

# Chapter 1

## International Student Achievement in Mathematics

Chapter 1 summarizes achievement for eighth- and fourth-grade students on the TIMSS 2003 mathematics assessment for each of the participating countries. It also shows trends in student performance at the eighth grade for those countries that also participated in TIMSS 1995 and 1999. At the fourth grade, trends are presented for those countries that participated in the 1995 assessment (no assessment was conducted at the fourth grade in 1999). Achievement differences by gender at both grades are also provided.

### How Do Countries Differ in Mathematics Achievement?

The first page of Exhibit 1.1 presents the distribution of student achievement<sup>1</sup> for the 46 countries and four benchmarking entities that participated at the eighth grade in TIMSS 2003 and the second page presents the distribution of student achievement for the 25 countries and three benchmarking entities that participated at the fourth grade.<sup>2</sup> Countries are shown in decreasing order of average (mean) scale score, together with an indication of whether the country average is significantly higher

- 1 TIMSS used item response theory (IRT) methods to summarize the achievement results on a scale with a mean of 500 and a standard deviation of 100. Given the matrix-sampling approach, scaling averages students' responses in a way that accounts for differences in the difficulty of different subsets of items. It allows students' performances to be summarized on a common metric even though individual students responded to different items in the mathematics test. For more detailed information, see the "IRT Scaling and Data Analysis" section of Appendix A.
- 2 Argentina was unable to complete the necessary steps on schedule for their data to appear in this report. Because the characteristics of their samples are not completely known, achievement results for Syria at the eighth grade and Yemen at the fourth grade are presented in Appendix F.

or lower than the international average. The international average of 467 at the eighth grade was obtained by averaging across the mean scores for each of the 46 participating countries. The mean scores for the four benchmarking participants were not included in calculating the average.<sup>3</sup> At the fourth grade, the international average of 495 was obtained by averaging across the mean scores for the 25 participating countries. It should be noted that the results for the eighth and fourth grades are not directly comparable. While the scales for the two grades are expressed in the same numerical units, they are not directly comparable in terms of being able to say how much achievement or learning at one grade equals how much achievement or learning at the other grade. Comparisons only can be made in terms of relative performance.<sup>4</sup>

At the eighth grade, with such a large number of participating countries, it is not surprising that the results reveal substantial differences in mathematics achievement between the highest- and lowest-performing countries, from an average of 605 for Singapore to 264 for South Africa. Twenty-six countries (including England) and the four benchmarking participants achieved average mathematics scores that were significantly above the international average and 18 countries scored below the international average. Romania and Moldova performed about the same as the international average. At the fourth grade, the range in achievement was from 594 in Singapore to 339 in Tunisia. Fourteen countries and the three benchmarking participants performed above the international average. Moldova, Australia, New Zealand, and Scotland performed at about the international average. Seven countries achieved below the international average.

For both the eighth and fourth grades, Exhibit 1.1 illustrates the broad range of achievement both within and across the countries assessed. It shows a graphical representation of the distribution of student performance within each country. Achievement for each country is shown for the 25th and 75th percentiles as well as for the 5th and 95th percentiles.<sup>5</sup> Each percentile point indicates the percentage of students performing

3 Even though England worked very hard to meet the TIMSS sampling requirements and adjustments were made to make the results representative, it did not meet the school participation rates as specified in the guidelines and consequently its results are shown below a line.

4 Since the TIMSS scales were developed using IRT technology, like all such scales, the eighth- and fourth-grade scales cannot be described in absolute terms.

5 Tables of the percentile values and standard deviations for all countries are presented in Appendix D.

below and above that point on the scale. For example, 25 percent of the eighth-grade students in each country performed below the 25th percentile for that country, and 75 percent performed above the 25th percentile. The range between the 25th and 75th percentiles represents performance by the middle half of the students. In most countries, the range of performance for the middle group was between 100 and 130 scale-score points. In contrast, performance at the 5th and 95th percentiles represents the extremes in both lower and higher achievement. The range of performance between these two score points, which includes 90 percent of the population, is approximately 270 to 300 points in most countries. The dark boxes at the midpoints of the distributions show the 95 percent confidence intervals around the average achievement in each country.<sup>6</sup>

As well as showing the wide spread of student achievement within each country, the percentiles also provide a perspective on the size of the differences among countries. Even though performance generally differed very little between one country and the next higher- or lower-performing country, the range in performance across the participating countries was very large at both grades. For example, Singaporean students had the highest average achievement at both grades, with their average eighth-grade performance exceeding performance at the 95th percentile in the lower-performing countries such as Botswana, Saudi Arabia, Ghana, and South Africa. Similarly, at the fourth grade, average performance in Singapore exceeded performance at the 95th percentile in Iran, the Philippines, Morocco, and Tunisia. This means that only the most proficient students in the lower-performing countries approached the level of achievement of Singaporean students of average proficiency.

To aid in interpretation, Exhibit 1.1 also includes the years of formal schooling and average age of the students in each country. Equivalence of chronological age does not necessarily mean that students have received the same number of years of formal schooling or studied the same curriculum. For example, as described in the introduction,

<sup>6</sup> See the “IRT Scaling and Data Analysis” section of Appendix A for more details about calculating standard errors and confidence intervals for the TIMSS statistics.

Exhibit 1.1: Distribution of Mathematics Achievement

Countries	Years of Schooling*	Average Age	Mathematics Achievement Distribution	Average Scale Score	Human Development Index**
Singapore	8	14.3		605 (3.6) ▲	0.884
♣ Korea, Rep. of	8	14.6		589 (2.2) ▲	0.879
† Hong Kong, SAR	8	14.4		586 (3.3) ▲	0.889
Chinese Taipei	8	14.2		585 (4.6) ▲	–
Japan	8	14.4		570 (2.1) ▲	0.932
Belgium (Flemish)	8	14.1		537 (2.8) ▲	0.937
† Netherlands	8	14.3		536 (3.8) ▲	0.938
Estonia	8	15.2		531 (3.0) ▲	0.833
Hungary	8	14.5		529 (3.2) ▲	0.837
Malaysia	8	14.3		508 (4.1) ▲	0.790
Latvia	8	15.0		508 (3.2) ▲	0.811
Russian Federation	7 or 8	14.2		508 (3.7) ▲	0.779
Slovak Republic	8	14.3		508 (3.3) ▲	0.836
Australia	8 or 9	13.9		505 (4.6) ▲	0.939
‡ United States	8	14.2		504 (3.3) ▲	0.937
<sup>1</sup> Lithuania	8	14.9		502 (2.5) ▲	0.824
Sweden	8	14.9		499 (2.6) ▲	0.941
† Scotland	9	13.7		498 (3.7) ▲	0.930
<sup>2</sup> Israel	8	14.0		496 (3.4) ▲	0.905
New Zealand	8.5 - 9.5	14.1		494 (5.3) ▲	0.917
Slovenia	7 or 8	13.8		493 (2.2) ▲	0.881
Italy	8	13.9		484 (3.2) ▲	0.916
Armenia	8	14.9		478 (3.0) ▲	0.729
<sup>1</sup> Serbia	8	14.9		477 (2.6) ▲	–
Bulgaria	8	14.9		476 (4.3) ▲	0.795
Romania	8	15.0		475 (4.8) ▲	0.773
<b>International Avg.</b>	<b>8</b>	<b>14.5</b>		<b>467 (0.5)</b>	–
Norway	7	13.8		461 (2.5) ▼	0.944
Moldova, Rep. of	8	14.9		460 (4.0) ▼	0.700
Cyprus	8	13.8		459 (1.7) ▼	0.891
<sup>2</sup> Macedonia, Rep. of	8	14.6		435 (3.5) ▼	0.784
Lebanon	8	14.6		433 (3.1) ▼	0.752
Jordan	8	13.9		424 (4.1) ▼	0.743
Iran, Islamic Rep. of	8	14.4		411 (2.4) ▼	0.719
<sup>1</sup> Indonesia	8	14.5		411 (4.8) ▼	0.682
Tunisia	8	14.8		410 (2.2) ▼	0.740
Egypt	8	14.4		406 (3.5) ▼	0.648
Bahrain	8	14.1		401 (1.7) ▼	0.839
Palestinian Nat'l Auth.	8	14.1		390 (3.1) ▼	0.731
Chile	8	14.2		387 (3.3) ▼	0.831
<sup>1</sup> ‡ Morocco	8	15.2		387 (2.5) ▼	0.606
Philippines	8	14.8		378 (5.2) ▼	0.751
Botswana	8	15.1		366 (2.6) ▼	0.614
Saudi Arabia	8	14.1		332 (4.6) ▼	0.769
Ghana	8	15.5		276 (4.7) ▼	0.567
South Africa	8	15.1		264 (5.5) ▼	0.684
‡ England	9	14.3		498 (4.7) ▲	0.930
<b>Benchmarking Participants</b>					
Basque Country, Spain	8	14.1		487 (2.7) ▲	–
Indiana State, US	8	14.5		508 (5.2) ▲	–
Ontario Province, Can.	8	13.8		521 (3.1) ▲	–
Quebec Province, Can.	8	14.2		543 (3.0) ▲	–

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

\* Represents years of schooling counting from the first year of ISCED Level 1.  
 \*\* Taken from United Nations Development Programme's *Human Development Report 2003*, p. 237-240.  
 † Met guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).  
 ‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).  
 ‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).  
 1 National Desired Population does not cover all of International Desired Population (see Exhibit A.6).  
 2 National Defined Population covers less than 90% of National Desired Population (see Exhibit A.6).  
 ♣ Korea tested the same cohort of students as other countries, but later in 2003, at the beginning of the next school year.  
 ( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.  
 A dash (–) indicates comparable data are not available.

Exhibit 1.1: Distribution of Mathematics Achievement



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† Met guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).

<sup>1</sup> National Desired Population does not cover all of International Desired Population (see Exhibit A.6).

ø Norway: 4 years of formal schooling, but First Grade is called "First grade/Preschool."

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

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

countries have different policies about the age at which students begin formal schooling and different policies about promotion and retention from grade to grade.

At the eighth grade, the aim was that the students assessed would have had eight years of formal schooling. Most notably, students in Norway, most of Slovenia, and parts of the Russian Federation had fewer years of formal schooling than their counterparts in other countries, while those in England, Scotland, New Zealand, and parts of Australia had more years of schooling. Even though the students assessed at the eighth grade typically averaged between 14 and 15 years old, the variety of countries assessed and their situations also resulted in a considerable range in the average age of the students assessed. To illustrate how education policies can affect the interaction between age and number of years of schooling, it is interesting to note that Scotland, one of the few countries with an additional year of schooling, starts formal schooling at an early age and had the youngest students assessed—13.7 years old on average. Other countries assessing students younger than 14 years old included Slovenia, Norway, and Cyprus with 13.8 and Australia, Jordan, and Italy with 13.9. Students in the Balkans and some Eastern European countries start school later and tended to be older, particularly in Estonia with an average of 15.2. Students also were older in several African countries including Botswana and South Africa both averaging 15.1, Morocco averaging 15.2, and Ghana averaging 15.5. In these countries, it is not unusual for students to start school at an older age and also perhaps to find it necessary to interrupt their schooling.

At the fourth grade, the aim was to assess students having had four years of formal schooling and this was the case for the most part. However, some students in Slovenia and parts of the Russian Federation had only three years of formal schooling, and students in England and Scotland as well as some in Australia and New Zealand had five years. In terms of chronological age, students in most countries averaged between 10 and 11 years old. Consistent with the patterns at the eighth grade, students were somewhat younger in Scotland, averaging 9.7 years old; Italy,

Slovenia, and Norway, averaging 9.8; and Australia and Cyprus, averaging 9.9. The students in the Balkan and Eastern European countries were somewhat older, especially in Latvia with an average age of 11.1.

As a reminder that not all countries are equally well equipped to meet the challenge of educating their young people, Exhibit 1.1 includes the value for each country on the Human Development Index provided by the United Nations Development Programme (UNDP).<sup>7</sup> The index has a minimum value of 0 and a maximum of 1.0. Countries with high values on the index enjoy long life expectancy, high levels of school enrollment and adult literacy, and a good standard of living as measured by per capita GDP. For example, TIMSS countries with index values greater than 0.9 included Australia, Belgium (Flemish), England, Israel, Italy, Japan, New Zealand, Norway, The Netherlands, Scotland, Sweden, and the United States. All except Norway have average eighth-grade mathematics achievement above the international average. However, not all countries above the international average had an index value as high as this.

Exhibit 1.2 shows how a country's average achievement in mathematics compares to achievement in the other countries. This figure shows whether or not the differences in average achievement between pairs of countries are statistically significant. Selecting a country of interest and reading across the table, a circle with a triangle pointing up indicates significantly higher performance than the comparison country listed across the top; absence of a symbol indicates no significant difference in performances; and a circle with triangle pointing down indicates significantly lower performance.

The data in Exhibit 1.2 reinforce the point that, when ordered by average achievement, adjacent countries usually did not significantly differ from each other, although the differences in achievement between the high-performing and low-performing countries were very large. Because of this wide range in performance, the pattern for a number of countries was one of having lower mean achievement than some countries, about the same mean achievement as other countries, and higher mean achievement than a third group of countries.

<sup>7</sup> *Human Development Report 2003*, p. 237-240.





Exhibit 1.2: 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.

Countries	Singapore	Korea, Rep. of	Hong Kong, SAR	Chinese Taipei	Japan	Belgium (Flemish)	Netherlands	Estonia	Hungary	Malaysia	Latvia	Russian Federation	Slovak Republic	Australia	United States	Lithuania	Sweden	England	Scotland	Israel	New Zealand	Slovenia	Italy	Armenia	Serbia	Bulgaria	Romania	Norway	Moldova, Rep. of	Cyprus
Singapore		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Korea, Rep. of	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hong Kong, SAR	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chinese Taipei	▼				▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Japan	▼	▼	▼	▼		▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Belgium (Flemish)	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Netherlands	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Estonia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Hungary	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Malaysia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Latvia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Russian Federation	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Slovak Republic	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Australia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
United States	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lithuania	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Sweden	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
England	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Scotland	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Israel	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
New Zealand	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Slovenia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Italy	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Armenia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Serbia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Bulgaria	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Romania	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Norway	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Moldova, Rep. of	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Cyprus	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Macedonia, Rep. of	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Lebanon	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Jordan	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Iran, Islamic Rep. of	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Indonesia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Tunisia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Egypt	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Bahrain	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Palestinian Nat'l Auth.	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Chile	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Morocco	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Philippines	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Botswana	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Saudi Arabia	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ghana	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
South Africa	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
<b>Benchmarking Participants</b>																														
Basque Country, Spain	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Indiana State, US	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Ontario Province, Can.	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	
Quebec Province, Can.	▼	▼	▼	▼	▼					▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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

Exhibit 1.2: 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.

Macedonia, Rep. of	Lebanon	Jordan	Iran, Islamic Rep. of	Indonesia	Tunisia	Egypt	Bahrain	Palestinian Nat   Auth.	Chile	Morocco	Philippines	Botswana	Saudi Arabia	Ghana	South Africa	Basque Country, Spain	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.	Countries
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Singapore
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Korea, Rep. of
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Hong Kong, SAR
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Chinese Taipei
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Japan
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Belgium (Flemish)
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Netherlands
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▲	Estonia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Hungary
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Malaysia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Latvia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Russian Federation
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Slovak Republic
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Australia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	United States
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Lithuania
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Sweden
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	England
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Scotland
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Israel
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	New Zealand
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Slovenia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Italy
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Armenia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Serbia
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Bulgaria
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Romania
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Norway
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Moldova, Rep. of
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Cyprus
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▼	Macedonia, Rep. of
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Lebanon
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Jordan
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Iran, Islamic Rep. of
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Indonesia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Tunisia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Egypt
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Bahrain
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Palestinian Nat   Auth.
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Chile
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Morocco
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Philippines
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Botswana
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Saudi Arabia
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	Ghana
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	South Africa
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	<b>Benchmarking Participants</b>
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Basque Country, Spain
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Indiana State, US
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Ontario Province, Can.
▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Quebec Province, Can.

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

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

Exhibit 1.2: 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.

Countries	Singapore	Hong Kong, SAR	Japan	Chinese Taipei	Belgium (Flemish)	Netherlands	Latvia	Lithuania	Russian Federation	England	Hungary	United States	Cyprus	Moldova, Rep. of	Italy	Australia	New Zealand	Scotland	Slovenia	Armenia	Norway	Iran, Islamic Rep. of	Philippines	Morocco	Tunisia	Indiana State, US	Ontario Province, Can.	Quebec Province, Can.
Singapore	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hong Kong, SAR	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Japan	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Chinese Taipei	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Belgium (Flemish)	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Netherlands	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Latvia	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Lithuania	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Russian Federation	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
England	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Hungary	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
United States	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▼	▲	▲
Cyprus	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Moldova, Rep. of	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Italy	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Australia	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
New Zealand	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Scotland	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Slovenia	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Armenia	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Norway	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Iran, Islamic Rep. of	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Philippines	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Morocco	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Tunisia	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
<b>Benchmarking Participants</b>																												
Indiana State, US	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ontario Province, Can.	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Quebec Province, Can.	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

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

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

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

At both the eighth and fourth grades, Singapore was the top-performing country having significantly higher mean achievement than the rest of the participating countries. At the eighth grade, the Republic of Korea, Hong Kong SAR, and Chinese Taipei had significantly higher mean achievement than all of the other participating countries except Singapore. Japan also performed very well, with significantly higher achievement than most other participating countries, as did Belgium (Flemish), the Netherlands, Estonia, and Hungary. At the fourth grade, in addition to Singapore, Hong Kong SAR, Japan, and Chinese Taipei had significantly higher average achievement than most of the other participating countries as did Belgium (Flemish).

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

Exhibit 1.3 shows the countries that have comparable data from previous TIMSS assessments at the eighth and fourth grades. At the eighth grade, 35 countries and three of the benchmarking participants have data from one or both of the previous TIMSS assessments conducted in 1995 and 1999. Well over half of the countries and two of the benchmarking entities, the Canadian provinces of Ontario and Quebec, have participated in all three assessments. Of these, 18 countries as well as Ontario and Quebec have trends in mathematics achievement for their eighth-grade students across three points in time—1995, 1999, and 2003. For several three-time participants, not all the results are presented because they were not strictly comparable. For example, changes in policy about age of school entry complicated trend data collection in Australia and Slovenia so their 1999 data are not shown. Also, the 1995 data are not shown for Israel, Italy, and South Africa since the characteristics of their samples were not completely known in that first assessment. Twelve countries and the US state of Indiana can monitor changes in performance between 1999 and 2003, and five countries between 1995 and 2003, including Australia, Sweden, Scotland, Slovenia, and Norway. At the fourth grade, 15 of the TIMSS 2003

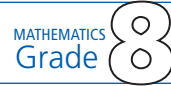


Exhibit 1.3: Trends in Mathematics Achievement

Countries	Average Scale Score	1999 to 2003 Difference	1995 to 2003 Difference	Mathematics Achievement Distribution	Average Age
<b>Singapore</b>					
2003	605 (3.6)				14.3
1999	604 (6.3)	1 (7.2)			14.4
1995	609 (4.0)		-3 (5.4)		14.5
<b>Korea, Rep. of</b>					
2003	589 (2.2)				14.6
1999	587 (2.0)	2 (2.9)			14.4
1995	581 (2.0)		8 (3.0) ▲		14.2
<b>Hong Kong, SAR</b>					
2003	586 (3.3)				14.4
1999	582 (4.3)	4 (5.4)			14.2
1995	569 (6.1)		17 (7.0) ▲		14.2
<b>Chinese Taipei</b>					
2003	585 (4.6)				14.2
1999	585 (4.0)	0 (6.0)			14.2
<b>Japan</b>					
2003	570 (2.1)				14.4
1999	579 (1.7)	-9 (2.6) ▼			14.4
1995	581 (1.6)		-11 (2.6) ▼		14.4
<b>Belgium (Flemish)</b>					
2003	537 (2.8)				14.1
1999	558 (3.3)	-21 (4.1) ▼			14.1
1995	550 (5.9)		-13 (6.5) ▼		14.1
<b>Netherlands</b>					
2003	536 (3.8)				14.3
1999	540 (7.1)	-4 (8.1)			14.2
1995	529 (6.1)		7 (7.3)		14.4
<b>Hungary</b>					
2003	529 (3.2)				14.5
1999	532 (3.7)	-2 (4.9)			14.4
1995	527 (3.2)		3 (4.5)		14.3
<b>Malaysia</b>					
2003	508 (4.1)				14.3
1999	519 (4.4)	-11 (6.0)			14.4
<b>Russian Federation</b>					
2003	508 (3.7)				14.2
1999	526 (5.9)	-18 (7.1) ▼			14.1
1995	524 (5.3)		-16 (6.5) ▼		14.0
<b>Slovak Republic</b>					
2003	508 (3.3)				14.3
1999	534 (4.0)	-26 (5.1) ▼			14.3
1995	534 (3.1)		-26 (4.4) ▼		14.3
<b>Latvia (LSS)</b>					
2003	505 (3.8)				15.1
1999	505 (3.4)	0 (5.1)			14.5
1995	488 (3.6)		17 (5.2) ▲		14.3
<b>Australia</b>					
2003	505 (4.6)				13.9
1995	509 (3.7)		-4 (6.0)		13.9
<b>United States</b>					
2003	504 (3.3)				14.2
1999	502 (4.0)	3 (5.2)			14.2
1995	492 (4.7)		12 (5.8) ▲		14.2

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

- ▲ 2003 country average significantly higher than previous assessment year
- ▼ 2003 country average significantly lower than previous assessment year



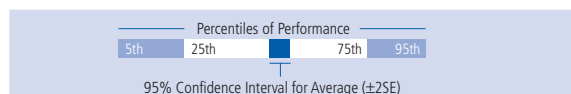
Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia and Slovenia, and 1995 data are not shown for Israel, Italy, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995. Data for Latvia in this exhibit include Latvian-speaking schools only.

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

Exhibit 1.3: Trends in Mathematics Achievement (Continued...)

Countries	Average Scale Score	1999 to 2003 Difference	1995 to 2003 Difference	Mathematics Achievement Distribution	Average Age
<b>Lithuania</b>					
2003	502 (2.5)				14.9
1999	482 (4.3)	20 (5.0) ▲			15.2
1995	472 (4.1)		30 (4.8) ▲		14.3
<b>Sweden</b>					
2003	499 (2.6)				14.9
1995	540 (4.3)		-41 (5.0) ▼		14.9
<b>Scotland</b>					
2003	498 (3.7)				13.7
1995	493 (5.7)		4 (6.7)		13.7
<b>Israel</b>					
2003	496 (3.4)				14.0
1999	466 (3.9)	29 (5.2) ▲			14.1
<b>New Zealand</b>					
2003	494 (5.3)				14.1
1999	491 (5.2)	3 (7.4)			14.0
1995	501 (4.7)		-7 (7.1)		14.0
<b>Slovenia</b>					
2003	493 (2.2)				13.8
1995	494 (2.9)		-2 (3.7)		13.8
<b>Italy</b>					
2003	484 (3.2)				13.9
1999	479 (3.8)	4 (4.9)			14.0
<b>Bulgaria</b>					
2003	476 (4.3)				14.9
1999	511 (5.8)	-34 (7.3) ▼			14.8
1995	527 (5.8)		-51 (7.2) ▼		14.0
<b>Romania</b>					
2003	475 (4.8)				15.0
1999	472 (5.8)	3 (7.5)			14.8
1995	474 (4.6)		2 (6.6)		14.6
<b>Norway</b>					
2003	461 (2.5)				13.8
1995	498 (2.2)		-37 (3.3) ▼		13.9
<b>Moldova, Rep. of</b>					
2003	460 (4.0)				14.9
1999	469 (3.9)	-9 (5.5)			14.4
<b>Cyprus</b>					
2003	459 (1.7)				13.8
1999	476 (1.8)	-17 (2.4) ▼			13.8
1995	468 (2.2)		-8 (3.0) ▼		13.7
<b>Macedonia, Rep. of</b>					
2003	435 (3.5)				14.6
1999	447 (4.2)	-12 (5.5) ▼			14.6
<b>Jordan</b>					
2003	424 (4.1)				13.9
1999	428 (3.6)	-3 (5.5)			14.0
<b>Iran, Islamic Rep. of</b>					
2003	411 (2.4)				14.4
1999	422 (3.4)	-11 (4.2) ▼			14.6
1995	418 (3.9)		-7 (4.5)		14.6

- ▲ 2003 country average significantly higher than previous assessment year
- ▼ 2003 country average significantly lower than previous assessment year



Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia and Slovenia, and 1995 data are not shown for Israel, Italy, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995. Data for Latvia in this exhibit include Latvian-speaking schools only.

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

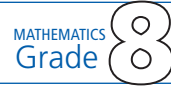
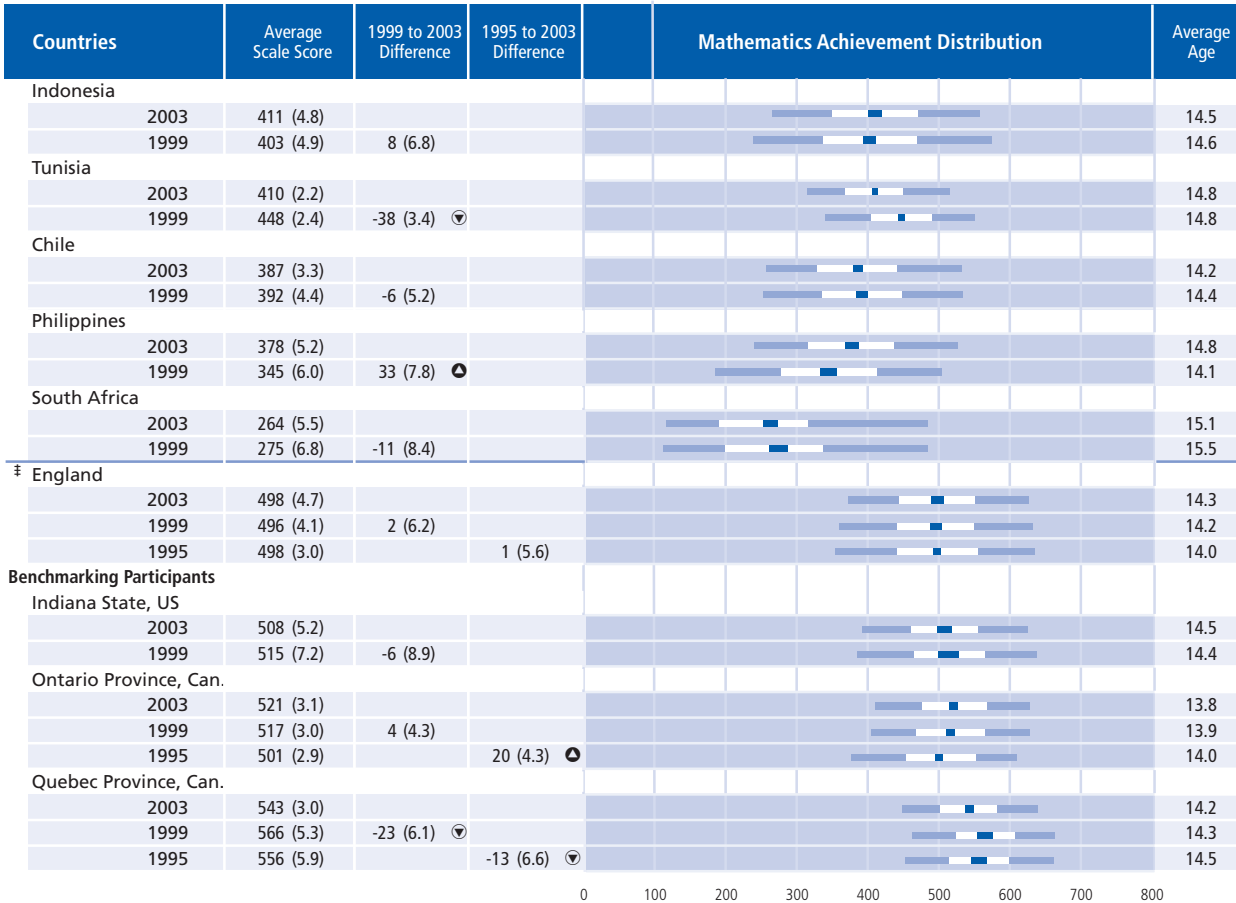
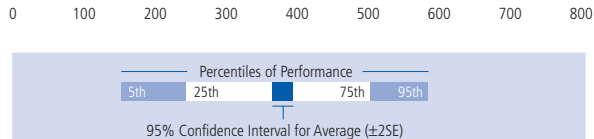


Exhibit 1.3: Trends in Mathematics Achievement (...Continued)



- ▲ 2003 country average significantly higher than previous assessment year
- ▼ 2003 country average significantly lower than previous assessment year



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia and Slovenia, and 1995 data are not shown for Israel, Italy, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995. Data for Latvia in this exhibit include Latvian-speaking schools only.

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

Exhibit 1.3: Trends in Mathematics Achievement

Countries	Average Scale Score	1995 to 2003 Difference	Mathematics Achievement Distribution	Average Age
<b>Singapore</b>				
2003	594 (5.6)			10.3
1995	590 (4.5)	4 (7.2)		10.3
<b>Hong Kong, SAR</b>				
2003	575 (3.2)			10.2
1995	557 (4.0)	18 (5.0) ▲		10.1
<b>Japan</b>				
2003	565 (1.6)			10.4
1995	567 (1.9)	-3 (2.5)		10.4
<b>Netherlands</b>				
2003	540 (2.1)			10.2
1995	549 (3.0)	-9 (3.7) ▼		10.3
<b>Latvia (LSS)</b>				
2003	533 (3.1)			11.1
1995	499 (4.6)	34 (5.5) ▲		10.5
<b>England</b>				
2003	531 (3.7)			10.3
1995	484 (3.3)	47 (5.0) ▲		10.0
<b>Hungary</b>				
2003	529 (3.1)			10.5
1995	521 (3.6)	7 (4.8)		10.4
<b>United States</b>				
2003	518 (2.4)			10.2
1995	518 (2.9)	0 (3.8)		10.2
<b>Cyprus</b>				
2003	510 (2.4)			9.9
1995	475 (3.2)	35 (4.1) ▲		9.8
<b>Australia</b>				
2003	499 (3.9)			9.9
1995	495 (3.4)	4 (5.2)		9.9
<b>New Zealand</b>				
2003	496 (2.1)			10.0
1995	469 (4.4)	26 (4.9) ▲		10.0
<b>Scotland</b>				
2003	490 (3.3)			9.7
1995	493 (4.2)	-3 (5.3)		9.7
<b>Slovenia</b>				
2003	479 (2.6)			9.8
1995	462 (3.1)	17 (4.1) ▲		9.9
<b>Norway</b>				
2003	451 (2.3)			9.8
1995	476 (3.0)	-25 (3.7) ▼		9.9
<b>Iran, Islamic Rep. of</b>				
2003	389 (4.2)			10.4
1995	387 (5.0)	2 (6.5)		10.5
<b>Benchmarking Participants</b>				
<b>Ontario Province, Can.</b>				
2003	511 (3.8)			9.8
1995	489 (3.5)	23 (5.2) ▲		9.9
<b>Quebec Province, Can.</b>				
2003	506 (2.4)			10.1
1995	550 (4.2)	-44 (4.8) ▼		10.3

- ▲ 2003 country average significantly higher than previous assessment year
- ▼ 2003 country average significantly lower than previous assessment year



Trend notes: Because of differences between 1995 and 2003 in population coverage, 1995 data are not shown for Italy. Data for Latvia in this exhibit include Latvian-speaking schools only. To be comparable with 1995, 2003 data for New Zealand in this exhibit include students in English medium instruction only (98% of the estimated population).

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



countries and Ontario and Quebec also participated in TIMSS 1995. Since TIMSS was not conducted at the fourth grade in 1999, these participants can track changes in student achievement over an eight-year period, between 1995 and 2003.

For the countries participating in assessments prior to TIMSS 2003, Exhibit 1.3 compares average achievement between the years.<sup>8</sup> Countries are presented in descending order according to their average TIMSS 2003 achievements. At the eighth grade, a number of countries had significantly higher achievement in TIMSS 2003 than in previous assessments. Most notably, Korea, Hong Kong SAR, the US, Latvia (LSS), Lithuania, and Ontario have shown a pattern of improvement with significant change over the 8-year period. For Lithuania, the increase between 1995 and 1999 also was significant. Israel and the Philippines showed significant improvement from 1999 to 2003. Countries showing a decrease at the eighth grade in TIMSS 2003, from 1995, 1999, or both, included Japan, Belgium (Flemish), the Russian Federation, the Slovak Republic, Sweden, Bulgaria, Norway, Cyprus, Macedonia, Iran, Tunisia, and Quebec.

At the fourth grade, many countries had significant increases in average achievement between 1995 and 2003. Participants showing improved performance included Hong Kong SAR, Latvia (LSS), England, Cyprus, New Zealand, Slovenia, and Ontario. Several participants showed significant declines, including the Netherlands, Norway, and Quebec.

A number of countries showed remarkable changes in mathematics achievement over the eight-year period covered by the TIMSS assessments, some of which may be the result of societal or educational changes during this time. For example, the political changes in Eastern Europe more than a decade ago spawned far-reaching educational reform initiatives that have changed the face of education in many countries in the region. The achievement growth in Latvia and Lithuania, as well as the strong performance of Estonia in its first TIMSS appearance, may reflect the efforts at improvement in those countries. In contrast, countries in the region where reform efforts seem to have been less successful

8 TIMSS used IRT methods to place the TIMSS 2003 results on the same scales that were developed for 1995 and also used for 1999 at the eighth grade. See Appendix A for more detailed information.

include Bulgaria, the Russian Federation, and the Slovak Republic, each of which show large decreases over the period.

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

Exhibit 1.4 shows gender differences in eighth- and fourth-grade mathematics achievement in 2003. It presents average achievement separately for girls and boys for each of the TIMSS 2003 countries, as well as the difference between the means. Countries are shown in increasing order of this gender difference. The gender difference for each country is shown by a bar indicating the amount of the difference, whether the direction of the difference favored girls or boys, and whether the difference is statistically significant (indicated by a darkened bar).

On average, across all countries, there was essentially no difference in achievement between boys and girls at either the eighth or fourth grade, although the situation varied from country to country. In many countries the results paralleled the international pattern and the gender difference was negligible. However, at the eighth grade, countries where girls had significantly higher achievement included Serbia, Macedonia, Armenia, Moldova, Singapore, the Philippines, Cyprus, Jordan, and Bahrain. Participants where boys had significantly higher achievement included the United States, Italy, Hungary, Lebanon, Belgium (Flemish), Morocco, Chile, Ghana, Tunisia, US state of Indiana and Quebec province. At the fourth grade, girls had significantly higher average achievement in Singapore, Moldova, the Philippines, and Armenia. Boys had higher average achievement in the Netherlands, the United States, Italy, Cyprus, Scotland, and in the two Canadian provinces.

Achievement differences between TIMSS 2003 and 1995 and 1999 are presented separately for girls and for boys in Exhibit 1.5. At the eighth grade, both boys and girls had significantly higher achievement in 2003 in Israel, Lithuania, the Philippines, the United States, and Ontario. Girls showed improved performance compared to previous

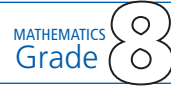


Exhibit 1.4: Average Mathematics Achievement by Gender

Countries	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
Slovak Republic	48 (1.3)	508 (3.4)	52 (1.3)	508 (4.0)	0 (3.5)		
Sweden	51 (0.9)	499 (3.0)	49 (0.9)	499 (2.7)	1 (2.2)		
<sup>1</sup> Indonesia	50 (0.7)	411 (4.9)	50 (0.7)	410 (5.3)	1 (3.0)		
Egypt	46 (2.7)	407 (4.4)	54 (2.7)	406 (5.0)	1 (6.4)		
Bulgaria	48 (1.3)	476 (5.5)	52 (1.3)	477 (4.3)	1 (4.7)		
<b>International Avg.</b>	<b>50 (0.2)</b>	<b>467 (0.6)</b>	<b>50 (0.2)</b>	<b>466 (0.6)</b>	<b>1 (0.6)</b>		
<sup>†</sup> Hong Kong, SAR	50 (2.4)	587 (3.8)	50 (2.4)	585 (4.6)	2 (5.1)		
Estonia	50 (1.0)	532 (3.4)	50 (1.0)	530 (3.3)	2 (3.0)		
New Zealand	52 (1.7)	495 (4.8)	48 (1.7)	493 (7.0)	3 (5.7)		
Japan	49 (1.2)	569 (4.0)	51 (1.2)	571 (3.6)	3 (6.4)		
South Africa	51 (0.9)	262 (6.2)	49 (0.9)	264 (6.4)	3 (5.8)		
Norway	50 (0.8)	463 (2.7)	50 (0.8)	460 (3.0)	3 (2.8)		
Russian Federation	49 (1.2)	510 (3.5)	51 (1.2)	507 (4.4)	3 (2.8)		
Slovenia	50 (0.9)	495 (2.6)	50 (0.9)	491 (2.6)	3 (2.8)		
Botswana	51 (0.7)	368 (2.6)	49 (0.7)	365 (2.9)	3 (1.8)		
Romania	52 (0.9)	477 (5.1)	48 (0.9)	473 (5.0)	4 (3.3)		
<sup>1</sup> Lithuania	50 (0.9)	503 (2.9)	50 (0.9)	499 (3.0)	5 (2.9)		
<sup>†</sup> Scotland	50 (1.3)	500 (4.3)	50 (1.3)	495 (3.8)	5 (3.5)		
<sup>♦♦</sup> Korea, Rep. of	48 (2.8)	586 (2.7)	52 (2.8)	592 (2.6)	5 (3.1)		
Latvia	49 (0.8)	511 (3.3)	51 (0.8)	506 (3.7)	6 (2.9)		
<sup>‡</sup> United States	52 (0.7)	502 (3.4)	48 (0.7)	507 (3.5)	6 (1.9)		
Italy	50 (0.9)	481 (3.0)	50 (0.9)	486 (3.9)	6 (2.8)		
<sup>†</sup> Netherlands	49 (1.2)	533 (4.1)	51 (1.2)	540 (4.5)	7 (3.6)		
<sup>1</sup> Serbia	49 (0.8)	480 (2.9)	51 (0.8)	473 (2.9)	7 (2.8)		
Chinese Taipei	48 (1.0)	589 (4.9)	52 (1.0)	582 (5.2)	7 (4.2)		
Hungary	50 (1.0)	526 (3.7)	50 (1.0)	533 (3.5)	7 (3.2)		
Malaysia	50 (1.8)	512 (4.7)	50 (1.8)	505 (4.5)	8 (4.2)		
<sup>2</sup> Israel	52 (1.6)	492 (3.3)	48 (1.6)	500 (4.5)	8 (4.0)		
Palestinian Nat'l Auth.	55 (2.4)	394 (3.9)	45 (2.4)	386 (4.7)	8 (5.9)		
<sup>2</sup> Macedonia, Rep. of	49 (0.9)	439 (4.0)	51 (0.9)	431 (3.9)	9 (3.5)		
Iran, Islamic Rep. of	40 (4.1)	417 (4.3)	60 (4.1)	408 (4.2)	9 (7.2)		
Lebanon	57 (1.8)	429 (3.6)	43 (1.8)	439 (3.9)	10 (4.0)		
Armenia	53 (0.7)	483 (3.3)	47 (0.7)	473 (3.4)	10 (3.0)		
Moldova, Rep. of	51 (0.8)	465 (4.1)	49 (0.8)	455 (4.8)	10 (3.5)		
Singapore	49 (0.8)	611 (3.3)	51 (0.8)	601 (4.3)	10 (2.9)		
Saudi Arabia	43 (2.3)	326 (7.9)	57 (2.3)	336 (5.5)	10 (9.7)		
Belgium (Flemish)	54 (2.1)	532 (3.5)	46 (2.1)	542 (3.8)	11 (4.8)		
<sup>1</sup> <sup>‡</sup> Morocco	50 (1.8)	381 (2.8)	50 (1.8)	393 (3.0)	12 (3.1)		
Australia	51 (2.2)	499 (5.8)	49 (2.2)	511 (5.8)	13 (7.0)		
Philippines	58 (0.9)	383 (5.2)	42 (0.9)	370 (5.8)	13 (3.4)		
Chile	48 (1.6)	379 (3.5)	52 (1.6)	394 (4.3)	15 (4.5)		
Cyprus	49 (0.6)	467 (1.9)	51 (0.6)	452 (2.3)	16 (2.7)		
Ghana	45 (0.9)	266 (5.1)	55 (0.9)	283 (4.9)	17 (3.1)		
Tunisia	53 (0.7)	399 (2.6)	47 (0.7)	423 (2.2)	24 (1.9)		
Jordan	49 (1.7)	438 (4.6)	51 (1.7)	411 (5.8)	27 (6.8)		
Bahrain	50 (0.4)	417 (2.4)	50 (0.4)	385 (2.4)	33 (3.3)		
<sup>‡</sup> England	50 (2.4)	499 (5.3)	50 (2.4)	498 (5.8)	0 (6.0)		
<b>Benchmarking Participants</b>							
Basque Country, Spain	49 (1.7)	490 (2.5)	51 (1.7)	484 (3.7)	6 (3.1)		
Indiana State, US	49 (1.2)	502 (5.1)	51 (1.2)	514 (5.8)	12 (3.4)		
Ontario Province, Can.	51 (0.9)	520 (3.4)	49 (0.9)	522 (3.4)	2 (2.8)		
Quebec Province, Can.	50 (1.6)	540 (3.7)	50 (1.6)	546 (3.3)	7 (3.3)		

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

■ Gender difference statistically significant □ Gender difference not statistically significant

<sup>†</sup> Met guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).

<sup>‡</sup> Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).

<sup>‡</sup> Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

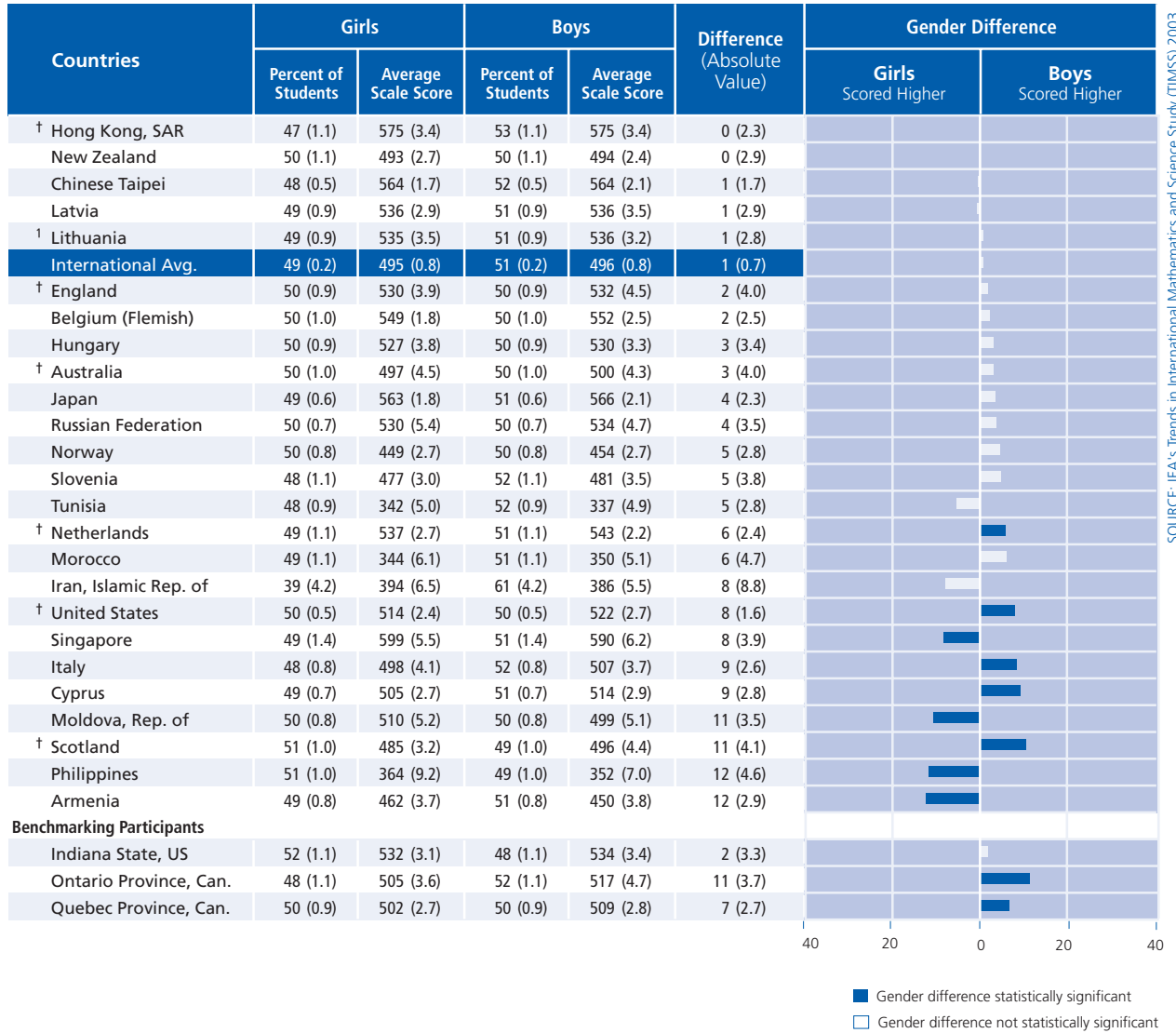
<sup>1</sup> National Desired Population does not cover all of International Desired Population (see Exhibit A.6).

<sup>2</sup> National Defined Population covers less than 90% of National Desired Population (see Exhibit A.6).

<sup>♦♦</sup> Korea tested the same cohort of students as other countries, but later in 2003, at the beginning of the next school year.

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

Exhibit 1.4: Average Mathematics Achievement by Gender

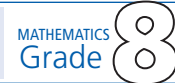


† Met guidelines for sample participation rates only after replacement schools were included (see Exhibit A.9).

<sup>1</sup> National Desired Population does not cover all of International Desired Population (see Exhibit A.6).

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

## Exhibit 1.5: Trends in Average Mathematics Achievement by Gender



Countries	Girls			Boys		
	2003 Average Scale Score	1999 to 2003 Difference	1995 to 2003 Difference	2003 Average Scale Score	1999 to 2003 Difference	1995 to 2003 Difference
Australia	499 (5.8)	--	-13 (7.1)	511 (5.8)	--	4 (7.5)
Belgium (Flemish)	532 (3.5)	-28 (7.7) ▼	-21 (8.9) ▼	542 (3.8)	-13 (9.0)	-4 (9.5)
Bulgaria	476 (5.5)	-35 (8.1) ▼	-57 (8.0) ▼	477 (4.3)	-34 (8.2) ▼	-45 (7.5) ▼
Chile	379 (3.5)	-9 (5.4)	◇ ◇	394 (4.3)	-3 (7.0)	◇ ◇
Chinese Taipei	589 (4.9)	5 (6.2)	◇ ◇	582 (5.2)	-5 (7.4)	◇ ◇
Cyprus	467 (1.9)	-11 (2.7) ▼	-4 (3.3)	452 (2.3)	-23 (3.6) ▼	-13 (4.2) ▼
Hong Kong, SAR	587 (3.8)	4 (6.1)	28 (7.9) ▲	585 (4.6)	4 (7.5)	8 (8.5)
Hungary	526 (3.7)	-3 (5.4)	-1 (5.2)	533 (3.5)	-2 (5.6)	6 (5.1)
Indonesia	411 (4.9)	10 (7.2)	◇ ◇	410 (5.3)	5 (7.3)	◇ ◇
Iran, Islamic Rep. of	417 (4.3)	9 (6.0)	12 (7.5)	408 (4.2)	-24 (6.4) ▼	-21 (6.3) ▼
Israel	492 (3.3)	33 (5.4) ▲	--	500 (4.5)	25 (6.7) ▲	--
Italy	481 (3.0)	6 (5.3)	--	486 (3.9)	2 (5.8)	--
Japan	569 (4.0)	-6 (4.7)	-8 (4.5)	571 (3.6)	-11 (4.2) ▼	-14 (4.2) ▼
Jordan	438 (4.6)	7 (6.7)	◇ ◇	411 (5.8)	-14 (8.3)	◇ ◇
Korea, Rep. of	586 (2.7)	2 (4.1)	15 (4.1) ▲	592 (2.6)	2 (3.2)	3 (3.8)
Latvia (LSS)	509 (4.0)	6 (5.3)	22 (5.5) ▲	502 (4.4)	-6 (6.0)	11 (6.1)
Lithuania	503 (2.9)	23 (5.4) ▲	32 (5.5) ▲	499 (3.0)	16 (5.8) ▲	27 (5.5) ▲
Macedonia, Rep. of	439 (4.0)	-7 (6.5)	◇ ◇	431 (3.9)	-16 (5.8) ▼	◇ ◇
Malaysia	512 (4.7)	-9 (6.7)	◇ ◇	505 (4.5)	-12 (7.4)	◇ ◇
Moldova, Rep. of	465 (4.1)	-3 (5.8)	◇ ◇	455 (4.8)	-16 (6.7) ▼	◇ ◇
Netherlands	533 (4.1)	-4 (8.6)	11 (7.8)	540 (4.5)	-3 (8.4)	5 (7.9)
New Zealand	495 (4.8)	0 (7.4)	-1 (7.2)	493 (7.0)	5 (10.2)	-12 (9.3)
Norway	463 (2.7)	◇ ◇	-35 (3.8) ▼	460 (3.0)	◇ ◇	-39 (4.1) ▼
Philippines	383 (5.2)	31 (8.4) ▲	◇ ◇	370 (5.8)	34 (8.7) ▲	◇ ◇
Romania	477 (5.1)	2 (8.0)	5 (6.8)	473 (5.0)	3 (8.0)	-2 (7.3)
Russian Federation	510 (3.5)	-16 (6.9) ▼	-15 (6.1) ▼	507 (4.4)	-20 (7.7) ▼	-16 (7.5) ▼
Scotland	500 (4.3)	◇ ◇	14 (6.8) ▲	495 (3.8)	◇ ◇	-5 (7.9)
Singapore	611 (3.3)	7 (7.0)	1 (5.9)	601 (4.3)	-5 (8.6)	-7 (6.4)
Slovak Republic	508 (3.4)	-24 (5.3) ▼	-25 (4.7) ▼	508 (4.0)	-28 (6.0) ▼	-28 (5.3) ▼
Slovenia	495 (2.6)	--	3 (3.9)	491 (2.6)	--	-6 (4.4)
South Africa	262 (6.2)	-6 (9.4)	--	264 (6.4)	-19 (9.7)	--
Sweden	499 (3.0)	◇ ◇	-43 (5.5) ▼	499 (2.7)	◇ ◇	-39 (5.4) ▼
Tunisia	399 (2.6)	-37 (3.7) ▼	◇ ◇	423 (2.2)	-37 (3.8) ▼	◇ ◇
United States	502 (3.4)	3 (5.2)	12 (5.8) ▲	507 (3.5)	2 (5.9)	12 (6.3) ▲
‡ England	499 (5.3)	12 (7.6)	4 (6.7)	498 (5.8)	-7 (7.7)	-2 (7.9)
International Avg.	486 (0.7)	0 (1.2)	-5 (1.3) ▼	485 (0.8)	-6 (1.4) ▼	-9 (1.4) ▼
<b>Benchmarking Participants</b>						
Indiana State, US	502 (5.1)	-8 (8.6)	◇ ◇	514 (5.8)	-6 (10.0)	◇ ◇
Ontario Province, Can.	520 (3.4)	6 (4.7)	20 (4.5) ▲	522 (3.4)	3 (4.7)	18 (4.8) ▲
Quebec Province, Can.	540 (3.7)	-27 (6.8) ▼	-20 (7.7) ▼	546 (3.3)	-19 (6.5) ▼	-6 (7.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

▲ 2003 significantly higher

▼ 2003 significantly lower

‡ Did not satisfy guidelines for sample participation rates (see Exhibit A.9).

Trend notes: Because of differences in population coverage, 1999 data are not shown for Australia and Slovenia, and 1995 data are not shown for Israel, Italy, and South Africa. Korea tested later in 2003 than in 1999 and 1995, at the beginning of the next school year. Similarly, Lithuania tested later in 1999 than in 2003 and 1995. Data for Latvia in this exhibit include Latvian-speaking schools only.

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

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

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

Exhibit 1.5: Trends in Average Mathematics Achievement by Gender

Countries	Girls		Boys		
	2003 Average Scale Score	1995 to 2003 Difference	2003 Average Scale Score	1995 to 2003 Difference	
Australia	497 (4.5)	4 (5.9)	500 (4.3)	4 (6.0)	
Cyprus	505 (2.7)	34 (4.5)	514 (2.9)	35 (4.8)	▲
England	530 (3.9)	51 (5.7)	532 (4.5)	44 (5.7)	▲
Hong Kong, SAR	575 (3.4)	17 (5.1)	575 (3.4)	18 (5.5)	▲
Hungary	527 (3.8)	8 (5.5)	530 (3.3)	6 (5.1)	
Iran, Islamic Rep. of	394 (6.5)	15 (8.9)	386 (5.5)	-8 (9.7)	
Japan	563 (1.8)	-1 (2.6)	566 (2.1)	-5 (3.3)	
Latvia (LSS)	535 (3.2)	30 (5.9)	531 (3.9)	38 (6.9)	▲
Netherlands	537 (2.7)	-6 (4.4)	543 (2.2)	-13 (4.2)	▼
New Zealand	495 (2.8)	22 (5.1)	496 (2.4)	31 (6.6)	▲
Norway	449 (2.7)	-25 (5.0)	454 (2.7)	-24 (4.5)	▼
Scotland	485 (3.2)	-8 (5.2)	496 (4.4)	3 (6.5)	
Singapore	599 (5.5)	4 (7.8)	590 (6.2)	4 (7.8)	
Slovenia	477 (3.0)	19 (4.8)	481 (3.5)	15 (4.9)	▲
United States	514 (2.4)	-2 (3.8)	522 (2.7)	3 (4.1)	
<b>International Avg.</b>	<b>512 (2.3)</b>	<b>11 (4.4)</b>	<b>515 (2.3)</b>	<b>12 (4.5)</b>	
<b>Benchmarking Participants</b>					
Ontario Province, Can.	505 (3.6)	19 (4.9)	517 (4.7)	26 (6.4)	▲
Quebec Province, Can.	502 (2.7)	-46 (6.1)	509 (2.8)	-42 (5.6)	▼

▲ 2003 significantly higher than 1995

▼ 2003 significantly lower than 1995

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Trend notes: Because of differences between 1995 and 2003 in population coverage, 1995 data are not shown for Italy. Data for Latvia in this exhibit include Latvian-speaking schools only. To be comparable with 1995, 2003 data for New Zealand in this exhibit include students in English medium instruction only (98% of the estimated population).

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

assessments in Hong Kong SAR, Korea, Latvia (LSS), and Scotland. There was no country in which boys showed improvement and girls did not. Both boys and girls had significantly lower average achievement in TIMSS 2003 in Bulgaria, Cyprus, Norway, the Russian Federation, the Slovak Republic, Sweden, Tunisia, and Quebec. In Belgium (Flemish), the girls showed a significant decrease but the boys did not. In Iran, Japan, Macedonia, and Moldova the boys had the significant decrease. At the fourth grade, changes in achievement were very consistent for both boys and girls. Both genders improved in Cyprus, England, Hong Kong, Latvia (LSS), New Zealand, Slovenia, and Ontario. In Norway and Quebec, both boys and girls showed declines. Only in the Netherlands did the genders behave differently, with boys showing a decline but not girls.

