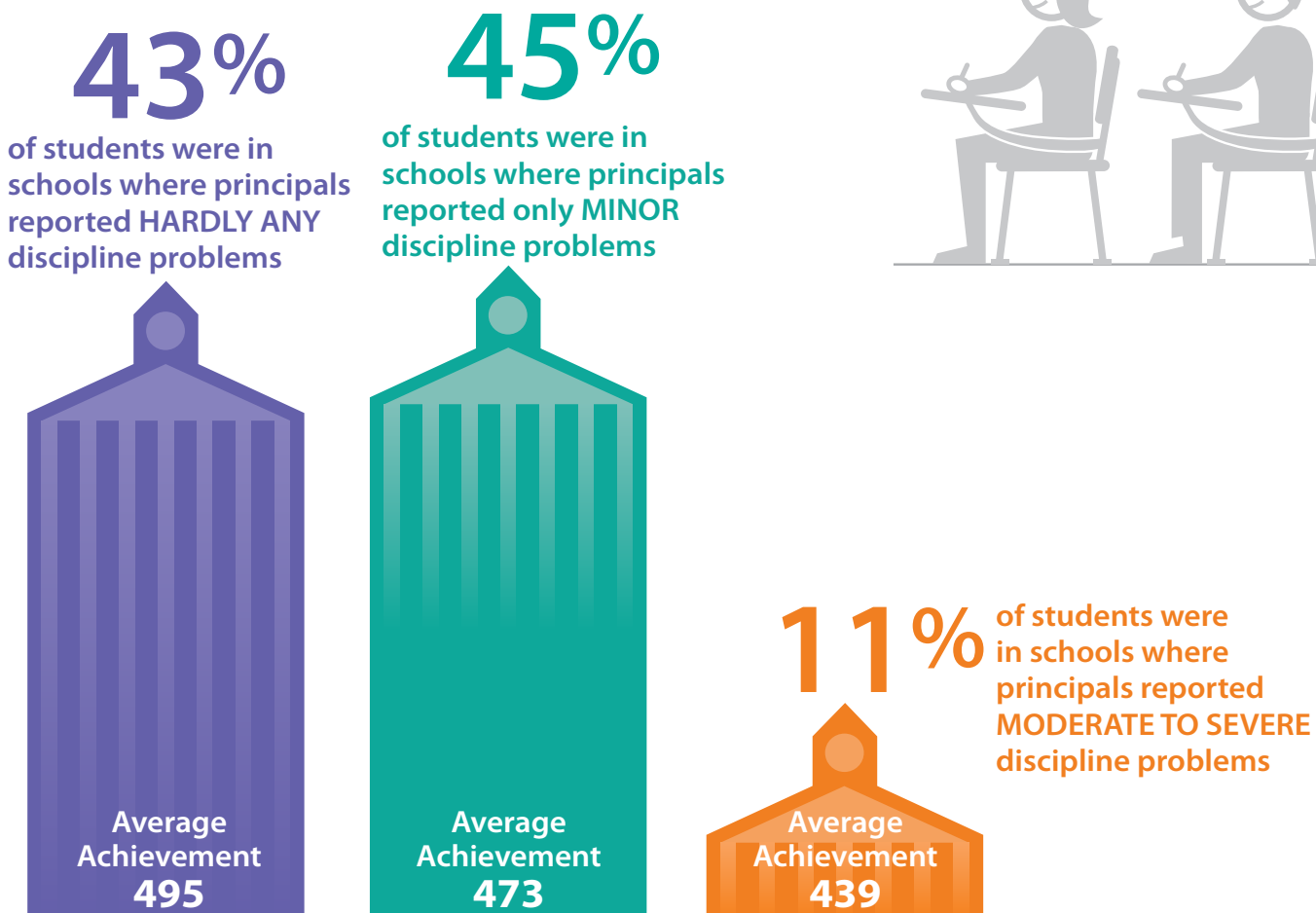
**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



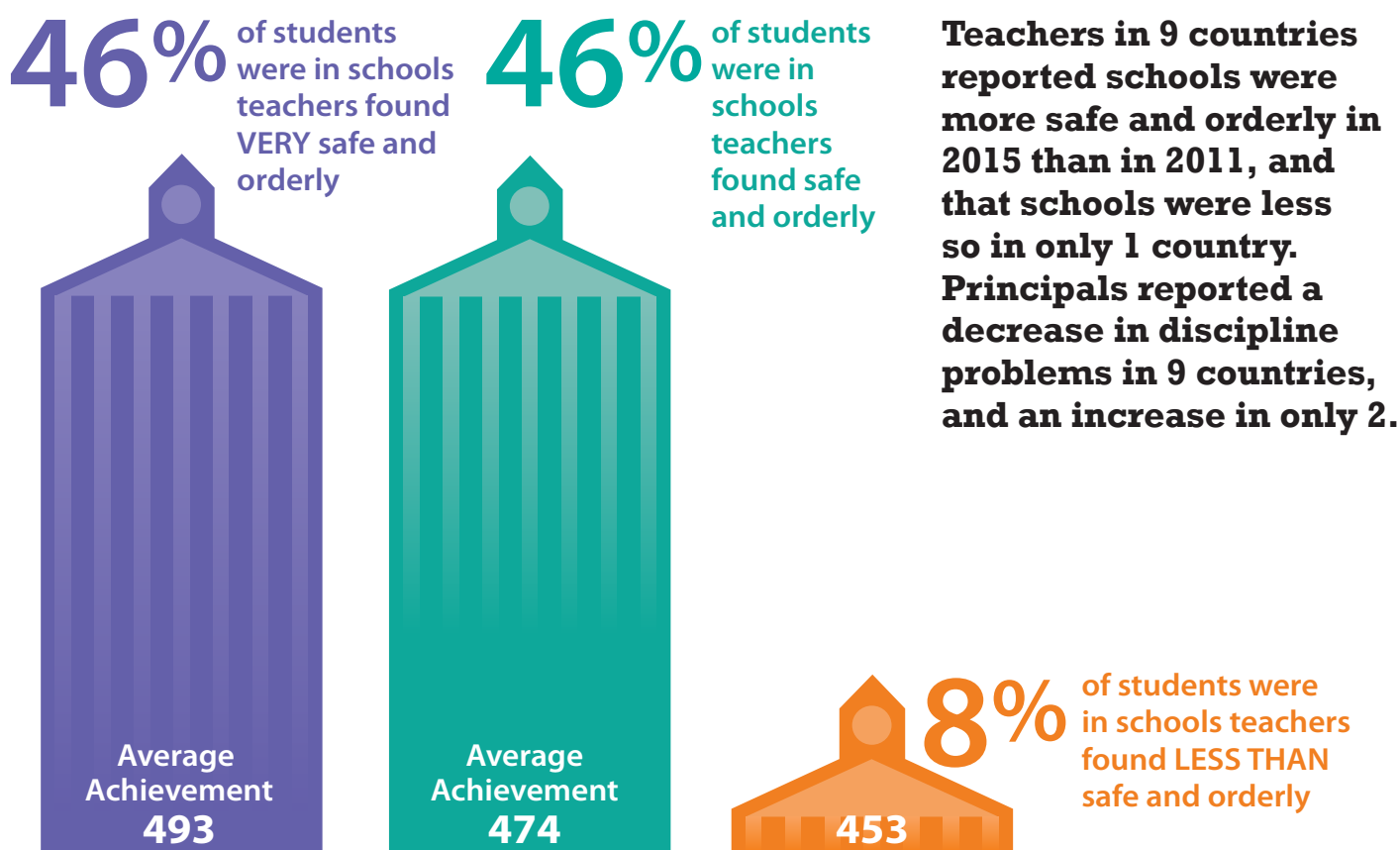
### Students Are in Safe Schools

Internationally, the majority of eighth grade students were in safe school environments according to their principals and teachers. However, students that attended schools with disorderly environments had much lower achievement than their counterparts in safe and orderly schools.

#### Principals' Reports



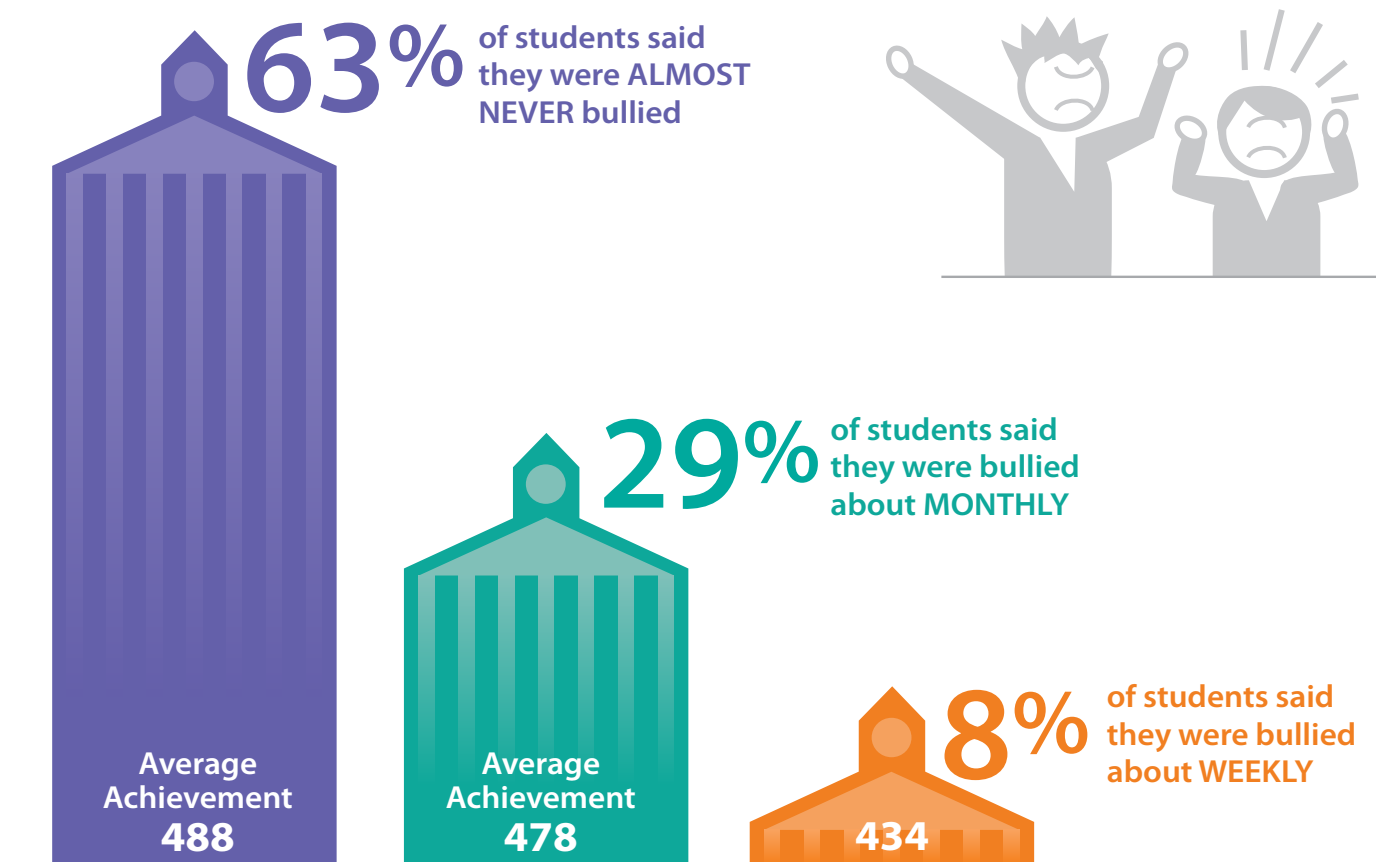
#### Teachers' Reports



### Student Bullying

With the emergence of cyber-bullying, there is growing evidence that school-related bullying is on the rise and does have a negative impact on student achievement.

#### Students' Reports





**Exhibit 7.2: School Discipline Problems – Principals' Reports**

*Reported by Principals*

Students were scored according to their principals' responses concerning eleven potential school problems on the *School Discipline Problems* scale. Students in schools with **Hardly Any Problems** had a score on the scale of at least 10.8, which corresponds to their principals reporting "not a problem" for six of the eleven issues and "minor problem" for the other five, on average. Students in schools with **Moderate to Severe Problems** had a score no higher than 8.0, which corresponds to their principals reporting "moderate problem" for six of the eleven issues and "minor problem" for the other five, on average. All other students attended schools with **Minor Problems**.

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score	Difference in Average Scale Score from 2011	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Singapore	74 (0.0)	630 (3.4)	26 (0.0)	595 (7.1)	0 (0.0)	~ ~	11.7 (0.00)	0.7 (0.00)	▲
England	r 73 (4.5)	535 (6.3)	27 (4.5)	504 (10.7)	0 (0.0)	~ ~	11.6 (0.13)	r 1.0 (0.20)	▲
Norway (9)	67 (4.5)	513 (2.7)	33 (4.5)	509 (4.6)	0 (0.0)	~ ~	11.2 (0.13)	◊ ◊	
Hong Kong SAR	66 (4.5)	602 (6.8)	33 (4.6)	574 (8.5)	1 (1.1)	~ ~	11.4 (0.15)	0.4 (0.21)	
Kazakhstan	65 (4.2)	536 (7.1)	18 (3.3)	507 (12.1)	17 (3.2)	517 (13.3)	10.8 (0.23)	-0.9 (0.26)	▼
Ireland	64 (3.9)	531 (3.3)	34 (4.0)	514 (6.0)	2 (1.2)	~ ~	10.9 (0.13)	◊ ◊	
Georgia	57 (3.8)	451 (5.2)	40 (3.8)	456 (5.1)	3 (1.0)	474 (28.7)	10.8 (0.12)	0.0 (0.16)	
Chinese Taipei	57 (3.8)	610 (3.8)	42 (3.7)	586 (4.5)	1 (0.8)	~ ~	11.1 (0.13)	-0.3 (0.20)	
Russian Federation	56 (3.7)	545 (6.4)	43 (3.5)	530 (6.0)	1 (0.8)	~ ~	10.8 (0.08)	0.2 (0.11)	
Iran, Islamic Rep. of	55 (3.4)	446 (6.4)	41 (3.4)	423 (5.5)	4 (1.1)	436 (17.1)	11.0 (0.13)	-0.4 (0.17)	
Korea, Rep. of	55 (4.7)	606 (3.9)	38 (4.6)	606 (3.8)	7 (2.3)	600 (7.2)	11.0 (0.17)	0.9 (0.25)	▲
United Arab Emirates	54 (2.3)	483 (3.3)	40 (2.2)	445 (3.3)	6 (0.9)	403 (7.9)	11.0 (0.08)	0.8 (0.11)	▲
Japan	54 (3.9)	595 (3.4)	37 (4.2)	579 (4.9)	9 (2.3)	571 (11.9)	10.5 (0.13)	0.5 (0.22)	
Bahrain	51 (0.2)	465 (2.1)	36 (0.2)	438 (2.3)	13 (0.2)	455 (5.0)	10.4 (0.02)	0.5 (0.02)	▲
Lebanon	51 (4.6)	448 (5.1)	29 (4.3)	436 (7.1)	20 (3.5)	440 (9.6)	10.2 (0.23)	0.0 (0.30)	
Qatar	51 (0.7)	439 (4.6)	34 (0.7)	436 (3.8)	15 (0.3)	434 (5.7)	10.2 (0.02)	-0.4 (0.05)	▼
Oman	50 (3.9)	411 (3.8)	27 (3.6)	402 (7.2)	23 (3.1)	388 (6.4)	10.2 (0.19)	0.4 (0.27)	
Malta	50 (0.1)	520 (1.5)	45 (0.1)	466 (1.5)	5 (0.1)	465 (3.8)	10.6 (0.00)	◊ ◊	
Malaysia	50 (4.6)	477 (5.3)	48 (4.4)	454 (5.7)	3 (2.1)	455 (20.5)	10.8 (0.15)	0.9 (0.18)	▲
Saudi Arabia	49 (4.3)	383 (7.0)	31 (3.9)	354 (6.5)	20 (3.5)	356 (9.5)	10.2 (0.24)	0.5 (0.32)	
Australia	48 (3.2)	528 (4.7)	51 (3.2)	487 (4.4)	1 (0.6)	~ ~	10.6 (0.09)	0.5 (0.13)	▲
Canada	45 (4.1)	538 (2.8)	54 (4.1)	520 (3.2)	1 (0.7)	~ ~	10.6 (0.12)	◊ ◊	
Thailand	42 (4.0)	450 (7.3)	53 (4.0)	418 (6.5)	5 (1.7)	405 (14.1)	10.4 (0.14)	0.4 (0.19)	
Lithuania	40 (4.2)	524 (5.2)	57 (4.2)	503 (4.2)	2 (1.1)	~ ~	10.3 (0.10)	0.2 (0.15)	
United States	34 (3.0)	539 (5.6)	64 (3.4)	511 (3.9)	2 (1.0)	~ ~	10.2 (0.09)	0.2 (0.12)	
Jordan	34 (3.5)	398 (5.6)	43 (3.9)	377 (5.4)	23 (3.3)	382 (6.9)	9.6 (0.18)	0.6 (0.23)	
Slovenia	32 (3.6)	519 (4.5)	63 (3.7)	516 (2.6)	5 (1.8)	509 (7.9)	10.0 (0.12)	0.1 (0.17)	
New Zealand	31 (4.6)	507 (4.0)	66 (4.6)	485 (4.8)	3 (1.5)	438 (18.0)	10.2 (0.13)	0.5 (0.16)	▲
Chile	29 (3.8)	454 (7.3)	58 (3.9)	421 (4.9)	13 (3.0)	398 (6.7)	9.8 (0.12)	0.1 (0.20)	
Hungary	29 (3.9)	540 (8.4)	63 (4.1)	512 (5.1)	8 (2.1)	428 (12.2)	10.1 (0.12)	0.5 (0.16)	▲
Italy	27 (4.2)	501 (6.2)	61 (4.5)	490 (3.7)	12 (2.6)	493 (11.0)	9.7 (0.12)	0.2 (0.18)	
Kuwait	27 (3.3)	423 (11.1)	50 (4.0)	385 (4.9)	23 (3.5)	375 (11.2)	9.4 (0.15)	◊ ◊	
Israel	26 (3.6)	535 (9.3)	61 (3.6)	511 (6.6)	13 (2.3)	464 (12.2)	9.6 (0.14)	0.2 (0.21)	
Sweden	26 (4.3)	515 (4.6)	70 (4.6)	496 (3.4)	4 (1.8)	483 (26.5)	9.8 (0.13)	r 0.3 (0.16)	
Turkey	19 (2.6)	499 (12.5)	49 (3.8)	455 (5.1)	32 (3.4)	437 (7.6)	8.8 (0.14)	-0.4 (0.20)	
Egypt	19 (3.4)	394 (10.7)	42 (3.6)	396 (6.4)	40 (3.6)	388 (7.2)	8.4 (0.18)	◊ ◊	
Morocco	13 (2.1)	401 (8.4)	34 (3.4)	384 (3.9)	53 (3.2)	381 (3.1)	8.1 (0.12)	-0.1 (0.18)	
Botswana (9)	11 (2.8)	414 (9.6)	68 (3.8)	394 (2.8)	22 (3.5)	372 (5.3)	9.0 (0.11)	0.1 (0.14)	
South Africa (9)	10 (2.1)	408 (19.4)	56 (3.7)	384 (6.9)	34 (3.8)	344 (4.4)	8.8 (0.12)	0.0 (0.15)	
International Avg.	43 (0.6)	495 (1.1)	45 (0.6)	473 (0.9)	11 (0.4)	439 (2.4)			

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

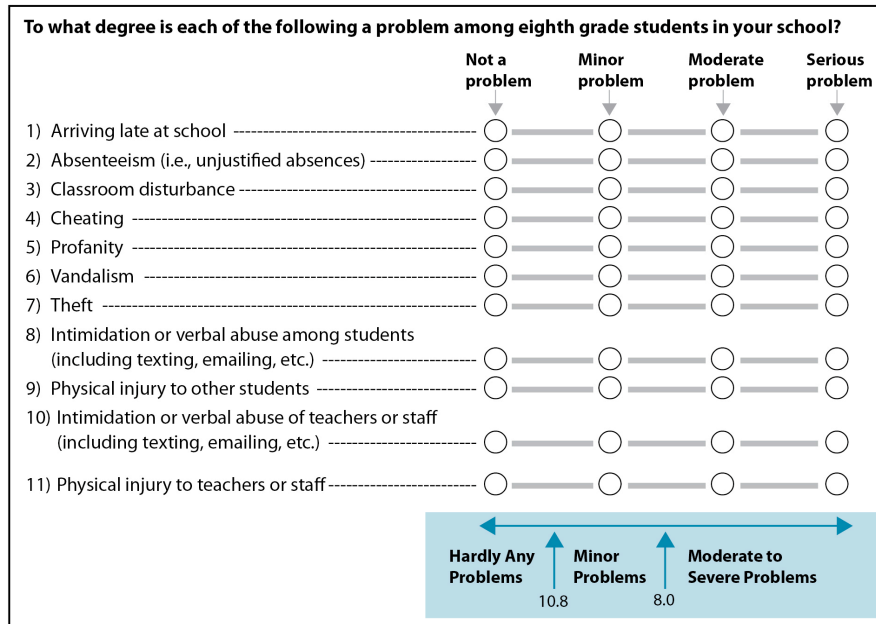
An "r" indicates data are available for at least 70% but less than 85% of the students. An "s" indicates data are available for at least 50% but less than 70% of the students.

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

**Exhibit 7.2: School Discipline Problems – Principals' Reports (Continued)**

Country	Hardly Any Problems		Minor Problems		Moderate to Severe Problems		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Dubai, UAE	76 (0.3)	528 (2.6)	22 (0.3)	467 (3.7)	2 (0.1)	~ ~	12.1 (0.01)	1.1 (0.02)
Norway (8)	73 (4.1)	490 (2.3)	27 (4.1)	481 (5.0)	0 (0.0)	~ ~	11.6 (0.13)	1.5 (0.18)
Quebec, Canada	56 (6.1)	556 (4.1)	44 (6.1)	541 (5.8)	1 (0.6)	~ ~	10.9 (0.19)	0.9 (0.22)
Abu Dhabi, UAE	41 (4.2)	445 (8.5)	53 (4.1)	438 (6.0)	7 (1.7)	394 (14.9)	10.5 (0.14)	0.3 (0.22)
Ontario, Canada	39 (5.3)	529 (3.7)	59 (5.2)	516 (4.1)	2 (1.1)	~ ~	10.4 (0.16)	0.2 (0.22)
Florida, US	29 (8.2)	490 (15.2)	71 (8.2)	503 (11.6)	0 (0.0)	~ ~	10.2 (0.33)	0.4 (0.40)
Buenos Aires, Argentina	21 (4.2)	460 (9.1)	61 (5.7)	384 (7.4)	18 (4.4)	365 (10.1)	9.5 (0.15)	0.0

Significantly higher than 2011   
Significantly lower than 2011



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 7.4: Safe and Orderly School – Teachers' Reports**

Reported by Teachers

Students were scored according to their teachers' degree of agreement with eight statements on the *Safe and Orderly School* scale. Students in **Very Safe and Orderly** schools had a score on the scale of at least 10.6, which corresponds to their teachers "agreeing a lot" with four of the eight qualities of a safe and orderly school and "agreeing a little" with the other four, on average. Students in **Less than Safe and Orderly** schools had a score no higher than 7.2, which corresponds to their teachers "disagreeing a little" with four of the eight qualities and "agreeing a little" with the other four, on average. All other students attended **Safe and Orderly** schools.

Country	Very Safe and Orderly		Safe and Orderly		Less than Safe and Orderly		Average Scale Score	Difference in Average Scale Score from 2011	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Qatar	75 (2.8)	440 (4.0)	23 (2.8)	424 (8.1)	2 (0.9)	~ ~	11.5 (0.10)	0.5 (0.15)	▲
Norway (9)	72 (3.4)	515 (2.6)	28 (3.3)	506 (3.6)	0 (0.4)	~ ~	11.3 (0.11)	◊ ◊	
Ireland	70 (2.7)	534 (3.1)	26 (2.4)	505 (6.4)	4 (1.3)	452 (25.9)	11.6 (0.13)	◊ ◊	
Lebanon	67 (4.4)	447 (5.0)	30 (4.3)	434 (7.6)	3 (1.5)	417 (32.8)	11.1 (0.17)	1.3 (0.25)	▲
United Arab Emirates	67 (2.0)	482 (3.2)	32 (1.9)	433 (5.2)	2 (0.5)	~ ~	11.4 (0.09)	0.5 (0.11)	▲
Kazakhstan	61 (4.0)	529 (6.5)	38 (4.0)	526 (8.3)	0 (0.2)	~ ~	11.4 (0.16)	0.3 (0.21)	
Australia	60 (3.0)	523 (3.6)	33 (2.7)	492 (4.5)	7 (1.6)	445 (10.1)	11.0 (0.16)	r 0.5 (0.26)	
Israel	60 (2.9)	523 (6.3)	35 (2.9)	498 (7.8)	5 (0.9)	463 (19.3)	10.9 (0.12)	0.0 (0.17)	
Singapore	59 (2.3)	629 (4.7)	38 (2.2)	609 (5.5)	3 (0.9)	586 (20.0)	11.2 (0.11)	0.5 (0.14)	▲
Russian Federation	57 (2.9)	545 (4.9)	42 (2.8)	528 (7.4)	2 (1.0)	~ ~	10.7 (0.10)	0.7 (0.18)	▲
Hong Kong SAR	56 (4.9)	606 (5.6)	43 (4.9)	580 (8.6)	1 (0.2)	~ ~	10.9 (0.16)	0.4 (0.23)	
Kuwait	55 (4.1)	395 (7.2)	41 (4.1)	389 (8.8)	4 (1.4)	379 (12.5)	10.5 (0.13)	◊ ◊	
Iran, Islamic Rep. of	54 (3.3)	446 (6.4)	40 (3.4)	429 (6.4)	6 (1.5)	391 (10.3)	10.7 (0.14)	0.1 (0.18)	
Oman	52 (3.1)	416 (4.1)	46 (3.1)	391 (3.7)	2 (1.0)	~ ~	10.7 (0.14)	0.8 (0.18)	▲
Bahrain	50 (2.9)	464 (2.7)	44 (2.9)	443 (3.3)	6 (1.3)	453 (8.0)	10.2 (0.10)	0.0 (0.15)	
New Zealand	50 (3.6)	507 (5.0)	42 (3.5)	479 (4.3)	8 (1.4)	482 (19.7)	10.7 (0.14)	0.1 (0.20)	
Canada	50 (3.2)	533 (2.5)	45 (3.1)	529 (3.7)	4 (1.0)	507 (14.0)	10.7 (0.16)	◊ ◊	
England	50 (3.9)	527 (7.2)	44 (3.8)	514 (8.8)	6 (2.0)	461 (9.0)	10.6 (0.17)	0.0 (0.26)	
Egypt	49 (4.2)	407 (5.0)	45 (4.2)	378 (6.3)	6 (1.8)	373 (15.9)	10.4 (0.15)	◊ ◊	
Lithuania	49 (4.1)	514 (4.2)	46 (4.3)	507 (4.9)	5 (1.9)	507 (14.7)	10.3 (0.15)	0.4 (0.18)	
Saudi Arabia	48 (4.6)	378 (6.4)	42 (4.4)	361 (5.6)	10 (2.5)	339 (12.6)	10.3 (0.18)	0.0 (0.23)	
Malta	48 (0.1)	509 (1.7)	46 (0.1)	485 (1.6)	6 (0.1)	447 (4.5)	10.4 (0.01)	◊ ◊	
United States	46 (3.0)	538 (4.1)	41 (2.7)	507 (5.1)	13 (2.0)	482 (9.2)	10.3 (0.16)	r 0.0 (0.21)	
Georgia	45 (4.3)	465 (5.3)	53 (4.1)	445 (4.5)	2 (1.4)	~ ~	10.3 (0.15)	-0.9 (0.19)	▼
Thailand	44 (3.5)	441 (8.0)	51 (3.8)	423 (6.4)	6 (1.8)	430 (16.0)	10.3 (0.13)	-0.1 (0.20)	
Hungary	41 (3.8)	527 (5.5)	52 (3.7)	511 (6.1)	7 (1.7)	459 (17.2)	10.0 (0.14)	0.1 (0.18)	
Jordan	41 (4.0)	400 (5.2)	48 (4.0)	380 (4.0)	11 (3.0)	360 (13.3)	9.9 (0.17)	0.3 (0.21)	
Chinese Taipei	38 (3.4)	613 (5.1)	57 (3.7)	590 (3.9)	5 (1.7)	594 (9.7)	10.1 (0.14)	0.9 (0.21)	▲
Chile	38 (3.8)	451 (5.8)	49 (4.2)	424 (6.4)	14 (2.5)	390 (7.4)	9.7 (0.16)	0.3 (0.24)	
Malaysia	35 (3.6)	492 (6.8)	62 (3.5)	452 (5.3)	4 (1.9)	461 (10.9)	9.9 (0.14)	-0.3 (0.22)	
South Africa (9)	33 (3.5)	397 (10.4)	45 (3.3)	366 (6.3)	22 (3.0)	348 (4.9)	9.2 (0.15)	0.6 (0.21)	▲
Sweden	31 (3.8)	511 (5.0)	63 (4.0)	497 (3.7)	6 (1.9)	484 (12.2)	9.8 (0.14)	r 0.3 (0.18)	
Turkey	30 (3.6)	479 (7.6)	47 (3.9)	463 (7.1)	23 (2.9)	418 (8.9)	9.2 (0.16)	-0.1 (0.20)	
Korea, Rep. of	27 (2.8)	613 (3.8)	64 (3.1)	604 (3.6)	8 (2.2)	598 (12.0)	9.6 (0.12)	1.2 (0.16)	▲
Morocco	26 (2.8)	399 (5.0)	52 (3.7)	382 (3.3)	23 (2.4)	372 (4.6)	9.1 (0.13)	0.1 (0.16)	
Slovenia	19 (2.4)	527 (6.9)	71 (2.7)	515 (2.1)	10 (1.7)	512 (5.3)	9.3 (0.10)	0.3 (0.14)	
Italy	17 (3.0)	515 (5.7)	75 (3.1)	492 (3.1)	8 (1.7)	461 (10.0)	9.1 (0.12)	0.3 (0.17)	
Botswana (9)	15 (3.0)	415 (8.6)	53 (4.6)	389 (3.4)	32 (4.4)	385 (3.7)	8.3 (0.20)	0.3 (0.26)	
Japan	14 (2.5)	583 (6.3)	73 (3.4)	590 (2.8)	14 (2.6)	574 (7.1)	8.8 (0.11)	0.3 (0.17)	
International Avg.	46 (0.5)	493 (0.9)	46 (0.6)	474 (0.9)	8 (0.3)	453 (2.5)			

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

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

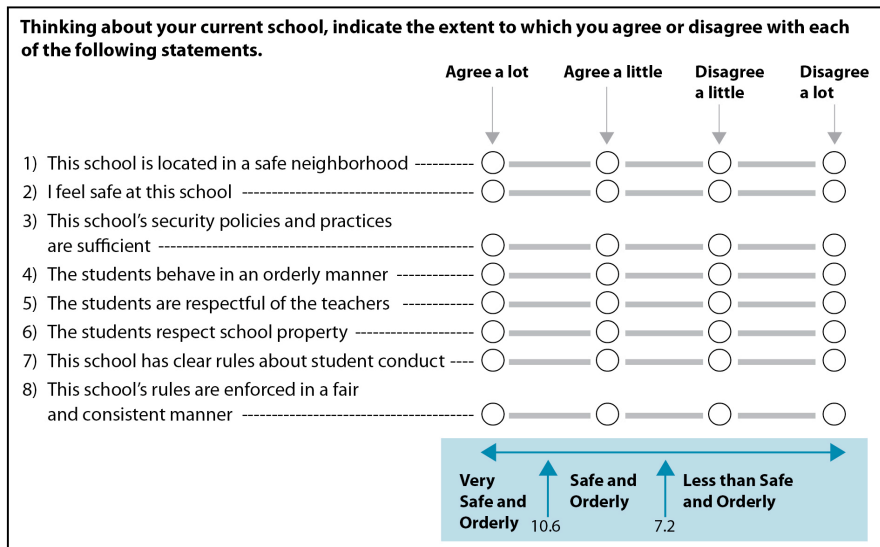
An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

**Exhibit 7.4: Safe and Orderly School – Teachers' Reports (Continued)**

Country	Very Safe and Orderly		Safe and Orderly		Less than Safe and Orderly		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Dubai, UAE	80 (1.7)	524 (3.0)	19 (1.8)	471 (6.2)	2 (0.8)	~ ~	12.2 (0.11)	0.9 (0.14) ⬆
Norway (8)	63 (3.9)	490 (2.5)	37 (3.9)	482 (3.8)	1 (0.6)	~ ~	11.2 (0.15)	0.3 (0.21)
Abu Dhabi, UAE	56 (4.3)	459 (7.7)	43 (4.3)	420 (7.7)	1 (0.4)	~ ~	10.9 (0.14)	0.1 (0.19)
Ontario, Canada	53 (3.9)	531 (2.7)	43 (3.9)	518 (5.0)	5 (1.3)	503 (12.8)	10.7 (0.21)	0.1 (0.28)
Quebec, Canada	41 (5.7)	554 (5.2)	55 (5.8)	548 (4.7)	4 (2.3)	518 (31.4)	10.4 (0.23)	0.5 (0.27)
Florida, US	r 34 (7.5)	519 (15.5)	51 (6.8)	497 (9.0)	15 (4.5)	470 (19.6)	9.5 (0.38)	r 0.0 (0.45)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x	x x

Significantly higher than 2011 ⬆  
Significantly lower than 2011 ⬇



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 7.6: Student Bullying**

*Reported by Students*

Students were scored according to their responses to how often they experienced nine bullying behaviors on the *Student Bullying* scale. Students bullied **Almost Never** had a score on the scale of at least 9.3, which corresponds to “never” experiencing five of the nine bullying behaviors and experiencing each of the other four behaviors “a few times a year,” on average. Students bullied **About Weekly** had a score no higher than 7.3, which corresponds to their experiencing each of five of the nine behaviors “once or twice a month” and each of the other four “a few times a year,” on average. All other students were bullied **About Monthly**.

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Chinese Taipei	86 (0.7)	600 (2.4)	13 (0.6)	596 (5.1)	1 (0.2)	~ ~	11.3 (0.04)
Kazakhstan	86 (0.8)	531 (5.4)	13 (0.7)	513 (6.4)	2 (0.2)	~ ~	11.3 (0.05)
Korea, Rep. of	84 (0.6)	607 (2.7)	15 (0.6)	603 (3.9)	1 (0.2)	~ ~	11.1 (0.03)
Georgia	82 (1.0)	459 (3.5)	16 (0.9)	441 (6.0)	2 (0.3)	~ ~	11.0 (0.05)
Japan	80 (0.8)	585 (2.6)	18 (0.7)	596 (3.5)	2 (0.2)	~ ~	10.9 (0.05)
Chile	78 (0.8)	431 (3.3)	18 (0.7)	420 (4.4)	3 (0.4)	401 (8.1)	10.6 (0.04)
Norway (9)	75 (0.9)	514 (2.2)	22 (0.8)	509 (3.5)	3 (0.3)	478 (10.9)	10.6 (0.04)
Ireland	75 (0.9)	526 (2.7)	22 (0.9)	521 (3.6)	4 (0.3)	492 (6.8)	10.5 (0.04)
Sweden	74 (0.9)	504 (2.8)	23 (0.8)	497 (4.3)	3 (0.3)	459 (8.3)	10.5 (0.04)
Italy	73 (0.9)	497 (2.7)	25 (0.8)	488 (3.2)	2 (0.3)	~ ~	10.3 (0.04)
Hungary	73 (1.0)	521 (3.8)	25 (0.9)	502 (5.3)	2 (0.3)	~ ~	10.3 (0.04)
Slovenia	72 (1.1)	518 (2.2)	24 (1.0)	515 (2.7)	4 (0.3)	491 (10.3)	10.3 (0.04)
Lithuania	72 (1.3)	515 (3.1)	24 (1.1)	505 (4.0)	4 (0.4)	491 (8.0)	10.3 (0.06)
Turkey	69 (1.1)	468 (5.2)	26 (0.9)	447 (4.8)	6 (0.3)	397 (7.4)	10.3 (0.05)
Russian Federation	66 (1.0)	541 (4.9)	30 (0.9)	536 (5.1)	4 (0.3)	511 (7.9)	10.1 (0.04)
Canada	65 (0.8)	533 (2.1)	30 (0.7)	525 (2.4)	5 (0.3)	500 (5.0)	10.0 (0.03)
United States	64 (0.6)	522 (3.2)	29 (0.5)	518 (3.4)	7 (0.4)	494 (4.7)	10.0 (0.03)
Saudi Arabia	64 (1.2)	374 (4.4)	27 (1.0)	372 (6.1)	9 (0.6)	328 (7.8)	10.1 (0.06)
Malta	64 (0.9)	500 (1.5)	29 (0.8)	499 (2.2)	7 (0.5)	445 (7.2)	10.0 (0.03)
Jordan	64 (1.1)	400 (3.2)	26 (0.9)	378 (4.3)	11 (0.5)	342 (6.4)	10.1 (0.05)
England	62 (1.2)	524 (4.2)	32 (1.0)	516 (4.9)	6 (0.5)	496 (7.4)	9.9 (0.05)
Qatar	61 (1.0)	449 (2.8)	27 (0.7)	443 (3.9)	12 (0.8)	383 (7.5)	9.8 (0.05)
Iran, Islamic Rep. of	60 (0.8)	445 (4.7)	32 (0.8)	432 (5.5)	8 (0.5)	389 (6.4)	9.9 (0.04)
Kuwait	60 (1.1)	397 (4.7)	32 (1.0)	390 (6.0)	8 (0.6)	370 (9.6)	9.8 (0.05)
United Arab Emirates	58 (0.8)	477 (2.1)	32 (0.6)	461 (2.4)	10 (0.5)	414 (4.8)	9.7 (0.04)
Singapore	58 (0.8)	628 (3.0)	36 (0.7)	615 (3.8)	6 (0.4)	591 (7.1)	9.7 (0.03)
Australia	57 (1.0)	514 (3.2)	34 (0.8)	500 (3.2)	9 (0.4)	476 (5.1)	9.7 (0.04)
Hong Kong SAR	56 (1.1)	590 (4.4)	37 (1.0)	601 (5.4)	7 (0.6)	593 (8.4)	9.6 (0.04)
New Zealand	55 (1.0)	501 (3.9)	35 (0.8)	492 (3.6)	10 (0.5)	466 (4.9)	9.5 (0.04)
Egypt	55 (1.5)	418 (4.1)	29 (1.0)	381 (4.8)	16 (1.0)	335 (5.6)	9.7 (0.07)
Lebanon	52 (2.0)	456 (4.0)	28 (1.3)	446 (4.2)	19 (1.8)	412 (6.9)	9.5 (0.10)
Morocco	51 (0.8)	391 (2.6)	38 (0.7)	384 (2.4)	11 (0.5)	370 (3.8)	9.4 (0.04)
Bahrain	49 (0.8)	466 (2.0)	36 (0.7)	455 (2.3)	15 (0.6)	424 (3.4)	9.3 (0.04)
Malaysia	48 (1.1)	478 (3.6)	42 (0.7)	462 (3.5)	11 (0.8)	425 (5.5)	9.3 (0.05)
Oman	44 (0.9)	416 (2.5)	41 (0.8)	402 (3.1)	14 (0.7)	373 (5.3)	9.2 (0.04)
South Africa (9)	36 (1.2)	396 (5.5)	47 (0.9)	374 (4.2)	17 (0.9)	328 (5.4)	8.9 (0.04)
Thailand	33 (1.1)	435 (5.7)	50 (0.9)	435 (5.0)	17 (0.8)	415 (5.6)	8.8 (0.04)
Botswana (9)	26 (0.8)	408 (2.7)	51 (0.7)	400 (2.1)	23 (0.6)	368 (4.3)	8.4 (0.03)
Israel	--	--	--	--	--	--	--
International Avg.	63 (0.2)	488 (0.6)	29 (0.1)	478 (0.7)	8 (0.1)	434 (1.2)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

(.) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

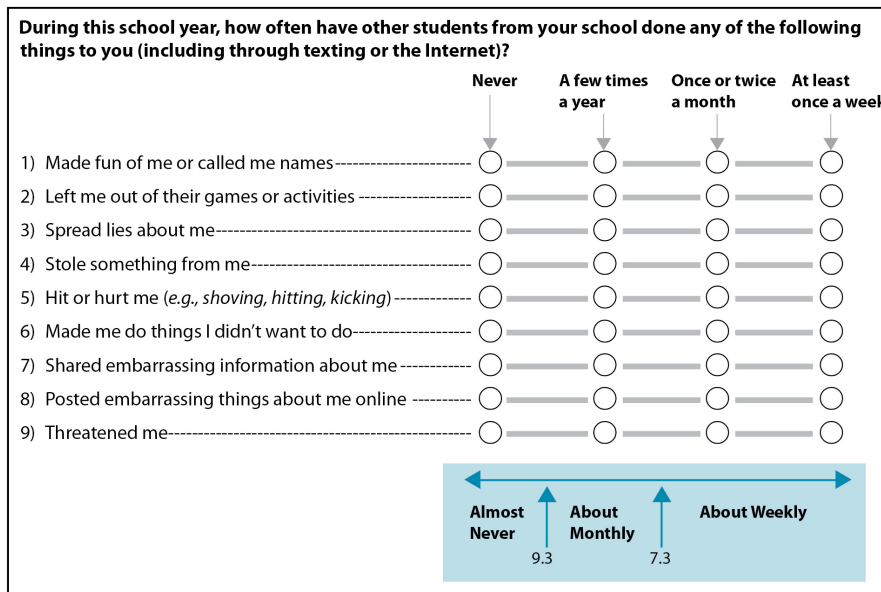
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 7.6: Student Bullying (Continued)**

Country	Almost Never		About Monthly		About Weekly		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Norway (8)	81 (0.8)	490 (1.9)	17 (0.7)	481 (3.3)	2 (0.3)	~ ~	10.9 (0.04)
Buenos Aires, Argentina	75 (1.2)	399 (4.7)	22 (1.1)	389 (6.1)	3 (0.4)	373 (11.2)	10.5 (0.05)
Quebec, Canada	74 (0.9)	547 (3.2)	24 (0.9)	541 (4.4)	3 (0.3)	531 (7.3)	10.4 (0.04)
Florida, US	68 (1.2)	497 (6.8)	26 (1.0)	497 (6.9)	6 (0.6)	461 (13.2)	10.2 (0.06)
Dubai, UAE	62 (1.1)	518 (2.4)	30 (0.9)	510 (3.2)	8 (0.7)	468 (6.1)	9.9 (0.05)
Ontario, Canada	61 (1.0)	527 (2.9)	32 (0.9)	523 (2.8)	7 (0.4)	495 (6.2)	9.9 (0.04)
Abu Dhabi, UAE	56 (1.5)	456 (4.5)	31 (1.0)	439 (5.2)	13 (1.0)	388 (7.7)	9.7 (0.07)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**TIMSS**  
**2015**

# **CHAPTER 8: TEACHERS' AND PRINCIPALS' PREPARATION**

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

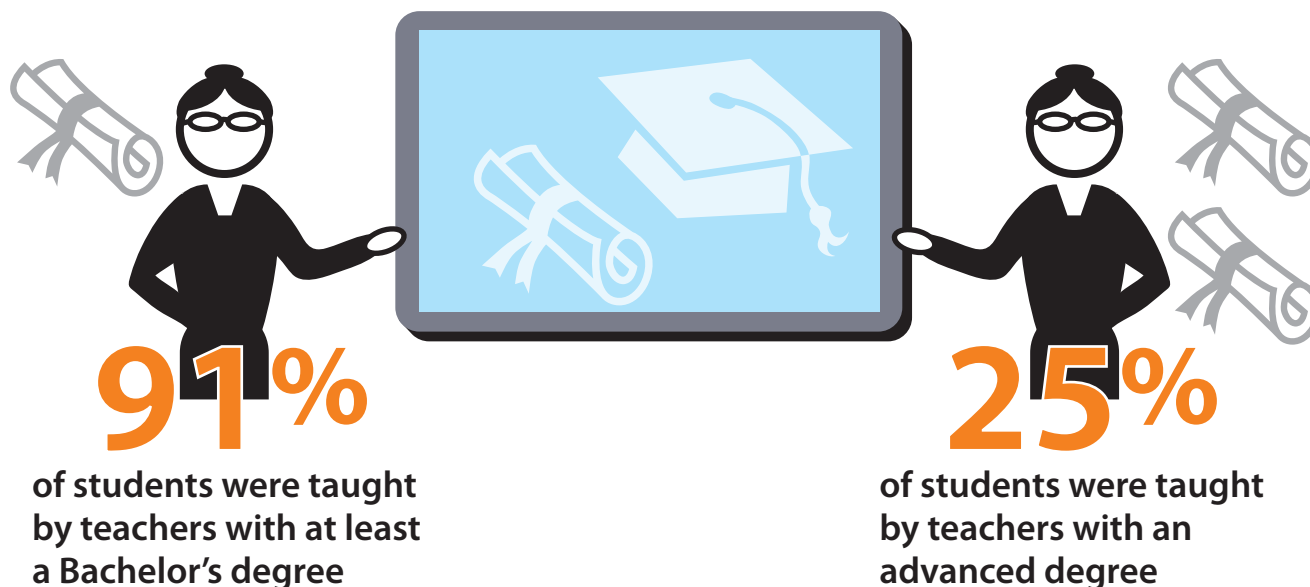
**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College



## Students Have Well Qualified Teachers and Principals

### Mathematics Teachers' Preparation and Experience

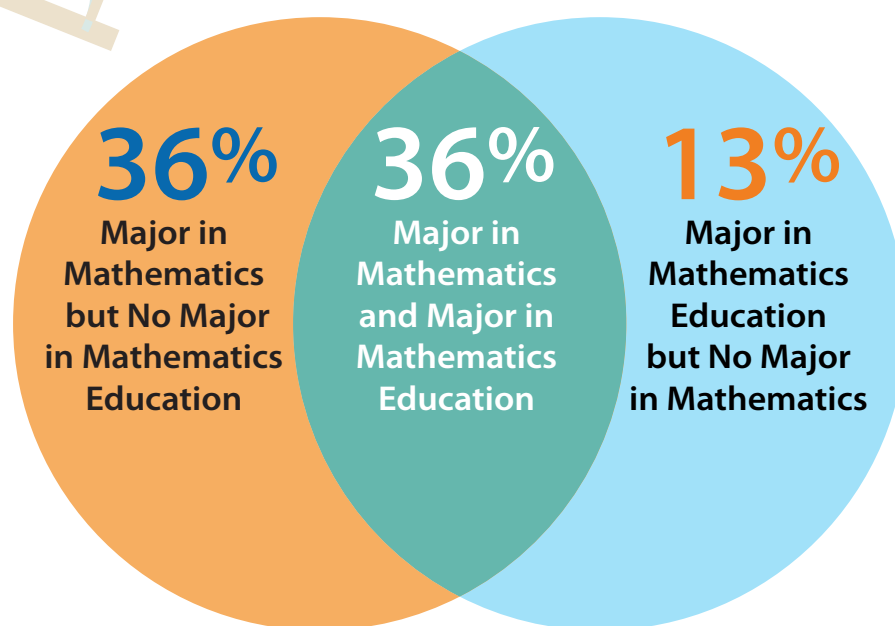
Internationally, teachers of eighth grade students reported high levels of education and considerable experience.



**34%**

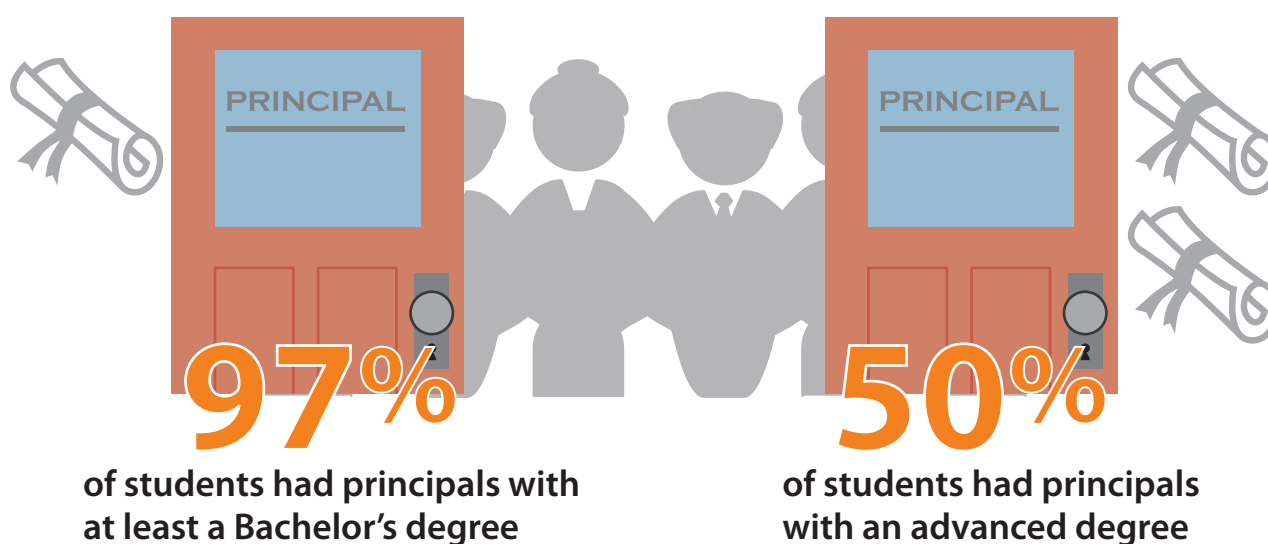
of students were taught by teachers with at least 20 years of experience (on average, students' teachers had 16 years of experience).

**Most students (72%) had teachers that majored in mathematics and 49% had teachers that majored in mathematics education.**



### Principals' Preparation and Experience

Internationally, principals of eighth grade students reported high levels of education and considerable experience.



**On average, principals had 9 years of experience. They were required to have teaching experience in 31 countries, but completion of a specialized leadership program was less common (22 countries).**





**Exhibit 8.2: Teachers' Formal Education\***

Reported by Teachers

Country	Percent of Students by Teacher Educational Level			
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Completed Post-Secondary Education but Not a Bachelor's Degree	No Further than Upper-Secondary Education
Australia	20 (2.7)	80 (2.7)	0 (0.0)	0 (0.0)
Bahrain	18 (4.0)	74 (4.6)	7 (2.0)	1 (1.0)
Botswana (9) s	1 (0.9)	34 (5.6)	61 (5.6)	4 (2.0)
Canada	17 (2.6)	82 (2.7)	1 (0.6)	0 (0.0)
Chile r	7 (2.4)	86 (3.0)	5 (1.6)	2 (1.8)
Chinese Taipei	51 (3.9)	49 (3.9)	0 (0.0)	0 (0.0)
Egypt r	0 (0.2)	87 (2.9)	11 (2.8)	2 (1.1)
England	17 (3.0)	82 (3.1)	0 (0.4)	1 (0.5)
Georgia	88 (2.9)	10 (2.7)	0 (0.0)	2 (1.2)
Hong Kong SAR	43 (4.6)	53 (4.8)	3 (0.8)	1 (0.8)
Hungary	30 (3.2)	70 (3.2)	0 (0.3)	0 (0.0)
Iran, Islamic Rep. of	12 (2.4)	65 (3.4)	21 (2.7)	2 (1.1)
Ireland	32 (2.7)	66 (2.7)	0 (0.2)	1 (0.5)
Israel	37 (3.0)	59 (3.2)	3 (1.0)	0 (0.2)
Italy	11 (2.9)	71 (4.1)	18 (3.2)	0 (0.0)
Japan	9 (2.2)	90 (2.3)	1 (0.4)	0 (0.0)
Jordan r	9 (2.9)	80 (3.6)	6 (2.1)	4 (1.6)
Kazakhstan	4 (1.5)	93 (2.1)	0 (0.4)	2 (1.2)
Korea, Rep. of	34 (3.5)	66 (3.5)	0 (0.0)	0 (0.0)
Kuwait r	14 (3.9)	76 (4.1)	8 (1.4)	2 (1.1)
Lebanon	41 (4.4)	39 (4.1)	1 (0.7)	20 (3.5)
Lithuania	33 (3.4)	67 (3.3)	0 (0.2)	0 (0.2)
Malaysia	3 (1.2)	92 (2.0)	5 (1.4)	0 (0.0)
Malta	13 (0.1)	80 (0.1)	6 (0.1)	1 (0.0)
Morocco r	5 (1.6)	32 (3.3)	22 (2.8)	41 (3.0)
New Zealand	46 (2.9)	44 (3.4)	9 (2.1)	0 (0.0)
Norway (9)	22 (3.6)	74 (3.5)	5 (1.7)	0 (0.0)
Oman	13 (1.5)	86 (1.6)	1 (0.6)	1 (0.3)
Qatar	30 (3.2)	66 (3.2)	2 (0.5)	1 (0.4)
Russian Federation	64 (3.9)	36 (3.9)	0 (0.4)	0 (0.0)
Saudi Arabia s	3 (2.0)	88 (3.6)	5 (2.3)	4 (2.1)
Singapore	11 (1.6)	87 (1.8)	2 (0.8)	0 (0.0)
Slovenia	60 (3.5)	0 (0.2)	40 (3.5)	0 (0.0)
South Africa (9)	2 (0.7)	71 (2.8)	25 (2.8)	2 (0.9)
Sweden	35 (3.8)	59 (4.0)	4 (1.7)	1 (0.8)
Thailand	26 (3.1)	74 (3.1)	0 (0.0)	0 (0.0)
Turkey	7 (2.0)	90 (2.2)	3 (1.5)	0 (0.0)
United Arab Emirates r	30 (2.2)	66 (2.7)	4 (1.2)	1 (0.3)
United States	58 (2.7)	42 (2.7)	0 (0.0)	0 (0.0)
International Avg.	25 (0.5)	66 (0.5)	7 (0.3)	2 (0.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	x x	x x	x x	x x
Ontario, Canada r	18 (3.6)	80 (3.7)	1 (1.1)	0 (0.0)
Quebec, Canada	15 (4.4)	85 (4.4)	0 (0.0)	0 (0.0)
Norway (8)	23 (2.8)	74 (3.2)	3 (1.2)	0 (0.0)
Abu Dhabi, UAE r	16 (3.6)	79 (4.0)	5 (2.1)	0 (0.5)
Dubai, UAE r	42 (2.3)	56 (2.5)	1 (0.4)	1 (0.9)
Florida, US r	35 (5.6)	65 (5.6)	0 (0.0)	0 (0.0)

\* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

\*\* For example, doctorate, master's, or other postgraduate degree.

() Standard errors appear in parentheses. Because of rounding some results 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 students.

**Exhibit 8.4: Teachers Majored in Education and Mathematics**

Reported by Teachers

Country	Major in Mathematics and Mathematics Education		Major in Mathematics but No Major in Mathematics Education		Major in Mathematics Education but No Major in Mathematics		All Other Majors		No Formal Education Beyond Upper-Secondary*	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Australia	46 (3.3)	513 (4.7)	18 (2.7)	507 (10.3)	14 (2.7)	498 (9.8)	22 (2.7)	503 (6.0)	0 (0.0)	~ ~
Bahrain	33 (4.2)	460 (4.1)	48 (4.5)	452 (3.3)	16 (2.2)	440 (5.6)	3 (0.6)	469 (15.9)	1 (0.9)	~ ~
Botswana (9)	22 (4.0)	395 (6.4)	46 (5.2)	392 (4.4)	14 (3.2)	383 (6.3)	16 (3.6)	398 (6.8)	2 (1.3)	~ ~
Canada	19 (2.2)	545 (6.0)	8 (1.6)	537 (5.6)	15 (2.3)	546 (4.8)	59 (2.5)	521 (2.9)	0 (0.0)	~ ~
Chile	44 (4.7)	444 (6.2)	34 (4.2)	425 (7.1)	5 (2.0)	440 (15.8)	14 (3.4)	399 (8.9)	2 (1.7)	~ ~
Chinese Taipei	31 (3.1)	610 (5.8)	50 (3.8)	600 (4.6)	4 (1.5)	599 (16.9)	15 (2.3)	577 (4.8)	0 (0.0)	~ ~
Egypt	46 (4.4)	392 (6.1)	25 (3.5)	397 (8.5)	22 (3.2)	395 (9.3)	5 (1.5)	362 (16.7)	2 (0.9)	~ ~
England	44 (4.1)	520 (8.1)	37 (4.3)	526 (8.5)	4 (1.5)	475 (26.2)	15 (3.0)	504 (12.6)	1 (0.5)	~ ~
Georgia	46 (4.1)	453 (6.0)	45 (3.8)	458 (4.5)	4 (1.7)	439 (13.4)	3 (1.3)	435 (26.2)	2 (1.2)	~ ~
Hong Kong SAR	42 (4.1)	574 (8.2)	25 (3.5)	610 (8.2)	9 (2.3)	597 (16.3)	23 (3.9)	610 (8.2)	1 (0.8)	~ ~
Hungary	12 (2.4)	500 (14.4)	8 (2.3)	519 (18.2)	76 (3.3)	518 (4.3)	4 (1.3)	472 (17.2)	0 (0.0)	~ ~
Iran, Islamic Rep. of	21 (2.1)	440 (10.0)	46 (3.6)	441 (7.0)	22 (2.9)	445 (9.2)	9 (2.2)	407 (13.3)	2 (1.1)	~ ~
Ireland	33 (3.0)	519 (5.1)	36 (2.6)	532 (5.6)	8 (1.6)	534 (5.7)	22 (2.5)	510 (8.3)	1 (0.5)	~ ~
Israel	62 (2.6)	519 (5.9)	25 (2.2)	498 (6.7)	7 (1.7)	511 (14.2)	5 (1.0)	474 (18.2)	0 (0.2)	~ ~
Italy	25 (3.6)	494 (6.3)	20 (3.0)	495 (7.1)	9 (2.3)	491 (9.6)	46 (4.0)	492 (4.5)	0 (0.0)	~ ~
Japan	41 (3.5)	582 (3.9)	40 (3.2)	593 (3.5)	6 (1.8)	562 (10.9)	13 (2.0)	592 (6.9)	0 (0.0)	~ ~
Jordan	12 (2.5)	385 (9.2)	75 (3.3)	384 (3.9)	6 (1.7)	389 (14.0)	4 (1.3)	402 (16.2)	3 (1.2)	406 (11.1)
Kazakhstan	37 (3.8)	540 (8.4)	58 (3.8)	524 (7.9)	1 (0.8)	~ ~	1 (1.0)	~ ~	2 (1.2)	~ ~
Korea, Rep. of	18 (3.1)	610 (6.2)	30 (3.4)	606 (5.7)	49 (4.1)	603 (3.7)	3 (1.2)	618 (9.4)	0 (0.0)	~ ~
Kuwait	38 (4.5)	407 (9.0)	38 (3.9)	387 (5.4)	16 (2.9)	377 (12.1)	7 (2.2)	411 (37.2)	1 (0.9)	~ ~
Lebanon	20 (3.5)	426 (9.6)	46 (4.1)	451 (5.7)	3 (1.5)	470 (23.0)	11 (2.8)	442 (9.8)	20 (3.6)	431 (8.5)
Lithuania	55 (5.1)	512 (4.9)	36 (4.7)	508 (5.5)	8 (2.5)	508 (13.0)	1 (0.9)	~ ~	0 (0.2)	~ ~
Malaysia	31 (3.3)	466 (8.6)	27 (3.3)	478 (10.0)	18 (2.6)	477 (9.8)	24 (3.3)	449 (9.1)	0 (0.0)	~ ~
Malta	66 (0.1)	494 (1.2)	21 (0.1)	492 (2.2)	8 (0.1)	489 (4.2)	4 (0.0)	506 (7.7)	1 (0.0)	~ ~
Morocco	10 (2.1)	393 (8.0)	43 (3.3)	381 (3.9)	1 (0.5)	~ ~	9 (1.7)	375 (7.2)	37 (2.9)	388 (3.0)
New Zealand	29 (2.9)	496 (8.0)	30 (3.1)	503 (8.9)	7 (1.6)	502 (13.5)	34 (3.7)	481 (6.1)	0 (0.0)	~ ~
Norway (9)	15 (2.5)	512 (5.3)	54 (4.0)	515 (2.9)	2 (1.2)	~ ~	29 (3.5)	512 (3.5)	0 (0.0)	~ ~
Oman	40 (3.4)	398 (5.6)	42 (2.9)	406 (3.7)	17 (2.6)	409 (6.2)	0 (0.1)	~ ~	0 (0.3)	~ ~
Qatar	35 (2.9)	434 (6.1)	50 (3.3)	434 (5.0)	7 (1.7)	452 (16.7)	7 (1.4)	446 (15.8)	1 (0.3)	~ ~
Russian Federation	58 (4.0)	544 (4.5)	41 (3.9)	530 (6.8)	0 (0.0)	~ ~	1 (0.6)	~ ~	0 (0.0)	~ ~
Saudi Arabia	37 (4.3)	366 (7.7)	42 (4.4)	367 (6.8)	16 (2.9)	366 (7.4)	1 (1.0)	~ ~	3 (1.5)	360 (9.6)
Singapore	53 (2.6)	625 (5.2)	31 (2.4)	614 (7.0)	6 (1.1)	645 (11.1)	10 (1.5)	595 (11.4)	0 (0.0)	~ ~
Slovenia	39 (3.2)	511 (2.9)	40 (3.3)	518 (3.2)	20 (2.7)	527 (5.7)	1 (0.5)	~ ~	0 (0.0)	~ ~
South Africa (9)	24 (2.6)	379 (6.5)	48 (3.4)	363 (7.8)	13 (2.3)	396 (17.1)	11 (2.3)	369 (12.6)	2 (0.9)	~ ~
Sweden	50 (4.3)	506 (4.1)	17 (3.3)	495 (8.5)	21 (3.7)	497 (4.9)	11 (2.9)	489 (8.8)	1 (0.8)	~ ~
Thailand	34 (4.0)	419 (7.6)	47 (4.3)	437 (7.7)	3 (1.4)	440 (18.3)	16 (3.0)	439 (9.8)	0 (0.0)	~ ~
Turkey	53 (4.0)	460 (6.8)	18 (2.7)	470 (12.1)	27 (3.3)	444 (8.0)	3 (1.3)	463 (20.1)	0 (0.0)	~ ~
United Arab Emirates	36 (2.0)	478 (4.2)	49 (2.1)	457 (3.6)	10 (1.2)	445 (13.0)	5 (1.1)	493 (20.1)	0 (0.3)	~ ~
United States	35 (2.9)	521 (4.9)	12 (1.6)	512 (8.5)	22 (2.4)	513 (8.2)	31 (2.8)	522 (5.9)	0 (0.0)	~ ~
International Avg.	36 (0.6)	483 (1.1)	36 (0.5)	482 (1.2)	13 (0.4)	481 (2.1)	13 (0.4)	477 (2.4)	2 (0.2)	396 (4.3)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	
Ontario, Canada	6 (2.0)	524 (11.8)	3 (1.3)	524 (10.9)	7 (2.0)	538 (10.1)	84 (2.9)	524 (3.3)	0 (0.0)	~ ~	
Quebec, Canada	43 (5.4)	557 (6.0)	16 (3.9)	543 (8.1)	25 (5.6)	561 (6.2)	15 (3.3)	522 (8.6)	0 (0.0)	~ ~	
Norway (8)	19 (3.5)	482 (5.5)	51 (4.1)	489 (3.0)	3 (1.3)	498 (13.3)	27 (3.2)	487 (3.4)	0 (0.0)	~ ~	
Abu Dhabi, UAE	26 (4.0)	449 (10.7)	51 (4.4)	435 (7.1)	17 (3.2)	438 (19.2)	5 (2.0)	483 (36.3)	0 (0.4)	~ ~	
Dubai, UAE	46 (2.9)	516 (3.9)	45 (2.9)	510 (4.6)	5 (1.2)	490 (19.5)	4 (1.0)	555 (21.7)	1 (0.8)	~ ~	
Florida, US	r	26 (5.3)	498 (19.3)	24 (6.5)	506 (15.2)	14 (4.4)	532 (17.0)	35 (6.7)	489 (13.8)	0 (0.0)	~ ~

\* Countries have been increasing their certification requirements and providing professional development to teachers certified under earlier guidelines.

( ) Standard errors appear in parentheses. Because of rounding some results 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 "x" indicates data are available for less than 50% of students.

**Exhibit 8.6: Teachers' Years of Experience**

Reported by Teachers

Country	20 Years or More		At Least 10 but Less than 20 Years		At Least 5 but Less than 10 Years		Less than 5 Years		Average Years of Experience
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Australia	36 (3.3)	514 (5.5)	28 (2.6)	505 (6.6)	19 (2.3)	508 (7.4)	18 (2.1)	498 (8.6)	16 (0.7)
Bahrain	20 (3.8)	455 (6.4)	41 (3.6)	453 (3.7)	22 (4.2)	463 (6.2)	18 (3.1)	437 (5.6)	12 (0.9)
Botswana (9)	8 (2.2)	398 (8.8)	32 (4.1)	386 (4.1)	22 (3.6)	401 (5.1)	38 (4.4)	388 (4.6)	9 (0.6)
Canada	28 (3.1)	533 (3.5)	45 (3.3)	527 (4.1)	15 (2.4)	532 (5.5)	12 (2.1)	536 (7.6)	15 (0.5)
Chile	36 (4.5)	430 (6.4)	21 (3.6)	431 (8.8)	22 (3.4)	430 (8.9)	21 (4.3)	429 (11.9)	16 (1.2)
Chinese Taipei	23 (3.4)	602 (7.1)	43 (4.0)	601 (4.7)	20 (3.3)	598 (7.3)	14 (2.6)	590 (9.7)	14 (0.7)
Egypt	46 (3.6)	394 (5.5)	22 (2.9)	405 (11.1)	23 (3.1)	376 (8.0)	9 (2.4)	393 (18.9)	17 (0.7)
England	17 (3.1)	511 (13.4)	25 (4.0)	524 (10.8)	29 (3.6)	508 (9.9)	29 (3.7)	525 (10.5)	11 (0.7)
Georgia	78 (3.1)	450 (4.0)	12 (2.7)	464 (12.2)	8 (2.0)	486 (16.3)	2 (0.8)	~ ~	26 (0.9)
Hong Kong SAR	32 (3.8)	603 (9.9)	26 (3.9)	586 (9.7)	25 (3.5)	589 (7.6)	17 (3.6)	601 (11.2)	14 (0.8)
Hungary	69 (3.6)	512 (4.5)	23 (3.5)	523 (11.1)	4 (1.5)	540 (26.8)	4 (1.1)	484 (26.4)	25 (0.8)
Iran, Islamic Rep. of	48 (3.8)	447 (6.7)	38 (3.8)	441 (6.5)	13 (2.2)	391 (7.8)	1 (0.7)	~ ~	18 (0.5)
Ireland	31 (2.8)	527 (5.2)	28 (2.5)	520 (7.3)	22 (2.1)	525 (6.1)	19 (2.4)	518 (4.8)	14 (0.6)
Israel	40 (2.5)	529 (7.4)	29 (2.5)	505 (10.6)	15 (1.9)	496 (9.6)	16 (1.7)	490 (9.9)	16 (0.5)
Italy	63 (4.1)	497 (3.6)	19 (3.2)	482 (5.6)	13 (2.7)	497 (6.3)	4 (1.6)	472 (19.4)	23 (1.0)
Japan	42 (3.6)	589 (3.7)	21 (3.0)	586 (7.5)	20 (2.7)	587 (5.0)	17 (2.5)	580 (5.3)	17 (0.8)
Jordan	14 (2.4)	383 (8.1)	26 (3.2)	392 (5.9)	34 (3.8)	390 (7.2)	26 (3.2)	378 (6.5)	10 (0.5)
Kazakhstan	57 (3.7)	536 (6.9)	21 (3.2)	521 (12.4)	12 (3.1)	515 (15.5)	10 (2.2)	517 (17.0)	20 (0.9)
Korea, Rep. of	36 (3.2)	609 (3.6)	22 (2.9)	606 (4.9)	15 (3.1)	610 (11.1)	26 (3.0)	599 (5.6)	14 (0.6)
Kuwait	21 (3.4)	392 (11.1)	36 (4.2)	401 (8.3)	30 (3.8)	393 (11.2)	13 (2.4)	371 (13.6)	13 (0.6)
Lebanon	25 (3.6)	456 (7.2)	32 (3.4)	433 (6.3)	27 (3.8)	441 (10.6)	16 (3.0)	440 (9.5)	13 (0.8)
Lithuania	76 (3.6)	511 (3.6)	18 (3.3)	518 (6.9)	4 (1.5)	472 (18.9)	2 (1.2)	~ ~	27 (0.8)
Malaysia	14 (2.4)	475 (10.8)	41 (4.0)	455 (7.4)	29 (4.0)	470 (8.3)	16 (2.9)	475 (8.9)	12 (0.6)
Malta	15 (0.1)	482 (2.6)	38 (0.2)	495 (1.6)	24 (0.1)	491 (2.0)	23 (0.1)	505 (2.2)	12 (0.0)
Morocco	54 (3.0)	392 (3.1)	14 (2.4)	375 (6.0)	11 (2.0)	379 (7.4)	20 (2.4)	374 (5.0)	20 (0.7)
New Zealand	40 (3.4)	502 (6.6)	26 (2.7)	485 (6.8)	14 (2.1)	493 (10.1)	21 (2.5)	488 (8.3)	17 (1.0)
Norway (9)	25 (3.5)	513 (4.1)	41 (4.1)	514 (3.9)	19 (2.9)	518 (4.3)	15 (2.7)	501 (4.1)	15 (0.8)
Oman	16 (2.4)	395 (6.9)	44 (3.9)	413 (4.2)	30 (3.1)	395 (5.4)	10 (2.0)	399 (8.3)	13 (0.5)
Qatar	20 (3.2)	439 (9.8)	43 (4.0)	432 (5.9)	28 (2.7)	437 (7.6)	9 (2.0)	452 (13.0)	13 (0.4)
Russian Federation	62 (3.3)	534 (5.7)	24 (3.5)	546 (9.1)	7 (1.7)	525 (9.8)	7 (1.7)	546 (22.6)	23 (0.7)
Saudi Arabia	14 (3.3)	374 (11.1)	39 (4.1)	375 (8.7)	26 (3.7)	361 (6.2)	21 (3.6)	357 (8.6)	11 (0.7)
Singapore	11 (1.6)	619 (14.8)	19 (2.2)	625 (8.3)	30 (2.4)	617 (7.4)	40 (2.5)	620 (5.8)	9 (0.4)
Slovenia	53 (3.3)	516 (2.7)	29 (2.9)	518 (4.4)	12 (2.1)	520 (6.5)	5 (1.3)	508 (7.9)	21 (0.7)
South Africa (9)	33 (3.5)	377 (8.7)	23 (3.4)	366 (8.8)	24 (3.2)	383 (13.1)	19 (2.9)	371 (9.2)	14 (0.7)
Sweden	21 (3.5)	502 (6.5)	46 (3.8)	504 (4.3)	20 (3.9)	502 (4.5)	13 (2.7)	482 (6.7)	14 (0.7)
Thailand	28 (3.1)	430 (8.8)	19 (3.0)	439 (14.3)	16 (2.7)	436 (10.8)	36 (3.8)	427 (8.7)	13 (0.9)
Turkey	11 (2.4)	476 (11.5)	31 (2.9)	497 (9.4)	25 (2.7)	452 (5.7)	33 (3.0)	420 (7.0)	10 (0.6)
United Arab Emirates	24 (2.2)	452 (6.6)	41 (2.5)	463 (5.0)	25 (2.3)	485 (5.9)	10 (1.1)	466 (8.2)	14 (0.3)
United States	25 (2.9)	527 (5.8)	38 (2.9)	509 (5.1)	18 (2.3)	526 (7.0)	19 (2.0)	520 (7.1)	14 (0.6)
International Avg.	34 (0.5)	484 (1.2)	30 (0.5)	483 (1.2)	20 (0.5)	480 (1.6)	17 (0.4)	477 (1.8)	16 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

	x x	x x	x x	x x	x x	x x	x x	x x	x x	
Buenos Aires, Argentina										
Ontario, Canada	25 (4.2)	527 (4.9)	47 (4.4)	518 (4.6)	16 (3.2)	532 (6.6)	13 (2.4)	534 (10.2)	14 (0.6)	
Quebec, Canada	38 (5.4)	543 (4.3)	45 (5.2)	549 (6.6)	11 (3.1)	559 (9.0)	6 (1.2)	571 (7.8)	17 (0.7)	
Norway (8)	15 (2.6)	487 (5.5)	39 (4.3)	493 (3.2)	25 (3.6)	488 (4.5)	21 (3.1)	474 (4.7)	12 (0.7)	
Abu Dhabi, UAE	r	28 (4.7)	451 (15.1)	43 (4.6)	425 (9.5)	22 (3.7)	461 (12.2)	7 (1.9)	456 (27.6)	15 (0.7)
Dubai, UAE		15 (2.9)	490 (7.4)	42 (3.7)	511 (4.9)	31 (3.0)	528 (6.0)	12 (1.7)	506 (7.6)	12 (0.4)
Florida, US	r	13 (4.4)	508 (27.4)	30 (6.5)	485 (15.7)	38 (7.9)	511 (14.5)	19 (5.9)	503 (14.6)	10 (1.1)

( ) Standard errors appear in parentheses. Because of rounding some results 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 "x" indicates data are available for less than 50% of students.

**Exhibit 8.8: Teacher Participation in Professional Development in Mathematics in the Past Two Years**

Reported by Teachers

Teachers could indicate participating in more than one area of professional development.

Country	Percent of Students by Teachers' Area of Professional Development						
	Mathematics Content	Mathematics Pedagogy/ Instruction	Mathematics Curriculum	Integrating Information Technology into Mathematics	Improving Students' Critical Thinking or Problem Solving Skills	Mathematics Assessment	Addressing Individual Students' Needs
Australia	65 (2.6)	67 (2.7)	71 (2.8)	59 (2.6)	49 (3.9)	47 (3.4)	58 (3.8)
Bahrain	45 (3.2)	65 (2.9)	44 (2.7)	69 (2.9)	60 (3.5)	58 (3.6)	64 (3.6)
Botswana (9)	45 (4.1)	28 (3.7)	51 (4.8)	26 (4.1)	31 (4.3)	39 (4.3)	33 (4.5)
Canada	66 (3.1)	72 (3.2)	47 (3.3)	62 (3.2)	64 (3.2)	49 (3.7)	57 (2.6)
Chile	48 (4.0)	41 (4.6)	30 (3.5)	27 (4.1)	30 (4.0)	22 (3.7)	18 (3.2)
Chinese Taipei	78 (3.3)	65 (3.6)	72 (3.5)	60 (3.3)	40 (3.6)	65 (3.6)	46 (3.9)
Egypt	49 (4.0)	60 (3.7)	40 (3.6)	40 (3.5)	55 (4.0)	47 (4.1)	56 (3.9)
England	59 (4.2)	65 (4.4)	65 (3.7)	41 (4.7)	43 (4.4)	43 (4.3)	48 (4.4)
Georgia	39 (4.3)	41 (4.2)	41 (4.5)	53 (4.7)	40 (4.5)	34 (4.2)	35 (4.3)
Hong Kong SAR	63 (4.3)	64 (4.7)	51 (4.5)	58 (4.5)	42 (4.5)	42 (4.4)	50 (4.4)
Hungary	28 (3.3)	36 (3.3)	15 (2.7)	31 (3.5)	18 (2.7)	20 (3.2)	22 (3.3)
Iran, Islamic Rep. of	74 (3.0)	83 (2.9)	55 (3.9)	39 (3.5)	42 (3.4)	40 (2.7)	36 (3.0)
Ireland	94 (1.2)	78 (2.6)	91 (1.7)	65 (2.9)	71 (2.5)	40 (2.6)	35 (2.7)
Israel	69 (2.7)	70 (2.5)	60 (2.9)	65 (2.8)	42 (3.4)	34 (2.5)	51 (2.6)
Italy	26 (3.3)	40 (3.4)	30 (3.7)	41 (4.0)	25 (3.2)	24 (3.3)	45 (4.1)
Japan	70 (3.0)	68 (3.6)	28 (3.6)	39 (3.6)	30 (3.4)	23 (3.3)	37 (3.7)
Jordan	25 (3.3)	36 (3.4)	24 (2.7)	31 (3.3)	49 (3.3)	26 (3.4)	42 (3.8)
Kazakhstan	59 (3.9)	73 (3.9)	60 (4.2)	82 (3.2)	75 (3.7)	66 (4.0)	66 (3.8)
Korea, Rep. of	51 (3.1)	63 (3.3)	44 (3.1)	32 (3.1)	34 (3.3)	46 (3.8)	38 (3.3)
Kuwait	63 (4.1)	62 (4.3)	61 (4.0)	45 (3.9)	56 (3.8)	50 (4.0)	57 (4.3)
Lebanon	57 (4.8)	60 (4.3)	51 (4.5)	53 (4.3)	53 (4.1)	57 (4.7)	47 (4.6)
Lithuania	62 (4.4)	61 (4.3)	57 (3.8)	70 (3.5)	53 (3.6)	68 (3.5)	50 (4.6)
Malaysia	47 (3.6)	65 (3.6)	46 (3.7)	36 (4.0)	70 (3.7)	56 (3.3)	33 (3.6)
Malta	45 (0.1)	60 (0.2)	54 (0.2)	57 (0.1)	33 (0.1)	41 (0.1)	44 (0.1)
Morocco	23 (3.0)	27 (2.9)	20 (2.8)	41 (3.0)	14 (2.3)	24 (2.9)	13 (2.5)
New Zealand	66 (3.2)	63 (3.6)	61 (2.6)	58 (3.5)	37 (3.2)	51 (2.6)	48 (3.0)
Norway (9)	18 (3.3)	24 (3.6)	11 (2.6)	36 (3.2)	12 (2.7)	22 (3.5)	12 (2.5)
Oman	50 (3.4)	56 (3.5)	36 (3.2)	38 (3.1)	41 (3.0)	36 (3.1)	27 (2.7)
Qatar	67 (3.0)	71 (3.1)	60 (3.5)	62 (3.5)	59 (3.2)	62 (2.8)	64 (3.1)
Russian Federation	70 (3.7)	79 (3.1)	77 (3.2)	78 (2.4)	42 (3.6)	51 (4.0)	51 (3.7)
Saudi Arabia	49 (4.8)	69 (4.3)	36 (4.1)	37 (3.8)	44 (4.5)	33 (4.1)	40 (4.3)
Singapore	68 (2.5)	90 (1.7)	65 (2.6)	62 (2.6)	55 (2.7)	51 (2.9)	38 (2.9)
Slovenia	60 (3.5)	57 (3.6)	36 (2.7)	55 (3.2)	36 (3.3)	40 (3.2)	35 (2.9)
South Africa (9)	84 (3.0)	58 (3.6)	86 (2.4)	45 (3.5)	56 (3.2)	73 (2.7)	52 (3.7)
Sweden	58 (4.6)	70 (4.4)	39 (4.5)	18 (2.5)	52 (4.1)	52 (4.0)	25 (3.6)
Thailand	70 (3.5)	73 (3.6)	56 (4.1)	63 (3.5)	57 (3.9)	50 (3.9)	31 (3.4)
Turkey	19 (2.6)	27 (3.2)	25 (3.0)	27 (3.0)	26 (3.0)	33 (3.3)	21 (2.7)
United Arab Emirates	59 (2.4)	60 (2.8)	60 (2.3)	71 (2.1)	71 (2.2)	59 (2.6)	68 (2.1)
United States	78 (2.5)	70 (2.7)	84 (2.0)	65 (2.9)	62 (2.7)	61 (2.8)	59 (3.1)
International Avg.	56 (0.6)	59 (0.6)	50 (0.5)	50 (0.5)	45 (0.6)	44 (0.6)	42 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x	x x
Ontario, Canada	r 74 (3.9)	r 79 (4.1)	r 57 (4.1)	r 60 (4.2)	r 81 (3.2)	r 53 (4.9)	r 61 (3.8)	
Quebec, Canada	49 (5.2)	58 (4.5)	26 (5.2)	70 (4.7)	30 (5.7)	39 (5.4)	57 (4.0)	
Norway (8)	20 (3.5)	25 (3.6)	12 (2.5)	36 (3.8)	11 (2.8)	20 (3.5)	11 (2.6)	
Abu Dhabi, UAE	45 (4.3)	51 (4.9)	47 (4.8)	61 (4.9)	71 (4.1)	50 (4.9)	74 (4.0)	
Dubai, UAE	71 (2.6)	68 (3.0)	73 (2.5)	83 (2.0)	76 (2.7)	59 (3.2)	67 (3.2)	
Florida, US	r 82 (6.4)	r 77 (7.4)	r 81 (6.5)	r 67 (8.2)	r 67 (7.1)	r 66 (6.6)	r 67 (6.0)	

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 8.10: Principals' Formal Education\***

Principal Education Level Reported by Principals and Current Requirements Reported by National Research Coordinators

Country	Percent of Students by Principal Educational Level			Current Requirements	
	Completed Postgraduate University Degree**	Completed Bachelor's Degree or Equivalent but Not a Postgraduate Degree	Did Not Complete Bachelor's Degree	Teaching Experience	Completion of Specialized School Leadership Training Program
Australia	56 (3.3)	43 (3.1)	1 (1.0)	●	○
Bahrain	36 (0.2)	64 (0.2)	0 (0.0)	●	●
Botswana (9)	12 (2.9)	76 (4.0)	12 (2.8)	●	○
Canada	56 (3.1)	44 (3.1)	0 (0.0)	●	●
Chile	64 (4.6)	36 (4.6)	0 (0.0)	●	●
Chinese Taipei	83 (3.0)	17 (3.0)	0 (0.0)	●	●
Egypt	6 (1.6)	87 (2.3)	7 (1.8)	–	–
England	87 (3.4)	13 (3.4)	0 (0.0)	○	○
Georgia	98 (1.3)	2 (1.3)	0 (0.0)	○	○
Hong Kong SAR	89 (2.9)	11 (2.9)	0 (0.0)	●	●
Hungary	43 (4.6)	57 (4.6)	0 (0.0)	○	●
Iran, Islamic Rep. of	16 (2.9)	77 (3.1)	7 (1.7)	○	○
Ireland	65 (4.2)	34 (4.2)	1 (1.0)	●	○
Israel	89 (2.0)	10 (1.9)	0 (0.4)	●	●
Italy	20 (3.6)	74 (4.2)	6 (2.2)	●	○
Japan	8 (2.4)	92 (2.4)	0 (0.0)	●	○
Jordan	50 (3.8)	48 (3.9)	2 (0.9)	○	○
Kazakhstan	14 (2.5)	86 (2.5)	0 (0.5)	●	●
Korea, Rep. of	79 (3.1)	21 (3.1)	0 (0.0)	●	●
Kuwait	17 (2.9)	72 (3.3)	11 (1.9)	●	●
Lebanon	58 (4.6)	28 (4.2)	15 (3.4)	●	●
Lithuania	54 (4.7)	46 (4.7)	0 (0.0)	●	○
Malaysia	35 (4.4)	65 (4.4)	0 (0.0)	●	●
Malta	58 (0.1)	42 (0.1)	0 (0.0)	●	●
Morocco	8 (1.7)	63 (3.1)	29 (2.6)	●	●
New Zealand	65 (4.6)	32 (4.2)	2 (2.2)	●	○
Norway (9)	41 (4.6)	58 (4.6)	1 (1.0)	○	○
Oman	27 (2.8)	68 (2.9)	5 (1.5)	●	●
Qatar	41 (0.5)	57 (0.5)	3 (0.0)	●	●
Russian Federation	84 (3.0)	16 (3.0)	0 (0.0)	●	○
Saudi Arabia	18 (3.3)	72 (3.6)	9 (2.3)	●	○
Singapore	61 (0.0)	39 (0.0)	0 (0.0)	●	●
Slovenia	99 (0.7)	1 (0.7)	0 (0.0)	●	●
South Africa (9)	12 (2.1)	80 (2.6)	8 (1.8)	●	○
Sweden	33 (4.1)	60 (4.6)	8 (2.5)	○	●
Thailand	94 (1.9)	6 (1.9)	0 (0.0)	●	●
Turkey	23 (3.0)	76 (3.1)	2 (0.8)	●	○
United Arab Emirates	50 (1.9)	48 (2.0)	2 (0.6)	●	●
United States	98 (0.7)	2 (0.7)	0 (0.0)	●	●
International Avg.	50 (0.5)	47 (0.5)	3 (0.2)		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	22 (5.1)	72 (5.6)	5 (2.5)	●	○
Ontario, Canada	51 (4.4)	49 (4.4)	0 (0.0)	●	●
Quebec, Canada	61 (5.7)	39 (5.7)	0 (0.0)	●	●
Norway (8)	42 (4.6)	57 (4.6)	1 (1.0)	○	○
Abu Dhabi, UAE	38 (4.7)	59 (4.9)	3 (1.5)	●	●
Dubai, UAE	67 (0.3)	32 (0.3)	1 (0.0)	●	○
Florida, US	100 (0.0)	0 (0.0)	0 (0.0)	●	●

● Yes  
○ No

\* Based on countries' categorizations according to UNESCO's International Standard Classification of Education (Operational Manual for ISCED-2011).

\*\* For example, doctorate, master's, or other postgraduate degree.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A dash (-) indicates comparable data 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 8.12: Principals' Years of Experience**

Reported by Principals

Country	Percent of Students by Principals' Years of Experience as a Principal				Average Years of Experience as a Principal
	20 Years or More	At Least 10 but Less than 20 Years	At Least 5 but Less than 10 Years	Less than 5 Years	
Australia	12 (2.4)	32 (4.3)	32 (4.1)	23 (3.4)	10 (0.5)
Bahrain	4 (0.1)	13 (0.2)	32 (0.2)	52 (0.3)	6 (0.0)
Botswana (9)	6 (2.2)	19 (2.9)	41 (4.4)	33 (4.2)	8 (0.5)
Canada	0 (0.3)	32 (3.5)	35 (3.6)	32 (3.6)	8 (0.4)
Chile	17 (3.3)	21 (3.4)	24 (3.7)	38 (4.0)	10 (0.8)
Chinese Taipei	6 (2.0)	29 (3.7)	30 (3.6)	35 (3.8)	8 (0.5)
Egypt	3 (1.2)	20 (3.5)	27 (3.6)	50 (4.3)	6 (0.5)
England	r 1 (1.0)	28 (4.7)	36 (4.5)	35 (4.8)	7 (0.5)
Georgia	16 (3.0)	15 (3.1)	38 (4.4)	31 (4.4)	9 (0.7)
Hong Kong SAR	12 (2.9)	31 (4.2)	33 (4.2)	24 (3.9)	11 (0.7)
Hungary	15 (3.5)	31 (4.4)	32 (3.9)	22 (3.5)	11 (0.7)
Iran, Islamic Rep. of	13 (2.1)	36 (3.1)	27 (2.5)	24 (3.0)	10 (0.5)
Ireland	7 (2.3)	24 (3.4)	38 (4.0)	31 (3.8)	8 (0.5)
Israel	10 (2.3)	26 (3.0)	32 (3.2)	33 (3.4)	9 (0.5)
Italy	18 (3.4)	23 (3.6)	28 (3.6)	30 (3.9)	10 (0.7)
Japan	0 (0.0)	8 (2.0)	38 (4.3)	54 (4.2)	5 (0.2)
Jordan	9 (2.1)	25 (2.9)	37 (3.6)	30 (3.6)	8 (0.5)
Kazakhstan	11 (2.2)	28 (3.7)	32 (4.1)	29 (3.9)	10 (0.7)
Korea, Rep. of	36 (4.4)	0 (0.0)	17 (2.9)	47 (4.5)	15 (1.5)
Kuwait	8 (2.6)	23 (3.4)	43 (4.3)	26 (3.3)	9 (0.7)
Lebanon	34 (4.9)	25 (3.9)	19 (3.7)	21 (4.0)	15 (1.1)
Lithuania	33 (4.1)	36 (3.9)	18 (3.5)	13 (3.0)	15 (0.9)
Malaysia	4 (1.5)	22 (3.0)	29 (4.1)	45 (4.7)	7 (0.5)
Malta	4 (0.0)	21 (0.1)	19 (0.1)	55 (0.1)	7 (0.0)
Morocco	1 (0.7)	20 (2.2)	38 (3.2)	40 (3.0)	7 (0.3)
New Zealand	12 (3.8)	36 (5.0)	33 (5.6)	19 (4.0)	11 (0.7)
Norway (9)	6 (2.1)	32 (4.3)	32 (4.7)	31 (4.4)	9 (0.6)
Oman	13 (2.3)	43 (4.1)	21 (2.9)	23 (2.9)	11 (0.5)
Qatar	12 (0.4)	27 (0.5)	40 (0.5)	21 (0.7)	10 (0.1)
Russian Federation	20 (3.7)	29 (3.9)	24 (3.3)	27 (3.7)	12 (0.8)
Saudi Arabia	9 (2.6)	33 (4.7)	17 (3.3)	40 (4.8)	9 (0.7)
Singapore	2 (0.0)	37 (0.0)	25 (0.0)	35 (0.0)	8 (0.0)
Slovenia	8 (2.1)	36 (4.1)	34 (4.4)	22 (3.7)	10 (0.5)
South Africa (9)	18 (2.6)	28 (2.8)	20 (2.9)	34 (3.5)	10 (0.7)
Sweden	7 (2.4)	34 (4.9)	28 (3.8)	31 (4.5)	9 (0.6)
Thailand	29 (3.3)	41 (3.6)	21 (2.9)	9 (1.8)	15 (0.7)
Turkey	8 (2.2)	23 (3.3)	21 (3.1)	48 (3.3)	7 (0.5)
United Arab Emirates	18 (1.5)	31 (1.6)	29 (2.0)	22 (2.1)	11 (0.3)
United States	7 (1.7)	19 (2.8)	31 (2.9)	44 (3.3)	7 (0.4)
International Avg.	12 (0.4)	27 (0.5)	29 (0.6)	32 (0.6)	9 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	s 9 (3.2)	14 (4.7)	27 (5.2)	49 (5.6)	7 (0.8)
Ontario, Canada	0 (0.0)	29 (4.8)	41 (5.2)	30 (5.1)	7 (0.5)
Quebec, Canada	1 (0.9)	36 (7.0)	24 (5.3)	38 (6.1)	8 (0.7)
Norway (8)	7 (2.5)	30 (4.2)	31 (4.6)	31 (4.5)	9 (0.7)
Abu Dhabi, UAE	15 (3.1)	43 (3.7)	20 (4.4)	21 (3.6)	11 (0.6)
Dubai, UAE	14 (0.2)	20 (0.3)	41 (0.3)	26 (0.3)	9 (0.0)
Florida, US	s 12 (6.1)	19 (7.0)	30 (8.2)	40 (6.2)	9 (1.7)

( ) Standard errors appear in parentheses. Because of rounding some results 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**  
**2015**

# CHAPTER 9: CLASSROOM INSTRUCTION

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

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



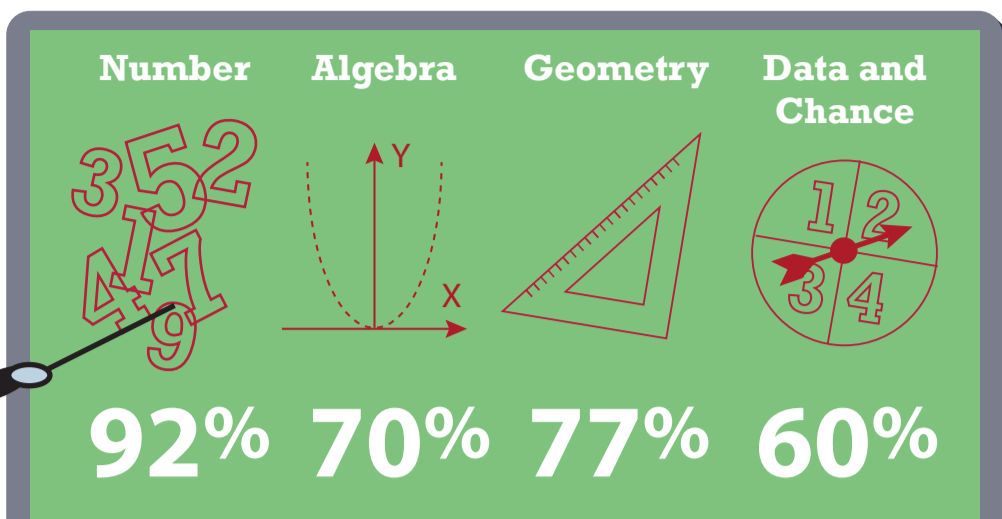


### Instruction in Mathematics Classes

#### Curriculum Coverage

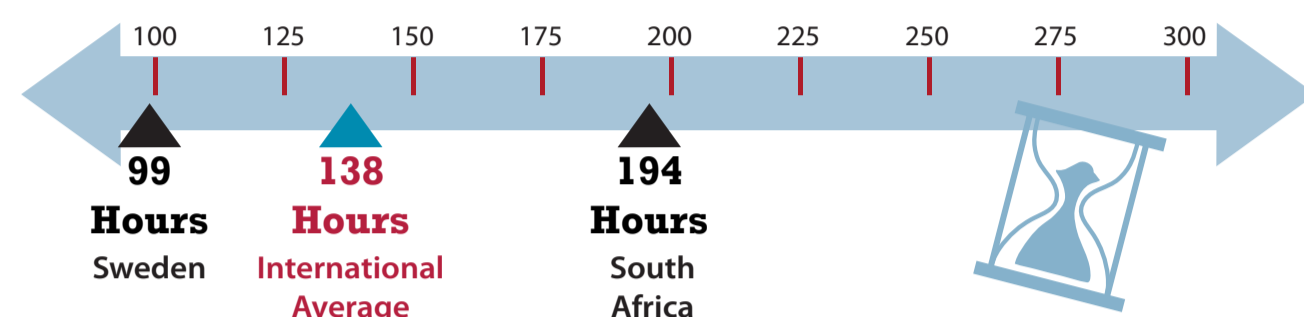
There was variation in topic coverage within content domains. However, according to their teachers many students had been taught the TIMSS topics, particularly those in Number.

Percentage of students taught the TIMSS 2015 topics

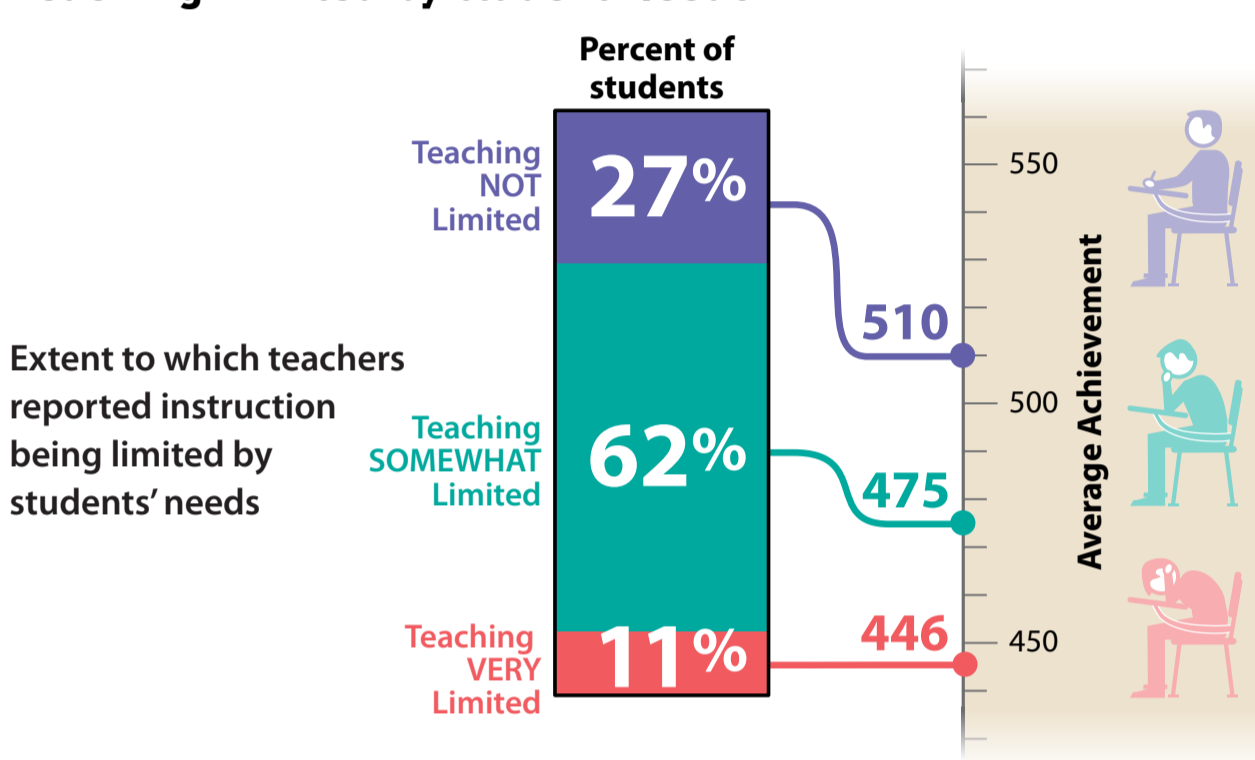


#### Instructional Time

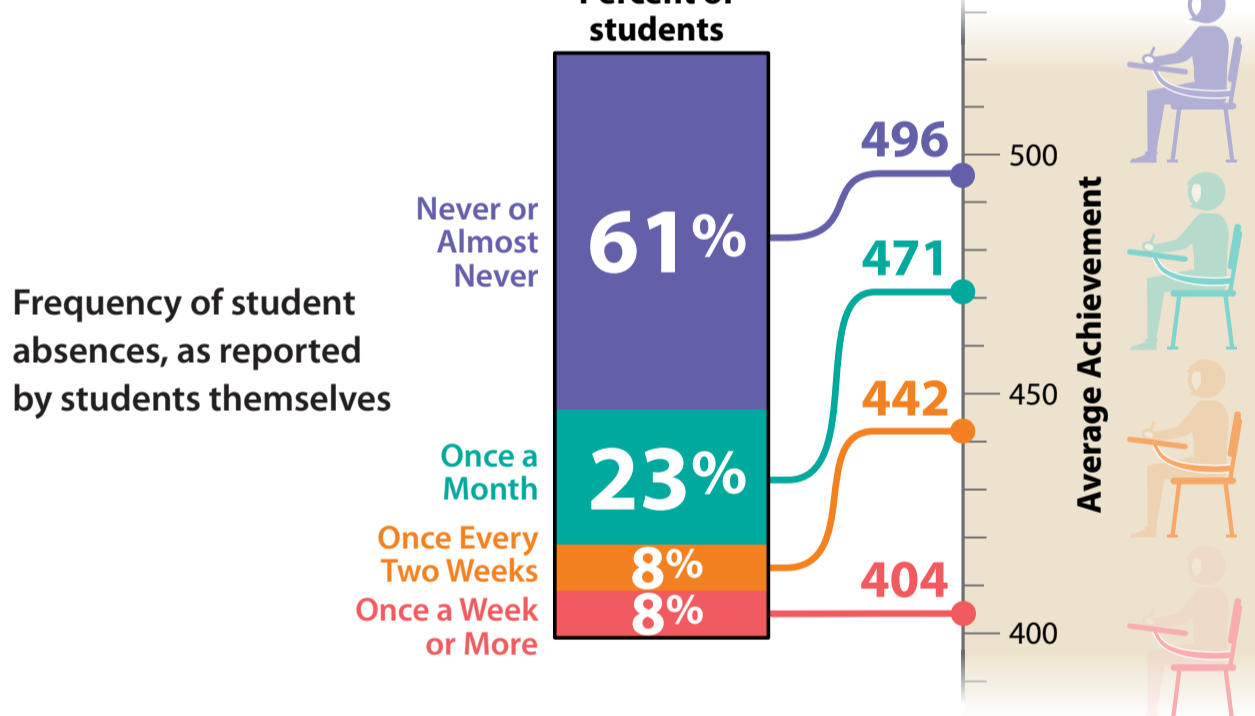
Instructional time remains a crucial resource in considering students' opportunity to learn, even though there are many factors that influence the effectiveness of an educational system. There was a considerable range in the yearly number of instructional hours in mathematics.



#### Teaching Limited by Student Needs



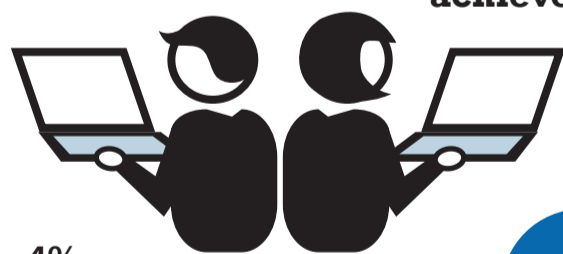
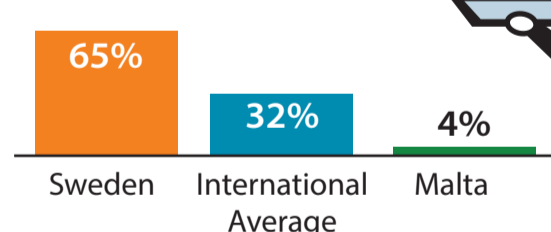
#### Student Attendance



#### Computer Activities During Mathematics Lessons

There is a continuing debate about the role of technology in education, and more particularly in mathematics classes.

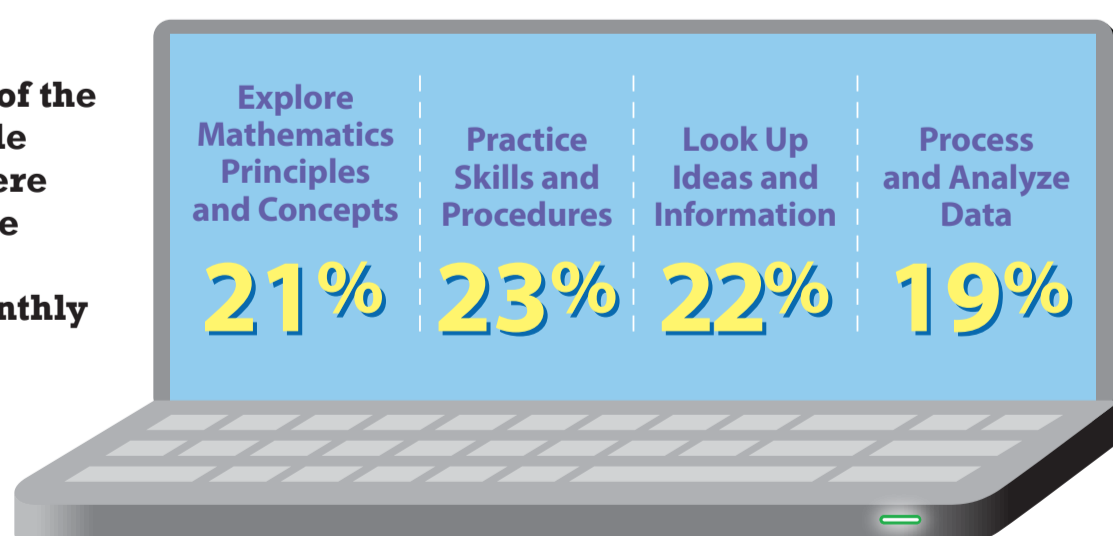
Teachers reported considerable variation in computer availability for use in mathematics lessons.



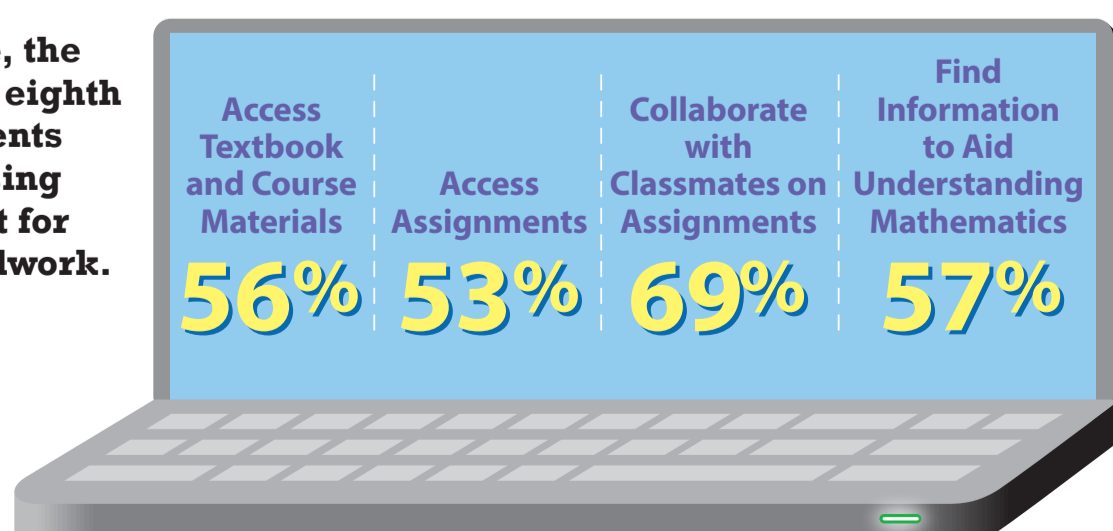
Average mathematics achievement for students with computer availability compared to those without availability:



About 20% of the eighth grade students were asked to use computers at least monthly for various activities.



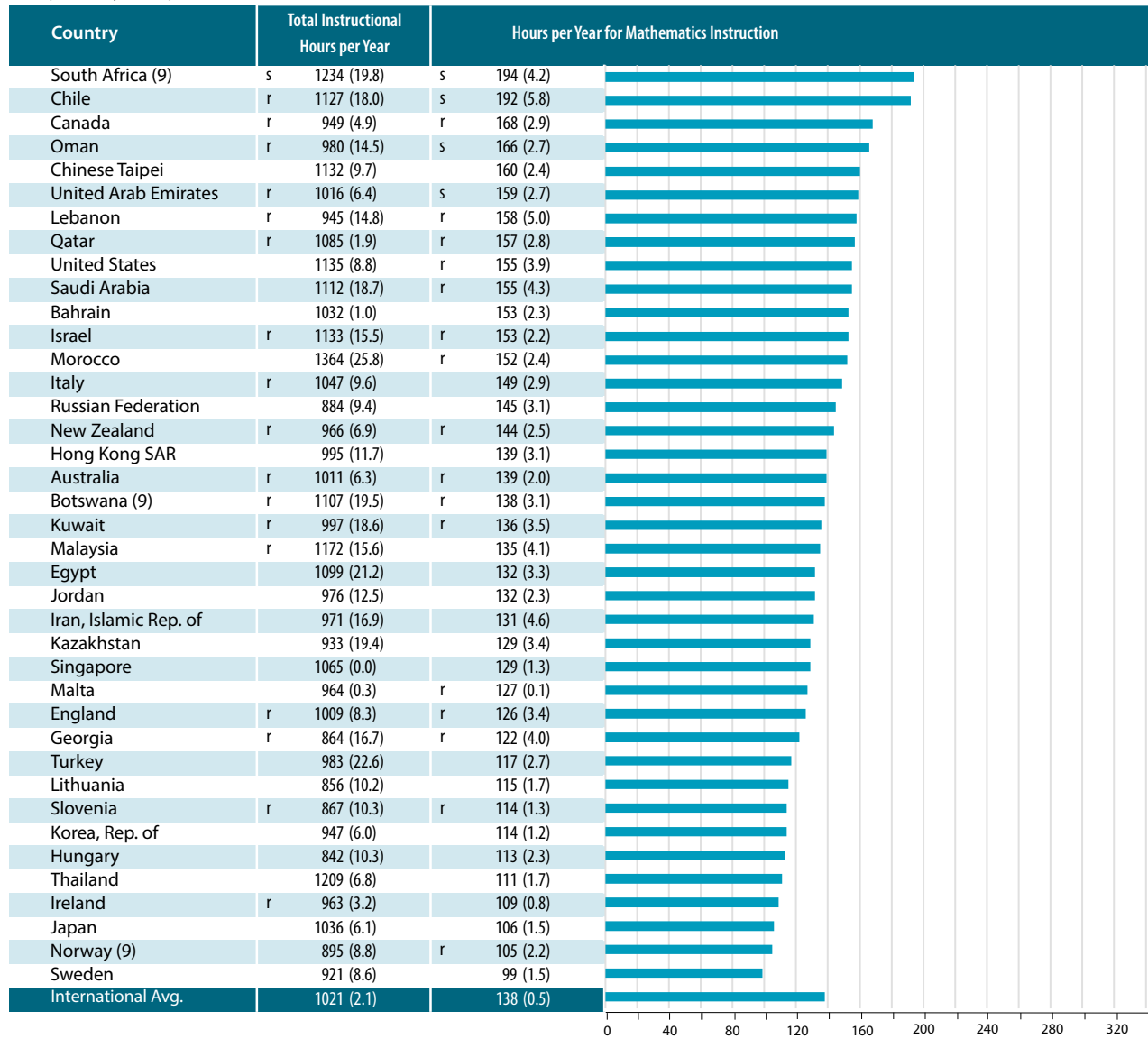
On average, the majority of eighth grade students reported using the Internet for their schoolwork.





**Exhibit 9.2: Instructional Time Spent on Mathematics**

Reported by Principals and Teachers

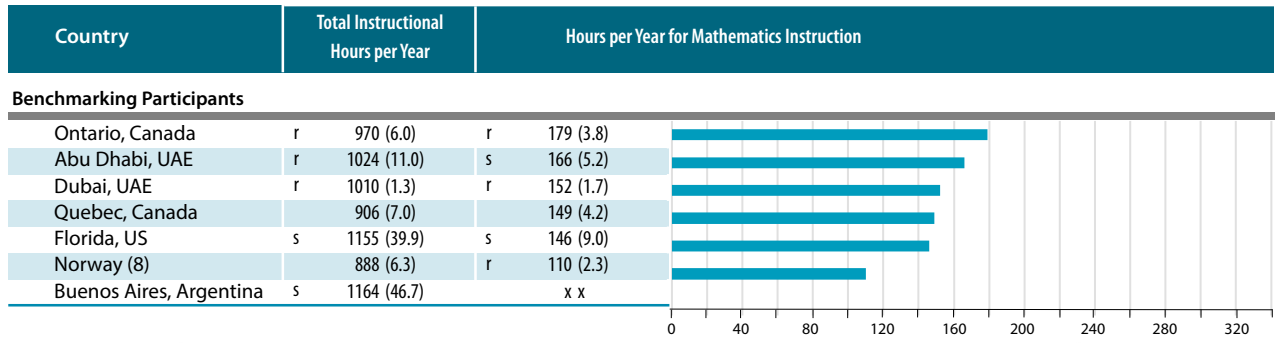


SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

( ) Standard errors appear in parentheses. Because of rounding some results 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 students.

**Exhibit 9.2: Instructional Time Spent on Mathematics (Continued)**



<b>Total Instructional Hours per Year</b>	=	Principal Reports of School Days per Year	X	Principal Reports of Instructional Hours per Day
<b>Hours per Year for Mathematics Instruction</b>	=	Teacher Reports of Weekly Mathematics Instructional Hours	X	Principal Reports of School Days per Year
		Principal Reports of School Days per Week		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 9.4: Percentages of Students Taught the TIMSS Mathematics Topics\***

Reported by Teachers

Country	All Mathematics (20 topics)	Number (5 topics)	Algebra (6 topics)	Geometry (6 topics)	Data and Chance (3 topics)
Australia	76 (0.9)	90 (0.9)	65 (1.5)	77 (1.4)	71 (2.2)
Bahrain	88 (0.5)	95 (0.5)	83 (0.7)	90 (0.8)	83 (1.6)
Botswana (9)	67 (1.5)	72 (2.4)	56 (2.4)	76 (1.8)	62 (3.2)
Canada	76 (0.8)	89 (0.8)	61 (1.2)	85 (1.3)	69 (1.9)
Chile	80 (1.5)	90 (1.3)	65 (2.4)	87 (1.6)	78 (3.4)
Chinese Taipei	72 (0.6)	95 (0.7)	88 (0.7)	72 (1.5)	2 (0.6)
Egypt	82 (0.7)	96 (0.6)	71 (1.3)	85 (0.9)	78 (2.0)
England	77 (1.3)	82 (1.0)	72 (1.9)	77 (2.2)	76 (2.2)
Georgia	71 (1.0)	96 (0.6)	72 (1.6)	61 (1.5)	45 (2.9)
Hong Kong SAR	73 (1.0)	93 (1.3)	72 (1.5)	79 (1.3)	33 (2.7)
Hungary	85 (0.7)	98 (0.4)	78 (1.0)	90 (0.9)	67 (2.7)
Iran, Islamic Rep. of	71 (0.9)	90 (1.0)	45 (1.3)	84 (1.1)	63 (2.8)
Ireland	73 (1.0)	92 (0.8)	72 (1.5)	58 (1.8)	75 (2.3)
Israel	82 (0.8)	90 (0.7)	90 (0.8)	78 (1.1)	59 (2.4)
Italy	75 (0.8)	99 (0.3)	49 (1.4)	92 (0.9)	56 (2.9)
Japan	88 (0.6)	81 (1.2)	91 (0.8)	95 (0.6)	79 (2.3)
Jordan	86 (0.8)	99 (0.6)	94 (0.8)	80 (1.5)	64 (2.6)
Kazakhstan	81 (0.9)	99 (0.2)	84 (1.4)	71 (1.3)	63 (2.7)
Korea, Rep. of	80 (0.6)	81 (0.7)	94 (0.6)	90 (0.9)	34 (3.1)
Kuwait	75 (1.1)	88 (0.9)	60 (1.6)	82 (1.5)	69 (2.5)
Lebanon	60 (1.3)	88 (1.0)	47 (1.7)	62 (1.7)	34 (3.3)
Lithuania	61 (1.0)	89 (0.8)	50 (1.5)	56 (1.5)	49 (2.5)
Malaysia	71 (1.3)	96 (0.7)	54 (2.1)	86 (1.3)	36 (3.4)
Malta	74 (0.0)	89 (0.0)	77 (0.1)	63 (0.1)	63 (0.1)
Morocco	60 (0.8)	96 (0.6)	50 (1.3)	54 (1.2)	29 (2.1)
New Zealand	75 (1.1)	87 (1.0)	69 (1.5)	69 (1.8)	76 (2.2)
Norway (9)	65 (0.8)	87 (1.0)	51 (1.7)	58 (1.6)	65 (2.5)
Oman	77 (0.8)	90 (0.7)	62 (1.1)	85 (1.1)	72 (1.9)
Qatar	80 (0.7)	89 (0.7)	77 (1.3)	84 (1.0)	66 (2.5)
Russian Federation	--	--	--	--	--
Saudi Arabia	89 (0.8)	99 (0.5)	81 (1.5)	91 (1.0)	87 (2.1)
Singapore	88 (0.4)	98 (0.4)	94 (0.5)	80 (0.6)	77 (1.4)
Slovenia	60 (0.7)	97 (0.6)	49 (1.1)	63 (1.1)	14 (1.2)
South Africa (9)	80 (1.2)	97 (0.8)	80 (1.6)	81 (1.5)	49 (3.6)
Sweden	61 (1.3)	78 (1.4)	55 (2.7)	59 (1.7)	49 (2.6)
Thailand	70 (1.1)	99 (0.5)	54 (1.9)	80 (1.8)	31 (2.6)
Turkey	82 (0.7)	100 (0.2)	62 (1.7)	79 (1.0)	99 (0.6)
United Arab Emirates	84 (0.6)	92 (0.6)	79 (0.9)	84 (0.7)	78 (1.4)
United States	90 (0.7)	98 (0.4)	92 (0.8)	r 84 (1.3)	r 83 (2.0)
International Avg.	76 (0.1)	92 (0.1)	70 (0.2)	77 (0.2)	60 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

\* Percentage mostly taught before or in the assessment year averaged across topics.  
 ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
 A dash (-) indicates comparable data not available.  
 An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 9.4: Percentages of Students Taught the TIMSS Mathematics Topics\*  
 (Continued)**

Country	All Mathematics (20 topics)	Number (5 topics)	Algebra (6 topics)	Geometry (6 topics)	Data and Chance (3 topics)
<b>Benchmarking Participants</b>					
Buenos Aires, Argentina	x x	x x	x x	x x	x x
Ontario, Canada	r 80 (1.1)	r 89 (1.2)	r 64 (1.5)	r 86 (1.8)	r 85 (1.9)
Quebec, Canada	72 (1.2)	89 (1.1)	57 (1.7)	87 (1.6)	45 (3.7)
Norway (8)	45 (1.1)	79 (1.5)	20 (1.7)	45 (2.0)	40 (2.8)
Abu Dhabi, UAE	83 (1.3)	91 (1.4)	79 (1.8)	r 85 (1.5)	73 (2.9)
Dubai, UAE	84 (0.7)	92 (0.6)	79 (1.0)	83 (0.9)	81 (2.1)
Florida, US	r 91 (1.5)	r 100 (0.3)	r 97 (1.0)	r 83 (3.9)	r 84 (4.3)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**TIMSS 2015 Mathematics Topics**

**A. Number**

- 1) Computing with whole numbers
- 2) Comparing and ordering rational numbers
- 3) Computing with rational numbers
- 4) Concepts of irrational numbers
- 5) Problem solving involving percents or proportions

**B. Algebra**

- 1) Simplifying and evaluating algebraic expressions
- 2) Simple linear equations and inequalities
- 3) Simultaneous equations
- 4) Numeric, algebraic, and geometric patterns or sequences
- 5) Representation of functions as ordered pairs, tables, graphs, words, or equations
- 6) Properties of functions

**C. Geometry**

- 1) Geometric properties of angles and geometric shapes
- 2) Congruent figures and similar triangles
- 3) Relationship between three-dimensional shapes and their two-dimensional representations
- 4) Using appropriate measurement formulas for perimeters, circumferences, areas, surface areas, and volumes
- 5) Points on the Cartesian plane
- 6) Translation, reflection, and rotation

**D. Data and Chance**

- 1) Characteristics of data sets
- 2) Interpreting data sets
- 3) Judging, predicting, and determining the chances of possible outcomes

**Exhibit 9.6: Computer Activities During Mathematics Lessons**

Reported by Teachers

Country	Computers Available for Students to Use in Mathematics Lessons			Percent of Students Whose Teachers Have Them Use Computers at Least Monthly			
	Percent of Students	Average Achievement		To Explore Mathematics Principles and Concepts	To Practice Skills and Procedures	To Look Up Ideas and Information	To Process and Analyze Data
	Yes	Yes	No				
Sweden	65 (3.6)	499 (4.0)	502 (4.0)	25 (3.7)	38 (4.0)	32 (4.2)	26 (3.9)
Australia	62 (3.4)	512 (3.5)	506 (5.4)	51 (3.5)	52 (3.6)	48 (3.6)	44 (3.2)
Kazakhstan	53 (3.9)	531 (7.6)	525 (7.4)	45 (4.5)	50 (4.1)	51 (4.2)	45 (4.5)
Canada	50 (3.3)	528 (3.7)	533 (3.2)	35 (2.8)	36 (3.1)	33 (3.0)	31 (3.1)
Chile	49 (4.6)	423 (5.5)	437 (5.8)	29 (4.3)	36 (4.4)	32 (4.5)	36 (4.3)
Egypt	48 (3.9)	395 (6.1)	390 (5.8)	35 (4.0)	42 (4.1)	45 (4.0)	32 (3.7)
Russian Federation	47 (3.5)	535 (5.1)	540 (6.4)	36 (3.5)	41 (3.6)	42 (3.2)	34 (3.5)
New Zealand	47 (3.5)	501 (4.8)	488 (5.7)	36 (3.3)	35 (3.3)	35 (3.3)	33 (3.5)
United Arab Emirates	44 (2.2)	481 (4.5)	456 (3.8)	38 (2.0)	40 (2.1)	40 (2.2)	37 (2.3)
Japan	43 (3.7)	585 (4.1)	588 (3.4)	3 (1.0)	6 (1.8)	4 (1.3)	5 (1.5)
Italy	43 (3.7)	493 (4.3)	495 (4.1)	28 (3.2)	29 (3.3)	31 (3.5)	26 (2.9)
Norway (9)	40 (3.9)	513 (3.5)	513 (3.2)	27 (3.9)	35 (4.1)	27 (4.0)	29 (3.8)
Jordan	39 (3.3)	394 (6.5)	378 (4.0)	29 (3.4)	28 (3.4)	32 (3.5)	25 (3.3)
Thailand	39 (4.5)	442 (8.5)	425 (6.1)	25 (4.0)	26 (4.2)	28 (4.3)	23 (4.1)
United States	39 (2.9)	519 (5.0)	518 (4.3)	r 27 (2.8)	r 31 (2.9)	r 29 (2.8)	r 26 (2.8)
Korea, Rep. of	39 (3.6)	604 (4.3)	607 (3.6)	25 (3.3)	22 (3.1)	24 (3.2)	19 (2.6)
Lithuania	38 (4.0)	508 (4.9)	512 (4.5)	21 (3.7)	24 (3.4)	29 (3.8)	23 (3.5)
Georgia	38 (3.6)	453 (6.6)	452 (4.5)	33 (3.8)	31 (3.5)	34 (3.8)	33 (3.7)
Qatar	36 (2.6)	422 (6.6)	445 (4.3)	31 (2.3)	33 (2.5)	30 (2.7)	26 (2.9)
Singapore	35 (2.5)	617 (6.0)	621 (4.1)	27 (2.2)	27 (2.3)	23 (2.0)	19 (2.0)
Hungary	30 (3.8)	509 (8.0)	516 (4.6)	20 (3.3)	27 (3.6)	22 (3.2)	18 (3.0)
Bahrain	30 (2.8)	458 (3.8)	452 (2.2)	23 (2.4)	23 (2.7)	24 (2.8)	16 (1.9)
England	29 (4.1)	511 (9.7)	520 (6.0)	17 (3.6)	23 (3.7)	17 (3.3)	13 (2.9)
Chinese Taipei	28 (3.5)	604 (6.8)	597 (2.9)	13 (2.8)	11 (2.6)	16 (2.8)	11 (2.5)
Iran, Islamic Rep. of	28 (3.0)	457 (8.6)	429 (5.1)	18 (2.7)	19 (2.8)	17 (2.8)	18 (2.7)
Ireland	25 (2.8)	515 (6.2)	525 (3.4)	11 (1.9)	12 (2.0)	10 (1.7)	10 (1.8)
Hong Kong SAR	21 (3.6)	591 (10.7)	596 (5.5)	13 (2.8)	12 (2.8)	13 (2.8)	12 (2.6)
Slovenia	19 (2.5)	517 (6.7)	516 (2.1)	12 (2.2)	14 (2.1)	13 (1.9)	13 (1.9)
Kuwait	19 (3.4)	393 (16.7)	393 (4.2)	14 (3.4)	17 (3.4)	17 (3.4)	15 (3.4)
Saudi Arabia	17 (2.9)	396 (12.7)	361 (4.6)	13 (2.9)	13 (2.8)	16 (3.0)	14 (3.1)
Israel	17 (2.4)	536 (11.8)	508 (4.3)	11 (2.0)	13 (2.2)	12 (2.1)	11 (1.9)
Turkey	16 (2.3)	471 (13.2)	456 (5.0)	13 (2.1)	11 (2.2)	15 (2.2)	12 (2.1)
Morocco	11 (2.2)	400 (6.9)	382 (2.6)	5 (1.4)	4 (1.4)	6 (1.6)	5 (1.4)
Malaysia	10 (2.0)	477 (11.7)	465 (4.6)	6 (1.5)	5 (1.7)	7 (1.5)	4 (1.3)
South Africa (9)	9 (1.7)	430 (12.4)	367 (4.9)	5 (1.4)	6 (1.6)	5 (1.4)	4 (1.5)
Oman	9 (1.8)	403 (9.9)	404 (3.1)	9 (1.8)	6 (1.5)	9 (1.7)	r 2 (0.6)
Lebanon	8 (2.3)	451 (11.8)	442 (3.9)	5 (2.0)	5 (1.8)	3 (1.1)	5 (1.8)
Botswana (9)	8 (2.4)	375 (6.1)	393 (2.4)	3 (1.5)	3 (1.7)	4 (1.7)	2 (1.4)
Malta	4 (0.0)	470 (5.4)	495 (1.1)	2 (0.0)	2 (0.0)	2 (0.0)	2 (0.0)
International Avg.	32 (0.5)	485 (1.3)	481 (0.7)	21 (0.5)	23 (0.5)	22 (0.5)	19 (0.5)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Ontario, Canada	r	63 (5.1)	527 (4.7)	519 (4.3)	r	48 (4.2)	r	49 (4.7)	r	50 (4.6)	r	48 (5.0)
Dubai, UAE		63 (2.6)	524 (3.8)	499 (3.8)		58 (2.5)		60 (2.6)		60 (2.6)		55 (3.0)
Norway (8)		50 (4.0)	485 (3.1)	490 (2.8)		33 (3.7)		45 (4.0)		30 (3.7)		42 (4.1)
Abu Dhabi, UAE	r	30 (5.0)	468 (14.6)	431 (8.0)	r	24 (4.2)	r	27 (4.8)	r	27 (4.8)	r	24 (4.6)
Florida, US	r	28 (5.1)	483 (15.9)	513 (8.3)	r	21 (4.9)	r	28 (5.1)	r	16 (5.3)	r	21 (4.9)
Quebec, Canada		20 (2.5)	556 (6.2)	548 (3.8)		12 (2.3)		13 (2.5)		6 (1.7)		6 (1.4)
Buenos Aires, Argentina	x x		x x	x x		x x		x x		x x		x x

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates data are available for less than 50% of students.

**Exhibit 9.7: Student Use of Internet for Schoolwork**

Reported by Students

Country	Percent of Students Who Use the Internet to Do the Following Tasks				
	Access the Textbook or Other Course Materials	Access Assignments Posted Online by the Teacher	Collaborate with Classmates on Assignments or Projects	Communicate with the Teacher	Find Information, Articles, or Tutorials to Aid in Understanding Mathematics
Australia	55 (1.4)	66 (1.2)	63 (0.8)	46 (1.1)	57 (1.0)
Bahrain	56 (1.0)	43 (1.1)	77 (0.8)	41 (1.1)	58 (0.8)
Botswana (9)	46 (0.8)	37 (1.0)	58 (1.1)	36 (0.8)	54 (0.8)
Canada	45 (1.5)	58 (2.0)	76 (1.0)	32 (1.2)	56 (1.2)
Chile	62 (1.0)	37 (1.4)	79 (0.9)	25 (1.2)	60 (1.0)
Chinese Taipei	74 (0.9)	50 (1.1)	72 (1.0)	28 (1.0)	38 (0.8)
Egypt	57 (1.1)	34 (1.0)	58 (1.0)	56 (1.2)	64 (1.0)
England	54 (1.5)	71 (1.4)	53 (1.4)	33 (1.9)	66 (1.1)
Georgia	76 (1.3)	44 (1.5)	73 (1.3)	31 (1.4)	47 (1.2)
Hong Kong SAR	51 (1.3)	64 (1.9)	76 (1.3)	33 (1.2)	61 (1.1)
Hungary	40 (1.1)	58 (1.2)	76 (1.1)	26 (1.3)	41 (1.1)
Iran, Islamic Rep. of	60 (1.4)	40 (1.1)	56 (1.2)	31 (1.0)	52 (1.2)
Ireland	34 (1.2)	35 (2.6)	50 (1.2)	12 (1.2)	44 (1.0)
Israel	64 (1.2)	68 (1.4)	60 (1.2)	32 (1.3)	55 (0.9)
Italy	50 (1.1)	34 (2.1)	75 (1.1)	27 (1.5)	41 (1.0)
Japan	23 (0.8)	16 (0.9)	28 (1.0)	5 (0.5)	30 (0.8)
Jordan	65 (1.1)	42 (1.2)	70 (1.3)	49 (1.2)	61 (1.0)
Kazakhstan	65 (1.1)	39 (1.5)	76 (0.9)	24 (1.3)	66 (0.9)
Korea, Rep. of	51 (1.0)	43 (1.3)	69 (1.1)	13 (0.7)	45 (0.9)
Kuwait	x x	x x	x x	x x	x x
Lebanon	57 (1.3)	43 (1.7)	77 (1.5)	42 (1.7)	58 (1.3)
Lithuania	52 (1.0)	83 (1.0)	84 (0.7)	29 (1.1)	62 (1.2)
Malaysia	60 (1.1)	27 (1.1)	80 (1.0)	45 (1.2)	63 (1.1)
Malta	45 (0.8)	65 (0.6)	80 (0.6)	35 (0.8)	58 (0.8)
Morocco	47 (1.1)	64 (1.1)	36 (1.2)	64 (1.1)	41 (1.2)
New Zealand	48 (1.4)	61 (2.2)	60 (1.5)	38 (1.8)	59 (1.0)
Norway (9)	52 (1.3)	86 (1.2)	81 (1.1)	34 (1.7)	64 (1.1)
Oman	68 (0.9)	47 (1.0)	80 (0.7)	39 (1.0)	71 (1.0)
Qatar	59 (1.0)	61 (0.8)	66 (0.7)	43 (0.9)	61 (0.9)
Russian Federation	68 (1.0)	49 (1.9)	82 (0.9)	29 (1.5)	72 (1.1)
Saudi Arabia	44 (1.3)	55 (1.8)	39 (1.9)	57 (1.8)	42 (1.4)
Singapore	57 (0.7)	90 (0.5)	84 (0.7)	49 (0.6)	61 (0.7)
Slovenia	68 (1.6)	62 (1.7)	70 (1.2)	27 (1.3)	53 (1.2)
South Africa (9)	59 (1.1)	40 (1.3)	72 (1.1)	43 (1.4)	63 (1.0)
Sweden	67 (1.4)	81 (1.7)	71 (1.5)	47 (1.7)	54 (1.3)
Thailand	81 (0.9)	56 (1.7)	88 (0.7)	46 (1.5)	70 (1.0)
Turkey	54 (0.9)	24 (0.8)	75 (0.9)	19 (0.7)	66 (1.0)
United Arab Emirates	70 (0.6)	69 (0.9)	83 (0.6)	44 (0.8)	69 (0.5)
United States	52 (1.4)	64 (1.7)	61 (1.0)	40 (1.4)	63 (0.8)
<b>International Avg.</b>	<b>56 (0.2)</b>	<b>53 (0.2)</b>	<b>69 (0.2)</b>	<b>36 (0.2)</b>	<b>57 (0.2)</b>

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	55 (1.5)	56 (2.0)	75 (1.2)	25 (1.7)	50 (1.4)
Ontario, Canada	48 (2.1)	60 (2.6)	77 (1.1)	35 (1.9)	59 (1.4)
Quebec, Canada	43 (1.7)	58 (3.0)	77 (1.3)	28 (1.4)	52 (1.9)
Norway (8)	52 (1.3)	86 (1.2)	72 (1.2)	28 (1.6)	64 (0.9)
Abu Dhabi, UAE	70 (1.2)	58 (2.0)	84 (0.9)	42 (1.6)	69 (0.9)
Dubai, UAE	71 (0.9)	84 (0.6)	83 (0.8)	46 (0.9)	74 (0.8)
Florida, US	63 (2.1)	71 (2.2)	56 (2.1)	42 (2.9)	68 (1.2)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
An "x" indicates data are available for less than 50% of students.



**Exhibit 9.8: Weekly Time Students Spend on Assigned Mathematics Homework**

Reported by Students

Country	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Russian Federation	43 (1.3)	532 (4.7)	43 (1.1)	543 (4.7)	14 (0.9)	543 (7.4)
Kazakhstan	41 (1.2)	536 (6.3)	40 (0.9)	531 (5.9)	19 (1.0)	509 (7.7)
South Africa (9)	34 (1.1)	382 (5.0)	38 (0.8)	389 (5.3)	28 (0.9)	348 (5.0)
Georgia	28 (1.3)	470 (5.5)	39 (1.1)	470 (4.0)	32 (1.2)	435 (4.5)
Italy	23 (1.0)	488 (3.6)	54 (1.0)	502 (2.8)	23 (1.1)	486 (4.4)
Thailand	23 (1.2)	454 (5.1)	49 (1.0)	439 (5.0)	28 (1.4)	402 (5.3)
Singapore	22 (0.8)	633 (3.1)	55 (0.9)	631 (3.0)	23 (0.9)	586 (5.7)
Botswana (9)	22 (0.9)	397 (3.3)	39 (0.7)	410 (2.4)	39 (1.1)	376 (2.7)
Slovenia	21 (1.2)	505 (4.0)	44 (1.1)	518 (2.6)	35 (1.5)	524 (2.9)
Hong Kong SAR	21 (1.4)	596 (4.7)	45 (1.6)	604 (4.6)	34 (1.8)	582 (7.0)
Israel	20 (1.2)	549 (4.1)	38 (0.9)	526 (3.8)	42 (1.4)	484 (5.6)
Canada	19 (1.0)	529 (3.1)	42 (1.1)	534 (2.4)	39 (1.4)	524 (2.7)
Lithuania	19 (1.1)	501 (5.3)	45 (1.2)	512 (3.6)	36 (1.4)	517 (3.5)
Ireland	19 (1.0)	531 (4.2)	49 (1.0)	533 (2.6)	32 (1.2)	507 (4.5)
Malta	18 (0.6)	513 (2.8)	44 (0.8)	516 (1.8)	38 (0.7)	472 (2.2)
United States	18 (1.0)	547 (5.0)	36 (0.9)	530 (3.2)	46 (1.5)	502 (3.2)
Malaysia	17 (0.7)	467 (3.7)	51 (1.0)	478 (3.4)	31 (1.0)	452 (5.2)
Chinese Taipei	15 (1.1)	608 (6.0)	44 (1.0)	613 (2.7)	41 (1.4)	582 (3.4)
Lebanon	14 (1.0)	436 (5.4)	32 (1.3)	456 (4.8)	54 (1.5)	442 (4.0)
Iran, Islamic Rep. of	13 (0.6)	448 (7.0)	46 (0.9)	452 (4.8)	42 (1.1)	418 (4.8)
Turkey	12 (1.0)	453 (8.1)	42 (1.4)	470 (5.9)	46 (1.8)	454 (5.1)
Morocco	11 (0.5)	381 (4.0)	29 (0.7)	397 (3.0)	60 (0.8)	385 (2.3)
Hungary	11 (0.7)	513 (5.5)	38 (1.1)	523 (4.6)	51 (1.5)	510 (4.7)
Qatar	10 (0.6)	451 (6.3)	32 (0.9)	463 (4.1)	58 (0.8)	424 (3.3)
Egypt	10 (0.5)	380 (6.2)	24 (0.8)	406 (4.7)	66 (1.0)	397 (4.3)
United Arab Emirates	10 (0.5)	463 (4.9)	31 (0.8)	487 (3.2)	59 (1.0)	457 (2.3)
Australia	9 (0.8)	530 (5.6)	35 (1.2)	527 (3.4)	56 (1.6)	491 (3.7)
Norway (9)	9 (1.0)	492 (4.2)	50 (1.3)	514 (2.7)	41 (1.5)	515 (3.0)
Jordan	9 (0.5)	357 (5.6)	30 (0.8)	394 (3.4)	62 (0.8)	391 (3.5)
Bahrain	8 (0.6)	440 (7.3)	22 (0.8)	456 (3.9)	70 (1.0)	458 (1.7)
Saudi Arabia	7 (0.5)	335 (8.8)	17 (0.9)	374 (8.6)	76 (1.1)	372 (4.5)
Oman	6 (0.4)	380 (7.9)	17 (0.6)	405 (4.5)	78 (0.7)	408 (2.5)
Kuwait	6 (0.8)	375 (12.7)	18 (0.9)	404 (9.3)	76 (1.2)	392 (4.4)
Chile	4 (0.5)	425 (6.1)	28 (1.4)	432 (4.2)	67 (1.6)	428 (3.5)
New Zealand	4 (0.4)	500 (8.8)	28 (1.3)	517 (3.9)	68 (1.5)	485 (3.3)
Japan	3 (0.5)	588 (15.1)	25 (1.4)	583 (3.8)	72 (1.6)	592 (2.5)
Korea, Rep. of	3 (0.3)	604 (11.3)	16 (0.9)	600 (4.3)	81 (1.0)	607 (2.8)
Sweden	2 (0.3)	~ ~	19 (1.2)	486 (4.7)	80 (1.4)	508 (2.7)
England	1 (0.2)	~ ~	26 (1.1)	539 (5.0)	73 (1.2)	514 (4.3)
International Avg.	15 (0.1)	481 (1.1)	36 (0.2)	491 (0.7)	49 (0.2)	474 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent. A tilde (~) indicates insufficient data to report achievement.

**Exhibit 9.8: Weekly Time Students Spend on Assigned Mathematics Homework (Continued)**

Country	3 Hours or More		More than 45 Minutes but Less than 3 Hours		45 Minutes or Less	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
<b>Benchmarking Participants</b>						
Quebec, Canada	27 (2.1)	543 (4.3)	45 (1.3)	549 (3.5)	29 (1.8)	546 (4.4)
Florida, US	17 (1.9)	531 (8.5)	38 (1.6)	510 (5.8)	45 (2.7)	472 (7.7)
Ontario, Canada	16 (1.2)	519 (4.6)	42 (1.6)	530 (3.0)	42 (2.0)	520 (3.5)
Buenos Aires, Argentina	16 (1.3)	403 (7.4)	39 (1.4)	408 (4.9)	46 (2.0)	387 (6.1)
Dubai, UAE	11 (0.7)	507 (7.9)	38 (0.7)	528 (3.1)	51 (0.8)	503 (2.4)
Norway (8)	9 (0.9)	472 (4.7)	47 (1.3)	489 (2.3)	44 (1.8)	490 (2.7)
Abu Dhabi, UAE	9 (0.8)	439 (11.9)	28 (2.0)	466 (8.8)	63 (2.4)	435 (4.4)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

<p><b>A. How often does your teacher give you homework in mathematics?</b></p> <ol style="list-style-type: none"> <li>1) Every day</li> <li>2) 3 or 4 times a week</li> <li>3) 1 or 2 times a week</li> <li>4) Less than once a week</li> <li>5) Never</li> </ol>	<p><b>B. When your teacher gives you homework in mathematics, about how many minutes do you usually spend on your homework?</b></p> <ol style="list-style-type: none"> <li>1) My teacher never gives me homework</li> <li>2) 1-15 minutes</li> <li>3) 16-30 minutes</li> <li>4) 31-60 minutes</li> <li>5) 61-90 minutes</li> <li>6) More than 90 minutes</li> </ol>
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The weekly time spent on mathematics homework was calculated by multiplying how often students were given homework weekly by the minutes they spent on that homework.

**The values for Part A were:** Every day = 5; 3 or 4 times a week = 3.5; 1 or 2 times a week = 1.5; Less than once a week = 0.5; and Never = 0.

**The values for Part B were:** My teacher never gives me homework = 0; 1-15 minutes = 8; 16-30 minutes = 23; 31-60 minutes = 45; 61-90 minutes = 75; and More than 90 minutes = 105.

**Exhibit 9.10: Teaching Limited by Student Needs**

Reported by Teachers

Students were scored according to their teachers' responses concerning six needs on the *Teaching Limited by Student Needs* scale. Students with teachers who felt **Not Limited** by student needs had a score on the scale of at least 11.4, which corresponds to their teachers feeling "not at all" limited by three of the six needs and to "some" extent limited by the other three needs, on average. Students with teachers who felt **Very Limited** by student needs had a score no higher than 7.4, which corresponds to their teachers reporting feeling limited "a lot" by three of the six needs and to "some" extent limited by the other three needs, on average. All other students had teachers who felt **Somewhat Limited** by student needs.

Country	Not Limited		Somewhat Limited		Very Limited		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Japan	76 (3.1)	593 (2.6)	24 (3.1)	568 (4.1)	0 (0.0)	~ ~	12.5 (0.13)
Slovenia	53 (2.8)	528 (3.3)	43 (2.7)	503 (3.3)	3 (1.2)	510 (10.9)	11.3 (0.14)
Hungary	42 (3.5)	551 (4.7)	48 (3.5)	492 (5.1)	9 (2.3)	463 (17.3)	10.6 (0.15)
England	41 (4.0)	557 (7.0)	54 (4.1)	493 (6.4)	5 (1.6)	455 (14.5)	10.8 (0.17)
Kazakhstan	41 (4.2)	528 (8.0)	49 (3.9)	531 (7.6)	11 (2.5)	514 (16.4)	10.6 (0.21)
Ireland	41 (3.1)	546 (3.3)	53 (3.2)	514 (4.1)	6 (1.4)	449 (16.3)	10.7 (0.11)
Sweden	40 (3.7)	520 (3.8)	53 (3.7)	489 (3.9)	6 (2.1)	476 (9.2)	10.7 (0.18)
Singapore	38 (2.2)	646 (5.3)	58 (2.2)	606 (4.9)	4 (1.1)	576 (18.9)	10.7 (0.08)
Norway (9)	36 (4.2)	520 (4.2)	62 (4.2)	510 (2.9)	2 (1.0)	~ ~	10.7 (0.15)
United Arab Emirates	36 (2.0)	507 (4.8)	60 (2.1)	448 (3.5)	4 (0.9)	431 (18.8)	10.6 (0.08)
Hong Kong SAR	33 (4.4)	616 (5.9)	64 (4.7)	584 (6.7)	3 (1.5)	519 (52.0)	10.4 (0.14)
Malta	32 (0.1)	537 (1.9)	63 (0.1)	481 (1.4)	5 (0.1)	391 (4.8)	10.4 (0.01)
Lithuania	30 (3.8)	527 (7.9)	63 (4.0)	507 (3.2)	7 (1.8)	475 (9.6)	10.2 (0.14)
Israel	30 (2.6)	565 (6.3)	51 (3.5)	498 (6.7)	19 (2.2)	467 (11.3)	9.8 (0.11)
Qatar	29 (3.9)	498 (8.8)	59 (4.1)	419 (5.0)	11 (2.0)	392 (8.1)	10.2 (0.13)
Canada	29 (2.8)	552 (4.3)	63 (3.0)	524 (3.1)	8 (1.8)	500 (8.4)	10.2 (0.11)
New Zealand	29 (2.5)	540 (5.2)	67 (2.4)	477 (4.9)	5 (1.0)	433 (16.9)	10.3 (0.12)
Malaysia	29 (3.4)	506 (7.7)	60 (4.1)	458 (5.1)	12 (2.5)	413 (10.7)	9.9 (0.14)
Australia	28 (2.3)	563 (5.7)	64 (2.3)	493 (3.4)	8 (1.4)	458 (9.2)	10.3 (0.10)
Lebanon	27 (3.6)	436 (7.0)	68 (3.7)	442 (5.1)	5 (1.7)	466 (17.0)	10.2 (0.17)
Russian Federation	26 (4.2)	545 (7.8)	62 (4.4)	538 (5.8)	12 (2.3)	519 (8.9)	10.0 (0.18)
Korea, Rep. of	24 (3.2)	620 (6.3)	67 (3.2)	603 (2.8)	8 (2.2)	583 (9.7)	9.9 (0.16)
United States	23 (2.6)	553 (6.7)	68 (2.7)	512 (3.8)	8 (1.7)	471 (10.1)	9.9 (0.12)
Chinese Taipei	23 (3.4)	629 (8.0)	63 (3.9)	596 (2.8)	14 (2.5)	567 (10.2)	9.7 (0.15)
Italy	22 (3.4)	509 (5.2)	69 (3.6)	490 (3.2)	9 (2.3)	486 (11.7)	9.9 (0.14)
Oman	21 (2.8)	426 (6.9)	56 (3.4)	399 (3.5)	24 (2.6)	394 (5.8)	9.2 (0.12)
Georgia	20 (3.4)	460 (7.7)	75 (3.6)	454 (3.8)	5 (1.7)	415 (9.2)	9.8 (0.12)
Bahrain	18 (3.9)	481 (7.5)	68 (4.5)	450 (2.7)	14 (2.7)	446 (5.1)	9.6 (0.13)
Thailand	17 (3.1)	481 (14.0)	78 (3.6)	422 (4.4)	5 (1.8)	408 (23.5)	9.9 (0.12)
Kuwait	15 (3.2)	437 (16.8)	71 (3.8)	387 (6.3)	15 (2.7)	374 (6.9)	9.4 (0.14)
Botswana (9)	14 (3.3)	398 (7.3)	72 (3.9)	392 (2.6)	14 (3.3)	380 (7.9)	9.3 (0.15)
South Africa (9)	14 (2.8)	371 (16.1)	70 (3.8)	376 (5.5)	17 (2.8)	356 (9.9)	9.2 (0.13)
Chile	12 (2.8)	487 (9.9)	63 (4.4)	429 (5.0)	25 (4.1)	399 (6.2)	8.9 (0.18)
Jordan	11 (2.3)	404 (9.5)	70 (3.6)	389 (4.1)	19 (3.0)	367 (7.4)	9.1 (0.11)
Saudi Arabia	9 (2.4)	425 (18.8)	80 (3.7)	365 (4.4)	11 (3.2)	336 (11.8)	9.1 (0.13)
Egypt	8 (1.6)	409 (18.6)	76 (3.2)	393 (4.6)	17 (3.0)	378 (9.1)	9.1 (0.11)
Iran, Islamic Rep. of	7 (1.6)	504 (18.5)	62 (3.1)	436 (5.0)	31 (2.9)	425 (6.5)	8.5 (0.12)
Morocco	6 (1.5)	394 (12.7)	63 (3.2)	384 (2.8)	31 (3.0)	383 (4.2)	8.5 (0.09)
Turkey	5 (1.4)	527 (17.8)	70 (2.8)	462 (5.6)	25 (2.8)	433 (7.7)	8.7 (0.11)
International Avg.	27 (0.5)	510 (1.5)	62 (0.6)	475 (0.7)	11 (0.4)	446 (2.4)	

This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

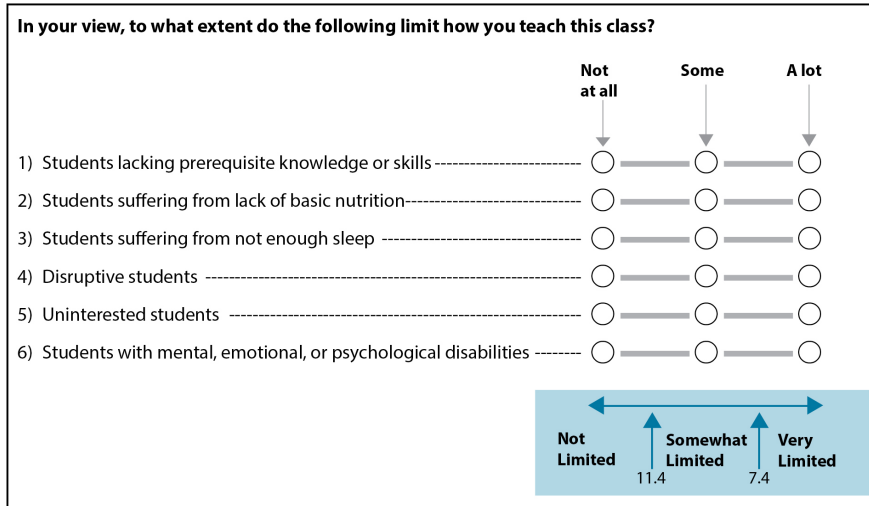
A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70% but less than 85% of the students. An "x" indicates that data are available for less than 50% of students.

**Exhibit 9.10: Teaching Limited by Student Needs (Continued)**

Country	Not Limited		Somewhat Limited		Very Limited		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Dubai, UAE	54 (3.3)	536 (3.7)	43 (2.6)	485 (4.9)	3 (1.9)	512 (17.5)	11.2 (0.16)
Quebec, Canada	40 (4.6)	571 (6.1)	53 (5.2)	535 (4.3)	7 (2.8)	531 (12.7)	10.6 (0.18)
Norway (8)	36 (3.8)	503 (3.4)	61 (3.8)	479 (2.2)	3 (1.2)	465 (16.7)	10.6 (0.14)
Abu Dhabi, UAE	r 28 (4.5)	483 (15.5)	66 (4.9)	432 (7.5)	7 (2.2)	404 (11.2)	10.3 (0.16)
Ontario, Canada	r 23 (3.1)	541 (4.9)	68 (3.5)	523 (3.9)	9 (2.6)	484 (8.0)	10.0 (0.14)
Florida, US	r 15 (5.6)	572 (18.7)	61 (6.4)	503 (8.8)	24 (4.2)	456 (12.4)	9.1 (0.32)
Buenos Aires, Argentina	x x	x x	x x	x x	x x	x x	x x

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**Exhibit 9.12: Frequency of Student Absences**

Reported by Students

Country	Never or Almost Never		Once a Month		Once Every Two Weeks		Once a Week or More	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Korea, Rep. of	96 (0.3)	609 (2.6)	3 (0.2)	520 (9.1)	1 (0.1)	~ ~	0 (0.1)	~ ~
Chinese Taipei	89 (0.6)	605 (2.3)	8 (0.5)	575 (6.8)	1 (0.2)	~ ~	2 (0.2)	~ ~
Japan	87 (0.6)	593 (2.3)	8 (0.5)	564 (4.7)	3 (0.3)	519 (11.4)	2 (0.2)	~ ~
Hong Kong SAR	87 (0.8)	600 (4.5)	9 (0.5)	576 (5.4)	2 (0.3)	~ ~	2 (0.3)	~ ~
Singapore	82 (0.7)	633 (2.8)	12 (0.5)	587 (5.6)	3 (0.2)	552 (7.4)	3 (0.3)	505 (9.6)
Thailand	71 (1.0)	446 (5.1)	13 (0.6)	409 (5.3)	6 (0.4)	397 (6.1)	9 (0.6)	372 (5.7)
Morocco	70 (0.6)	395 (2.1)	17 (0.4)	368 (3.4)	5 (0.3)	362 (4.8)	8 (0.3)	353 (4.4)
Iran, Islamic Rep. of	70 (1.0)	447 (4.7)	22 (0.9)	423 (5.7)	4 (0.3)	391 (8.4)	4 (0.3)	366 (10.5)
Norway (9)	69 (0.9)	519 (2.3)	22 (0.8)	501 (3.3)	6 (0.4)	504 (4.8)	2 (0.3)	~ ~
England	69 (1.0)	531 (4.3)	24 (0.8)	505 (5.1)	5 (0.4)	489 (7.8)	3 (0.3)	440 (10.0)
South Africa (9)	66 (1.0)	387 (4.9)	17 (0.6)	368 (5.2)	5 (0.3)	337 (7.6)	12 (0.6)	323 (3.7)
Lebanon	66 (1.2)	455 (3.7)	18 (0.7)	436 (4.9)	6 (0.6)	413 (6.2)	10 (0.6)	401 (5.7)
Malta	66 (0.9)	517 (1.5)	23 (0.7)	473 (2.5)	6 (0.4)	438 (5.6)	5 (0.4)	393 (6.8)
Sweden	65 (1.1)	512 (2.6)	23 (0.9)	491 (4.1)	8 (0.6)	484 (6.0)	5 (0.6)	442 (8.6)
Botswana (9)	64 (0.8)	412 (2.2)	19 (0.6)	377 (3.1)	5 (0.3)	301 (5.6)	13 (0.4)	348 (3.6)
Ireland	63 (0.9)	535 (2.8)	27 (0.8)	516 (3.4)	7 (0.4)	494 (6.2)	3 (0.3)	444 (7.8)
United Arab Emirates	62 (0.6)	481 (2.1)	21 (0.4)	465 (2.8)	8 (0.3)	430 (3.5)	9 (0.3)	389 (3.4)
Lithuania	62 (1.1)	515 (3.2)	25 (0.9)	513 (3.8)	9 (0.6)	506 (5.7)	4 (0.4)	458 (9.4)
United States	62 (0.8)	528 (3.3)	26 (0.6)	516 (3.2)	8 (0.3)	498 (4.0)	4 (0.3)	441 (6.0)
Chile	60 (1.2)	435 (3.5)	21 (0.8)	430 (4.5)	10 (0.5)	428 (5.7)	8 (0.6)	371 (6.3)
Canada	60 (0.8)	537 (2.3)	27 (0.7)	524 (2.4)	9 (0.4)	511 (3.9)	4 (0.3)	470 (7.1)
Australia	59 (0.8)	519 (3.3)	28 (0.8)	501 (3.3)	9 (0.4)	488 (3.8)	5 (0.3)	428 (6.0)
Russian Federation	58 (1.2)	542 (4.6)	23 (0.9)	539 (5.3)	12 (0.7)	532 (6.9)	6 (0.5)	504 (9.8)
Turkey	58 (1.0)	485 (5.0)	27 (0.7)	438 (4.9)	9 (0.5)	417 (6.6)	6 (0.4)	358 (7.6)
Oman	57 (0.9)	419 (2.5)	25 (0.7)	398 (3.7)	6 (0.4)	363 (6.9)	12 (0.5)	361 (3.6)
Kazakhstan	57 (1.3)	537 (5.6)	30 (1.2)	519 (5.7)	9 (0.6)	511 (9.2)	5 (0.4)	507 (10.4)
Slovenia	57 (1.0)	521 (2.6)	32 (0.9)	517 (2.4)	8 (0.5)	502 (5.1)	3 (0.4)	477 (7.8)
Italy	55 (1.0)	505 (2.9)	27 (0.8)	495 (3.4)	13 (0.7)	477 (4.4)	5 (0.5)	424 (8.1)
Jordan	52 (1.0)	409 (3.3)	30 (0.8)	378 (3.6)	9 (0.4)	358 (6.0)	9 (0.5)	317 (6.0)
Israel	50 (1.0)	530 (4.3)	30 (0.8)	513 (4.4)	12 (0.5)	489 (6.4)	8 (0.6)	433 (7.8)
Qatar	47 (0.8)	475 (3.8)	31 (0.7)	428 (3.5)	11 (0.5)	386 (5.1)	11 (0.4)	352 (4.8)
Bahrain	45 (0.8)	475 (2.6)	32 (0.7)	453 (1.8)	12 (0.5)	422 (4.0)	12 (0.4)	403 (3.4)
Malaysia	45 (1.2)	495 (3.7)	26 (0.6)	465 (4.1)	11 (0.6)	435 (4.7)	18 (0.8)	414 (4.3)
Hungary	43 (0.9)	540 (3.8)	45 (0.9)	508 (4.5)	9 (0.5)	473 (6.5)	4 (0.4)	394 (10.2)
Egypt	40 (1.2)	411 (4.8)	20 (0.6)	390 (5.6)	15 (0.7)	379 (5.0)	24 (1.0)	376 (5.3)
Kuwait	37 (1.4)	429 (7.3)	28 (1.0)	400 (4.9)	18 (0.7)	359 (5.6)	18 (1.0)	339 (5.8)
Georgia	33 (1.2)	476 (4.4)	38 (1.1)	455 (3.8)	19 (0.9)	447 (5.7)	11 (0.7)	393 (6.8)
Saudi Arabia	32 (1.3)	396 (6.3)	28 (0.8)	367 (4.7)	20 (0.8)	359 (5.4)	20 (1.2)	332 (5.9)
New Zealand	- -	- -	- -	- -	- -	- -	- -	- -
International Avg.	61 (0.2)	496 (0.6)	23 (0.1)	471 (0.7)	8 (0.1)	442 (1.0)	8 (0.1)	404 (1.2)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Norway (8)	71 (0.9)	491 (2.1)	22 (0.7)	486 (3.2)	5 (0.4)	473 (6.2)	2 (0.2)	~ ~
Quebec, Canada	71 (1.1)	550 (3.6)	21 (1.0)	542 (3.8)	6 (0.6)	529 (7.4)	2 (0.4)	~ ~
Dubai, UAE	65 (0.9)	526 (2.5)	22 (0.9)	505 (3.1)	6 (0.4)	480 (5.5)	7 (0.5)	435 (5.8)
Abu Dhabi, UAE	60 (1.1)	461 (4.7)	21 (0.8)	445 (6.4)	9 (0.6)	401 (6.1)	11 (0.6)	361 (5.9)
Ontario, Canada	55 (0.9)	533 (3.0)	29 (0.8)	521 (3.2)	11 (0.6)	510 (4.4)	4 (0.3)	463 (8.7)
Florida, US	53 (1.1)	505 (6.4)	28 (0.9)	498 (7.3)	12 (0.8)	479 (8.5)	7 (0.9)	421 (8.2)
Buenos Aires, Argentina	48 (1.1)	404 (5.1)	23 (0.9)	413 (5.3)	16 (0.8)	396 (6.7)	13 (1.0)	332 (6.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
A dash (-) indicates comparable data not available. A tilde (~) indicates insufficient data to report achievement.





# CHAPTER 10: STUDENT ENGAGEMENT AND ATTITUDES

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

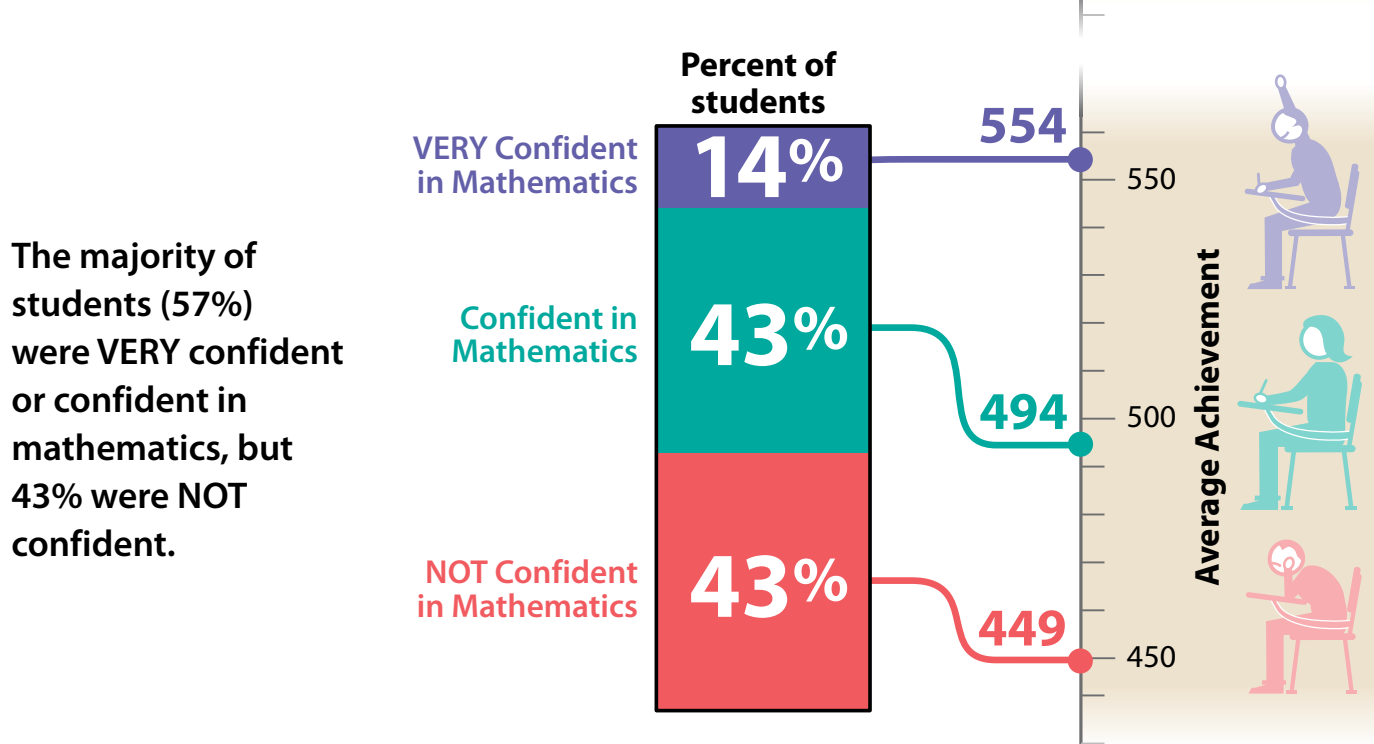
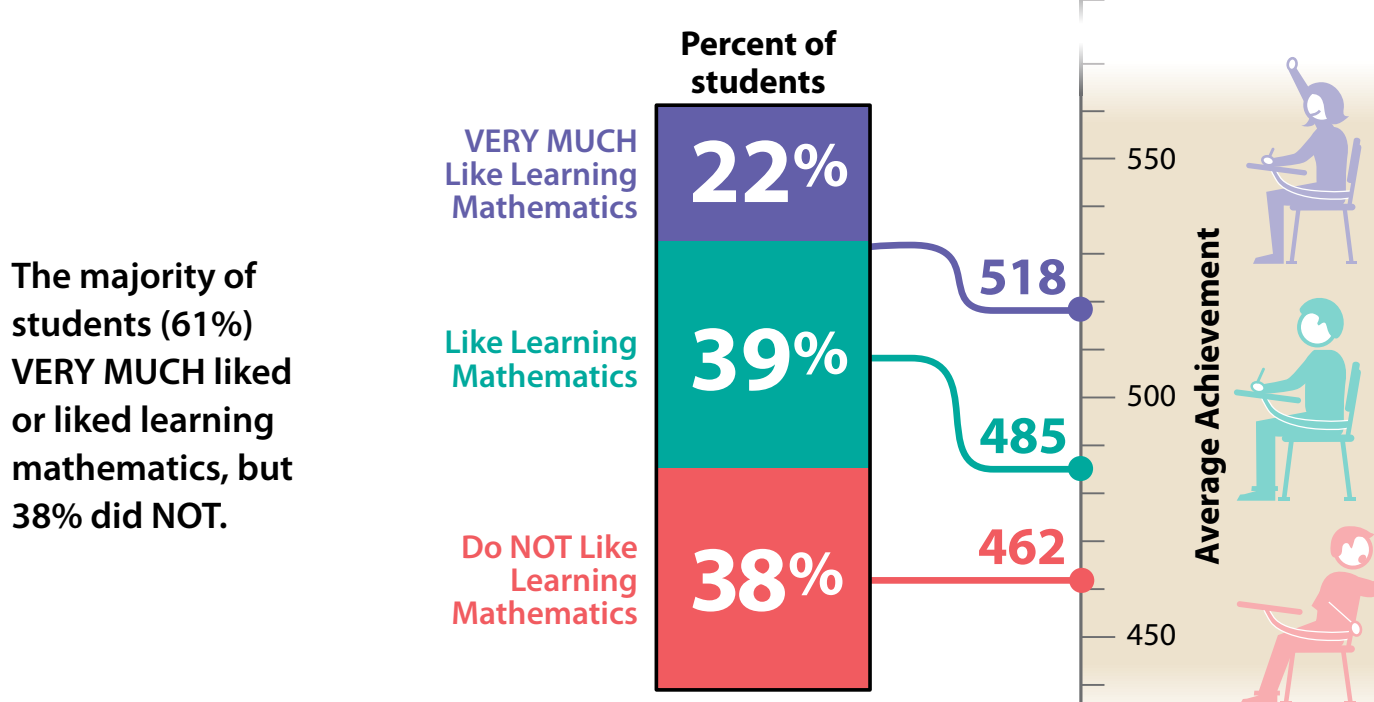
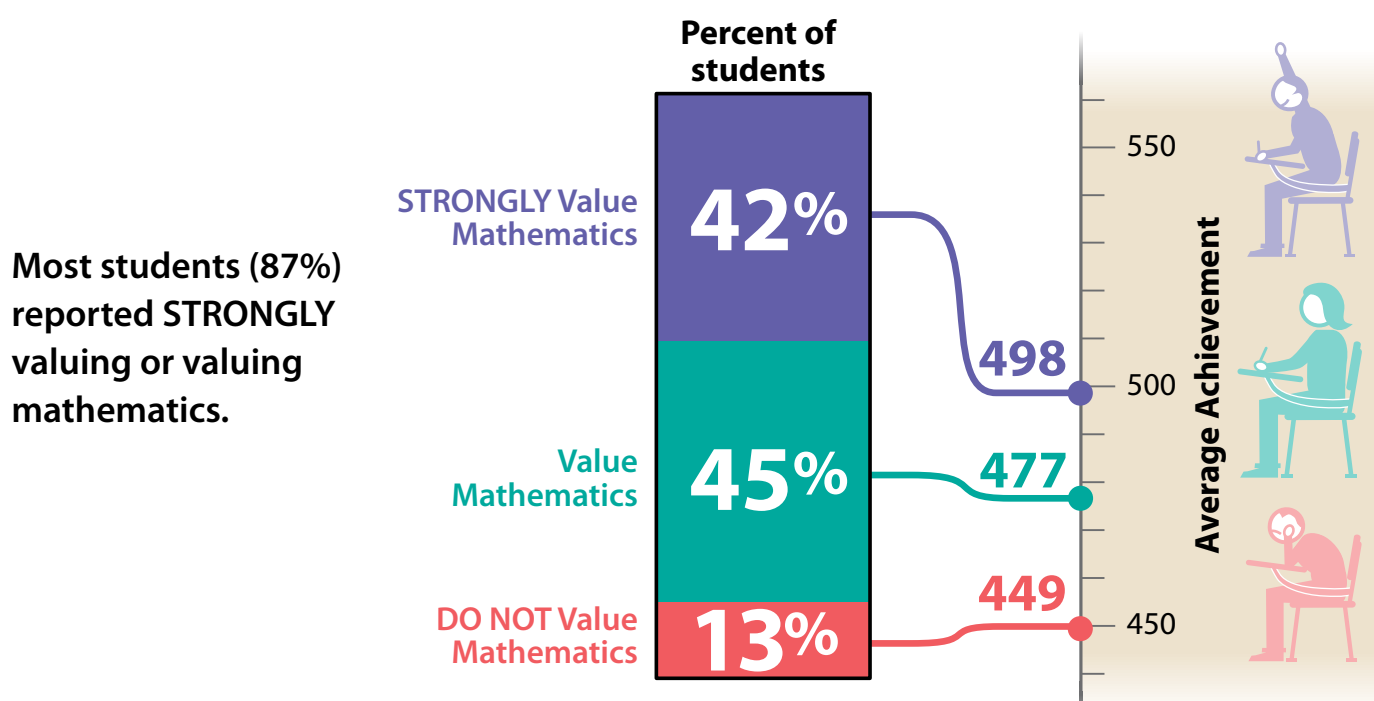
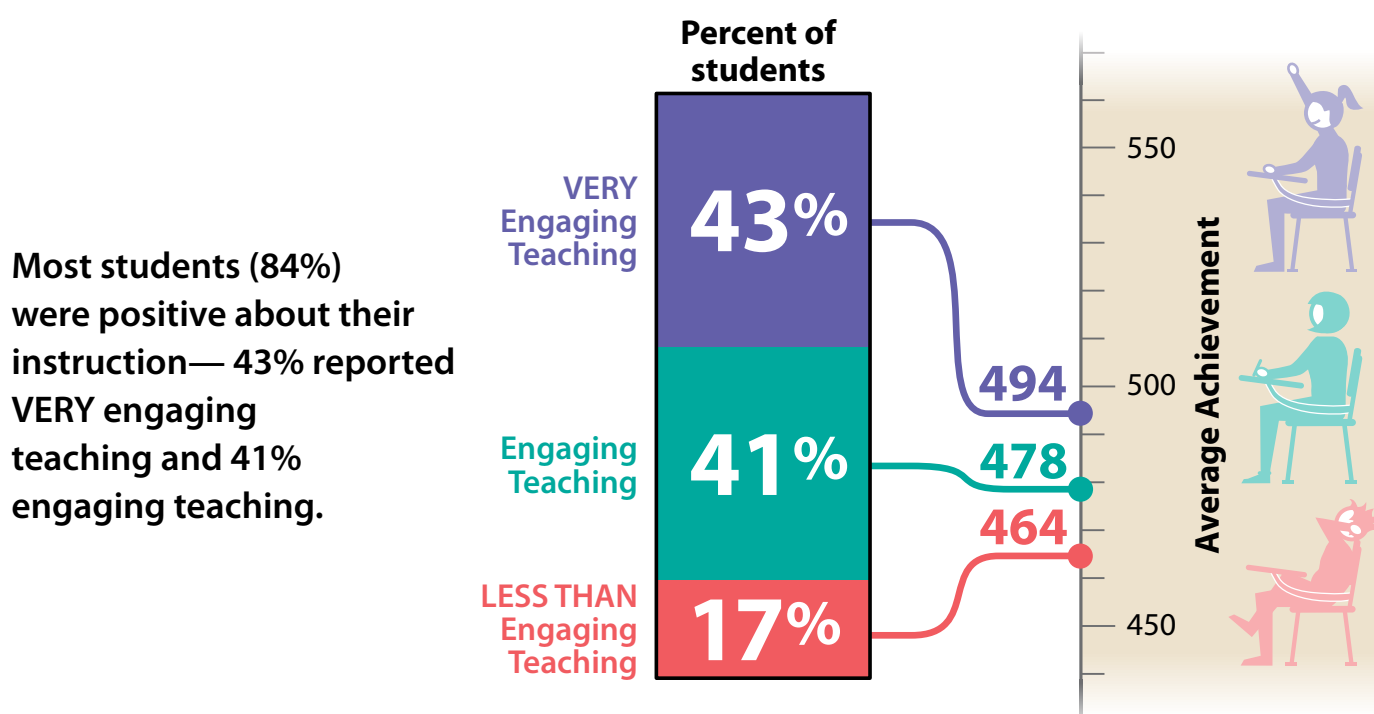
**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College





### Students' Attitudes Toward Mathematics

The eighth grade students were positive about their mathematics teaching and value mathematics. They were less positive about how much they liked learning the subject and their confidence in mathematics.



#### Trends 2011-2015: 33 Countries

Between 2011 and 2015, there were more decreases than increases in students' attitudes.

- The scale average for *Students Like Learning Mathematics* decreased in **6** countries and increased in **4** countries.
- The scale average for *Students Confident in Mathematics* decreased in **10** countries and increased in **9** countries.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015.  
<http://timss2015.org/download-center/>



### Exhibit 10.2: Students' Views on Engaging Teaching in Mathematics Lessons

Reported by Students

Students were scored according to their degree of agreement with ten statements on the *Students' Views on Engaging Teaching in Mathematics Lessons* scale. Students who experienced **Very Engaging Teaching** in mathematics lessons had a score on the scale of at least 10.4, which corresponds to their "agreeing a lot" with five of the ten statements and "agreeing a little" with the other five, on average. Students who experienced teaching that was **Less than Engaging** had a score no higher than 8.2, which corresponds to their "disagreeing a little" with five of the ten statements and "agreeing a little" with the other five, on average. All other students experienced **Engaging Teaching** in mathematics lessons.

Country	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
Jordan	68 (1.2)	394 (3.3)	25 (0.9)	377 (4.3)	7 (0.5)	361 (6.1)	11.1 (0.05)
Egypt	65 (1.4)	404 (4.1)	27 (1.0)	378 (5.9)	8 (0.6)	369 (8.0)	11.0 (0.07)
Lebanon	64 (1.6)	450 (3.7)	25 (1.2)	436 (5.3)	11 (0.9)	426 (6.1)	11.0 (0.08)
Morocco	62 (1.3)	390 (2.3)	29 (0.8)	376 (3.0)	10 (0.7)	384 (4.4)	10.7 (0.05)
South Africa (9)	61 (1.2)	378 (4.7)	31 (0.9)	367 (5.3)	8 (0.6)	376 (7.1)	10.7 (0.05)
Turkey	60 (1.4)	470 (5.1)	31 (1.0)	438 (5.4)	10 (0.8)	445 (8.1)	10.6 (0.06)
Botswana (9)	60 (1.4)	408 (1.8)	31 (0.9)	374 (3.5)	10 (0.9)	378 (6.3)	10.7 (0.06)
Oman	59 (1.2)	416 (2.7)	34 (1.0)	391 (3.1)	8 (0.5)	370 (5.5)	10.6 (0.04)
Iran, Islamic Rep. of	55 (1.6)	442 (4.8)	33 (1.0)	435 (5.3)	12 (0.9)	418 (7.1)	10.5 (0.07)
Georgia	52 (1.2)	467 (3.6)	40 (0.9)	444 (4.3)	8 (0.7)	425 (9.2)	10.6 (0.05)
Saudi Arabia	50 (1.7)	376 (4.8)	35 (1.1)	366 (5.5)	15 (1.0)	349 (6.4)	10.2 (0.07)
Kazakhstan	49 (1.7)	542 (5.6)	47 (1.6)	516 (6.2)	4 (0.4)	499 (8.4)	10.6 (0.06)
Kuwait	49 (1.6)	398 (5.3)	37 (1.1)	391 (5.5)	15 (1.0)	384 (9.3)	10.2 (0.06)
Chile	48 (1.8)	435 (3.9)	33 (1.0)	425 (3.7)	19 (1.5)	415 (5.6)	10.1 (0.09)
Canada	46 (1.2)	534 (2.2)	40 (0.7)	530 (2.5)	14 (1.0)	509 (3.9)	10.2 (0.05)
Israel	45 (1.3)	513 (5.3)	36 (0.8)	515 (4.2)	20 (0.9)	504 (4.9)	10.0 (0.06)
United Arab Emirates	45 (0.9)	484 (2.6)	41 (0.7)	455 (2.4)	14 (0.6)	438 (3.7)	10.2 (0.04)
Russian Federation	44 (1.2)	548 (5.5)	46 (1.1)	533 (4.7)	11 (0.8)	519 (5.6)	10.2 (0.05)
Qatar	43 (1.3)	459 (3.7)	37 (0.8)	432 (3.5)	19 (1.0)	406 (4.4)	10.0 (0.06)
Thailand	43 (1.1)	431 (4.8)	48 (0.9)	432 (5.1)	9 (0.6)	430 (9.4)	10.1 (0.04)
United States	43 (1.2)	530 (3.5)	36 (0.7)	515 (3.3)	21 (1.0)	504 (4.0)	10.0 (0.06)
Bahrain	42 (1.5)	466 (2.3)	37 (1.0)	452 (2.2)	21 (1.2)	438 (2.9)	9.9 (0.07)
Malta	41 (0.7)	505 (2.1)	37 (0.8)	496 (2.2)	22 (0.6)	478 (2.8)	9.8 (0.03)
Malaysia	40 (1.2)	472 (4.1)	50 (0.9)	466 (3.9)	11 (0.8)	438 (5.9)	10.0 (0.05)
Lithuania	39 (1.7)	523 (3.7)	45 (1.1)	505 (3.1)	17 (1.5)	502 (4.3)	9.9 (0.07)
England	38 (1.7)	532 (5.4)	42 (1.0)	518 (4.8)	20 (1.4)	501 (6.0)	9.8 (0.08)
Ireland	37 (1.4)	528 (3.3)	41 (1.0)	523 (3.4)	22 (1.1)	517 (3.8)	9.7 (0.06)
Hungary	34 (1.6)	530 (6.5)	46 (1.1)	507 (3.9)	20 (1.3)	505 (5.3)	9.6 (0.07)
Australia	34 (1.3)	521 (3.7)	42 (0.7)	506 (3.2)	24 (1.3)	485 (4.6)	9.5 (0.07)
Singapore	33 (1.0)	633 (3.6)	52 (0.8)	620 (3.4)	16 (0.8)	596 (6.3)	9.7 (0.04)
Norway (9)	33 (1.3)	526 (3.0)	44 (1.0)	510 (2.8)	23 (1.4)	496 (3.1)	9.5 (0.06)
New Zealand	32 (1.5)	506 (4.9)	44 (0.9)	495 (3.9)	24 (1.3)	475 (3.5)	9.5 (0.07)
Italy	31 (1.3)	500 (3.5)	50 (1.0)	495 (3.0)	19 (1.2)	482 (4.6)	9.6 (0.05)
Sweden	31 (1.6)	517 (3.5)	49 (1.2)	500 (3.0)	20 (1.5)	481 (4.1)	9.5 (0.07)
Hong Kong SAR	26 (1.3)	606 (4.9)	49 (0.9)	595 (4.3)	24 (1.5)	581 (8.1)	9.3 (0.08)
Chinese Taipei	23 (1.2)	629 (3.3)	52 (1.0)	602 (2.6)	25 (1.6)	565 (5.2)	9.2 (0.07)
Slovenia	20 (1.0)	538 (4.8)	59 (1.3)	515 (2.3)	21 (1.2)	500 (3.1)	9.2 (0.05)
Japan	10 (0.7)	610 (5.0)	50 (1.2)	594 (2.7)	40 (1.6)	572 (3.0)	8.5 (0.05)
Korea, Rep. of	8 (0.5)	642 (5.0)	52 (1.2)	614 (3.2)	40 (1.4)	589 (2.7)	8.4 (0.04)
International Avg.	43 (0.2)	494 (0.7)	41 (0.2)	478 (0.6)	17 (0.2)	464 (0.9)	

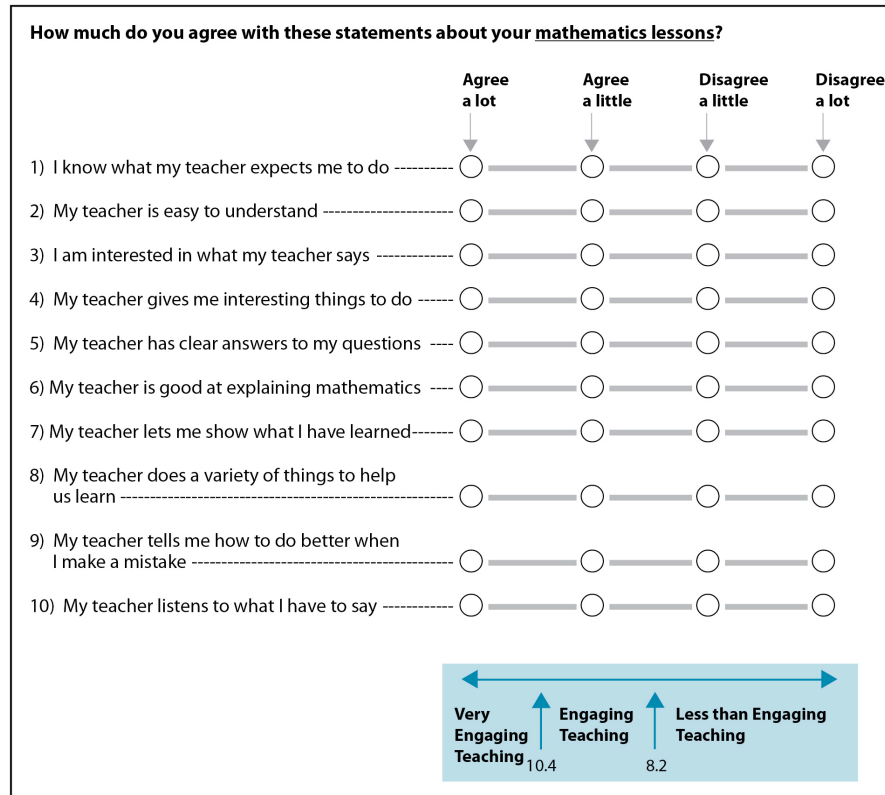
This TIMSS questionnaire scale was established in 2015 based on the combined response distribution of all countries that participated in TIMSS 2015. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

(.) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Exhibit 10.2: Students' Views on Engaging Teaching in Mathematics Lessons (Continued)**

Country	Very Engaging Teaching		Engaging Teaching		Less than Engaging Teaching		Average Scale Score
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	
<b>Benchmarking Participants</b>							
Ontario, Canada	53 (1.7)	529 (2.6)	35 (1.1)	522 (3.5)	12 (1.1)	501 (4.9)	10.5 (0.07)
Dubai, UAE	53 (1.3)	524 (2.9)	35 (1.2)	504 (3.0)	12 (0.8)	486 (5.5)	10.4 (0.05)
Buenos Aires, Argentina	51 (1.7)	398 (5.4)	32 (1.2)	398 (4.9)	18 (1.4)	394 (7.9)	10.2 (0.09)
Norway (8)	40 (1.3)	495 (2.6)	44 (0.9)	487 (2.4)	16 (0.9)	470 (3.6)	9.9 (0.05)
Florida, US	40 (2.5)	504 (8.5)	38 (1.4)	491 (6.6)	23 (2.1)	486 (6.9)	9.9 (0.13)
Abu Dhabi, UAE	40 (2.0)	459 (7.2)	44 (1.3)	438 (4.9)	16 (1.2)	419 (7.2)	10.0 (0.08)
Quebec, Canada	33 (1.6)	554 (3.9)	51 (1.3)	547 (3.6)	16 (1.7)	524 (8.0)	9.7 (0.07)



SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 10.4: Students Like Learning Mathematics**

Reported by Students

Students were scored according to their degree of agreement with nine statements on the *Students Like Learning Mathematics* scale. Students who **Very Much Like Learning Mathematics** had a score on the scale of at least 11.4, which corresponds to their “agreeing a lot” with five of the nine statements and “agreeing a little” with the other four, on average. Students who **Do Not Like Learning Mathematics** had a score no higher than 9.4, which corresponds to their “disagreeing a little” with five of the nine statements and “agreeing a little” with the other four, on average. All other students **Like Learning Mathematics**.

Country	Very Much Like Learning Mathematics		Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score	Difference in Average Scale Score from 2011	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement			
Botswana (9)	50 (1.1)	416 (1.9)	38 (1.0)	373 (3.1)	12 (0.6)	377 (5.0)	11.4 (0.04)	0.4 (0.06)	▲
Morocco	44 (0.8)	411 (2.5)	40 (0.6)	368 (3.1)	16 (0.6)	357 (2.4)	11.1 (0.03)	-0.1 (0.04)	
South Africa (9)	39 (1.2)	386 (4.7)	42 (0.8)	362 (4.9)	19 (1.0)	377 (6.3)	10.9 (0.05)	0.1 (0.06)	
Oman	39 (1.0)	436 (3.1)	45 (0.8)	385 (2.6)	17 (0.7)	382 (3.6)	11.0 (0.04)	0.2 (0.05)	▲
Egypt	39 (1.5)	429 (4.1)	42 (1.0)	369 (4.7)	20 (1.0)	378 (5.0)	10.9 (0.07)	◊ ◊	
Jordan	39 (1.0)	410 (3.6)	37 (0.8)	373 (4.0)	24 (0.8)	377 (4.2)	10.8 (0.05)	0.0 (0.08)	
Kazakhstan	34 (1.3)	548 (5.9)	54 (1.1)	522 (5.9)	12 (0.8)	503 (6.3)	11.0 (0.05)	0.1 (0.07)	
Iran, Islamic Rep. of	32 (1.1)	470 (6.1)	39 (0.9)	430 (4.8)	28 (1.1)	407 (4.3)	10.5 (0.05)	-0.1 (0.08)	
Lebanon	31 (1.3)	466 (4.5)	45 (1.5)	434 (4.7)	23 (1.4)	430 (4.6)	10.6 (0.06)	0.1 (0.08)	
Malaysia	28 (1.0)	497 (4.1)	56 (0.7)	459 (3.9)	16 (0.8)	433 (4.9)	10.7 (0.04)	-0.1 (0.07)	
Turkey	28 (1.0)	495 (6.6)	42 (0.8)	445 (5.4)	30 (1.0)	443 (4.5)	10.3 (0.05)	0.0 (0.07)	
Kuwait	26 (1.1)	413 (6.0)	38 (1.1)	392 (5.7)	36 (1.4)	379 (5.0)	10.0 (0.07)	◊ ◊	
United Arab Emirates	25 (0.7)	502 (3.0)	43 (0.6)	461 (2.3)	32 (0.8)	442 (2.6)	10.2 (0.04)	-0.1 (0.05)	
Singapore	24 (0.7)	654 (3.2)	42 (0.8)	625 (3.5)	33 (0.8)	592 (4.3)	10.1 (0.03)	-0.2 (0.05)	▼
Georgia	23 (1.2)	486 (4.8)	44 (1.0)	456 (4.4)	33 (1.3)	431 (4.2)	10.2 (0.06)	-0.6 (0.08)	▼
Saudi Arabia	21 (1.1)	396 (6.0)	37 (1.1)	370 (5.4)	42 (1.7)	354 (4.9)	9.8 (0.07)	-0.3 (0.11)	▼
Qatar	21 (0.8)	488 (4.8)	41 (0.8)	441 (3.9)	39 (0.9)	411 (2.9)	9.9 (0.04)	-0.1 (0.07)	
Bahrain	20 (0.9)	492 (3.5)	36 (1.0)	456 (2.7)	44 (1.4)	437 (2.1)	9.7 (0.06)	0.0 (0.07)	
Canada	20 (0.8)	561 (2.6)	40 (0.9)	537 (2.4)	39 (1.1)	503 (2.3)	9.8 (0.05)	◊ ◊	
Thailand	20 (0.8)	466 (7.4)	58 (0.9)	425 (4.5)	23 (1.0)	418 (5.5)	10.3 (0.04)	0.0 (0.06)	
Israel	19 (0.9)	524 (6.6)	36 (0.7)	517 (4.9)	44 (1.1)	502 (3.8)	9.6 (0.05)	-0.2 (0.07)	▼
Russian Federation	19 (1.0)	566 (6.8)	48 (0.7)	545 (5.1)	33 (1.1)	512 (4.6)	10.1 (0.04)	-0.3 (0.06)	▼
United States	17 (0.6)	554 (4.0)	36 (0.6)	528 (3.4)	47 (0.9)	499 (3.0)	9.5 (0.04)	0.0 (0.06)	
Malta	17 (0.6)	536 (3.4)	34 (0.7)	500 (2.3)	49 (0.8)	478 (1.7)	9.5 (0.03)	◊ ◊	
Italy	17 (0.9)	537 (3.7)	32 (0.9)	506 (3.4)	51 (1.2)	473 (2.8)	9.4 (0.05)	-0.1 (0.08)	
Chile	16 (0.8)	466 (4.9)	34 (0.9)	435 (4.3)	50 (1.3)	410 (3.1)	9.5 (0.06)	-0.3 (0.07)	▼
Lithuania	15 (0.9)	553 (4.5)	41 (1.2)	515 (3.1)	43 (1.4)	493 (3.3)	9.7 (0.05)	-0.1 (0.07)	
Hong Kong SAR	15 (0.6)	638 (4.5)	39 (0.8)	605 (4.6)	46 (1.1)	572 (5.2)	9.5 (0.04)	-0.2 (0.07)	
New Zealand	14 (0.6)	534 (5.9)	40 (1.0)	501 (4.5)	46 (1.2)	476 (3.1)	9.6 (0.04)	0.1 (0.07)	
England	14 (0.8)	559 (6.4)	39 (1.0)	532 (4.7)	48 (1.4)	498 (4.4)	9.5 (0.06)	0.1 (0.09)	
Sweden	14 (1.3)	546 (4.7)	34 (1.2)	522 (3.4)	52 (1.5)	476 (2.9)	9.3 (0.06)	0.0 (0.07)	
Ireland	14 (0.7)	562 (4.6)	35 (0.9)	537 (3.1)	52 (1.2)	505 (2.8)	9.3 (0.05)	◊ ◊	
Australia	13 (0.7)	551 (4.4)	36 (0.9)	522 (3.3)	50 (1.2)	482 (3.0)	9.4 (0.05)	0.1 (0.08)	
Norway (9)	13 (0.6)	562 (3.9)	35 (1.0)	527 (2.9)	52 (1.3)	490 (2.4)	9.3 (0.05)	◊ ◊	
Chinese Taipei	11 (0.5)	666 (4.4)	33 (0.7)	633 (2.8)	56 (1.0)	566 (2.9)	9.2 (0.04)	0.2 (0.07)	▲
Hungary	11 (0.7)	574 (8.8)	31 (1.1)	531 (5.3)	58 (1.3)	495 (3.5)	9.1 (0.05)	0.0 (0.07)	
Japan	9 (0.5)	640 (4.8)	32 (0.8)	614 (2.8)	59 (1.1)	563 (2.4)	9.2 (0.04)	0.1 (0.06)	
Korea, Rep. of	8 (0.4)	668 (4.2)	34 (0.7)	634 (3.0)	58 (0.8)	581 (2.7)	9.1 (0.04)	0.2 (0.05)	▲
Slovenia	5 (0.4)	560 (7.0)	28 (1.1)	541 (2.7)	67 (1.2)	503 (2.2)	8.7 (0.05)	0.2 (0.07)	
International Avg.	22 (0.1)	518 (0.8)	39 (0.1)	485 (0.6)	38 (0.2)	462 (0.6)			

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

**Exhibit 10.4: Students Like Learning Mathematics (Continued)**

Country	Very Much Like Learning Mathematics		Like Learning Mathematics		Do Not Like Learning Mathematics		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Dubai, UAE	28 (1.0)	546 (3.6)	41 (0.9)	510 (2.7)	31 (1.0)	484 (2.8)	10.3 (0.05)	0.2 (0.07) ●
Ontario, Canada	25 (1.2)	561 (2.9)	40 (1.1)	529 (3.0)	35 (1.4)	490 (2.9)	10.0 (0.06)	0.2 (0.09)
Abu Dhabi, UAE	24 (1.4)	477 (6.6)	43 (1.0)	439 (5.4)	33 (1.5)	421 (4.8)	10.2 (0.07)	-0.1 (0.09)
Norway (8)	17 (0.9)	521 (3.4)	35 (0.8)	497 (2.7)	48 (1.1)	468 (2.2)	9.5 (0.05)	0.1 (0.07)
Buenos Aires, Argentina	17 (1.0)	417 (6.5)	35 (1.0)	404 (5.7)	48 (1.2)	384 (5.1)	9.5 (0.05)	0
Florida, US	15 (1.1)	524 (10.7)	34 (1.1)	500 (7.5)	50 (1.7)	482 (5.9)	9.3 (0.07)	0.0 (0.11)
Quebec, Canada	12 (0.7)	573 (4.3)	42 (1.5)	558 (3.1)	46 (1.8)	528 (4.0)	9.5 (0.07)	0.2 (0.08)

Significantly higher than 2011 ●  
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

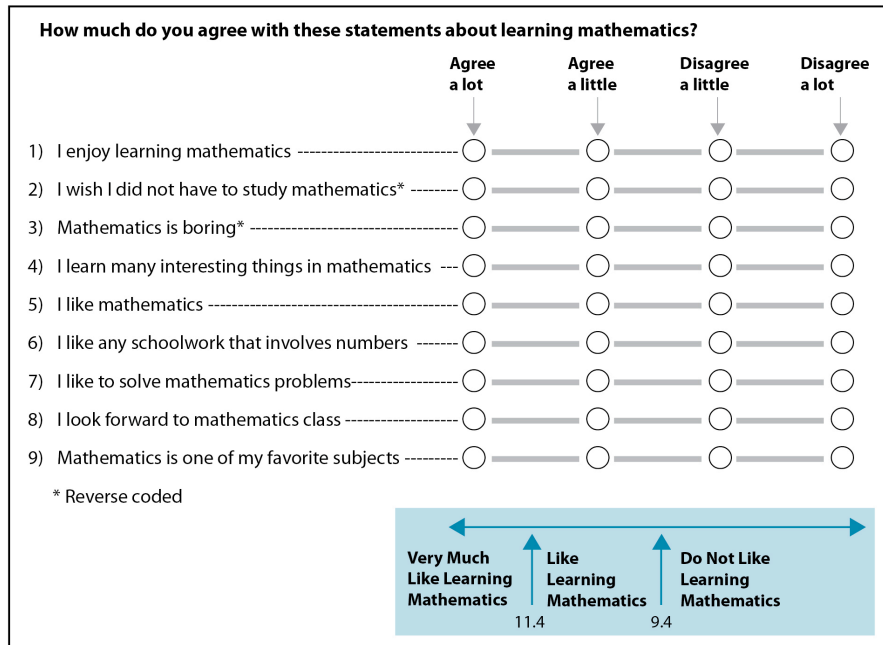


Exhibit 10.6: Students Confident in Mathematics

Reported by Students

Students were scored according to their degree of agreement with nine statements on the *Students Confident in Mathematics* scale. Students **Very Confident in Mathematics** had a score on the scale of at least 12.1, which corresponds to their “agreeing a lot” with five of the nine statements and “agreeing a little” with the other four, on average. Students who were **Not Confident in Mathematics** had a score no higher than 9.5, which corresponds to their “disagreeing a little” with five of the nine statements and “agreeing a little” with the other four, on average. All other students were **Confident in Mathematics**.

Country	Very Confident in Mathematics		Confident in Mathematics		Not Confident in Mathematics		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
Canada	26 (0.7)	579 (2.1)	41 (0.8)	535 (2.3)	33 (0.9)	482 (2.2)	10.6 (0.04)	◇ ◇
Israel	24 (0.9)	569 (5.0)	44 (0.8)	512 (4.4)	32 (1.0)	470 (3.6)	10.7 (0.05)	-0.4 (0.07) ▼
Norway (9)	23 (0.8)	576 (2.7)	41 (0.9)	515 (2.4)	36 (1.1)	468 (2.3)	10.4 (0.05)	◇ ◇
United States	21 (0.7)	573 (3.5)	40 (0.6)	530 (3.0)	39 (0.9)	480 (2.9)	10.3 (0.05)	-0.2 (0.06) ▼
Hungary	19 (0.9)	597 (5.3)	39 (0.9)	528 (3.9)	42 (1.2)	465 (3.5)	10.2 (0.06)	0.4 (0.08) ▲
Italy	19 (0.7)	553 (2.9)	38 (1.0)	507 (3.0)	43 (1.2)	458 (2.9)	10.0 (0.05)	0.1 (0.07)
Sweden	18 (1.0)	570 (3.3)	41 (1.1)	514 (3.1)	41 (1.2)	459 (2.9)	10.2 (0.06)	-0.1 (0.07)
Lebanon	18 (1.1)	494 (6.0)	45 (1.0)	446 (4.1)	37 (1.0)	422 (4.5)	10.4 (0.05)	-0.1 (0.08)
Jordan	17 (0.7)	454 (4.9)	48 (0.8)	389 (3.3)	35 (0.8)	354 (3.5)	10.5 (0.04)	-0.3 (0.06) ▼
Oman	17 (0.6)	465 (3.9)	52 (0.7)	403 (2.4)	31 (0.7)	372 (2.8)	10.5 (0.03)	0.0 (0.05)
United Arab Emirates	17 (0.5)	536 (2.9)	50 (0.6)	467 (2.1)	33 (0.7)	429 (2.5)	10.4 (0.03)	-0.2 (0.04) ▼
Iran, Islamic Rep. of	16 (0.8)	512 (5.8)	42 (0.8)	444 (5.1)	42 (1.1)	400 (3.8)	10.2 (0.05)	-0.1 (0.07)
Ireland	16 (0.8)	583 (4.0)	42 (0.9)	534 (2.9)	43 (1.0)	492 (3.2)	10.0 (0.05)	◇ ◇
Kuwait	15 (1.0)	450 (7.1)	47 (0.9)	394 (5.2)	38 (1.4)	368 (5.3)	10.2 (0.06)	◇ ◇
Qatar	15 (0.6)	520 (4.7)	47 (0.8)	447 (3.4)	38 (0.9)	398 (3.3)	10.3 (0.04)	-0.2 (0.06) ▼
England	15 (0.8)	578 (5.4)	50 (1.0)	530 (4.2)	35 (1.4)	479 (4.2)	10.3 (0.06)	0.0 (0.09)
Australia	15 (0.7)	580 (3.6)	42 (0.7)	522 (3.4)	43 (0.9)	465 (2.5)	10.0 (0.04)	-0.2 (0.08)
Lithuania	15 (0.8)	589 (3.6)	45 (0.9)	525 (2.7)	40 (1.2)	468 (2.8)	10.2 (0.05)	0.3 (0.07) ▲
Bahrain	15 (0.5)	522 (3.7)	43 (0.9)	460 (2.2)	42 (1.1)	428 (2.3)	10.1 (0.04)	0.0 (0.05)
Egypt	15 (0.8)	467 (4.9)	51 (0.8)	393 (4.0)	34 (1.1)	364 (4.5)	10.4 (0.05)	◇ ◇
Kazakhstan	15 (0.8)	571 (6.7)	57 (1.0)	533 (5.6)	28 (1.3)	496 (5.9)	10.5 (0.05)	0.2 (0.08) ▲
Turkey	14 (0.7)	571 (5.7)	32 (0.8)	473 (6.4)	54 (1.1)	419 (3.7)	9.8 (0.05)	0.0 (0.07)
Malta	13 (0.5)	571 (3.2)	37 (0.6)	506 (2.1)	49 (0.7)	468 (1.7)	9.7 (0.03)	◇ ◇
Singapore	13 (0.5)	675 (3.0)	41 (0.7)	642 (2.8)	46 (0.8)	588 (4.0)	9.7 (0.04)	-0.2 (0.05) ▼
Saudi Arabia	12 (0.9)	433 (7.8)	50 (1.3)	373 (4.4)	37 (1.5)	342 (5.4)	10.2 (0.05)	-0.4 (0.09) ▼
Russian Federation	12 (0.6)	602 (5.0)	42 (0.9)	558 (5.2)	46 (1.1)	503 (4.8)	9.8 (0.04)	-0.1 (0.06)
New Zealand	12 (0.6)	576 (4.6)	43 (0.7)	509 (3.7)	44 (0.8)	456 (3.2)	9.9 (0.04)	-0.2 (0.07)
Georgia	12 (0.8)	533 (5.1)	44 (1.0)	473 (3.9)	44 (1.1)	415 (4.1)	10.0 (0.05)	-0.1 (0.06)
Chile	12 (0.7)	506 (4.5)	36 (0.9)	441 (3.7)	52 (1.1)	401 (3.2)	9.7 (0.05)	0.2 (0.06) ▲
Slovenia	12 (0.5)	586 (3.7)	44 (0.9)	535 (2.3)	44 (0.9)	479 (2.6)	9.9 (0.03)	-0.1 (0.05)
Hong Kong SAR	10 (0.5)	660 (4.3)	36 (0.8)	611 (5.4)	54 (0.9)	571 (4.5)	9.4 (0.05)	0.2 (0.06) ▲
South Africa (9)	10 (0.6)	448 (7.5)	43 (0.9)	375 (4.6)	48 (1.1)	359 (4.8)	9.8 (0.04)	-0.2 (0.05) ▼
Chinese Taipei	9 (0.4)	688 (3.7)	30 (0.7)	647 (3.3)	60 (0.9)	562 (2.6)	9.1 (0.04)	0.5 (0.07) ▲
Morocco	9 (0.4)	467 (3.7)	50 (0.7)	391 (2.4)	41 (0.7)	361 (2.6)	10.0 (0.02)	-0.2 (0.04) ▼
Botswana (9)	8 (0.4)	475 (4.6)	45 (0.8)	396 (2.4)	47 (0.9)	381 (2.4)	9.8 (0.03)	0.0 (0.05)
Korea, Rep. of	8 (0.4)	687 (4.9)	38 (0.7)	643 (2.8)	55 (0.8)	569 (2.7)	9.4 (0.03)	0.4 (0.04) ▲
Japan	5 (0.3)	676 (5.3)	32 (0.8)	625 (2.9)	63 (0.9)	561 (2.2)	9.0 (0.04)	0.4 (0.05) ▲
Malaysia	4 (0.2)	568 (6.6)	42 (0.9)	485 (4.2)	54 (0.9)	444 (3.5)	9.5 (0.03)	0.2 (0.04) ▲
Thailand	3 (0.3)	560 (13.9)	29 (0.9)	456 (6.3)	69 (1.0)	416 (4.2)	9.1 (0.04)	-0.2 (0.05) ▼
International Avg.	14 (0.1)	554 (0.8)	43 (0.1)	494 (0.6)	43 (0.2)	449 (0.6)		

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◇) indicates the country did not participate in the 2011 assessment.

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼





**Exhibit 10.7: Students Value Mathematics**

*Reported by Students*

Students were scored according to their degree of agreement with nine statements on the *Students Value Mathematics* scale. Students who **Strongly Value Mathematics** had a score on the scale of at least 10.3, which corresponds to their “agreeing a lot” with five of the nine statements and “agreeing a little” with the other four, on average. Students who **Do Not Value Mathematics** had a score no higher than 7.7, which corresponds to their “disagreeing a little” with five of the nine statements and “agreeing a little” with the other four, on average. All other students **Value Mathematics**.

Country	Strongly Value Mathematics		Value Mathematics		Do Not Value Mathematics		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
South Africa (9)	72 (0.8)	382 (4.6)	24 (0.7)	360 (5.7)	4 (0.3)	329 (7.5)	11.1 (0.04)	-0.1 (0.05)
Botswana (9)	72 (0.8)	411 (1.9)	25 (0.7)	359 (3.4)	3 (0.3)	312 (6.9)	11.2 (0.04)	0.1 (0.05)
Morocco	68 (0.8)	395 (2.4)	27 (0.7)	368 (2.8)	5 (0.3)	349 (4.9)	11.1 (0.04)	-0.4 (0.05) ▼
Jordan	65 (0.9)	399 (3.3)	29 (0.8)	372 (3.8)	6 (0.4)	350 (7.2)	11.0 (0.04)	0.0 (0.06)
Egypt	61 (1.2)	409 (4.0)	32 (1.0)	374 (4.7)	7 (0.5)	365 (8.1)	10.8 (0.06)	◊ ◊
Oman	59 (0.9)	421 (2.6)	35 (0.7)	384 (2.8)	6 (0.4)	359 (6.3)	10.7 (0.04)	-0.2 (0.05) ▼
Israel	58 (1.0)	524 (4.4)	34 (0.8)	505 (4.3)	8 (0.5)	462 (7.1)	10.5 (0.05)	-0.1 (0.06)
Lebanon	58 (1.4)	453 (3.9)	34 (1.1)	438 (4.7)	9 (0.6)	425 (7.0)	10.7 (0.07)	0.3 (0.09) ●
Iran, Islamic Rep. of	53 (1.0)	446 (5.3)	38 (0.9)	431 (4.6)	9 (0.5)	407 (6.4)	10.4 (0.04)	0.0 (0.06)
Canada	51 (0.8)	540 (2.2)	42 (0.6)	522 (2.3)	7 (0.5)	483 (3.7)	10.3 (0.03)	◊ ◊
Thailand	50 (1.2)	446 (5.3)	45 (1.1)	421 (4.9)	5 (0.4)	390 (6.9)	10.3 (0.04)	0.1 (0.06)
Turkey	47 (1.1)	472 (5.4)	41 (0.8)	449 (5.1)	12 (0.6)	436 (6.0)	10.1 (0.05)	0.1 (0.07)
England	46 (1.1)	526 (4.4)	46 (0.9)	518 (4.5)	8 (0.6)	490 (6.5)	10.1 (0.05)	0.0 (0.06)
Kuwait	46 (1.4)	405 (5.7)	42 (1.1)	388 (5.1)	12 (0.8)	366 (6.2)	10.0 (0.06)	◊ ◊
Chile	46 (1.0)	436 (3.6)	42 (0.9)	424 (3.6)	12 (0.8)	412 (5.2)	10.0 (0.04)	-0.3 (0.05) ▼
Qatar	45 (1.0)	465 (3.5)	41 (0.8)	429 (3.3)	13 (0.6)	386 (5.4)	10.0 (0.04)	-0.1 (0.07)
United Arab Emirates	45 (0.8)	487 (2.7)	45 (0.6)	456 (2.3)	11 (0.4)	420 (3.9)	10.0 (0.04)	-0.3 (0.05) ▼
Georgia	44 (1.1)	466 (4.2)	46 (1.0)	451 (3.6)	9 (0.7)	423 (6.8)	10.1 (0.05)	-0.5 (0.06) ▼
United States	44 (0.8)	531 (3.6)	45 (0.6)	516 (3.1)	11 (0.4)	488 (3.8)	10.0 (0.03)	-0.2 (0.04) ▼
Malta	44 (0.7)	509 (2.2)	45 (0.8)	492 (1.8)	11 (0.5)	458 (4.6)	10.0 (0.03)	◊ ◊
Australia	43 (0.9)	524 (3.1)	46 (0.8)	501 (3.3)	12 (0.7)	464 (3.9)	9.9 (0.04)	-0.1 (0.06)
Saudi Arabia	42 (1.4)	379 (5.4)	42 (1.0)	369 (4.8)	15 (0.9)	344 (7.2)	9.8 (0.07)	-0.3 (0.09) ▼
New Zealand	42 (0.8)	505 (4.1)	48 (0.8)	491 (3.2)	10 (0.4)	458 (5.3)	9.9 (0.03)	-0.1 (0.05)
Bahrain	41 (0.9)	473 (2.4)	43 (0.9)	450 (2.6)	16 (0.9)	424 (4.6)	9.8 (0.05)	-0.2 (0.07) ▼
Ireland	41 (0.9)	534 (3.3)	48 (0.8)	520 (3.1)	11 (0.5)	501 (4.6)	9.8 (0.04)	◊ ◊
Norway (9)	41 (1.0)	527 (2.7)	48 (0.9)	509 (2.5)	12 (0.5)	476 (3.7)	9.8 (0.04)	◊ ◊
Kazakhstan	40 (1.2)	538 (5.7)	52 (0.9)	522 (5.8)	8 (0.5)	523 (6.9)	10.0 (0.05)	-0.3 (0.07) ▼
Malaysia	39 (0.9)	487 (3.5)	53 (0.7)	458 (4.0)	8 (0.7)	425 (6.2)	9.8 (0.04)	-0.2 (0.07) ▼
Lithuania	37 (1.1)	523 (4.5)	53 (0.9)	507 (2.7)	11 (0.6)	490 (4.8)	9.7 (0.04)	-0.3 (0.05) ▼
Singapore	34 (0.8)	629 (3.5)	58 (0.7)	621 (3.4)	8 (0.4)	590 (5.8)	9.7 (0.03)	-0.3 (0.04) ▼
Russian Federation	31 (1.2)	547 (6.4)	52 (1.1)	538 (4.8)	17 (0.7)	522 (5.2)	9.4 (0.05)	-0.4 (0.07) ▼
Hungary	28 (0.9)	537 (6.2)	54 (0.9)	511 (3.6)	19 (0.9)	492 (5.0)	9.3 (0.05)	-0.2 (0.06) ▼
Sweden	28 (1.2)	518 (3.8)	58 (1.2)	501 (2.9)	14 (0.8)	471 (4.5)	9.4 (0.05)	-0.1 (0.06)
Italy	19 (0.8)	513 (3.8)	57 (0.9)	496 (3.0)	24 (0.8)	477 (3.4)	8.9 (0.03)	-0.1 (0.05)
Slovenia	19 (0.8)	532 (4.5)	64 (1.0)	516 (2.3)	17 (0.8)	499 (2.9)	9.0 (0.03)	-0.2 (0.05) ▼
Hong Kong SAR	19 (0.8)	617 (5.4)	52 (1.0)	602 (4.3)	29 (1.0)	567 (5.6)	8.7 (0.05)	-0.5 (0.06) ▼
Korea, Rep. of	13 (0.6)	656 (4.4)	63 (0.9)	614 (2.8)	24 (0.8)	557 (3.7)	8.6 (0.04)	0.0 (0.05)
Japan	11 (0.6)	614 (4.4)	59 (0.7)	595 (2.5)	29 (0.9)	560 (3.6)	8.5 (0.03)	0.0 (0.05)
Chinese Taipei	10 (0.5)	650 (4.8)	49 (0.9)	621 (2.8)	41 (1.0)	561 (2.8)	8.1 (0.04)	-0.1 (0.06)
International Avg.	42 (0.2)	498 (0.7)	45 (0.1)	477 (0.6)	13 (0.1)	449 (0.9)		

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

This TIMSS questionnaire scale was established in 2011 based on the combined response distribution of all countries that participated in TIMSS 2011. To provide a point of reference for country comparisons, the scale centerpoint of 10 was located at the mean of the combined distribution. The units of the scale were chosen so that 2 scale score points corresponded to the standard deviation of the distribution.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

A diamond (◊) indicates the country did not participate in the 2011 assessment.

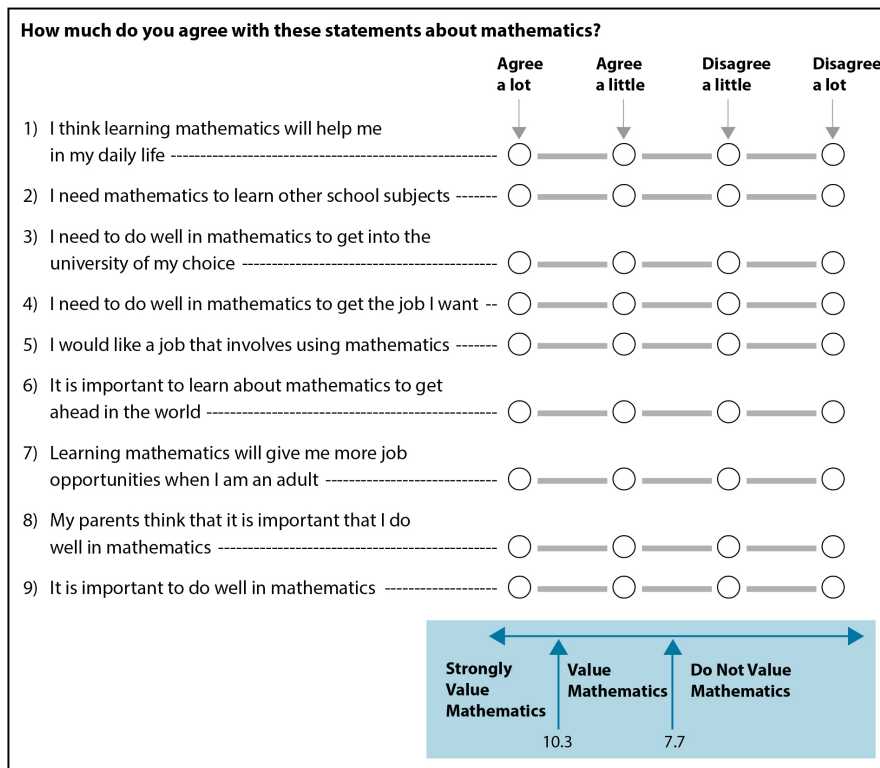
Significantly higher than 2011 ●  
Significantly lower than 2011 ▼

**Exhibit 10.7: Students Value Mathematics (Continued)**

Country	Strongly Value Mathematics		Value Mathematics		Do Not Value Mathematics		Average Scale Score	Difference in Average Scale Score from 2011
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement		
<b>Benchmarking Participants</b>								
Ontario, Canada	57 (1.0)	536 (2.6)	37 (0.8)	512 (3.0)	6 (0.4)	477 (4.8)	10.5 (0.04)	0.2 (0.06)
Norway (8)	49 (1.0)	497 (2.5)	44 (1.0)	484 (2.1)	8 (0.4)	452 (4.3)	10.2 (0.04)	0.3 (0.06) ▲
Dubai, UAE	48 (1.0)	530 (2.7)	41 (0.9)	504 (3.0)	10 (0.5)	462 (4.5)	10.2 (0.04)	0.0 (0.06)
Abu Dhabi, UAE	43 (1.4)	464 (5.7)	46 (1.2)	435 (5.5)	11 (0.8)	399 (8.3)	10.0 (0.07)	-0.3 (0.08) ▼
Buenos Aires, Argentina	41 (1.3)	401 (5.4)	46 (0.9)	395 (5.1)	13 (0.9)	394 (5.9)	9.8 (0.05)	◊ ◊
Quebec, Canada	40 (1.3)	559 (3.8)	53 (1.0)	541 (3.7)	7 (0.9)	503 (7.8)	9.9 (0.06)	-0.1 (0.07)
Florida, US	37 (1.2)	500 (8.3)	48 (1.1)	495 (6.4)	15 (1.0)	485 (7.3)	9.7 (0.06)	-0.3 (0.09) ▼

Significantly higher than 2011 ▲  
Significantly lower than 2011 ▼

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



**TIMSS**  
**2015**

# MATHEMATICS APPENDICES

TIMSS 2015 INTERNATIONAL RESULTS IN MATHEMATICS



**IEA**

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



**Appendix A.1: Countries Participating in TIMSS 2015 and in Earlier TIMSS Assessments**

Country	Grade 4					Grade 8					
	2015	2011	2007	2003	1995	2015	2011	2007	2003	1999	1995
Armenia	○	●	○	●		○	●	○	●		
Australia	●	●	●	●	●	●	●	●	●	○	●
Bahrain	●	●				●	●	●	●		
Belgium (Flemish)	●	●		●					●	●	●
Botswana (6, 9)		●				●	●	○	○		
Bulgaria	●							●	●		●
Canada	●				○	●				○	○
Chile	●	●				●	●		●	●	
Chinese Taipei	●	●	●	●		●	●	●	●	●	
Croatia	●	●									
Cyprus	●			●	●			●	●	●	●
Czech Republic	●	●	●		●			●		●	●
Denmark	●	●	●								●
Egypt						●		●	●		
England	●	●	●	●	●	●	●	●	●	●	●
Finland	●	●					●			○	
France	●										●
Georgia	●	●	●			●	●	●			
Germany	●	●	●								●
Hong Kong SAR	●	●	●	●	●	●	●	●	●	●	●
Hungary	●	●	●	●	●	●	●	●	●	●	●
Indonesia	●				○		●	●	○	○	○
Iran, Islamic Rep. of	●	●	●	●	●	●	●	●	●	●	●
Ireland	●	●			●	●					●
Israel					○	●	●	○	○	○	○
Italy	●	●	●	●	○	●	●	●	●	●	○
Japan	●	●	●	●	●	●	●	●	●	●	●
Jordan	●					●	●	●	●	●	
Kazakhstan	●	●	○			●	●				
Korea, Rep. of	●	●			●	●	●	●	●	●	●
Kuwait	●	●	○		○	●		○			○
Lebanon						●	●	●	●		
Lithuania	●	●	●	●		●	●	●	●	●	●
Malaysia						●	●	●	●	●	
Malta		●				●		●			
Morocco	●	●	○	○		●	●	○	○	○	
Netherlands	●	●	●	●	●				●	●	●
New Zealand	●	●	●	●	●	●	●		●	●	●
Northern Ireland	●	●									
Norway (5,9)						●					
Oman	●	●				●	●	●			
Poland	●	○									
Portugal	●	●			●						●
Qatar	●	●	○			●	●	○			
Russian Federation	●	●	●	●		●	●	●	●	●	●
Saudi Arabia	●	●				●	●	○	○		
Serbia	●	●						●	●		
Singapore	●	●	●	●	●	●	●	●	●	●	●
Slovak Republic	●	●	●						●	●	●
Slovenia	●	●	●	●	●	●	●	●		○	●
South Africa (5, 9)	●					●	●		○	○	○
Spain	●	●									●
Sweden	●	●	●			●	●	●	●		●
Thailand		●			○	●	●	●		●	○
Turkey	●	●				●	●	○		○	
United Arab Emirates	●	●				●	●				
United States	●	●	●	●	●	●	●	●	●	●	●

● Indicates participation in that testing cycle.  
○ Indicates participation but data not comparable for measuring trends to 2015, primarily due to countries improving translations or increasing population coverage.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Appendix A.1: Countries Participating in TIMSS 2015 and in Earlier TIMSS Assessments (Continued)**

Country	Grade 4					Grade 8					
	2015	2011	2007	2003	1995	2015	2011	2007	2003	1999	1995
<b>Benchmarking Participants</b>											
Buenos Aires, Argentina	●					●					
Ontario, Canada	●	●	●	●	●	●	●	●	●	●	●
Quebec, Canada	●	●	●	●	●	●	●	●	●	●	●
Norway (4,8)	●	●	●	●	●	●	●	●	●		●
Abu Dhabi, UAE	●	●				●	●				
Dubai, UAE	●	●	●			●	●	●			
Florida, US	●	●				●	●				

- Indicates participation in that testing cycle.
- Indicates participation but data not comparable for measuring trends to 2015, primarily due to countries improving translations or increasing population coverage.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Appendix B.2: Distribution of Items Included in the Assessment by Content Domain, Cognitive Domain, and Item Format**

TIMSS Assessment Items	Multiple-Choice Items	Constructed Response Items	Total Items	Percentage of Score Points
<b>Content Domain</b>				
Number	29 (29)	35 (41)	64 (70)	31%
Algebra	35 (35)	27 (30)	62 (65)	28%
Geometry	22 (22)	21 (25)	43 (47)	21%
Data and Chance	29 (31)	14 (16)	43 (47)	21%
Total	115 (117)	97 (112)	212 (229)	100%
Percentage of Score Points	51%	49%		
<b>Cognitive Domain</b>				
Knowing	50 (50)	19 (20)	69 (70)	31%
Applying	48 (48)	47 (55)	95 (103)	45%
Reasoning	17 (19)	31 (37)	48 (56)	24%
Total	115 (117)	97 (112)	212 (229)	100%
Percentage of Score Points	51%	49%		

Score points are shown in parentheses.  
 Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Appendix C.2: Coverage of TIMSS 2015 Target Population**

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-Level Exclusions	Within-Sample Exclusions	Overall Exclusions
Australia	100%		1.3%	2.2%	3.5%
Bahrain	100%		0.3%	3.5%	3.8%
Botswana (9)	100%		0.0%	0.3%	0.3%
<sup>1</sup> Canada	67%	Students from the provinces of Manitoba, Newfoundland, Ontario, and Quebec	2.5%	2.4%	4.8%
Chile	100%		1.4%	0.5%	1.9%
Chinese Taipei	100%		0.1%	1.6%	1.7%
Egypt	100%		0.1%	0.0%	0.1%
England	100%		2.3%	0.0%	2.3%
<sup>1 2</sup> Georgia	90%	Students taught in Georgian	2.3%	3.7%	6.0%
Hong Kong SAR	100%		1.3%	0.4%	1.6%
Hungary	100%		2.6%	2.9%	5.4%
Iran, Islamic Rep. of	100%		0.5%	1.7%	2.2%
Ireland	100%		0.3%	0.9%	1.2%
<sup>3</sup> Israel	100%		17.6%	5.3%	22.8%
<sup>2</sup> Italy	100%		0.8%	5.3%	6.1%
Japan	100%		0.8%	1.5%	2.3%
Jordan	100%		0.0%	1.0%	1.0%
Kazakhstan	100%		3.0%	0.8%	3.8%
Korea, Rep. of	100%		1.2%	0.9%	2.1%
Kuwait	100%		2.8%	0.5%	3.3%
Lebanon	100%		1.3%	0.0%	1.3%
<sup>2</sup> Lithuania	100%		3.9%	3.0%	7.0%
Malaysia	100%		1.1%	3.2%	4.3%
Malta	100%		1.9%	1.6%	3.5%
Morocco	100%		0.0%	0.0%	0.0%
New Zealand	100%		1.6%	1.5%	3.1%
Norway (9)	100%		1.0%	2.7%	3.7%
Oman	100%		0.1%	0.3%	0.4%
Qatar	100%		1.7%	1.5%	3.2%
Russian Federation	100%		2.3%	1.4%	3.7%
Saudi Arabia	100%		1.9%	0.2%	2.1%
<sup>2</sup> Singapore	100%		7.0%	0.0%	7.0%
Slovenia	100%		2.1%	1.7%	3.8%
South Africa (9)	100%		1.5%	0.0%	1.5%
Sweden	100%		1.8%	3.6%	5.5%
Thailand	100%		0.2%	0.0%	0.2%
Turkey	100%		0.2%	1.1%	1.3%
United Arab Emirates	100%		2.2%	1.5%	3.6%
United States	100%		0.0%	5.1%	5.1%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	100%		2.7%	0.0%	2.7%
Ontario, Canada	100%		1.8%	0.8%	2.5%
Quebec, Canada	100%		3.6%	1.7%	5.3%
Norway (8)	100%		1.4%	2.7%	4.1%
Abu Dhabi, UAE	100%		1.8%	2.3%	4.1%
Dubai, UAE	100%		3.6%	1.6%	5.2%
<sup>1</sup> Florida, US	90%	Students from public schools	0.0%	2.8%	2.8%

- 1 National Target Population does not include all of the International Target Population.
- 2 National Defined Population covers 90% to 95% of the National Target Population.
- 3 National Defined Population covers less than 90% of the National Target population (but at least 77%).



**Appendix C.4: School Sample Sizes**

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
Australia	290	287	285	0	285
Bahrain	105	105	105	0	105
Botswana (9)	159	159	159	0	159
Canada	344	337	253	23	276
Chile	184	184	154	17	171
Chinese Taipei	190	190	190	0	190
Egypt	214	214	197	14	211
England	150	148	135	8	143
Georgia	162	153	151	2	153
Hong Kong SAR	158	158	123	10	133
Hungary	150	145	140	4	144
Iran, Islamic Rep. of	250	250	250	0	250
Ireland	150	150	149	0	149
Israel	200	200	182	18	200
Italy	165	165	133	28	161
Japan	150	149	142	5	147
Jordan	260	252	252	0	252
Kazakhstan	176	176	168	4	172
Korea, Rep. of	150	150	150	0	150
Kuwait	178	177	168	0	168
Lebanon	150	150	116	22	138
Lithuania	211	208	204	4	208
Malaysia	212	207	207	0	207
Malta	48	48	48	0	48
Morocco	353	345	345	0	345
New Zealand	162	162	120	25	145
Norway (9)	150	150	143	0	143
Oman	310	308	300	1	301
Qatar	136	134	131	0	131
Russian Federation	204	204	204	0	204
Saudi Arabia	154	143	140	3	143
Singapore	167	167	167	0	167
Slovenia	150	150	144	4	148
South Africa (9)	300	292	282	10	292
Sweden	154	150	149	1	150
Thailand	204	204	200	4	204
Turkey	240	218	218	0	218
United Arab Emirates	489	477	477	0	477
United States	300	293	229	17	246

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	150	150	122	6	128
Ontario, Canada	152	147	135	3	138
Quebec, Canada	176	174	102	20	122
Norway (8)	150	150	142	0	142
Abu Dhabi, UAE	165	156	156	0	156
Dubai, UAE	137	135	135	0	135
Florida, US	54	54	53	0	53

**Appendix C.6: Student Sample Sizes**

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
Australia	91%	11,968	312	88	11,568	1,230	10,338
Bahrain	97%	5,334	66	201	5,067	149	4,918
Botswana (9)	98%	6,192	66	12	6,114	150	5,964
Canada	93%	9,618	70	139	9,409	652	8,757
Chile	93%	5,285	67	21	5,197	348	4,849
Chinese Taipei	98%	5,915	53	50	5,812	101	5,711
Egypt	91%	8,897	273	0	8,624	802	7,822
England	95%	5,252	185	0	5,067	253	4,814
Georgia	98%	4,215	28	46	4,141	106	4,035
Hong Kong SAR	96%	4,363	24	13	4,326	171	4,155
Hungary	97%	5,190	20	112	5,058	165	4,893
Iran, Islamic Rep. of	98%	6,482	80	177	6,225	95	6,130
Ireland	92%	5,214	44	47	5,123	419	4,704
Israel	93%	6,079	41	102	5,936	424	5,512
Italy	95%	5,021	16	282	4,723	242	4,481
Japan	95%	5,037	8	12	5,017	272	4,745
Jordan	96%	8,617	441	0	8,176	311	7,865
Kazakhstan	98%	5,040	61	0	4,979	92	4,887
Korea, Rep. of	98%	5,526	35	55	5,436	127	5,309
Kuwait	90%	5,081	113	0	4,968	465	4,503
Lebanon	96%	4,044	24	0	4,020	147	3,873
Lithuania	93%	4,864	27	148	4,689	342	4,347
Malaysia	98%	10,092	171	41	9,880	154	9,726
Malta	96%	4,063	15	67	3,981	164	3,817
Morocco	95%	13,979	229	0	13,750	715	13,035
New Zealand	90%	9,119	93	47	8,979	837	8,142
Norway (9)	91%	5,354	37	128	5,189	492	4,697
Oman	99%	9,218	161	21	9,036	153	8,883
Qatar	98%	5,691	115	73	5,503	100	5,403
Russian Federation	97%	5,025	52	59	4,914	134	4,780
Saudi Arabia	97%	3,962	72	5	3,885	126	3,759
Singapore	97%	6,341	15	0	6,326	210	6,116
Slovenia	94%	4,654	17	76	4,561	304	4,257
South Africa (9)	96%	13,708	574	0	13,134	620	12,514
Sweden	94%	4,561	43	121	4,397	307	4,090
Thailand	99%	6,761	179	0	6,582	100	6,482
Turkey	98%	6,537	232	71	6,234	155	6,079
United Arab Emirates	97%	18,740	78	106	18,556	544	18,012
United States	94%	11,489	198	439	10,852	631	10,221

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	85%	3,839	81	0	3,758	505	3,253
Ontario, Canada	93%	4,883	18	24	4,841	321	4,520
Quebec, Canada	92%	4,403	48	92	4,263	313	3,950
Norway (8)	93%	5,339	17	143	5,179	384	4,795
Abu Dhabi, UAE	98%	5,021	26	20	4,975	137	4,838
Dubai, UAE	97%	6,435	24	67	6,344	195	6,149
Florida, US	93%	2,336	38	47	2,251	177	2,074

Students attending a sampled class at the time the sample was chosen but leaving the class before the assessment was administered were classified as “withdrawn.” Students with a disability or language barrier that prevented them from participating in the assessment were classified as “excluded.” Students not present when the assessment was administered, and not subsequently assessed in a make-up session, were classified as “absent.”

**Appendix C.8: Participation Rates (Weighted)**

Country	School Participation		Class Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Australia	99%	99%	99%	91%	90%	90%
Bahrain	100%	100%	100%	97%	97%	97%
Botswana (9)	100%	100%	100%	98%	98%	98%
† Canada	80%	85%	99%	93%	73%	78%
Chile	85%	92%	100%	93%	79%	85%
Chinese Taipei	100%	100%	100%	98%	98%	98%
Egypt	95%	100%	100%	91%	87%	91%
England	91%	97%	100%	95%	87%	92%
Georgia	99%	100%	100%	98%	97%	98%
Hong Kong SAR	78%	84%	100%	96%	74%	81%
Hungary	96%	99%	100%	97%	93%	96%
Iran, Islamic Rep. of	100%	100%	100%	98%	98%	98%
Ireland	99%	99%	100%	92%	91%	91%
Israel	91%	100%	100%	93%	84%	93%
Italy	78%	98%	100%	95%	74%	93%
Japan	95%	99%	100%	95%	90%	93%
Jordan	100%	100%	100%	96%	96%	96%
Kazakhstan	97%	99%	100%	98%	95%	97%
Korea, Rep. of	100%	100%	100%	98%	98%	98%
Kuwait	94%	94%	100%	90%	85%	85%
Lebanon	77%	92%	100%	96%	74%	88%
Lithuania	99%	100%	100%	93%	92%	93%
Malaysia	100%	100%	100%	98%	98%	98%
Malta	100%	100%	100%	96%	96%	96%
Morocco	100%	100%	100%	95%	95%	95%
† New Zealand	76%	90%	100%	90%	68%	81%
Norway (9)	96%	96%	100%	91%	87%	87%
Oman	97%	97%	100%	99%	96%	96%
Qatar	98%	98%	100%	98%	96%	96%
Russian Federation	100%	100%	100%	97%	97%	97%
Saudi Arabia	98%	100%	100%	97%	95%	97%
Singapore	100%	100%	100%	97%	97%	97%
Slovenia	96%	99%	100%	94%	89%	92%
South Africa (9)	98%	100%	100%	96%	94%	96%
Sweden	97%	100%	100%	94%	91%	94%
Thailand	98%	100%	100%	99%	96%	99%
Turkey	100%	100%	100%	98%	98%	98%
United Arab Emirates	100%	100%	100%	97%	97%	97%
† United States	78%	84%	99%	94%	73%	78%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

† Buenos Aires, Argentina	81%	85%	98%	85%	68%	71%
Ontario, Canada	93%	94%	99%	93%	85%	87%
‡ Quebec, Canada	50%	63%	99%	92%	46%	58%
Norway (8)	95%	95%	100%	93%	87%	87%
Abu Dhabi, UAE	100%	100%	100%	98%	98%	98%
Dubai, UAE	100%	100%	100%	97%	97%	97%
Florida, US	98%	98%	99%	93%	90%	90%

TIMSS guidelines for sampling participation: The minimum acceptable participation rates were 85 percent of both schools and students, or a combined rate (the product of school and student participation) of 75 percent. Participants not meeting these guidelines were annotated as follows:

† Met guidelines for sample participation rates only after replacement schools were included.

‡ Nearly satisfied guidelines for sample participation rates after replacement schools were included.

‡ Did not satisfy guidelines for sample participation rates.

**Appendix C.10: Trends in Student Populations**

Country	Years of Formal Schooling*						Average Age at Time of Testing					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Australia	8	8	8	8		8	14.0	14.0	13.9	13.9		13.9
Bahrain	8	8	8	8			14.0	14.4	14.1	14.1		
Botswana (9)	9	9					15.6	15.8				
Chile	8	8		8	8		14.3	14.2		14.2	14.4	
Chinese Taipei	8	8	8	8	8		14.3	14.2	14.2	14.2	14.2	
Egypt	8		8	8			14.1		14.1	14.4		
England	9	9	9	9	9	9	14.1	14.2	14.2	14.3	14.2	14.0
Georgia	8	8	8				13.7	14.2	14.2			
Hong Kong SAR	8	8	8	8	8	8	14.2	14.2	14.4	14.4	14.2	14.2
Hungary	8	8	8	8	8	8	14.7	14.7	14.6	14.5	14.4	14.3
Iran, Islamic Rep. of	8	8	8	8	8	8	14.2	14.3	14.2	14.4	14.6	14.6
Ireland	8					8	14.4					14.4
Israel	8	8					14.0	14.0				
Italy	8	8	8	8	8		13.8	13.8	13.9	13.9	14.0	
Japan	8	8	8	8	8	8	14.5	14.5	14.5	14.4	14.4	14.4
Jordan	8	8	8	8	8		13.8	13.9	14.0	13.9	14.0	
Kazakhstan	8	8					14.3	14.6				
Korea, Rep. of	8	8	8	8	8	8	14.4	14.3	14.3	14.6	14.4	14.2
Kuwait	8		8				13.7		14.4			
Lebanon	8	8	8	8			14.2	14.3	14.4	14.6		
Lithuania	8	8	8	8	8.5	8	14.7	14.7	14.9	14.9	15.2	14.3
Malaysia	8	8	8	8	8		14.3	14.4	14.3	14.3	14.4	
Malta	8		9				13.8		14.0			
Morocco	8	8					14.5	14.7				
New Zealand	8.5-9.5	8.5-9.5		8.5-9.5	8.5-9.5	8.5-9.5	14.1	14.1		14.1	14.0	14.0
Oman	8	8	8				14.0	14.1	14.3			
Qatar	8	8					14.1	14.0				
Russian Federation	8	8	7 or 8	7 or 8	7 or 8	7 or 8	14.7	14.7	14.6	14.2	14.1	14.0
Saudi Arabia	8	8					14.1	14.1				
Singapore	8	8	8	8	8	8	14.4	14.4	14.4	14.3	14.4	14.5
Slovenia	8	8	7 or 8	7 or 8		7	13.8	13.9	13.8	13.8		13.8
South Africa (9)	9	9					15.7	16.0				
Sweden	8	8	8	8		7	14.7	14.8	14.8	14.9		14.9
Thailand	8	8	8		8		14.4	14.3	14.3		14.5	
Turkey	8	8					13.9	14.0				
United Arab Emirates	8	8					13.9	13.9				
United States	8	8	8	8	8	8	14.2	14.2	14.3	14.2	14.2	14.2

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Ontario, Canada	8	8	8	8	8	8	13.8	13.8	13.8	13.8	13.9	14.0
Quebec, Canada	8	8	8	8	8	8	14.3	14.2	14.2	14.2	14.3	14.5
Norway (8)	8	8	8	7		7	13.7	13.7	13.8	13.8		13.9
Abu Dhabi, UAE	8	8					13.9	13.8				
Dubai, UAE	8	8	8				13.9	13.9	14.2			
Florida, US	8	8					14.4	14.4				

\* Represents years of schooling counting from the first year of ISCED Level 1.

Georgian schools in South Ossetia and Abkhazia were excluded in 2011 due to lack of access and absence of official statistics. Abkhazia refugee schools in other territories of Georgia were included in the sample frame.

Bahrain in 2011, Korea in 2003, Lithuania in 1999, and Dubai (UAE) in 2007 tested the same cohort of students as other countries, but later in the assessment year. South Africa (9) tested one year later.

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian.

An empty cell indicates a country did not participate in that year's assessment. A dash (-) indicates comparable data not available.

**Appendix C.10: Trends in Student Populations (Continued)**

Country	Overall Exclusion Rates						Overall Participation Rates (After Replacement)					
	2015	2011	2007	2003	1999	1995	2015	2011	2007	2003	1999	1995
Australia	3.5%	3.2%	1.9%	1.3%		1.0%	90%	88%	93%	83%		70%
Bahrain	3.8%	1.6%	1.5%	0.0%			97%	97%	97%	98%		
Botswana (9)	0.3%	0.0%					98%	98%				
Chile	1.9%	2.8%		2.2%	2.8%		85%	95%		99%	96%	
Chinese Taipei	1.7%	1.3%	3.3%	4.8%	1.6%		98%	99%	99%	99%	99%	
Egypt	0.1%		0.5%	3.4%			91%		98%	97%		
England	2.3%	2.2%	2.3%	2.1%	5.0%	11.0%	92%	70%	75%	46%	77%	77%
Georgia	6.0%	4.5%	3.9%				98%	97%	97%			
Hong Kong SAR	1.6%	5.3%	3.8%	3.4%	0.8%	2.0%	81%	75%	75%	80%	74%	81%
Hungary	5.4%	4.4%	3.9%	8.5%	4.3%	4.0%	96%	95%	96%	94%	93%	87%
Iran, Islamic Rep. of	2.2%	2.2%	0.5%	6.5%	4.4%	0.0%	98%	99%	98%	98%	98%	98%
Ireland	1.2%					0.0%	91%					81%
Israel	22.8%	22.6%					93%	92%				
Italy	6.1%	4.7%	5.0%	3.6%	6.7%		93%	93%	96%	97%	97%	
Japan	2.3%	2.8%	3.5%	0.6%	1.3%	1.0%	93%	87%	91%	93%	89%	90%
Jordan	1.0%	0.4%	2.0%	1.3%	3.0%		96%	96%	96%	96%	99%	
Kazakhstan	3.8%	5.1%					97%	98%				
Korea, Rep. of	2.1%	1.9%	1.6%	4.9%	4.0%	4.0%	98%	99%	99%	98%	100%	95%
Kuwait	3.3%		0.3%				85%		84%			
Lebanon	1.3%	1.4%	1.4%	1.4%			88%	94%	85%	91%		
Lithuania	7.0%	4.8%	4.2%	2.6%	4.5%	7.0%	93%	92%	90%	84%	89%	83%
Malaysia	4.3%	0.1%	3.3%	4.0%	4.6%		98%	98%	98%	98%	99%	
Malta	3.5%		2.9%				96%		94%			
Morocco	0.0%	0.1%					95%	94%				
New Zealand	3.1%	3.2%		4.4%	2.4%	2.0%	81%	88%		90%	91%	94%
Oman	0.4%	1.2%	1.2%				96%	97%	99%			
Qatar	3.2%	4.5%					96%	99%				
Russian Federation	3.7%	6.0%	2.3%	5.5%	1.7%	6.0%	97%	98%	97%	96%	97%	95%
Saudi Arabia	2.1%	1.2%					97%	98%				
Singapore	7.0%	6.0%	1.8%	0.0%	0.0%	5.0%	97%	95%	95%	97%	98%	95%
Slovenia	3.8%	2.3%	1.9%	1.4%		3.0%	92%	92%	92%	91%		77%
South Africa (9)	1.5%	1.4%					96%	95%				
Sweden	5.5%	5.1%	3.6%	2.8%		1.0%	94%	92%	94%	87%		90%
Thailand	0.2%	1.5%	3.4%		3.3%		99%	99%	99%		99%	
Turkey	1.3%	1.5%					98%	97%				
United Arab Emirates	3.6%	2.8%					97%	97%				
United States	5.1%	7.2%	7.9%	4.9%	3.9%	2.0%	78%	81%	77%	73%	85%	78%

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Ontario, Canada	2.5%	5.6%	6.2%	6.0%	5.1%	-	87%	93%	89%	89%	93%	90%
Quebec, Canada	5.3%	4.9%	13.6%	4.8%	1.3%	-	58%	88%	77%	85%	92%	89%
Norway (8)	4.1%	1.9%	2.6%	2.3%		2.0%	87%	84%	86%	85%		93%
Abu Dhabi, UAE	4.1%	1.7%					98%	96%				
Dubai, UAE	5.2%	4.0%	5.0%				97%	95%	69%			
Florida, US	2.8%	6.9%					90%	84%				

**Appendix D.2: Percentages of Students with Achievement Too Low for Estimation\***

Country	Percentage of Students with Achievement Too Low for Estimation	Average Percent Correct
Australia	6 (0.5)	45 (0.7)
Bahrain	9 (0.3)	35 (0.3)
ψ Botswana (9)	23 (0.7)	23 (0.3)
Canada	3 (0.4)	50 (0.6)
ψ Chile	18 (0.8)	28 (0.5)
Chinese Taipei	2 (0.2)	68 (0.5)
ψ Egypt	24 (0.9)	25 (0.5)
England	4 (0.6)	48 (1.1)
Georgia	13 (0.9)	34 (0.7)
Hong Kong SAR	1 (0.2)	68 (1.1)
Hungary	6 (0.5)	48 (0.9)
ψ Iran, Islamic Rep. of	16 (0.9)	31 (0.9)
Ireland	3 (0.5)	49 (0.7)
Israel	8 (0.6)	47 (0.9)
Italy	5 (0.5)	42 (0.6)
Japan	1 (0.2)	65 (0.5)
⌘ Jordan	26 (0.9)	23 (0.4)
Kazakhstan	5 (0.5)	50 (1.4)
Korea, Rep. of	1 (0.1)	69 (0.6)
ψ Kuwait	24 (1.1)	24 (0.8)
Lebanon	15 (1.4)	30 (0.7)
Lithuania	5 (0.5)	46 (0.7)
Malaysia	10 (0.8)	36 (0.8)
Malta	8 (0.4)	43 (0.3)
⌘ Morocco	26 (0.6)	22 (0.3)
New Zealand	7 (0.6)	42 (0.8)
Norway (9)	4 (0.4)	46 (0.6)
ψ Oman	21 (0.6)	26 (0.4)
ψ Qatar	17 (0.6)	32 (0.5)
Russian Federation	3 (0.5)	53 (1.3)
⌘ Saudi Arabia	30 (1.1)	21 (0.6)
Singapore	1 (0.1)	74 (0.8)
Slovenia	3 (0.3)	47 (0.5)
⌘ South Africa (9)	30 (1.3)	21 (0.7)
Sweden	6 (0.7)	43 (0.7)
Thailand	15 (0.9)	30 (1.0)
Turkey	13 (0.8)	36 (1.0)
United Arab Emirates	12 (0.4)	37 (0.4)
United States	4 (0.3)	48 (0.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

⌘ Buenos Aires, Argentina	30 (1.4)	23 (0.7)
Ontario, Canada	4 (0.5)	49 (0.8)
Quebec, Canada	1 (0.6)	54 (1.0)
Norway (8)	6 (0.5)	39 (0.5)
Abu Dhabi, UAE	15 (1.0)	32 (0.9)
Dubai, UAE	5 (0.3)	47 (0.5)
Florida, US	7 (1.0)	43 (1.5)

\* Students were considered to have achievement too low for estimation if their performance on the assessment was no better than could be achieved by simply guessing on the multiple-choice assessment items. However, such students were assigned scale scores (plausible values) by the achievement scaling procedure, despite concerns about their reliability.

⌘ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

**Appendix E.3: Average Percent Correct in the Mathematics Content and Cognitive Domains**

Country	Overall Mathematics	Mathematics Content Domains				Mathematics Cognitive Domains		
		Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Australia	45 (0.7)	51 (0.8)	35 (0.7)	40 (0.8)	55 (0.7)	54 (0.7)	43 (0.7)	36 (0.8)
Bahrain	35 (0.3)	33 (0.4)	36 (0.4)	31 (0.4)	42 (0.4)	47 (0.4)	32 (0.3)	25 (0.5)
ψ Botswana (9)	23 (0.3)	25 (0.4)	20 (0.3)	20 (0.3)	28 (0.3)	32 (0.3)	21 (0.3)	15 (0.2)
Canada	50 (0.6)	57 (0.7)	40 (0.6)	46 (0.6)	58 (0.6)	58 (0.6)	49 (0.6)	41 (0.6)
ψ Chile	28 (0.5)	30 (0.6)	22 (0.5)	26 (0.5)	37 (0.6)	36 (0.6)	27 (0.5)	21 (0.5)
Chinese Taipei	68 (0.5)	69 (0.6)	67 (0.7)	65 (0.6)	69 (0.5)	74 (0.6)	68 (0.6)	60 (0.6)
ψ Egypt	25 (0.5)	26 (0.6)	25 (0.7)	22 (0.6)	26 (0.5)	36 (0.7)	22 (0.5)	15 (0.5)
England	48 (1.1)	54 (1.3)	37 (1.1)	43 (1.1)	60 (1.1)	56 (1.1)	47 (1.2)	39 (1.1)
Georgia	34 (0.7)	37 (0.8)	33 (0.9)	29 (0.7)	36 (0.6)	45 (0.9)	32 (0.7)	23 (0.7)
Hong Kong SAR	68 (1.1)	72 (1.1)	62 (1.2)	64 (1.1)	72 (1.0)	76 (1.0)	67 (1.1)	57 (1.3)
Hungary	48 (0.9)	52 (1.0)	41 (1.0)	45 (1.0)	55 (0.8)	56 (0.9)	47 (1.0)	38 (1.0)
ψ Iran, Islamic Rep. of	31 (0.9)	32 (1.0)	28 (0.9)	30 (0.9)	36 (0.9)	40 (1.0)	29 (0.9)	23 (0.9)
Ireland	49 (0.7)	60 (0.8)	39 (0.7)	40 (0.7)	58 (0.7)	61 (0.7)	48 (0.7)	38 (0.7)
Israel	47 (0.9)	52 (1.0)	45 (1.0)	39 (0.9)	52 (0.9)	57 (1.0)	46 (1.0)	37 (0.9)
Italy	42 (0.6)	45 (0.7)	33 (0.7)	41 (0.7)	49 (0.6)	50 (0.6)	41 (0.7)	33 (0.7)
Japan	65 (0.5)	66 (0.5)	62 (0.7)	64 (0.6)	71 (0.5)	71 (0.5)	65 (0.5)	57 (0.6)
✕ Jordan	23 (0.4)	22 (0.5)	24 (0.6)	21 (0.4)	26 (0.4)	32 (0.6)	21 (0.4)	15 (0.3)
Kazakhstan	50 (1.4)	51 (1.4)	53 (1.5)	47 (1.5)	48 (1.2)	61 (1.3)	49 (1.5)	39 (1.4)
Korea, Rep. of	69 (0.6)	72 (0.6)	67 (0.7)	67 (0.7)	72 (0.5)	76 (0.5)	69 (0.6)	61 (0.7)
ψ Kuwait	24 (0.8)	25 (1.0)	21 (0.8)	21 (0.7)	30 (0.9)	33 (1.0)	22 (0.9)	14 (0.7)
Lebanon	30 (0.7)	32 (0.8)	31 (0.8)	28 (0.8)	29 (0.7)	44 (0.9)	27 (0.7)	17 (0.6)
Lithuania	46 (0.7)	50 (0.7)	38 (0.8)	43 (0.7)	55 (0.6)	54 (0.7)	47 (0.7)	34 (0.7)
Malaysia	36 (0.8)	41 (0.9)	31 (0.7)	32 (0.7)	41 (0.8)	48 (0.9)	34 (0.8)	25 (0.6)
Malta	43 (0.3)	48 (0.4)	38 (0.4)	37 (0.4)	49 (0.4)	54 (0.3)	41 (0.4)	31 (0.4)
✕ Morocco	22 (0.3)	22 (0.3)	19 (0.3)	23 (0.3)	25 (0.3)	30 (0.4)	20 (0.3)	14 (0.2)
New Zealand	42 (0.8)	47 (0.9)	33 (0.8)	37 (0.7)	53 (0.8)	50 (0.8)	41 (0.8)	34 (0.8)
Norway (9)	46 (0.6)	55 (0.7)	31 (0.5)	39 (0.6)	61 (0.7)	53 (0.6)	46 (0.6)	36 (0.6)
ψ Oman	26 (0.4)	25 (0.4)	26 (0.4)	25 (0.4)	30 (0.4)	35 (0.5)	24 (0.4)	18 (0.3)
ψ Qatar	32 (0.5)	34 (0.7)	30 (0.6)	28 (0.5)	37 (0.5)	42 (0.6)	30 (0.6)	22 (0.5)
Russian Federation	53 (1.3)	56 (1.3)	53 (1.4)	49 (1.4)	52 (1.1)	63 (1.3)	52 (1.3)	40 (1.3)
✕ Saudi Arabia	21 (0.6)	19 (0.6)	20 (0.6)	18 (0.5)	28 (0.6)	28 (0.7)	19 (0.5)	14 (0.5)
Singapore	74 (0.8)	80 (0.8)	70 (0.9)	68 (0.8)	75 (0.7)	82 (0.7)	73 (0.8)	64 (1.0)
Slovenia	47 (0.5)	53 (0.6)	36 (0.5)	45 (0.6)	56 (0.6)	58 (0.6)	45 (0.5)	37 (0.6)
✕ South Africa (9)	21 (0.7)	21 (0.8)	20 (0.7)	19 (0.5)	26 (0.7)	30 (0.9)	19 (0.6)	15 (0.5)
Sweden	43 (0.7)	50 (0.8)	34 (0.8)	35 (0.6)	53 (0.8)	49 (0.7)	43 (0.7)	35 (0.7)
Thailand	30 (1.0)	32 (1.1)	25 (1.0)	27 (0.9)	36 (0.9)	37 (1.1)	28 (1.0)	22 (0.9)
Turkey	36 (1.0)	36 (1.1)	32 (1.0)	34 (1.0)	45 (1.0)	43 (1.0)	35 (1.0)	30 (1.0)
United Arab Emirates	37 (0.4)	39 (0.5)	36 (0.4)	31 (0.4)	42 (0.5)	49 (0.5)	34 (0.4)	27 (0.4)
United States	48 (0.8)	53 (0.9)	45 (0.8)	40 (0.8)	56 (0.8)	60 (0.8)	46 (0.8)	37 (0.8)
International Avg.	41 (0.1)	44 (0.1)	37 (0.1)	37 (0.1)	47 (0.1)	50 (0.1)	40 (0.1)	32 (0.1)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

✕ Buenos Aires, Argentina	23 (0.7)	28 (0.8)	17 (0.6)	18 (0.6)	28 (0.8)	31 (0.8)	21 (0.7)	15 (0.5)
Ontario, Canada	49 (0.8)	55 (0.9)	38 (0.9)	45 (0.7)	58 (0.8)	56 (0.8)	47 (0.7)	41 (0.9)
Quebec, Canada	54 (1.0)	63 (1.2)	45 (0.9)	49 (1.1)	60 (1.2)	63 (1.0)	54 (1.1)	42 (1.1)
Norway (8)	39 (0.5)	48 (0.6)	23 (0.5)	34 (0.5)	55 (0.7)	46 (0.5)	39 (0.5)	30 (0.5)
Abu Dhabi, UAE	32 (0.9)	34 (1.0)	31 (0.9)	27 (0.9)	37 (1.0)	44 (0.9)	29 (1.0)	23 (0.9)
Dubai, UAE	47 (0.5)	50 (0.6)	46 (0.5)	40 (0.6)	52 (0.5)	59 (0.5)	44 (0.6)	37 (0.6)
Florida, US	43 (1.5)	47 (1.8)	40 (1.6)	34 (1.3)	48 (1.6)	54 (1.7)	40 (1.6)	32 (1.3)

✕ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

# Appendix F: The Test–Curriculum Matching Analysis

TIMSS went to great lengths to ensure that comparisons of student achievement across countries would be as fair and equitable as possible. The [TIMSS 2015 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 2015 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 (NRCs) from each country formally approved the TIMSS 2015 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 2015 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 2015 mathematics assessment matched 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 2015 tests matched the curricula of the TIMSS countries and benchmarking participants, NRCs 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 NRCs were 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 the fourth or eighth grades. For example, in Poland the curriculum specifies the curricular goals to be achieved by the end of the sixth and ninth grades, but does not provide a grade-by-grade specification. In such

<sup>1</sup> Because there also may be curriculum areas covered in some countries that are not covered by the TIMSS 2015 tests, the TCMA does not provide complete information about how well the tests cover the curricula of the countries.



situations, coordinators were asked to make the best judgment possible.<sup>2</sup> Because an item might be in the curriculum for some but not all students in a country, NRCs were asked to consider an item included if it was in the intended curriculum for more than 50 percent of the students. All TIMSS 2015 participants took part in the TCMA analysis except Norway (4) and Buenos Aires at the fourth grade and Egypt, Norway (8), and Buenos Aires at the eighth grade. TCMA was not administered for TIMSS Numeracy and therefore Jordan and South Africa (5), who participated in TIMSS Numeracy but did not participate in TIMSS at the fourth grade, are not included in the fourth grade exhibit.

Exhibits F.1 through F.4 present the TCMA results for the TIMSS 2015 mathematics test at the fourth and eighth grades. Exhibits F.1 and F.2 show the average percent correct on the mathematics items judged appropriate by each country at the fourth and eighth grades, respectively. Exhibits F.3 and F.4 show the standard errors corresponding to the percentages presented in Exhibits F.1 and F.2.

In Exhibit F.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 fourth grade, the maximum number of score points in the assessment was 178 points.<sup>3</sup> Generally, the proportion of items judged appropriate was fairly high. Reading along the bottom row, it can be seen that 4 of the 47 countries that took part in the TCMA analysis judged 100 percent of the items to be included in their curricula as did 1 of the 5 benchmarking participants. A further 34 countries and 2 of the other 4 benchmarking participants judged 75 percent or more (134 score points) to be appropriate. All of the participants concurred that more than half of the mathematics items were included in their curricula.

At the eighth grade, the percentage of items judged appropriate was similar; 4 of the 38 countries and 1 of the 5 benchmarking participants judged 100 percent of the items to be appropriate (all 221 score points), and an additional 33 countries and the remainder of the benchmarking participants judged 75 percent or more (166 score points) to be appropriate.

Because 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 Exhibits F.1 and F.2 show 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 these exhibits, 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, where the average percent correct was 75 percent on its own set of items,

2 Exhibits 5 and 6 of the TIMSS 2015 Encyclopedia provide information on the grade-to-grade structure of the curriculum for each TIMSS 2015 participant.  
 3 The TIMSS 2015 fourth grade mathematics assessment contained 169 items, yielding 182 score points. However, following item review, response categories for four of the items were combined, resulting in data for 178 score points. Similarly, following item review, the 212 items and 229 score points in the eighth grade assessment were reduced to 209 items and 221 score points.  
 4 It should be noted that the mathematics achievement presented in Exhibits F.1 and F.2 is based on average percent correct (the percentage of students in a country answering each item correctly, averaged across all items), which is different from the average scale scores that are presented in main tables of the report.

**Exhibit F.1: Average Percent Correct for the Test-Curriculum Matching Analysis, Fourth Grade**

Based on a subset of items specifically identified by each country as addressing its curriculum

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	Korea, Rep. of	Chinese Taipei	Japan	Northern Ireland	Russian Federation	Ireland	Norway (5)	England	Belgium (Flemish)	Kazakhstan	Portugal	United States	Denmark	Lithuania	Finland	Hungary	Poland	Czech Republic	Netherlands	Bulgaria	Cyprus	Germany	Slovenia	Australia	Serbia	Sweden	Canada	Italy	
		Hong Kong SAR	75 (0.7)	75	75	75	74	76	75	75	75	75	75	75	74	75	77	75	75	75	75	75	75	75	76	75	75	75	75	75	75	75
Singapore	74 (0.8)	74	76	75	75	75	74	74	75	74	75	74	75	74	75	76	73	75	74	75	74	74	74	74	74	74	74	74	74	74	74	
Korea, Rep. of	73 (0.5)	74	74	76	73	76	73	74	74	73	74	75	74	73	74	76	73	75	73	75	73	71	75	73	75	75	74	75	75	73	74	
Chinese Taipei	70 (0.4)	72	72	73	72	74	71	71	71	70	71	72	70	70	71	73	70	71	70	70	72	71	69	71	71	70	71	72	71	70	71	
Japan	70 (0.4)	70	70	72	70	73	70	70	71	70	70	72	70	70	70	73	70	71	70	71	71	69	71	70	71	71	70	71	72	70	71	
Northern Ireland	64 (0.7)	64	64	64	63	65	65	65	65	64	65	64	65	64	65	64	65	64	65	64	65	64	65	66	65	65	65	64	64	65	64	
Russian Federation	63 (0.9)	62	61	63	61	64	63	67	63	63	62	63	66	63	63	66	64	63	64	63	65	64	68	64	65	65	63	64	64	63	64	
Ireland	59 (0.6)	59	59	59	58	60	59	59	60	59	59	59	57	59	59	62	59	59	59	59	59	59	59	60	60	60	59	58	60	59	59	
Norway (5)	59 (0.7)	59	58	59	58	59	59	59	60	59	59	60	58	59	59	63	59	60	60	60	60	60	60	60	60	60	60	59	59	62	59	
England	58 (0.7)	58	58	57	57	58	58	59	59	58	59	58	57	58	59	62	58	58	59	58	59	60	60	60	60	60	58	58	58	58	59	
Belgium (Flemish)	58 (0.6)	58	58	58	57	59	58	57	59	58	58	59	57	58	58	61	57	59	58	59	58	57	58	58	59	58	58	58	58	59	58	
Kazakhstan	57 (1.2)	57	57	58	57	58	57	61	57	57	57	58	60	57	58	60	58	58	58	58	58	59	58	61	58	60	59	57	59	58	57	
Portugal	57 (0.6)	57	57	57	56	58	57	57	58	57	57	57	57	57	57	60	57	57	57	57	57	57	57	57	57	58	57	57	57	57	57	
United States	57 (0.5)	57	57	57	56	57	57	57	56	57	57	57	55	57	57	60	56	57	57	56	57	57	57	57	57	57	58	57	57	57	57	
Denmark	56 (0.7)	56	56	56	55	56	56	57	57	56	56	57	56	56	57	61	56	57	57	56	57	57	57	58	56	58	57	56	56	59	56	57
Lithuania	56 (0.7)	54	53	55	54	57	56	58	55	55	56	56	56	56	59	57	56	56	56	56	57	57	59	56	58	57	56	56	57	56	56	
Finland	55 (0.5)	54	54	55	54	55	55	55	55	55	55	55	55	55	59	55	56	55	56	56	56	56	56	56	56	56	55	56	55	56	55	55
Hungary	55 (0.7)	55	54	54	53	55	55	58	55	55	55	55	57	55	55	58	55	55	56	54	57	56	58	56	58	56	54	56	57	55	55	
Poland	55 (0.6)	54	54	55	54	55	55	56	55	54	54	56	55	55	55	58	55	56	55	56	56	55	57	55	56	56	55	56	55	56	57	55
Czech Republic	53 (0.6)	54	52	53	52	54	53	55	54	53	53	54	55	53	54	57	53	54	55	53	56	55	56	54	57	56	52	55	56	53	54	
Netherlands	53 (0.5)	52	52	53	52	54	53	55	53	53	53	55	55	53	53	58	55	54	54	54	55	56	56	54	55	54	54	54	54	54	54	
Bulgaria	53 (1.3)	54	53	54	52	55	53	59	53	53	53	53	57	53	54	56	54	53	54	54	54	53	59	54	57	55	53	55	54	53	54	
Cyprus	53 (0.6)	53	52	52	51	53	53	54	53	53	53	53	53	53	53	56	53	53	54	53	54	54	54	54	54	55	53	53	53	55	53	
Germany	52 (0.5)	51	51	51	50	53	52	55	53	52	52	52	52	52	52	56	52	52	52	53	52	53	53	56	53	56	54	52	54	52	52	
Slovenia	51 (0.5)	51	50	50	49	51	52	53	52	51	51	51	52	51	52	55	51	52	53	51	54	53	54	52	54	51	52	54	51	52	52	
Australia	51 (0.7)	51	50	50	50	51	51	51	52	51	51	51	50	51	51	55	52	51	52	51	52	53	52	52	53	52	51	54	51	51	52	
Serbia	51 (0.8)	51	51	52	51	53	52	55	51	51	51	52	54	51	51	55	52	52	53	52	53	53	55	52	54	53	52	54	53	51	52	
Sweden	51 (0.7)	50	49	51	49	51	51	54	51	51	51	51	52	51	51	55	52	52	52	51	53	53	55	52	54	53	52	52	55	51	52	
Canada	49 (0.5)	49	48	49	48	50	50	50	49	49	49	49	49	49	50	53	50	50	50	49	51	51	51	50	50	50	50	50	50	50	49	50
Italy	48 (0.6)	48	48	49	47	49	48	49	49	48	48	48	48	48	48	51	48	48	48	48	49	48	47	50	48	50	49	48	49	49	48	49
Spain	47 (0.6)	48	47	48	47	49	48	48	48	47	47	48	47	47	48	51	48	48	48	48	48	48	47	49	48	50	49	48	48	49	47	48
Croatia	47 (0.5)	47	47	48	46	49	47	52	47	46	46	47	51	47	47	50	47	47	48	48	48	46	52	47	51	49	47	49	47	49	48	47
Slovak Republic	46 (0.5)	46	45	46	44	46	46	50	46	46	46	47	48	46	46	51	46	47	47	46	48	48	51	47	49	48	47	48	47	48	46	47
New Zealand	45 (0.5)	44	43	43	43	44	45	45	45	45	45	45	44	45	45	49	45	45	45	45	46	47	45	45	46	46	45	45	45	47	45	45
Turkey	44 (0.7)	45	45	45	44	46	45	46	45	44	44	44	44	44	45	47	45	45	45	45	45	44	46	45	46	46	44	45	45	44	45	44
France	44 (0.7)	44	43	43	42	44	44	45	44	43	44	44	44	44	44	47	43	44	44	44	45	43	45	44	46	45	43	45	45	46	44	44
Georgia	39 (0.8)	38	38	40	38	40	39	44	39	39	39	40	42	39	39	42	40	39	40	39	41	40	43	40	42	41	39	40	40	39	40	
United Arab Emirates	38 (0.5)	38	38	38	37	38	38	38	38	38	38	38	37	38	38	41	38	38	38	38	39	38	38	38	39	38	38	38	39	38	38	
Chile	37 (0.5)	36	36	36	36	38	37	37	38	37	37	36	36	37	37	41	38	37	38	37	39	38	38	38	39	39	37	38	40	37	37	
Bahrain	36 (0.4)	36	36	36	35	36	37	37	37	36	36	35	36	37	39	37	36	37	36	37	37	37	37	37	38	38	36	36	36	36	37	
Qatar	35 (0.7)	35	35	35	34	35	35	35	35	35	35	35	34	35	35	38	35	35	35	35	35	35	35	35	36	35	35	35	35	35	35	
Oman	33 (0.5)	33	33	33	33	33	33	33	33	33	33	32	32	33	34	35	33	33	33	34	33	34	33	33	34	34	33	33	34	33	34	
Iran, Islamic Rep. of	32 (0.6)	33	33	33	32	33	33	33	33	32	32	32	32	32	32	35	33	33	33	33	32	32	32	32	33	32	33	32	33	32	33	
Indonesia	26 (0.6)	25	25	25	25	26	26	27	26	26	26	26	26	26	26	28	26	26	26	26	26	26	27	27	27	27	26	26	26	26	26	
Morocco	25 (0.6)	25	25	24	24	25	25	26	25	25	26	24	25	25	25	28	25	25	25	25	25	26	25	26	26	25	26	25	25	26	25	
Saudi Arabia	25 (0.6)	25	25	25	25	26	25	26	25	25	25	25	25	25	25	27	25	25	25	25	25	25	25	25	26	26	25	25	26	25	25	
Kuwait	21 (0.6)	21	21	21	21	21	21	21	21	21	21	21	21	21	21	23	21	21	21	21	21	21	21	21	22	22	21	21	22	21	21	
International Avg.	50 (0.1)	50	50	50	49	51	50	52	51	50	50	50	50	50	51	53	50	51	51	51	51	51	52	51	52	50	51	52	50	51		

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Benchmarking Participants**

Florida, US	58 (1.2)	59	59	59	58	59	58	59	59	58	59	58	57	58	59	61	58	59	59	58	59	59	59	59	60	58	58	59	58	59
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**Exhibit F.1: Average Percent Correct for the Test-Curriculum Matching Analysis, Fourth Grade (Continued)**

Based on a subset of items specifically identified by each country as addressing its curriculum

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																	Benchmarking Participants						
	Spain	Croatia	Slovak Republic	New Zealand	Turkey	France	Georgia	United Arab Emirates	Chile	Bahrain	Qatar	Oman	Iran, Islamic Rep. of	Indonesia	Morocco	Saudi Arabia	Kuwait							
Hong Kong SAR	75 (0.7)	76	74	74	76	75	75	74	75	75	75	76	75	74	75	75	75	75	Florida, US	75	75	75	74	76
Singapore	74 (0.8)	74	73	73	74	75	74	73	74	74	74	76	74	74	74	74	75	75	Quebec, Canada	75	75	74	74	73
Korea, Rep. of	73 (0.5)	74	73	74	74	74	74	73	73	73	74	73	73	73	72	74	73	74	Dubai, UAE	74	75	73	72	73
Chinese Taipei	70 (0.4)	71	70	71	70	71	71	71	70	70	71	71	73	70	70	71	70	72	Ontario, Canada	71	71	70	70	69
Japan	70 (0.4)	71	69	70	71	71	71	71	70	69	70	70	70	69	71	70	70	Abu Dhabi, UAE	70	71	70	70	70	
Northern Ireland	64 (0.7)	65	62	65	65	65	65	64	64	64	65	64	66	64	64	65	64	65		65	66	64	65	65
Russian Federation	63 (0.9)	63	65	66	64	64	64	65	63	63	63	63	63	63	61	64	63	63		63	64	63	62	65
Ireland	59 (0.6)	59	56	58	60	59	59	58	59	58	59	59	61	59	58	59	59	60		59	61	59	60	59
Norway (5)	59 (0.7)	60	57	60	61	60	60	59	59	59	59	59	60	59	57	59	59	59		59	61	59	60	60
England	58 (0.7)	59	57	60	60	59	59	58	58	58	59	58	60	58	57	59	58	59		59	60	58	59	59
Belgium (Flemish)	58 (0.6)	59	57	57	59	59	59	57	58	58	58	58	60	58	57	59	58	59		58	59	58	57	57
Kazakhstan	57 (1.2)	58	61	59	58	58	58	57	58	58	58	58	58	57	59	57	58		58	59	57	57	59	
Portugal	57 (0.6)	58	55	56	59	57	57	57	57	57	57	57	59	57	56	57	57	58		57	59	57	57	57
United States	57 (0.5)	57	55	56	58	57	57	56	57	56	57	56	58	57	56	57	57	57		57	58	57	57	56
Denmark	56 (0.7)	57	56	57	58	57	57	56	56	56	56	56	57	56	55	57	56	56		57	58	56	56	57
Lithuania	56 (0.7)	56	55	57	57	56	56	56	56	55	56	55	56	56	54	57	56	56		56	57	56	55	57
Finland	55 (0.5)	55	53	56	57	56	55	55	55	54	55	54	56	55	53	55	55	55		55	57	55	55	56
Hungary	55 (0.7)	55	57	58	56	56	56	55	54	55	55	56	55	54	58	55	55		55	57	55	54	57	
Poland	55 (0.6)	55	54	56	57	56	55	56	55	54	55	54	55	55	53	54	55	55		55	56	55	55	55
Czech Republic	53 (0.6)	54	55	57	55	54	55	55	53	53	54	53	55	54	52	55	53	54		54	55	53	54	55
Netherlands	53 (0.5)	54	53	58	54	54	54	53	53	54	53	54	54	51	54	53	53		53	55	53	54	56	
Bulgaria	53 (1.3)	53	58	57	54	54	54	55	53	53	54	53	54	53	53	57	53	54		54	55	53	51	56
Cyprus	53 (0.6)	53	53	52	55	54	54	53	52	53	53	54	53	52	54	53	53		53	55	53	53	55	
Germany	52 (0.5)	53	53	56	54	53	53	52	52	52	52	52	53	52	50	55	52	52		52	54	52	53	54
Slovenia	51 (0.5)	52	51	53	54	52	52	52	51	51	52	51	52	52	49	52	51	52		52	54	51	52	53
Australia	51 (0.7)	52	49	51	54	52	52	51	51	51	52	51	52	51	49	52	51	52		51	53	51	53	53
Serbia	51 (0.8)	52	54	54	53	52	52	53	51	51	52	51	52	52	50	53	51	52		51	53	51	51	53
Sweden	51 (0.7)	51	51	54	53	52	52	52	51	51	51	50	51	51	48	52	51	51		51	53	51	52	54
Canada	49 (0.5)	50	48	50	52	50	50	50	49	49	50	49	50	50	47	50	49	50		50	51	49	51	51
Italy	48 (0.6)	49	48	48	50	49	48	48	48	48	48	48	49	48	47	49	48	48		48	49	48	47	48
Spain	47 (0.6)	48	47	48	50	48	48	48	47	47	48	48	49	48	46	49	47	48		48	49	47	47	47
Croatia	47 (0.5)	47	52	50	48	48	48	49	47	46	47	47	48	47	45	51	47	47		47	49	47	44	48
Slovak Republic	46 (0.5)	46	48	52	47	47	47	48	46	45	46	46	47	46	45	48	46	46		46	49	46	47	48
New Zealand	45 (0.5)	45	42	45	47	45	45	45	45	44	45	44	45	45	43	44	45	45		45	46	45	46	46
Turkey	44 (0.7)	45	44	44	46	45	45	45	44	44	45	45	46	45	44	45	44	45		45	46	44	44	45
France	44 (0.7)	44	44	43	46	44	44	44	44	44	44	44	45	44	43	45	44	44		44	46	44	43	45
Georgia	39 (0.8)	39	42	43	39	40	40	41	39	38	39	39	40	39	39	42	39	39		39	41	39	38	41
United Arab Emirates	38 (0.5)	38	36	38	39	39	39	38	38	38	38	38	39	38	37	38	38	38		38	39	38	38	38
Chile	37 (0.5)	38	35	37	40	38	38	37	37	37	37	37	38	38	36	37	37	37		37	39	37	38	39
Bahrain	36 (0.4)	37	35	36	38	37	37	36	36	36	37	36	38	37	35	37	36	37		37	38	36	37	37
Qatar	35 (0.7)	35	33	35	36	35	35	35	35	34	35	35	36	35	34	35	35	35		35	36	35	34	35
Oman	33 (0.5)	34	32	31	34	34	34	33	33	33	34	33	35	34	33	34	33	34		34	34	33	33	34
Iran, Islamic Rep. of	32 (0.6)	33	31	30	34	33	33	32	32	32	33	33	34	33	32	32	32	33		32	33	32	32	32
Indonesia	26 (0.6)	27	26	25	27	27	27	25	26	26	26	26	27	26	26	27	26	26		26	27	26	25	26
Morocco	25 (0.6)	26	25	24	26	26	26	25	25	25	26	26	25	26	27	25	26		25	26	25	25	25	
Saudi Arabia	25 (0.6)	26	25	24	26	26	26	25	25	25	25	26	25	25	25	25	25	25		25	26	25	25	26
Kuwait	21 (0.6)	21	20	20	22	22	21	21	21	21	21	21	22	21	21	21	21	21		21	22	21	21	21
International Avg.	50 (0.1)	51	50	51	52	51	51	50	50	50	50	50	51	50	49	51	50	51		51	52	50	50	51
<b>Benchmarking Participants</b>																								
Florida, US	58 (1.2)	58	56	58	60	59	58	58	58	58	59	58	60	58	58	58	58	59	59	60	58	58	58	
Quebec, Canada	55 (1.1)	57	55	55	58	56	56	56	55	55	56	56	57	56	54	56	55	56	56	58	55	56	56	
Dubai, UAE	50 (0.4)	51	49	50	52	51	51	50	50	50	51	50	51	50	49	51	50	51	51	52	50	50	51	
Ontario, Canada	50 (0.6)	51	48	51	53	51	51	50	50	50	50	50	51	51	48	51	50	50	50	52	50	51	52	
Abu Dhabi, UAE	32 (0.9)	33	31	32	33	33	33	32	32	32	33	33	33	32	32	33	32	33	33	33	32	32	33	
<b>Number of Items (Score Points) Identified*</b>																								
	178	160	111	102	132	172	166	146	178	169	175	170	130	168	142	129	178	161	170	149	178	125	127	

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Exhibit F.2: Average Percent Correct for the Test-Curriculum Matching Analysis, Eighth Grade**

Based on a subset of items specifically identified by each country as addressing its curriculum

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	Singapore	Korea, Rep. of	Chinese Taipei	Hong Kong SAR	Japan	Russian Federation	Kazakhstan	Canada	Ireland	United States	England	Hungary	Israel	Slovenia	Lithuania	Norway (9)	Australia	Malta	Sweden	New Zealand	Italy	United Arab Emirates	Malaysia	Turkey	Bahrain	Georgia	Qatar	Iran, Islamic Rep. of	Lebanon	Thailand	
	Singapore	74 (0.8)	74	74	74	75	74	75	74	75	74	74	74	74	74	74	75	74	74	74	75	76	75	74	75	74	74	74	74	75	77	74
Korea, Rep. of	69 (0.6)	70	70	70	70	70	70	69	70	70	69	69	69	69	69	69	70	70	70	71	72	70	69	70	69	69	70	70	72	70	72	70
Chinese Taipei	68 (0.5)	68	68	68	69	68	69	68	69	68	68	68	68	68	68	69	68	68	68	69	69	68	68	69	68	68	68	68	69	70	69	
Hong Kong SAR	68 (1.1)	68	68	68	69	68	69	68	70	68	68	68	68	68	68	69	68	68	68	70	70	69	68	69	68	68	68	68	69	71	69	
Japan	65 (0.5)	65	66	65	65	67	66	65	66	65	65	65	65	65	65	65	65	66	66	66	66	68	65	65	66	65	65	66	66	66	66	
Russian Federation	53 (1.3)	53	53	53	54	53	55	53	53	53	53	53	53	53	53	54	53	53	53	53	53	54	53	53	53	53	53	54	56	54		
Kazakhstan	50 (1.4)	51	51	50	51	50	52	50	50	50	50	50	50	50	51	51	50	51	50	50	51	50	50	51	50	50	50	51	51	53	51	
Canada	50 (0.6)	50	51	50	51	52	51	50	54	51	50	50	50	50	50	51	51	51	51	51	53	55	51	50	52	50	50	51	52	52	51	
Ireland	49 (0.7)	50	50	50	50	51	51	50	53	50	49	49	49	50	50	50	50	51	50	52	54	51	49	51	50	50	50	51	51	53	51	
United States	48 (0.8)	49	49	48	48	50	49	49	50	49	49	49	48	48	49	48	49	49	49	49	50	51	49	48	49	49	49	49	49	50	49	
England	48 (1.1)	48	48	48	48	49	49	48	51	49	48	48	48	48	48	49	49	49	49	49	50	52	49	48	49	48	48	48	49	49	50	
Hungary	48 (0.9)	48	49	48	48	49	49	48	50	49	48	48	48	48	48	49	49	49	49	49	50	52	49	48	50	48	48	48	49	49	51	
Israel	47 (0.9)	48	48	47	48	48	49	47	48	48	47	47	47	47	48	48	48	48	48	48	48	49	48	47	48	48	48	48	48	48	49	
Slovenia	47 (0.5)	47	48	47	48	49	48	47	50	48	47	47	47	47	48	48	48	48	48	48	50	51	48	47	49	47	47	47	48	48	51	
Lithuania	46 (0.7)	46	46	46	47	47	47	46	49	47	46	46	46	46	46	46	48	47	47	47	49	50	47	46	48	46	46	46	47	47	49	
Norway (9)	46 (0.6)	46	46	46	46	47	47	46	49	47	46	46	46	46	46	47	47	47	47	49	50	47	46	47	46	46	46	46	47	47	48	
Australia	45 (0.7)	45	45	45	45	46	46	45	48	46	45	45	45	45	45	46	46	46	46	46	47	49	46	45	46	45	45	45	46	46	46	
Malta	43 (0.3)	43	43	43	43	44	44	43	45	43	43	43	43	43	43	43	44	44	44	44	45	46	44	43	44	43	43	43	44	45	44	
Sweden	43 (0.7)	43	43	43	43	44	44	43	45	43	43	43	43	43	43	44	44	44	44	44	46	47	44	43	44	43	43	43	44	44	45	
New Zealand	42 (0.8)	42	43	42	42	44	43	42	45	43	42	42	42	42	42	43	43	43	43	43	45	46	43	42	43	42	42	42	43	44	43	
Italy	42 (0.6)	42	42	42	42	43	43	42	44	42	42	42	42	42	42	43	42	42	42	42	43	45	43	42	43	42	42	42	43	43	44	
United Arab Emirates	37 (0.4)	37	37	37	37	38	38	37	39	37	37	37	37	37	37	37	37	37	37	38	39	38	37	37	37	37	37	37	38	39	37	
Malaysia	36 (0.8)	37	37	37	37	37	38	36	39	37	36	36	36	36	37	37	38	37	37	38	39	37	36	38	37	37	37	37	37	39	37	
Turkey	36 (1.0)	36	36	36	36	36	37	36	38	37	36	36	36	36	36	36	36	36	36	37	38	37	36	37	36	36	36	36	37	37	37	
Bahrain	35 (0.3)	35	35	35	34	36	36	35	36	36	35	35	35	35	35	35	35	35	35	35	36	37	35	35	35	35	35	35	36	35	36	35
Georgia	34 (0.7)	34	34	34	34	35	35	34	35	34	34	34	34	34	34	34	34	34	34	35	36	34	35	34	34	34	34	34	35	35	36	35
Qatar	32 (0.5)	32	32	32	32	33	33	32	33	32	32	32	32	32	32	32	32	32	32	32	33	34	33	32	33	32	32	32	33	33	34	33
Iran, Islamic Rep. of	31 (0.9)	31	31	31	31	32	32	31	32	32	31	31	31	31	31	31	31	31	31	32	33	32	31	32	31	31	31	31	32	32	32	
Lebanon	30 (0.7)	30	30	30	31	30	31	30	30	30	30	30	30	30	30	30	30	30	30	30	31	30	30	31	30	30	30	30	31	30	31	34
Thailand	30 (1.0)	30	30	30	29	30	30	30	31	30	30	30	30	30	30	30	30	30	30	30	31	30	30	30	30	30	30	30	30	30	31	30
Chile	28 (0.5)	28	28	28	28	29	29	28	30	29	28	28	28	28	28	28	28	28	28	29	29	31	29	28	29	28	28	28	29	29	30	29
Oman	26 (0.4)	26	26	26	26	27	26	27	26	26	26	26	26	26	26	26	26	26	26	27	27	26	26	26	26	26	26	26	27	26	27	
Kuwait	24 (0.8)	24	24	24	23	24	25	24	25	24	24	24	24	24	24	24	24	24	24	24	24	25	24	24	24	24	24	24	24	24	25	24
Jordan	23 (0.4)	23	23	23	23	24	24	23	24	23	23	23	23	23	23	23	23	23	23	23	24	23	23	23	23	23	23	23	24	24	24	
Botswana (9)	23 (0.3)	23	23	23	23	24	24	23	25	24	23	23	23	23	23	23	23	23	23	24	23	24	23	23	23	23	23	24	23	25	23	
Morocco	22 (0.3)	22	22	22	22	22	22	22	23	22	22	22	22	22	22	22	22	22	22	22	23	22	22	22	22	22	22	22	22	22	23	
South Africa (9)	21 (0.7)	21	21	21	21	22	22	21	22	21	21	21	21	21	21	21	21	21	21	21	22	21	22	21	21	21	21	21	21	22	21	
Saudi Arabia	21 (0.6)	21	20	20	20	21	21	20	22	21	21	21	21	21	20	20	21	21	21	21	22	21	21	20	21	21	21	21	21	21	21	
International Avg.	42 (0.1)	42	42	42	42	42	43	42	43	42	42	42	42	42	42	42	42	42	42	43	44	42	42	43	42	42	42	42	42	44	42	

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Benchmarking Participants**

Quebec, Canada	54 (1.0)	55	55	55	55	56	55	54	57	55	54	54	54	55	55	55	55	56	55	57	59	55	54	56	54	54	54	55	56	57	56
Ontario, Canada	49 (0.8)	49	49	49	49	50	49	49	53	50	49	49	49	49	49	50	50	50	50	52	53	50	49	50	49	49	49	50	50	51	50
Dubai, UAE	47 (0.5)	48	47	47	47	48	48	47	49	48	47	47	47	47	48	48	48	48	48	50	48	48	47	48	47	47	47	48	48	49	48
Florida, US	43 (1.5)	43	43	42	42	44	43	43	44	43	43	43	43	43	43	43	43	44	44	44	45	43	43	43	43	43	43	43	43	44	43
Abu Dhabi, UAE	32 (0.9)	33	33	33	33	33	33	32																							

**Exhibit F.2: Average Percent Correct for the Test-Curriculum Matching Analysis, Eighth Grade (Continued)**

Based on a subset of items specifically identified by each country as addressing its curriculum

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	Benchmarking Participants												
		Chile	Oman	Kuwait	Jordan	Botswana (9)	Morocco	South Africa (9)	Saudi Arabia	Quebec, Canada	Ontario, Canada	Dubai, UAE	Florida, US	Abu Dhabi, UAE
Singapore	74 (0.8)	75	75	75	76	74	75	74	74	75	76	74	74	74
Korea, Rep. of	69 (0.6)	71	71	70	73	70	70	69	69	70	70	69	69	70
Chinese Taipei	68 (0.5)	69	69	69	71	68	69	68	68	69	69	68	68	68
Hong Kong SAR	68 (1.1)	70	69	69	71	68	69	68	68	69	70	68	68	68
Japan	65 (0.5)	66	66	66	69	66	65	65	65	66	67	65	65	65
Russian Federation	53 (1.3)	53	54	54	57	53	54	53	53	54	54	53	53	53
Kazakhstan	50 (1.4)	50	51	51	54	51	51	50	50	51	51	50	50	50
Canada	50 (0.6)	52	52	52	54	51	51	50	50	51	54	50	50	51
Ireland	49 (0.7)	52	51	51	53	50	50	49	49	51	53	49	49	50
United States	48 (0.8)	49	49	49	53	49	48	48	48	49	51	48	49	49
England	48 (1.1)	50	49	49	52	49	48	48	48	49	52	48	48	49
Hungary	48 (0.9)	50	50	49	52	49	49	48	48	49	51	48	48	49
Israel	47 (0.9)	48	48	48	51	48	47	47	47	48	49	47	47	48
Slovenia	47 (0.5)	49	49	49	51	48	48	47	47	49	51	47	47	48
Lithuania	46 (0.7)	48	48	47	50	46	47	46	46	47	49	46	46	47
Norway (9)	46 (0.6)	49	47	47	49	46	46	46	46	47	49	46	46	46
Australia	45 (0.7)	47	46	46	49	45	45	45	45	46	48	45	45	46
Malta	43 (0.3)	44	44	44	47	43	43	43	43	44	46	43	43	43
Sweden	43 (0.7)	45	45	44	46	43	43	43	43	44	46	43	43	43
New Zealand	42 (0.8)	44	44	43	46	43	42	42	42	43	45	42	42	43
Italy	42 (0.6)	44	43	43	46	42	43	42	42	43	45	42	42	42
United Arab Emirates	37 (0.4)	38	38	38	41	37	37	37	37	37	39	37	37	37
Malaysia	36 (0.8)	38	38	37	41	37	37	36	36	37	39	36	36	37
Turkey	36 (1.0)	37	36	37	40	36	36	36	36	37	38	36	36	36
Bahrain	35 (0.3)	35	35	35	40	35	34	35	35	35	36	35	35	35
Georgia	34 (0.7)	35	35	35	38	34	35	34	34	34	35	34	34	34
Qatar	32 (0.5)	33	33	33	36	32	32	32	32	33	34	32	32	32
Iran, Islamic Rep. of	31 (0.9)	32	32	32	35	31	32	31	31	32	33	31	31	32
Lebanon	30 (0.7)	31	31	31	34	30	31	30	30	31	30	30	30	30
Thailand	30 (1.0)	31	30	31	33	30	30	30	30	30	32	30	30	30
Chile	28 (0.5)	29	29	29	32	28	28	28	28	29	30	28	28	29
Oman	26 (0.4)	26	26	27	30	26	26	26	26	26	27	26	26	26
Kuwait	24 (0.8)	24	24	24	27	24	24	24	24	24	25	24	24	24
Jordan	23 (0.4)	23	23	24	27	23	23	23	23	23	24	23	23	23
Botswana (9)	23 (0.3)	24	24	24	27	23	23	23	23	23	25	23	23	23
Morocco	22 (0.3)	22	22	22	25	22	22	22	22	22	23	22	22	22
South Africa (9)	21 (0.7)	22	22	22	24	21	21	21	21	21	23	21	21	21
Saudi Arabia	21 (0.6)	21	20	21	24	21	20	21	21	20	22	21	21	21
International Avg.	42 (0.1)	43	43	43	45	42	42	42	42	42	44	42	42	42
<b>Benchmarking Participants</b>														
Quebec, Canada	54 (1.0)	57	57	56	58	55	55	54	54	56	58	54	54	55
Ontario, Canada	49 (0.8)	51	50	50	52	49	49	49	49	50	53	49	49	50
Dubai, UAE	47 (0.5)	48	48	48	51	48	47	47	47	48	49	47	47	48
Florida, US	43 (1.5)	43	43	43	47	43	42	43	43	43	45	43	43	43
Abu Dhabi, UAE	32 (0.9)	33	33	33	36	33	33	32	32	33	34	32	32	33
Number of Items (Score Points) Identified*	221	193	194	207	183	207	181	221	221	205	184	221	218	215

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



also had 75 percent correct on the items selected by Singapore and Korea, 74 percent on the items selected by Chinese Taipei, 76 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 on the set of items selected as appropriate for that country's students. Using the set of items selected by England at the fourth grade as an example, 75 percent of these items, on average, were answered correctly by students in Hong Kong and Singapore, 74 percent by students in Korea, 71 percent by students in Chinese Taipei, 70 percent by students in Japan, 65 percent by those in Northern Ireland, 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 England averaged 59 percent correct on the set of items identified by England 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 (the most difficult) for those chosen by Chinese Taipei and Indonesia, to 53 percent correct (the least difficult) for those chosen by Denmark. At the eighth grade, the average percent correct ranged from 42 percent for many participants to 45 percent for those chosen by Jordan.

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 Singapore across all fourth grade mathematics items was 74 percent. The diagonal element shows that students from Singapore had a slightly greater average percent correct (76 percent) across the set of items selected as appropriate for Singapore than they did overall. Most participants had a difference of one or two percentage points between the two performance measures, with the largest differences in Bulgaria and the Slovak Republic (6 percentage points). At the eighth grade, the differences were generally smaller; the largest being in Canada, New Zealand, Lebanon, Jordan, and the province of Ontario (4 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 eighth grade, Singapore had the highest average percent correct, not only on the test as a whole, but also on all of the different item selections, with Korea, Chinese Taipei, Hong Kong SAR and Japan next in order of performance (with some ties) 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>

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 2015 sample are provided in Exhibits F.3 and F.4. For any sample average shown in Exhibits F.1 and F.2, 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.

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 changed little. As an example, consider the 154 score points selected by Slovenia at the fourth grade. The students in Slovenia did better on these items (54% correct) than on the test as a whole (51% correct). However, most other countries also did better on these particular items, with an international average of 52 percent correct compared with 50 percent correct overall. The countries that performed better than Slovenia on the overall test also performed as well or better on the items selected by Slovenia.

The TCMA results provide evidence that the TIMSS 2015 mathematics assessment provides a reasonable basis for comparing achievement of the participating countries and benchmarking entities. This result is not unexpected; 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.





**Exhibit F.3: Standard Errors for the Test-Curriculum Matching Analysis, Fourth Grade (Continued)**

Based on a subset of items specifically identified by each country as addressing its curriculum

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	Benchmarking Participants																					
		Spain	Croatia	Slovak Republic	New Zealand	Turkey	France	Georgia	United Arab Emirates	Chile	Bahrain	Qatar	Oman	Iran, Islamic Rep. of	Indonesia	Morocco	Saudi Arabia	Kuwait	Florida, US	Quebec, Canada	Dubai, UAE	Ontario, Canada	Abu Dhabi, UAE
Hong Kong SAR	75 (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	0.7
Singapore	74 (0.8)	0.8	0.9	0.9	0.8	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8
Korea, Rep. of	73 (0.5)	0.4	0.5	0.5	0.4	0.5	0.4	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
Chinese Taipei	70 (0.4)	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Japan	70 (0.4)	0.4	0.5	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	0.5	0.5
Northern Ireland	64 (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	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Russian Federation	63 (0.9)	0.9	0.8	0.8	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
Ireland	59 (0.6)	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6
Norway (5)	59 (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	0.7
England	58 (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	0.7
Belgium (Flemish)	58 (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	0.6	0.6	0.6	0.6
Kazakhstan	57 (1.2)	1.2	1.1	1.1	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1
Portugal	57 (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	0.6	0.6	0.6	0.6
United States	57 (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	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6
Denmark	56 (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	0.7
Lithuania	56 (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	0.7
Finland	55 (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
Hungary	55 (0.7)	0.7	0.7	0.8	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	0.7	0.7	0.7	0.8	0.8	0.8
Poland	55 (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	0.6	0.6	0.6	0.6
Czech Republic	53 (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	0.6	0.6	0.7	0.7
Netherlands	53 (0.5)	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bulgaria	53 (1.3)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Cyprus	53 (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	0.6	0.6
Germany	52 (0.5)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Slovenia	51 (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	0.5	0.5	0.5
Australia	51 (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	0.7
Serbia	51 (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	0.8	0.8	0.8
Sweden	51 (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	0.7
Canada	49 (0.5)	0.6	0.5	0.5	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.5	0.6
Italy	48 (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	0.6	0.6	0.6	0.6
Spain	47 (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	0.6	0.6	0.6	0.6
Croatia	47 (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
Slovak Republic	46 (0.5)	0.5	0.5	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.6
New Zealand	45 (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
Turkey	44 (0.7)	0.7	0.6	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
France	44 (0.7)	0.7	0.7	0.7	0.7	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
Georgia	39 (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	0.8	0.8	0.8	0.8	0.8
United Arab Emirates	38 (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
Chile	37 (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
Bahrain	36 (0.4)	0.4	0.3	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
Qatar	35 (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	0.7
Oman	33 (0.5)	0.5	0.5	0.4	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
Iran, Islamic Rep. of	32 (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	0.6	0.6
Indonesia	26 (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	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Morocco	25 (0.6)	0.6	0.7	0.7	0.6	0.6	0.6	0.7	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
Saudi Arabia	25 (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	0.6	0.6	0.6	0.6
Kuwait	21 (0.6)	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
International Avg.	50 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Benchmarking Participants</b>																							
Florida, US	58 (1.2)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Quebec, Canada	55 (1.1)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Dubai, UAE	50 (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
Ontario, Canada	50 (0.6)	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Abu Dhabi, UAE	32 (0.9)	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Number of Items (Score Points) Identified*	178	160	111	102	132	172	166	146	178	169	175	170	130	168	142	129	178	161	170	149	178	125	127

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015



**Exhibit F.4: Standard Errors for the Test-Curriculum Matching Analysis, Eighth Grade (Continued)**

Based on a subset of items specifically identified by each country as addressing its curriculum

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	Country								Benchmarking Participants				
		Chile	Oman	Kuwait	Jordan	Botswana (9)	Morocco	South Africa (9)	Saudi Arabia	Quebec, Canada	Ontario, Canada	Dubai, UAE	Florida, US	Abu Dhabi, UAE
Singapore	74 (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
Korea, Rep. of	69 (0.6)	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Chinese Taipei	68 (0.5)	0.5	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Hong Kong SAR	68 (1.1)	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Japan	65 (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
Russian Federation	53 (1.3)	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Kazakhstan	50 (1.4)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Canada	50 (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
Ireland	49 (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
United States	48 (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
England	48 (1.1)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Hungary	48 (0.9)	0.9	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Israel	47 (0.9)	0.9	1.0	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
Slovenia	47 (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
Lithuania	46 (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 (9)	46 (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
Australia	45 (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
Malta	43 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Sweden	43 (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
New Zealand	42 (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
Italy	42 (0.6)	0.7	0.7	0.7	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
United Arab Emirates	37 (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
Malaysia	36 (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
Turkey	36 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Bahrain	35 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Georgia	34 (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
Qatar	32 (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
Iran, Islamic Rep. of	31 (0.9)	1.0	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Lebanon	30 (0.7)	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Thailand	30 (1.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chile	28 (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
Oman	26 (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
Kuwait	24 (0.8)	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Jordan	23 (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
Botswana (9)	23 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Morocco	22 (0.3)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
South Africa (9)	21 (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
Saudi Arabia	21 (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
International Avg.	42 (0.1)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Benchmarking Participants</b>														
Quebec, Canada	54 (1.0)	1.1	1.1	1.1	1.1	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.1
Ontario, Canada	49 (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
Dubai, UAE	47 (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
Florida, US	43 (1.5)	1.6	1.6	1.5	1.5	1.6	1.6	1.5	1.5	1.5	1.6	1.5	1.5	1.5
Abu Dhabi, UAE	32 (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
Number of Items (Score Points) Identified*	221	193	194	207	183	207	181	221	221	205	184	221	218	215

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2015

**Appendix G.2: Percentiles of Mathematics Achievement**

Country	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Australia	365 (5.6)	397 (5.8)	449 (4.3)	507 (3.6)	563 (3.3)	610 (4.2)	637 (6.0)
Bahrain	324 (2.6)	352 (2.8)	399 (2.0)	453 (1.9)	507 (2.0)	557 (3.4)	588 (5.1)
Botswana (9)	245 (5.8)	278 (3.9)	337 (2.9)	395 (2.0)	449 (2.8)	496 (2.7)	523 (3.2)
Canada	406 (4.1)	434 (3.1)	482 (3.0)	531 (2.6)	576 (2.1)	613 (2.4)	635 (3.7)
Chile	297 (7.2)	323 (5.1)	372 (4.3)	427 (3.8)	482 (3.3)	531 (4.4)	560 (5.0)
Chinese Taipei	419 (5.3)	459 (3.8)	539 (3.3)	612 (2.7)	669 (3.2)	714 (3.7)	739 (4.1)
Egypt	229 (6.4)	265 (5.8)	322 (4.9)	393 (4.5)	463 (5.0)	521 (4.9)	553 (4.1)
England	389 (7.4)	414 (5.5)	460 (6.2)	517 (5.6)	577 (5.1)	624 (4.1)	649 (5.4)
Georgia	297 (7.9)	331 (5.0)	390 (4.4)	456 (4.3)	520 (4.4)	570 (3.5)	596 (3.6)
Hong Kong SAR	448 (11.1)	489 (9.3)	550 (5.1)	602 (3.8)	647 (4.6)	686 (5.0)	710 (6.0)
Hungary	355 (5.5)	390 (6.8)	452 (4.5)	518 (4.8)	582 (4.2)	632 (5.3)	660 (5.7)
Iran, Islamic Rep. of	286 (4.5)	316 (5.3)	369 (4.8)	434 (5.1)	501 (5.8)	560 (7.2)	594 (9.4)
Ireland	392 (7.5)	426 (6.0)	478 (3.4)	530 (2.9)	574 (2.6)	612 (4.0)	634 (4.7)
Israel	332 (8.2)	371 (5.8)	441 (5.8)	518 (5.0)	586 (4.6)	637 (3.9)	664 (4.6)
Italy	365 (5.5)	397 (4.4)	445 (3.9)	498 (2.6)	547 (3.1)	588 (3.5)	612 (3.4)
Japan	434 (4.8)	470 (4.5)	529 (3.0)	589 (2.9)	647 (3.2)	699 (3.7)	729 (3.4)
Jordan	228 (5.7)	263 (4.6)	321 (4.1)	387 (3.9)	452 (3.1)	505 (3.9)	535 (3.9)
Kazakhstan	373 (6.5)	404 (6.1)	463 (6.3)	530 (6.7)	593 (7.2)	645 (7.2)	677 (7.4)
Korea, Rep. of	455 (4.6)	491 (4.2)	551 (3.8)	611 (2.7)	665 (3.0)	711 (3.6)	738 (3.7)
Kuwait	247 (7.1)	279 (5.8)	330 (4.3)	389 (4.4)	452 (5.9)	512 (10.1)	550 (12.2)
Lebanon	319 (5.9)	345 (4.9)	390 (5.5)	443 (5.1)	497 (3.5)	539 (3.7)	565 (4.1)
Lithuania	379 (4.2)	409 (5.3)	458 (2.8)	515 (3.5)	568 (2.8)	608 (4.1)	632 (4.9)
Malaysia	326 (5.4)	353 (5.2)	402 (4.8)	464 (4.2)	528 (4.0)	580 (3.3)	609 (3.9)
Malta	330 (3.2)	370 (2.7)	436 (2.2)	504 (1.8)	558 (1.7)	601 (1.7)	623 (2.0)
Morocco	257 (3.7)	284 (3.4)	329 (2.5)	381 (2.9)	438 (2.6)	492 (3.2)	522 (4.5)
New Zealand	345 (5.6)	378 (5.8)	433 (4.3)	494 (3.5)	555 (3.2)	605 (4.6)	633 (5.5)
Norway (9)	392 (5.7)	420 (3.6)	465 (3.6)	515 (2.6)	560 (2.4)	600 (3.3)	622 (3.9)
Oman	241 (5.3)	278 (4.2)	339 (2.7)	405 (2.9)	470 (3.1)	527 (2.9)	557 (3.4)
Qatar	272 (5.4)	305 (4.5)	363 (4.0)	436 (4.0)	509 (3.4)	572 (4.7)	607 (5.6)
Russian Federation	399 (5.2)	429 (5.7)	483 (5.9)	542 (5.0)	594 (4.9)	641 (4.9)	669 (5.5)
Saudi Arabia	230 (7.9)	261 (7.4)	309 (5.1)	364 (4.9)	425 (5.0)	480 (6.9)	514 (8.9)
Singapore	462 (7.1)	505 (7.9)	572 (5.2)	633 (3.9)	680 (2.4)	715 (2.1)	735 (2.0)
Slovenia	400 (4.6)	425 (5.8)	470 (2.8)	518 (2.7)	564 (2.6)	605 (3.0)	629 (3.4)
South Africa (9)	242 (4.9)	267 (4.3)	311 (3.7)	364 (4.4)	426 (6.9)	491 (9.2)	529 (10.2)
Sweden	378 (6.4)	406 (6.0)	452 (3.4)	504 (3.6)	553 (3.7)	590 (3.5)	613 (4.1)
Thailand	296 (5.4)	322 (4.5)	369 (5.1)	425 (5.5)	486 (5.9)	549 (8.7)	590 (13.1)
Turkey	289 (7.5)	324 (6.1)	385 (5.1)	454 (5.0)	531 (5.9)	599 (7.1)	634 (7.2)
United Arab Emirates	303 (3.7)	336 (3.0)	395 (2.4)	466 (2.6)	535 (2.4)	591 (3.3)	623 (3.4)
United States	378 (3.8)	408 (4.5)	461 (3.4)	521 (3.6)	577 (3.6)	624 (4.4)	651 (4.8)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	252 (7.4)	280 (5.9)	332 (6.3)	396 (4.4)	462 (5.6)	513 (4.9)	538 (5.2)
Ontario, Canada	399 (5.5)	428 (3.7)	475 (3.3)	526 (3.5)	572 (3.0)	610 (4.1)	632 (4.3)
Quebec, Canada	434 (8.5)	459 (7.3)	502 (5.6)	546 (4.5)	587 (3.8)	623 (3.5)	645 (3.4)
Norway (8)	373 (5.3)	399 (3.4)	444 (3.0)	491 (2.0)	533 (2.3)	568 (2.4)	589 (3.9)
Abu Dhabi, UAE	284 (6.5)	315 (7.3)	370 (5.1)	439 (6.2)	512 (5.7)	571 (8.5)	607 (8.8)
Dubai, UAE	354 (3.3)	390 (3.3)	451 (2.8)	518 (2.9)	576 (4.0)	624 (3.9)	652 (6.6)
Florida, US	346 (8.4)	376 (8.3)	431 (8.5)	493 (8.1)	557 (5.9)	608 (8.9)	641 (11.5)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.  
Note: Percentiles are defined in terms of percentages of students at or below a point on the scale.

**Appendix G.4: Standard Deviations of Mathematics Achievement**

Country	Overall		Girls		Boys	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Australia	505 (3.1)	82 (1.9)	504 (3.8)	82 (2.2)	506 (3.5)	83 (2.1)
Bahrain	454 (1.4)	80 (1.4)	462 (2.4)	73 (1.6)	446 (2.2)	86 (2.0)
Botswana (9)	391 (2.0)	83 (1.1)	400 (2.5)	78 (1.5)	381 (2.5)	87 (1.6)
Canada	527 (2.2)	70 (1.3)	525 (2.0)	67 (1.2)	530 (2.7)	72 (1.8)
Chile	427 (3.2)	80 (1.9)	418 (3.7)	79 (1.9)	436 (4.2)	80 (2.5)
Chinese Taipei	599 (2.4)	97 (1.7)	599 (2.6)	94 (1.8)	599 (3.0)	100 (2.1)
Egypt	392 (4.1)	99 (2.0)	397 (5.5)	98 (2.5)	387 (5.1)	99 (2.7)
England	518 (4.2)	80 (2.6)	520 (5.2)	82 (2.7)	517 (4.8)	78 (3.3)
Georgia	453 (3.4)	92 (1.7)	454 (3.9)	87 (2.3)	453 (4.0)	96 (2.0)
Hong Kong SAR	594 (4.6)	78 (2.8)	591 (4.7)	73 (3.1)	597 (6.0)	83 (3.5)
Hungary	514 (3.8)	93 (2.2)	510 (4.3)	92 (2.4)	519 (4.0)	94 (2.8)
Iran, Islamic Rep. of	436 (4.6)	94 (2.7)	438 (5.0)	90 (2.9)	435 (7.5)	98 (4.6)
Ireland	523 (2.7)	74 (2.3)	521 (2.6)	71 (2.5)	526 (4.0)	76 (2.7)
Israel	511 (4.1)	102 (2.3)	510 (4.3)	98 (2.4)	512 (4.8)	106 (2.8)
Italy	494 (2.5)	75 (1.8)	491 (3.0)	73 (1.8)	498 (2.8)	76 (2.3)
Japan	586 (2.3)	89 (1.3)	588 (3.1)	87 (1.9)	585 (3.0)	90 (1.8)
Jordan	386 (3.2)	94 (1.7)	395 (4.0)	89 (1.9)	376 (5.4)	98 (2.3)
Kazakhstan	528 (5.3)	93 (2.3)	531 (5.8)	92 (2.9)	525 (5.3)	94 (2.5)
Korea, Rep. of	606 (2.6)	85 (1.1)	605 (2.6)	81 (1.4)	606 (3.1)	89 (1.5)
Kuwait	392 (4.6)	91 (3.3)	396 (4.6)	83 (3.5)	389 (7.1)	99 (3.9)
Lebanon	442 (3.6)	75 (1.7)	441 (3.7)	74 (1.8)	444 (4.5)	76 (2.2)
Lithuania	511 (2.8)	77 (1.5)	510 (3.4)	76 (1.9)	513 (3.1)	78 (1.8)
Malaysia	465 (3.6)	87 (2.1)	470 (3.8)	85 (2.3)	461 (3.8)	88 (2.2)
Malta	494 (1.0)	88 (0.9)	495 (1.8)	85 (1.1)	492 (1.6)	91 (1.3)
Morocco	384 (2.3)	80 (1.3)	385 (2.3)	80 (1.2)	384 (2.6)	80 (1.5)
New Zealand	493 (3.4)	88 (2.0)	494 (3.2)	84 (1.7)	491 (4.6)	92 (3.0)
Norway (9)	512 (2.3)	70 (1.2)	511 (2.5)	69 (1.7)	512 (2.7)	71 (1.4)
Oman	403 (2.4)	96 (1.3)	420 (2.9)	88 (1.5)	388 (3.5)	100 (1.7)
Qatar	437 (3.0)	102 (2.2)	440 (3.2)	96 (2.8)	434 (4.5)	108 (3.1)
Russian Federation	538 (4.7)	82 (1.8)	533 (5.1)	82 (2.1)	543 (4.6)	81 (1.9)
Saudi Arabia	368 (4.6)	86 (2.9)	375 (5.1)	79 (2.3)	360 (7.1)	93 (4.8)
Singapore	621 (3.2)	82 (2.2)	626 (3.4)	77 (2.4)	616 (3.8)	86 (2.4)
Slovenia	516 (2.1)	69 (1.4)	515 (2.4)	69 (1.8)	518 (2.5)	70 (1.7)
South Africa (9)	372 (4.5)	87 (3.0)	376 (5.3)	87 (3.5)	369 (4.6)	87 (3.3)
Sweden	501 (2.8)	72 (1.9)	497 (3.3)	71 (2.3)	504 (3.1)	72 (2.2)
Thailand	431 (4.8)	89 (3.4)	440 (5.2)	85 (3.7)	422 (5.7)	92 (3.8)
Turkey	458 (4.7)	105 (2.8)	461 (4.8)	105 (3.0)	455 (5.3)	106 (3.1)
United Arab Emirates	465 (2.0)	98 (1.5)	471 (3.5)	91 (1.5)	459 (4.0)	104 (1.9)
United States	518 (3.1)	83 (1.6)	517 (3.3)	81 (1.7)	519 (3.2)	85 (1.6)

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

Buenos Aires, Argentina	396 (4.2)	89 (2.1)	391 (4.8)	89 (2.9)	401 (5.4)	88 (2.1)
Ontario, Canada	522 (2.9)	71 (1.5)	521 (2.9)	68 (1.6)	523 (3.3)	73 (2.1)
Quebec, Canada	543 (3.9)	64 (2.4)	538 (3.8)	63 (1.8)	550 (5.1)	65 (4.1)
Norway (8)	487 (2.0)	66 (1.3)	486 (2.4)	64 (1.3)	487 (2.3)	67 (1.8)
Abu Dhabi, UAE	442 (4.7)	99 (2.9)	457 (6.0)	90 (2.5)	427 (7.7)	104 (3.9)
Dubai, UAE	512 (2.1)	91 (1.8)	510 (3.7)	89 (2.2)	514 (4.3)	93 (2.7)
Florida, US	493 (6.4)	90 (3.2)	494 (7.2)	86 (3.4)	493 (6.5)	93 (3.7)

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

# Appendix H: Organizations and Individuals Responsible for TIMSS 2015

## Introduction

TIMSS 2015 was a collaborative effort involving hundreds of individuals around the world. This appendix acknowledges the individuals and organizations for their contributions. Given that work on TIMSS 2015 has spanned approximately four years and has involved so many people and organizations, this list may not include all who contributed. Any omission is inadvertent. TIMSS 2015 also acknowledges the students, parents, teachers, and school principals who contributed their time and effort to the study. This report would not be possible without them.

## Management and Coordination

TIMSS is a major undertaking of IEA, and together with the Progress in International Reading Literacy Study (PIRLS), comprises the core of IEA's regular cycles of studies. The TIMSS assessment at the fourth grade complements PIRLS, which regularly assesses reading achievement at fourth grade.

TIMSS was conducted by IEA's TIMSS & PIRLS International Study Center at Boston College, which has responsibility for the overall direction and management of the TIMSS and PIRLS projects, including design, development, and implementation. Headed by Executive Directors Drs. Ina V.S. Mullis and Michael O. Martin, 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 managed country participation, was responsible for verification of all translations produced by the participating countries, and coordinated the school visits by International Quality Control Monitors. Staff at the IEA Data Processing and Research Center in Hamburg worked closely with participating countries to organize sampling and data collection operations and to check all data for accuracy and consistency within and across countries; Statistics Canada in Ottawa was responsible for school and student sampling activities; and Educational Testing Service in Princeton, New Jersey consulted on psychometric methodology, provided software for scaling the achievement data, and replicated the achievement scaling for quality assurance.

The Project Management Team, comprising the study directors and representatives from the TIMSS & PIRLS International Study Center, IEA Secretariat and 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 study directors met with members of IEA's Technical Executive Group twice yearly to review technical issues.

To work with the international team and coordinate within-country activities, each participating country designates an individual to be the TIMSS National Research Coordinator (NRC). The NRCs have the challenging task of implementing TIMSS in their countries in accordance with the TIMSS guidelines and procedures. In addition, the NRCs provide feedback and contributions throughout the development of the TIMSS assessment. The quality of the TIMSS assessment and data depends on the work of the NRCs and their colleagues in carrying out the complex sampling, data collection, and scoring tasks involved. Continuing the tradition of exemplary work established in previous cycles of TIMSS, the TIMSS 2015 NRCs 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.

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Boston College also is gratefully acknowledged for its generous financial support and stimulating educational environment.



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