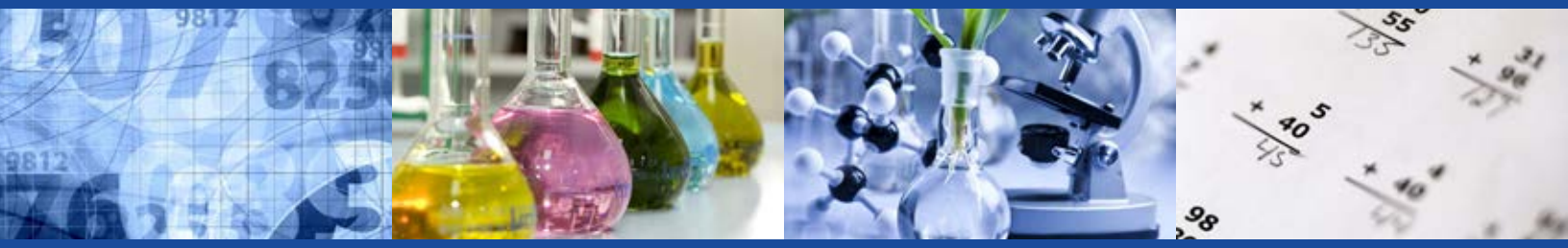
Highlights From TIMSS 2011

Mathematics and Science Achievement of U.S. Fourth- and Eighth-Grade Students in an International Context



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U.S. DEPARTMENT OF EDUCATION

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DECEMBER 2012

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Executive Summary

The Trends in International Mathematics and Science Study (TIMSS) is an international comparative study of student achievement. TIMSS 2011 represents the fifth such study since TIMSS was first conducted in 1995. Developed and implemented at the international level by the International Association for the Evaluation of Educational Achievement (IEA)—an international organization of national research institutions and governmental research agencies—TIMSS assesses the mathematics and science knowledge and skills of 4th- and 8th-graders. TIMSS is designed to align broadly with mathematics and science curricula in the participating countries and education systems.

This report focuses on the performance of U.S. students[1] relative to their peers around the world in countries and other education systems that participated in TIMSS 2011. For the purposes of this report, "countries" are complete, independent political entities, whereas "other education systems" represent a portion of a country, nation, kingdom, or emirate or are other non-national entities (e.g., U.S. states, Canadian provinces, Flemish Belgium, and Northern Ireland). In this report, these "other education systems" are designated as such by their national three-letter international abbreviation appended to their name (e.g., England-GBR, Ontario-CAN). This report also examines changes in mathematics and science achievement compared with TIMSS 1995 and TIMSS 2007.

In 2011, TIMSS was administered at grade 4 in 57 countries and other education systems and, at grade 8, in 56 countries and other education systems.[2] These total counts include U.S. states that participated in TIMSS 2011 not only as part of the U.S. national sample of public and private schools but also individually with state-level public school samples. At grade 4, this was Florida and North Carolina, and at grade 8 this was Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina. Note that, because all TIMSS participants are treated equally, these states are compared with the United States (national sample) throughout this report. All differences described in this report are statistically significant at the .05 level. No statistical adjustments to account for multiple comparisons were used.

Key findings from the report include the following:

Mathematics at grade 4

- The U.S. average mathematics score at grade 4 (541) was higher than the international TIMSS scale average, which is set at 500.[3]
- At grade 4, the United States was among the top 15 education systems in mathematics (8 education systems had higher averages and 6 were not measurably different) and scored higher, on average, than 42 education systems.
  - The 8 education systems with average mathematics scores above the U.S. score were Singapore, Korea, Hong Kong-CHN, Chinese Taipei-CHN, Japan, Northern Ireland-GBR, North Carolina-USA, and Belgium (Flemish)-BEL.
  - Among the U.S. states that participated in TIMSS at grade 4, North Carolina scored above the TIMSS scale average and the U.S. national average in mathematics, while Florida scored above the TIMSS scale average but was not measurably different from the U.S. national average.
- Compared with 1995, the U.S. average mathematics score at grade 4 was 23 score points higher in 2011 (541 vs. 518).
- Compared with 2007, the U.S. average mathematics score at grade 4 was 12 score points higher in 2011 (541 vs. 529).
- The percentage of 4th-graders performing at or above the *Advanced* international mathematics benchmark in 2011 was higher than in the United States in 7 education systems, was not different in 4 education systems, and was lower than in the United States in 45 education systems.[4]

[1]At grade 4, a total of 369 schools and 12,569 students participated in the United States in 2011. At grade 8, a total of 501 schools and 10,477 students participated. The overall weighted school response rate in the United States was 79 percent at grade 4 before the use of substitute schools. The weighted student response rate at grade 4 was 95 percent. At grade 8, the overall weighted school response rate before the use of substitute schools was 87 percent. The weighted student response rate at grade 8 was 94 percent.

[2]The 57 education systems that administered TIMSS at grade 4 overlap only partially with the set of 56 education systems that administered it at grade 8 (see table 1 for details). The total number of education systems reported here differs from the total number reported in the international TIMSS reports (Mullis et al. 2012; Martin et al. 2012) because some education systems administered the TIMSS grade 4 assessment to 6th-grade students, and some administered the TIMSS grade 8 assessment to 9th-grade students. Education systems that did not assess students at the target grade level are not counted or included in this report.

[3]TIMSS provides two overall scales—mathematics and science—as well as several content and cognitive domain subscales for each of the overall scales. The scores are reported on a scale from 0 to 1,000, with the TIMSS scale average set at 500 and standard deviation set at 100.

[4]TIMSS reports on four benchmarks to describe student performance in mathematics and science. Each benchmark is associated with a score on the achievement scale and a description of the knowledge and skills demonstrated by students at that level of achievement. The *Advanced* international benchmark indicates that students scored 625 or higher. More information on the benchmarks can be found in the main body of the report and appendix A.

Mathematics at grade 8

- The U.S. average mathematics score at grade 8 (509) was higher than the international TIMSS scale average, which is set at 500.
- At grade 8, the United States was among the top 24 education systems in mathematics (11 education systems had higher averages and 12 were not measurably different) and scored higher, on average, than 32 education systems.
  - The 11 education systems with average mathematics scores above the U.S. score were Korea, Singapore, Chinese Taipei-CHN, Hong Kong-CHN, Japan, Massachusetts-USA, Minnesota-USA, the Russian Federation, North Carolina-USA, Quebec-CAN, and Indiana-USA.
  - Among the U.S. states that participated in TIMSS at grade 8, Massachusetts, Minnesota, North Carolina, and Indiana scored both above the TIMSS scale average and the U.S. national average in mathematics. Colorado, Connecticut, and Florida scored above the TIMSS scale average, but they were not measurably different from the U.S. national average. California was not measurably different from the TIMSS scale average but scored below the U.S. national average, while Alabama scored both below the TIMSS scale average and the U.S. national average in mathematics.
- Compared with 1995, the U.S. average mathematics score at grade 8 was 17 score points higher in 2011 (509 vs. 492).
- There was no measurable difference between the U.S. average score in 2007 (508) and in 2011 (509).
- The percentage of 8th-grade students performing at or above the *Advanced* international mathematics benchmark in 2011 was higher than in the United States in 11 education systems; was not different in 13 education systems; and was lower than in the United States in 31 education systems.

Science at grade 4

- In 2011, the average science score of U.S. 4th-graders (544) was higher than the international TIMSS scale average, which is set at 500.
- At grade 4, the United States was among the top 10 education systems in science (6 education systems had higher averages and 3 were not measurably different) and scored higher, on average, than 47 education systems.
  - The 6 education systems with average science scores above the U.S. score were Korea, Singapore, Finland, Japan, the Russian Federation, and Chinese Taipei-CHN.
  - Among the U.S. states that participated in TIMSS at grade 4, both Florida and North Carolina scored above the TIMSS scale average but were not measurably different from the U.S. national average.
- There was no measurable difference between the U.S. average science score at grade 4 in 1995 (542) and in 2011 (544).
- There was no measurable difference between the U.S. average score in 2007 (539) and in 2011 (544).
- The percentage of 4th-graders performing at or above the *Advanced* international science benchmark in 2011 was higher than in the United States in 3 education systems, was not different in 6 education systems, and was lower than in the United States in 47 education systems.

Science at grade 8

- In 2011, the average science score of U.S. 8th-graders (525) was higher than the TIMSS scale average, which is set at 500.
- At grade 8, the United States was among the top 23 education systems in science (12 education systems had higher averages and 10 were not measurably different) and scored higher, on average, than 33 education systems.
  - The 12 education systems with average science scores above the U.S. score were Singapore, Massachusetts-USA, Chinese Taipei-CHN, Korea, Japan, Minnesota-USA, Finland, Alberta-CAN, Slovenia, the Russian Federation, Colorado-USA, and Hong Kong-CHN.
  - Among the U.S. states that participated in TIMSS at grade 8, Massachusetts, Minnesota, and Colorado scored both above the TIMSS scale average and the U.S. national average in science. Indiana, Connecticut, North Carolina, and Florida scored above the TIMSS scale average, but they were not measurably different from the U.S. national average. California was not measurably different from the TIMSS scale average but scored below the U.S. national average, while Alabama scored both below the TIMSS scale average and the U.S. national average in science.
- Compared with 1995, the U.S. average science score was 12 score points higher in 2011 (525 vs. 513).
- There was no measurable difference between the U.S. average score in 2007 (520) and in 2011 (525).
- The percentage of 8th-grade students performing at or above the *Advanced* international science benchmark in 2011 was higher than in the United States in 12 education systems, was not different in 10 education systems, and was lower than in the United States in 33 education systems.

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The authors wish to thank the students, teachers, and school officials who participated in TIMSS 2011. Without their assistance and cooperation, this study would not be possible. The authors also wish to thank all those who contributed to the TIMSS design, implementation, and data collection as well as the writing, production, and review of this report. We especially want to thank the TIMSS state coordinators: Rhonda Patton (Alabama), Jessica Valdez (California), Pam Sandoval (Colorado), Renee Savoie (Connecticut), Todd Clark (Florida), Mark O'Malley (Indiana), Rebecca Bennett (Massachusetts), Kate Beattie (Minnesota), and Iris Garner (North Carolina).

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Introduction

TIMSS in brief

The Trends in International Mathematics and Science Study (TIMSS) is an international comparative study of student achievement. TIMSS 2011 represents the fifth such study since TIMSS was first conducted in 1995. Developed and implemented at the international level by the International Association for the Evaluation of Educational Achievement (IEA), an international organization of national research institutions and governmental research agencies, TIMSS is used to measure the mathematics and science knowledge and skills of 4th- and 8th-graders over time.

TIMSS is designed to align broadly with mathematics and science curricula in the participating countries and education systems. The results, therefore, suggest the degree to which students have learned mathematics and science concepts and skills likely to have been taught in school. TIMSS also collects background information on students, teachers, schools, curricula, and official education policies to allow cross-national comparison of educational contexts that may be related to student achievement. In 2011, there were 54 countries and 20 other education systems that participated in TIMSS, at the 4th- or 8th-grade level, or both.[1] For the purposes of this report, "countries" are complete, independent political entities, whereas "other education systems" represent a portion of a country, nation, kingdom, or emirate or are other non-national entities. Thus the category "other education systems" includes all U.S. states and Canadian provinces that participated as "benchmarking participants"[2] as well as Flemish Belgium, Chinese Taipei, England, Hong Kong Special Administrative Region, Northern Ireland, and the Palestinian National Authority. In this report these "other education systems" are designated as such by their national three-letter international abbreviation appended to their name (e.g., England-GBR, Ontario-CAN).

This report presents the performance of U.S. students relative to their peers in other countries and other education systems, and reports on changes in mathematics and science achievement since 1995. Most of the findings in the report are based on the results presented in two international reports published by the IEA and available online at http://www.timss.org:

- *TIMSS 2011 International Results in Mathematics* (Mullis et al. 2012); and
- *TIMSS 2011 International Results in Science* (Martin et al. 2012).

Countries or Education Systems?

The international bodies that coordinate international assessments vary in the labels they apply to participating entities. For example, the IEA, which coordinates TIMSS and the Progress in International Reading Literacy Study (PIRLS), differentiates between IEA members, which the IEA refers to as "countries" in all cases, and "benchmarking participants." IEA members include countries such as the United States and Japan, as well as subnational entities, such as England and Scotland (which are both part of the United Kingdom), the Flemish community of Belgium and the French community of Belgium, and Hong Kong, which is a Special Administrative Region of China. IEA benchmarking participants are all subnational entities and include U.S. states, Dubai in the United Arab Emirates, and, in 2011, participating Canadian provinces. The Organization for Economic Cooperation and Development (OECD), which coordinates the Program for International Student Assessment (PISA), differentiates between OECD member countries and all other participating entities (called "partner countries" or "partner economies"), which include countries and subnational entities. In PISA, the United Kingdom and Belgium are reported as whole countries. Hong Kong is a PISA partner country, as are countries like Singapore, which is not an OECD member but is an IEA member.

In an effort to increase the comparability of results across the international assessments in which the United States participates, this report uses a standard international classification of nation-states (see the U.S. State Department list of "independent states" at http://www.state.gov/s/inr/rls/4250.htm) to report out separately "countries" and "other education systems," which include all other non-national entities that received a TIMSS score. This report's tables and figures, which are primarily adapted from the IEA's TIMSS 2011 report, follow the IEA TIMSS convention of placing members and nonmembers in separate parts of the tables and figures in order to facilitate readers moving between the international and U.S. national report. However, the text of this report refers to "countries" and "other education systems," following the standard classification of nation-states.

[1] This count of countries and other education systems differs from the totals in table 1 because countries that gave the 4th-grade assessment to 6th-graders and the 8th-grade assessment to 9th-graders are excluded from the analyses in this report.

[2] Subnational entities that are not members of the IEA can participate in TIMSS as *benchmarking participants*, which affords them the opportunity to assess the comparative international standing of their students' achievement and to view their curriculum and instruction in an international context.

Table 1. Participation in the TIMSS assessment, by education system: 1995, 1999, 2003, 2007, and 2011

Education system	Year and grade				
	1995	1999	2003	2007	2011
Total count	**54**	**55**	**52**	**66**	**77**
Total IEA members count	**46**	**38**	**48**	**58**	**63**
Algeria				4 8	
Argentina	‡		‡		
Armenia			4 8	4 8	4 8
Australia	4 8	8	4 8	4 8	4 8
Austria	4 8			4	4
Azerbaijan					4
Bahrain			8	8	4 8
Belgium (Flemish)-BEL	8	8	4 8		4
Belgium (French)-BEL	8				
Bosnia & Herzegovina				8	
Botswana[1]			8	8	4 8
Bulgaria	8	8	8	8	
Canada	4 8	8			
Chile		8	8		4 8
Chinese Taipei-CHN		8	4 8	4 8	4 8
Colombia	8			4 8	
Croatia					4
Cyprus	4 8	8	4 8	8	
Czech Republic	4 8	8		4 8	4
Denmark	8			4	4
Egypt			8	8	
El Salvador				4 8	
England-GBR	4 8	8	4 ‡	4 8	4 8
Estonia			8		
Finland		8			4 8
France	8				
Georgia				4 8	4 8
Germany	8			4	4
Ghana			8	8	8
Greece	4 8				
Honduras[1]					4 8
Hong Kong-CHN	4 8	8	4 8	4 8	4 8
Hungary	4 8	8	4 8	4 8	4 8
Iceland	4 8				
Indonesia	‡ ‡	8	8	8	8
Iran, Islamic Republic	4 8	8	4 8	4 8	4 8
Ireland	4 8				4
Israel	4 8	8	8	8	8
Italy	‡ ‡	8	4 8	4 8	4 8
Japan	4 8	8	4 8	4 8	4 8
Jordan		8	8	8	8
Kazakhstan				4	4 8
Korea, Republic of	4 8	8	8	8	4 8
Kuwait	4 8			4 8	4
Latvia	4 8	8	4 8	4	
Lebanon			8	8	8
Lithuania	8	8	4 8	4 8	4 8
Macedonia, Republic of		8	8		8
Malaysia		8	8	8	8
Malta				8	4
Mexico	‡ ‡				
Moldova, Republic of		8	4 8		
Morocco		8	4 8	4 ‡	4 8
Netherlands	4 8	8	4 8	4	4
New Zealand	4 8	8	4 8	4	4 8
Northern Ireland-GBR					4
Norway	4 8		4 8	4 8	4 8
Oman				8	4 8
Palestinian Nat'l Authority			8	8	8
Philippines	‡	8	4 8		
Poland					4
Portugal	4 8				4
Qatar				4 8	4 8
Romania	8	8	8	8	4 8
Russian Federation	8	8	4 8	4 8	4 8
Saudi Arabia			8	8	4 8
Scotland-GBR	4 8		4 8	4 8	
Serbia			8	8	4
Singapore	4 8	8	4 8	4 8	4 8
Slovak Republic	8	8	8	4	4
Slovenia	4 8	8	4 8	4 8	4 8
South Africa[2]	8	8	8		8
Spain	8				4
Sweden	8		8	4 8	4 8
Switzerland	8				
Syrian Arab Republic				8	8
Thailand	4 8	8		8	4 8
Tunisia		8	4 8	4 8	4 8
Turkey		8		8	4 8
Ukraine				4 8	8
United Arab Emirates					4 8
United States	4 8	8	4 8	4 8	4 8
Yemen[3]			‡	4	4

See notes at end of table.

It is important to note that comparisons in this report treat all participating education systems equally, as is done in the international reports. Thus, the United States is compared with some education systems that participated in the absence of a complete national sample (e.g., Northern Ireland-GBR partici¬pated but there was no national United Kingdom sample) as well as with some education systems that participated as part of a complete national sample (e.g., Alabama-USA participated as a separate state sample of public schools and as part of the United State national sample of all schools).

For a number of countries and education systems, changes in achievement can be documented over the last 16 years, from 1995 to 2011. For those that began participating in TIMSS data collections after 1995, changes can only be documented over a shorter period of time. Table 1 shows the countries and other education systems that participated in TIMSS 2011 as well as their participation status in the earlier TIMSS data collections. The TIMSS 4th-grade assessment was implemented in 1995, 2003, 2007, and 2011, while the 8th-grade assessment was implemented in 1995, 1999, 2003, 2007, and 2011.

Table 1. Participation in the TIMSS assessment, by education system: 1995, 1999, 2003, 2007, and 2011 —Continued

Benchmarking education systems

Education system	Year and grade				
	1995	1999	2003	2007	2011
Total benchmarking	**8**	**17**	**4**	**8**	**14**
Abu Dhabi-UAE					4 8
Alabama-USA					8
Alberta-CAN	4 8	8		4	4 8
Basque Country-ESP			8	8	
British Columbia-CAN		8		4 8	
California-USA					8
Colorado-USA	4				8
Connecticut-USA		8			8
Dubai-UAE				4 8	4 8
Florida-USA					4 8
Idaho-USA		8			
Illinois-USA	8	8			
Indiana-USA		8	4 8		8
Maryland-USA		8			
Massachusetts-USA		8		4 8	8
Michigan-USA		8			
Minnesota-USA	4 8			4 8	8
Missouri-USA	8	8			
North Carolina-USA		8			4 8
Ontario-CAN	4 8	8	4 8	4 8	4 8
Oregon-USA	8	8			
Pennsylvania-USA		8			
Quebec-CAN	4 8	8	4 8	4 8	4 8
South Carolina-USA		8			
Texas-USA		8			

‡ Participated in assessment but results not reported.
[1]Administered the TIMSS 4th-grade assessment to 6th-grade students and the 8th-grade assessment to 9th-grade students in 2011.
[2]Administered the TIMSS 8th-grade assessment to 9th-grade students in 2011.
[3]Administered the TIMSS 4th-grade assessment to a national sample of 4th-grade students and a national sample of 6th-grade students in 2011.
NOTE: Italics indicates participants identified and counted in this report as an education system and not as a separate country. The number in the table indicates the grade level of the assessment administered. TIMSS did not assess grade 4 in 1999. Only education systems that completed the necessary steps for their data to meet TIMSS standards and be eligible to appear in the reports from the International Study Center are listed. Unless otherwise noted, education systems sampled students enrolled in the grade corresponding, respectively, to the 4th and 8th year of formal schooling, counting the International Standard Classification of Education (ISCED) Level 1 as the first year of formal schooling, providing that the mean age at the time of testing was, respectively, at least 9.5 and 13.5 years. In the United States and most other countries this corresponds, respectively, to grade 4 and grade 8. Benchmarking education systems are subnational entities that are not members of the IEA but chose to participate in TIMSS to be able to compare themselves internationally.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, and 2011.

This report describes additional details about the achievement of U.S. students that are not available in the international reports, such as the achievement of students of different racial and ethnic and socioeconomic backgrounds. Results are presented in tables, figures, and text summaries of the tables and figures. In the interest of brevity, in most cases, the text reports only the names of countries and other education systems (including U.S. states) scoring higher than or not measurably different from the United States (not those scoring lower than the United States). In addition, because all TIMSS participants are treated equally, comparisons are made throughout this report between the United States (national sample) and the U.S. states that participated in TIMSS 2011 not only as part of the U.S. national sample of public and private schools but also individually with state-level public school samples. Summaries for each of these U.S. states are included in the section, "Performance within the United States."

Design and administration of TIMSS

TIMSS 2011 is sponsored by the IEA and carried out under a contract with the TIMSS & PIRLS International Study Center at Boston College.[3] The National Center for Education Statistics (NCES), in the Institute of Education Sciences at the U.S. Department of Education, is responsible for the implementation of TIMSS in the United States. Data collection in the United States was carried out under contract to Westat and its subcontractor, Pearson Educational Measurement.

Participating countries and education systems administered TIMSS to a probability sample of 4th- and 8th-grade students and schools, based on standardized definitions. TIMSS required participating countries and other education systems to draw samples of students who were nearing the end of their fourth or eighth year of formal schooling, counting from the first year of the International Standard Classification of Education (ISCED) Level 1.[4] In most education systems, including the United States, these students were in the 4th and 8th grades. Details on the average age at the time of testing in each education system are included in appendix A.

In the United States, one sample was drawn to represent the nation at grade 4 and another at grade 8. In addition to these two national samples, several state public school samples

[3]The International Study Center takes its name from the two main IEA studies it coordinates: the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS).

[4]The ISCED was developed by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to assist countries in providing comparable, cross-national data. ISCED Level 1 is termed primary schooling, and in the United States is equivalent to the first through sixth grades (Matheson et al. 1996).

were also drawn at both grades in order to benchmark those states' student performance internationally. Separate state public school samples were drawn, at grade 4, for Florida and North Carolina and, at grade 8, for Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina. Some of these states chose to participate as benchmarking participants in order to compare their performance internationally, and others were invited to participate in TIMSS by the National Assessment of Educational Progress (NAEP), which is conducting a study to link TIMSS and NAEP (as explained in appendix A). The states invited to participate were selected based on state enrollment size and willingness to participate, as well as on their general NAEP performance (above or below the national average on NAEP), their previous experience in benchmarking to TIMSS, and their regional distribution.

In the United States, TIMSS was administered between April and June 2011. The U.S. national sample included both public and private schools, randomly selected and weighted to be representative of the nation at grade 4 and at grade 8.[5] In total, the U.S. national sample consisted of 369 schools and 12,569 students at grade 4, and 501 schools and 10,477 students at grade 8. (For the participation rates for all the U.S. state samples, see table A-1 in appendix A.) The weighted school response rate for the United States was 79 percent at grade 4 before the use of substitute schools (schools substituted for originally sampled schools that refused to participate) and 84 percent with the inclusion of substitute schools.[6] At grade 8, the weighted school response rate before the use of substitute schools as well as with the inclusion of substitute schools was 87 percent. The weighted student response rate at grade 4 was 95 percent and at grade 8 was 94 percent. Student response rates are based on a combined total of students from both sampled and substitute schools. (For the response rates for each of the U.S. states that participated in TIMSS, see table A-1 in appendix A.) Detailed information on sampling, administration, response rates, and other technical issues are in appendix A.

[5]The sample frame for public schools in the United States was based on the 2011 National Assessment of Educational Progress (NAEP) sampling frame. The 2011 NAEP sampling frame was based on the 2007–08 Common Core of Data (CCD). The data for private schools are from the 2007–08 Private School Universe Survey (PSS). Any school containing at least one grade 4 or one grade 8 class was included in the school sampling frame. For more information about the NAEP sampling frame, see http://nces.ed.gov/nationsreportcard/tdw/sample_design/.

[6]Two kinds of response rates are reported here in the interests of comparability with the TIMSS international reports, which report response rates before and after "replacement." However, NCES standards advise that substitute schools should not be included in the calculation of response rates (Statistical Standard 1-3-8; National Center for Education Statistics 2002). Thus, response rates calculated before the use of substitute schools ("before replacement") are consistent with this standard, while response rates calculated with the inclusion of substitute schools ("after replacement") are not consistent with NCES standards.

The mathematics assessment

The TIMSS mathematics assessment is organized around two dimensions: (1) a content dimension specifying the subject matter to be assessed and (2) a cognitive dimension specifying the cognitive or thinking processes to be assessed. At grade 4, TIMSS assesses student knowledge in three content domains: *number*, *geometric shapes and measures*, and *data display*. At grade 8, TIMSS assesses student knowledge in four content domains: *number*, *algebra*, *geometry*, and *data and chance*. At both grades (and across all content domains), TIMSS assesses students' mathematical thinking in three cognitive domains: *knowing*, *applying*, and *reasoning*. Example items from the TIMSS mathematics assessment are included in appendix B (see items B-1 through B-10).

The proportion of item score points devoted to a content domain and, therefore, the contribution of the content domain to the overall mathematics scale score differ somewhat across grades (as shown in table 2). For example, in 2011 at grade 4, one-half or 50 percent of the TIMSS mathematics assessment focused on the number content domain, while the analogous percentage at grade 8 was 29 percent. The proportion of items devoted to each cognitive domain was similar across grades.

The science assessment

Similarly, the TIMSS science assessment is organized around two dimensions: (1) a content dimension specifying the subject matter to be assessed and (2) a cognitive dimension specifying the cognitive or thinking processes to be assessed. At grade 4, TIMSS assesses student knowledge in three content domains: *life science*, *physical science*, and *Earth science*. At grade 8, TIMSS assesses student knowledge in four content domains: *biology*, *chemistry*, *physics*, and *Earth science*. At both grades (and across all content domains), TIMSS assesses students' scientific thinking in three cognitive domains: *knowing*, *applying*, and *reasoning*. Example items from the TIMSS science assessment are included in appendix B (see items B-11 through B-18).

The proportion of item score points devoted to a content domain and, therefore, the contribution of the content domain to the overall science scale score differ somewhat across grades (as shown in table 2). For example, in 2011 at grade 4, some 21 percent of the TIMSS science assessment focused on the *Earth science* domain, while the analogous percentage at grade 8 was 18 percent. The proportion of items also differed slightly across grades. For example, 41 percent of the TIMSS science assessment at grade 4 focused on the *knowing* cognitive domain, whereas at grade 8 it was 32 percent.

For more detailed information

In both the mathematics and science assessments, items vary in terms of difficulty and the form of knowledge and skills addressed; they also differ across grade levels to reflect the nature, difficulty, and emphasis of the subject matter

encountered in school at each grade. For more detailed descriptions of the range of content and cognitive domains assessed in TIMSS, see the *TIMSS 2011 Assessment Frameworks* (Mullis et al. 2009). The development and validation of the mathematics cognitive domains is detailed in *IEA's TIMSS 2003 International Report on Achievement in the Mathematics Cognitive Domains: Findings From a Developmental Project* (Mullis, Martin, and Foy 2005).

Reporting TIMSS results

TIMSS achievement results are reported on a scale from 0 to 1,000, with a TIMSS scale average of 500 and standard deviation of 100. TIMSS provides an overall mathematics scale score and an overall science scale score as well as content and cognitive domain scores for each subject at each grade level. The scaling of data is conducted separately for each subject and grade. Data are also scaled separately for each of the content and cognitive domains.

Table 2. Percentage of TIMSS mathematics and science assessment score points at grade 4 and 8 devoted to content and cognitive domains: 2011

Mathematics content and cognitive domains

Grade 4		Grade 8	
Content domains	**Percent of assessment**	**Content domains**	**Percent of assessment**
Number	50	Number	29
Geometric shapes and measures	35	Algebra	33
Data display	15	Geometry	19
		Data and chance	19
Cognitive domains	**Percent of assessment**	**Cognitive domains**	**Percent of assessment**
Knowing	39	Knowing	36
Applying	41	Applying	39
Reasoning	20	Reasoning	25

Science content and cognitive domains

Grade 4		Grade 8	
Content domains	**Percent of assessment**	**Content domains**	**Percent of assessment**
Life science	45	Biology	37
Physical science	35	Chemistry	20
Earth science	21	Physics	25
		Earth science	18
Cognitive domains	**Percent of assessment**	**Cognitive domains**	**Percent of assessment**
Knowing	41	Knowing	32
Applying	41	Applying	44
Reasoning	18	Reasoning	24

NOTE: The percentages in this table are based on the number of score points and not the number of items. Some constructed-response items are worth more than one score point. For the corresponding percentages based on the number of items, see table A-3 in appendix A. The content domains define the specific mathematics and science subject matter covered by the assessment, and the cognitive domains define the sets of thinking processes students are likely to use as they engage with the respective subject's content. Each of the subject content domains has several topic areas. Each topic area is presented as a list of objectives covered in a majority of participating education systems, at either grade 4 or 8. However, the cognitive domains of mathematics and science are defined by the same three sets of expected processing behaviors—*knowing, applying*, and *reasoning*. Detail may not sum to totals because of rounding.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Although each scale was created to have a mean of 500 and a standard deviation of 100, the subject matter and the level of difficulty of items necessarily differ between subject, grade, and domains. Therefore, direct comparisons between scores across subjects, grades, and different domain types should not be made. (For details on why such comparisons are not warranted, see "Weighting, scaling, and plausible values" in appendix A.)

However, scores within a subject, grade, and domain (e.g., grade 4 mathematics content domain) are comparable over time. The TIMSS scale was established originally to have a mean of 500 set as the average of all of the countries and education systems that participated in TIMSS 1995 at the 4th and 8th grades. Successive TIMSS assessments since then (TIMSS 1999, 2003, 2007, and 2011) have scaled the achievement data so that scores are equivalent from assessment to assessment.[7] Thus, for example, a score of 500 in 8th-grade mathematics in 2011 is equivalent to a score of 500 in 8th-grade mathematics in 2007, in 2003, in 1999, and in 1995. The same example would be true for 4th-grade mathematics scores as well as science scores at either grade. (For more information on how the TIMSS scale was created, see "Weighting, scaling, and plausible values" in appendix A.)

In addition to scale scores, TIMSS has also developed international benchmarks for each subject and grade. The TIMSS international benchmarks provide a way to interpret the scale scores and to understand how students' proficiency in mathematics and science varies along the TIMSS scale. The TIMSS benchmarks describe four levels of student achievement (*Advanced*, *High*, *Intermediate*, and *Low*) for each subject and grade, based on the kinds of skills and knowledge students at each score cutpoint would need to successfully answer the mathematics and science items.

The score cutpoints for the TIMSS benchmarks were set in 2003 based on the distribution of students along the TIMSS scale in previous administrations.[8] More information on the development of the benchmarks and the procedures used to set the score cutpoints can be found in the *TIMSS and PIRLS Methods and Procedures* (Martin and Mullis 2011).

All differences described in this report are statistically significant at the .05 level. No statistical adjustments to account for multiple comparisons were used. Differences that are statistically significant are discussed using comparative terms such as "higher" and "lower." Differences that are not statistically significant are either not discussed or referred to as "not measurably different" or "not statistically significant." In the latter case, failure to find a difference as statistically significant does not necessarily mean that there was no difference. It could be that a real difference cannot be detected by the significance test because of small sample size or imprecise measurement in the sample. If the statistical test is significant, this means that there is convincing evidence (though no guarantee) of a real difference in the population. However, it is important to remember that statistically significant results do not necessarily identify those findings that have policy significance or practical importance. Supplemental tables providing all estimates and standard errors discussed in this report are available online at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.

All data presented in this report are used to describe relationships between variables. These data are not intended, nor can they be used, to imply causality. Student performance can be affected by a complex mix of educational and other factors that are not examined here.

Nonresponse bias in the U.S. TIMSS samples

NCES Statistical Standards require a nonresponse bias analysis if school-level response rates fall below 85 percent, as they did for the 4th-grade school sample in TIMSS 2011. As a consequence, a nonresponse bias analysis was undertaken for the 4th-grade school sample similar to that used for TIMSS 2007 (Gonzales et al. 2008).[9] Nonresponse bias analyses examined whether the participation status of schools (participant/non-participant) was related to seven school characteristics: region of the country in which the school was located (Northeast, Midwest, South, West); type of community served by the school (city, suburban, town, rural); whether the school was public or private; percentage of students eligible for free or reduced-price lunch; number of students enrolled in 4th-grade; total number of students; and percentage of students from minority backgrounds. (See appendix A for a detailed description of this analysis.)

The findings indicate some potential for bias in the data arising from school control, enrollment, regional and community-type differences in participation, along with the fact that schools with higher percentages of minority students were less likely to participate. Specifically, public schools were much more

[7]Even though the number and composition of education systems participating in TIMSS have changed between 1995 and 2011, comparisons between the 2011 results and prior results are still possible because the achievement scores in each of the TIMSS assessments are placed on a scale which is not dependent on the list of participating countries in any particular year. A brief description of the assessment equating and scaling is presented in appendix A to this volume. A more detailed presentation can be found in the *TIMSS and PIRLS Methods and Procedures* (Martin and Mullis 2011).

[8]For the TIMSS 1995 and 1999 assessments, the TIMSS scales were anchored using percentiles (90th, 75th, 50th, and 25th percentiles) instead of score cutpoints. By TIMSS 2003, however, it was clear that, with different education systems participating in each TIMSS cycle (and potentially different achievement for education systems in each cycles), TIMSS needed a set of points to serve as benchmarks that would not change in the future, that made sense, and that were similar to the points used in 1999. For these reasons, TIMSS selected the set of four score points (400, 475, 550, and 625) with equal intervals on the mathematics and science achievement scales that have been used ever since 2003 as the international benchmark cutpoints.

[9]NCES standards require a nonresponse bias analysis if school-level response rates fall below 85 percent, and the 4th-grade school sample in TIMSS 2011 had a school response rate of 84 percent. (Statistical Standard 2-2-2 found in National Center for Education Statistics 2002, available at: http://nces.ed.gov/statprog/2002/stdtoc.asp.) The full text of the nonresponse bias analysis conducted for TIMSS 2011 will be included in a technical report released with the U.S. national dataset.

likely to participate than private schools, grade 4 schools in the Midwest region were more likely to participate than schools in the other regions, and rural schools were more likely to participate than schools in central cities. However, with the inclusion of substitute schools and school nonresponse adjustments applied to the weights,[10] there were no measurable differences by school control, enrollment, and community type; only differences by region remained. Grade 4 schools with higher percentages of minority students were less likely to participate, but the measurable differences were small after substitution. Since TIMSS is conducted under a set of standard rules designed to facilitate international comparisons, the U.S. nonresponse bias analysis results were not used to adjust the U.S. data for this source of bias. While this may be possible at some later date, at present the variables identified above remain as potential sources of bias in the published estimates. See appendix A for additional details on the findings. The full text of the nonresponse bias analysis conducted for TIMSS 2011 will be included in the technical report released with the U.S. national dataset.

Further information

To assist the reader in understanding how TIMSS relates to the National Assessment of Educational Progress (NAEP), the primary source of national- and state-level data on U.S. students' mathematics and science achievement, NCES compared the form and content of the TIMSS and NAEP mathematics and science assessments. A summary of the results of this comparison is included in appendix C. Appendix D includes a list of TIMSS publications and resources published by NCES and the IEA. Standard errors for the estimates discussed in this report are available online at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009. Detailed information on TIMSS can also be found on the NCES website at http://nces.ed.gov/timss and the international TIMSS website at http://www.timss.org.

[10]The international weighting procedures created a nonresponse adjustment class for each explicit stratum; see the *TIMSS and PIRLS Methods and Procedures* (Martin and Mullis 2011) for details. In the case of the U.S. 4th-grade sample, 8 explicit strata were formed by poverty level, school control, and Census region. The procedures could not be varied for individual countries to account for any specific needs. Therefore, the U.S. nonresponse bias analyses could have no influence on the weighting procedures and were undertaken after the weighting process was complete.

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Mathematics Performance in the United States and Internationally

Average scores in 2011

In mathematics, the U.S. national average score was 541 at grade 4 and 509 at grade 8 (tables 3 and 4). Both scores were higher than the TIMSS scale average, which is set at 500 for every administration of TIMSS at both grades.[11]

Among the 45 *countries* that participated at grade 4, the U.S. average mathematics score was among the top 8 (3 countries had higher averages and 4 had averages not measurably different from the United States). Thirty-seven countries had a lower average score than the United States.

Looking at all 57 *education systems* that participated at grade 4 (i.e., both countries and other education systems, including U.S. states that participated in TIMSS with individual state samples), the United States was among the top 15 education systems in average mathematics scores (8 education systems had higher averages and 6 were not measurably different). Singapore, Korea, Hong Kong-CHN, Chinese Taipei-CHN, Japan, Northern Ireland-GBR, North Carolina-USA, and Belgium (Flemish)-BEL had higher average scores than the United States; and Finland, Florida-USA, England-GBR, the Russian Federation, the Netherlands, and Denmark had average scores not measurably different from the U.S. average at grade 4. The United States outperformed 42 education systems.

At grade 8, among the 38 *countries* that participated in TIMSS, the U.S. average mathematics score was among the top 11 (4 countries had higher averages and 6 had averages not measurably different from the United States). Twenty-seven countries had lower average scores than the United States.

Looking at all 56 *education systems* that participated at grade 8, the United States was among the top 24 education systems in average mathematics scores (11 had higher averages and 12 were not measurably different). Korea, Singapore, Chinese Taipei-CHN, Hong Kong-CHN, Japan, Massachusetts-USA, Minnesota-USA, the Russian Federation, North Carolina-USA, Quebec-CAN, and Indiana-USA had higher average scores than the United States; and Colorado-USA, Connecticut-USA, Israel, Finland, Florida-USA, Ontario-CAN, England-GBR, Alberta-CAN, Hungary, Australia, Slovenia, and Lithuania had average scores not measurably different from the U.S. average at grade 8. The United States had a higher average mathematics score than 32 education systems.

[11] A score of 500 represents the international average of participants in the first administration of TIMSS in 1995. The TIMSS scale is the same in each administration such that a value of 500 in 2011 equals 500 in 1995.

Table 3. Average mathematics scores of 4th-grade students, by education system: 2011

Grade 4	
Education system	**Average score**
TIMSS scale average	500
Singapore[1]	606 ▲
Korea, Rep. of	605 ▲
Hong Kong-CHN[1]	602 ▲
Chinese Taipei-CHN	591 ▲
Japan	585 ▲
Northern Ireland-GBR[2]	562 ▲
Belgium (Flemish)-BEL	549 ▲
Finland	545
England-GBR	542
Russian Federation	542
United States[1]	**541**
Netherlands[2]	540
Denmark[1]	537
Lithuania[1,3]	534 ▼
Portugal	532 ▼
Germany	528 ▼
Ireland	527 ▼
Serbia[1]	516 ▼
Australia	516 ▼
Hungary	515 ▼
Slovenia	513 ▼
Czech Republic	511 ▼
Austria	508 ▼
Italy	508 ▼
Slovak Republic	507 ▼
Sweden	504 ▼
Kazakhstan[1]	501 ▼
Malta	496 ▼
Norway[4]	495 ▼
Croatia[1]	490 ▼

Grade 4	
Education system	**Average score**
New Zealand	486 ▼
Spain	482 ▼
Romania	482 ▼
Poland	481 ▼
Turkey	469 ▼
Azerbaijan[1,5]	463 ▼
Chile	462 ▼
Thailand	458 ▼
Armenia	452 ▼
Georgia[3,5]	450 ▼
Bahrain	436 ▼
United Arab Emirates	434 ▼
Iran, Islamic Rep. of	431 ▼
Qatar[1]	413 ▼
Saudi Arabia	410 ▼
Oman[6]	385 ▼
Tunisia[6]	359 ▼
Kuwait[3,7]	342 ▼
Morocco[7]	335 ▼
Yemen[7]	248 ▼
Benchmarking education systems	
North Carolina-USA[1,3]	554 ▲
Florida-USA[3,8]	545
Quebec-CAN	533 ▼
Ontario-CAN	518 ▼
Alberta-CAN[1]	507 ▼
Dubai-UAE	468 ▼
Abu Dhabi-UAE	417 ▼

▲ Average score is higher than U.S. average score.
▼ Average score is lower than U.S. average score.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]Met guidelines for sample participation rates only after replacement schools were included.
[3]National Target Population does not include all of the International Target Population (see appendix A).
[4]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[5]Exclusion rates for Azerbaijan and Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
[8]National Defined Population covers less than 90 percent, but at least 77 percent, of National Target Population (see appendix A).
NOTE: Education systems are ordered by 2011 average score. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All average scores reported as higher or lower than the U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may not be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-1 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 4. Average mathematics scores of 8th-grade students, by education system: 2011

Education system	Grade 8 Average score
TIMSS scale average	500
Korea, Rep. of	613 ▲
Singapore[1]	611 ▲
Chinese Taipei-CHN	609 ▲
Hong Kong-CHN	586 ▲
Japan	570 ▲
Russian Federation[1]	539 ▲
Israel[2]	516
Finland	514
United States[1]	**509**
England-GBR[3]	507
Hungary	505
Australia	505
Slovenia	505
Lithuania[4]	502
Italy	498 ▼
New Zealand	488 ▼
Kazakhstan	487 ▼
Sweden	484 ▼
Ukraine	479 ▼
Norway	475 ▼
Armenia	467 ▼
Romania	458 ▼
United Arab Emirates	456 ▼
Turkey	452 ▼
Lebanon	449 ▼
Malaysia	440 ▼
Georgia[4,5]	431 ▼
Thailand	427 ▼
Macedonia, Rep. of[6]	426 ▼
Tunisia	425 ▼
Chile	416 ▼
Iran, Islamic Rep. of[6]	415 ▼
Qatar[6]	410 ▼
Bahrain[6]	409 ▼
Jordan[6]	406 ▼
Palestinian Nat'l Auth.[6]	404 ▼
Saudi Arabia[6]	394 ▼
Indonesia[6]	386 ▼
Syrian Arab Republic[6]	380 ▼
Morocco[7]	371 ▼
Oman[6]	366 ▼
Ghana[7]	331 ▼
Benchmarking education systems	
Massachusetts-USA[1,4]	561 ▲
Minnesota-USA[4]	545 ▲
North Carolina-USA[2,4]	537 ▲
Quebec-CAN	532 ▲
Indiana-USA[1,4]	522 ▲
Colorado-USA[4]	518
Connecticut-USA[1,4]	518
Florida-USA[1,4]	513
Ontario-CAN[1]	512
Alberta-CAN[1]	505
California-USA[1,4]	493 ▼
Dubai-UAE	478 ▼
Alabama-USA[4]	466 ▼
Abu Dhabi-UAE	449 ▼

▲ Average score is higher than U.S. average score.
▼ Average score is lower than U.S. average score.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]National Defined Population covers less than 90 percent, but at least 77 percent, of National Target Population (see appendix A).
[3]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[4]National Target Population does not include all of the International Target Population (see appendix A).
[5]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
NOTE: Education systems are ordered by 2011 average score. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All average scores reported as higher or lower than the U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-2 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Change in scores

Several education systems that participated in TIMSS 2011 also participated in the last administration of TIMSS in 2007 or in the first administration of TIMSS in 1995. Some education systems participated in both of these previous administrations. Comparing scores between previous administrations of TIMSS and the most recent administration provides perspective on change over time.[12]

[12]Several participating countries that are reported with the 2011 results in other tables in this report are excluded from these comparisons over time based on the International Study Center (ISC) review of the assessment results. Kuwait, Morocco, and Yemen participated at grade 4 in both 2007 or 1995 and 2011, but had unreliable 2011 mathematics scores. Armenia, Kazakhstan, and Qatar also participated in 2007 and 2011 at grade 4, but their 2007 mathematics scores were not comparable to their 2011 scores. Kuwait, Italy, and Thailand participated in 1995 and 2011 at both grades 4 and 8, but their 1995 mathematics scores were not comparable to their 2011 scores. Ghana and Morocco participated in 2007 and 2011 at grade 8, but their 2011 mathematics scores were unreliable. Armenia, Qatar, Saudi Arabia, and Turkey participated in 2007 and 2011 at grade 8, but their 2007 mathematics scores were not comparable to their 2011 scores. Lastly, Indonesia and Israel participated in both 1995 and 2011 at grade 8, but their 1995 mathematics scores were not comparable to their 2011 scores.

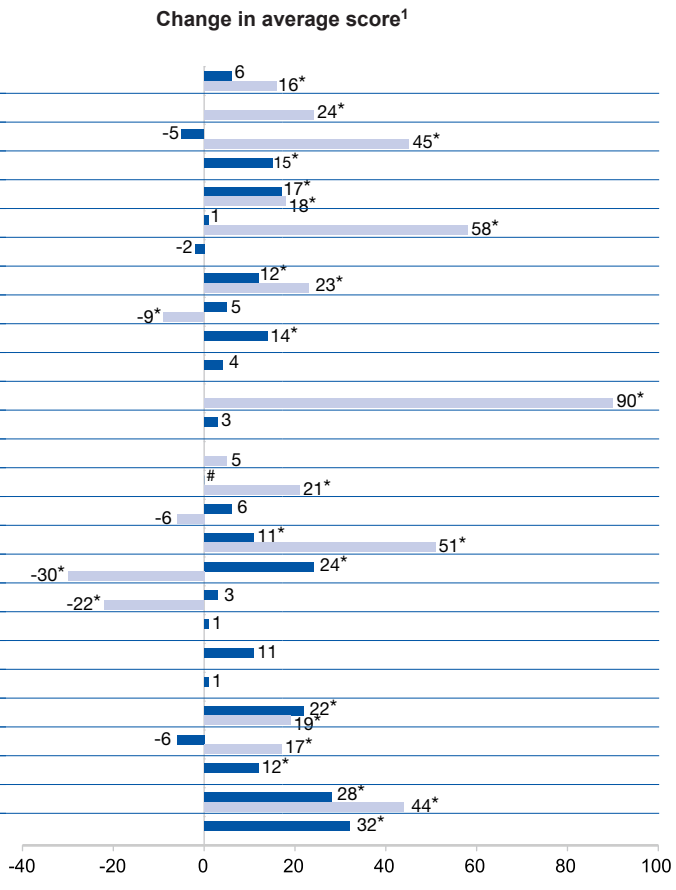
Change at grade 4 between 2007 and 2011

Among the 28 education systems that participated in both the 2007 and 2011 TIMSS mathematics assessments at grade 4, the average mathematics score increased in 12 education systems, including the United States. There was no measurable change in the other 16 education systems that participated in TIMSS in both these years, and in none did average scores decrease measurably (figure 1).

The U.S. increase in average score at grade 4 between 2007 and 2011 was 12 score points (from 529 to 541). Five education systems had larger increases than the United States during this time: Tunisia (32 points), the Islamic Republic of Iran (28 points), the Czech Republic (24 points), Dubai-UAE (24 points), and Norway (22 points). Despite experiencing larger gains than the United States between the two time points, all five of these education systems had lower average scores than the United States in 2011. Thus, none of these increases changed these education systems' standing relative to the United States between 2007 and 2011.

Figure 1. Change in average mathematics scores of 4th-grade students, by education system: 2007–2011 and 1995–2011

Grade 4			
Average score			
1995	2007	2011	Education system
590 ▲	599 ▲	606 ▲	Singapore[2]
581 ▲		605 ▲	Korea, Rep. of
557 ▲	607 ▲	602 ▲	*Hong Kong-CHN*[2]
	576 ▲	591 ▲	*Chinese Taipei-CHN*
567 ▲	568 ▲	585 ▲	Japan
484 ▼	541 ▲	542	*England-GBR*
	544 ▲	542	Russian Federation
518	**529**	**541**	**United States[2]**
549 ▲	535	540	Netherlands[3]
	523	537	Denmark[2]
	530	534 ▼	Lithuania[2,4]
442 ▼		532 ▼	Portugal
	525	528 ▼	Germany
523		527 ▼	Ireland
495 ▼	516 ▼	516 ▼	Australia
521	510 ▼	515 ▼	Hungary
462 ▼	502 ▼	513 ▼	Slovenia
541 ▲	486 ▼	511 ▼	Czech Republic
531 ▲	505 ▼	508 ▼	Austria
	507 ▼	508 ▼	Italy
	496 ▼	507 ▼	Slovak Republic
	503 ▼	504 ▼	Sweden
476 ▼	473 ▼	495 ▼	Norway[5]
469 ▼	492 ▼	486 ▼	New Zealand
	438 ▼	450 ▼	Georgia[4,6]
387 ▼	402 ▼	431 ▼	Iran, Islamic Rep. of
	327 ▼	359 ▼	Tunisia[7]



See notes at end of table.

The increase in the U.S. average score between 2007 and 2011 moved the United States from scoring below England-GBR and the Russian Federation in 2007 to being not measurably different in 2011. It also moved the United States from being not measurably different from Lithuania and Germany in 2007 to scoring above them in 2011.

Change at grade 4 between 1995 and 2011

Among the 20 education systems that participated in both the 1995 and 2011 TIMSS mathematics assessments at grade 4, the average mathematics score increased in 13 education systems, including the United States, and decreased in 4 education systems (figure 1). In the other 3 education systems, there was no measurable change in the average grade 4 mathematics scores between 1995 and 2011.

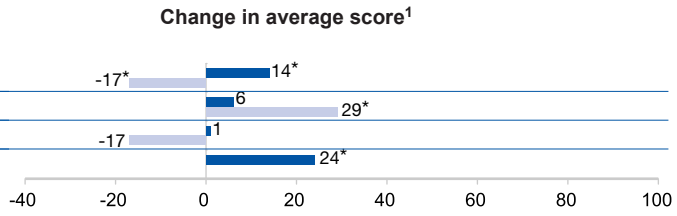
The U.S. increase in the average mathematics score at grade 4 between 1995 and 2011 was 23 score points (from 518 to 541). Five education systems had larger increases than the United States during this time: Portugal (90 points), England-GBR (58 points), Slovenia (51 points), Hong Kong-CHN (45 points), and the Islamic Republic of Iran (44 points). U.S. average performance at grade 4 went from above that of England-GBR in 1995 to being not measurably different in 2011.[13] None of the other education systems' increases changed their standing relative to the United States between 1995 and 2011.

Average scores decreased during this time at grade 4 in the Czech Republic (30 points), Austria (22 points), Quebec-CAN (17 points), and the Netherlands (9 points). U.S. average performance at grade 4 went from below the averages in the Czech Republic, Austria, and Quebec-CAN in 1995 to higher than their averages in 2011, and from below the average in the Netherlands in 1995 to being not measurably different in 2011.

[13]More than three-quarters of England's increase (47 points) occurred between 1995 and 2003.

Figure 1. Change in average mathematics scores of 4th-grade students, by education system: 2007–2011 and 1995–2011—Continued

Grade 4			
Average score			Benchmarking education systems
1995	2007	2011	
550 ▲	519 ▼	533 ▼	*Quebec-CAN*
489 ▼	512 ▼	518 ▼	*Ontario-CAN*
523	505 ▼	507 ▼	*Alberta-CAN*[2]
	444 ▼	468 ▼	*Dubai-UAE*



▲ Score is higher than U.S. score.
▼ Score is lower than U.S. score.
Change from 2007 to 2011.
Change from 1995 to 2011.
Rounds to zero.
*p<.05. Change in average scores is significant.
[1]The change in average score is calculated by subtracting the 2007 or 1995 estimate, respectively, from the 2011 estimate using unrounded numbers.
[2]National Defined Population covers 90 to 95 percent of National Target Population for 2011 (see appendix A).
[3]Met guidelines for sample participation rates only after replacement schools were included for 2011.
[4]National Target Population does not include all of the International Target Population for 2011 (see appendix A).
[5]Nearly satisfied guidelines for sample participation rates after replacement schools were included for 2011.
[6]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available for 2011.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation in 2011 exceeds 15 percent, though it is less than 25 percent.
NOTE: Education systems are ordered by 2011 average scores. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Data are not shown for some education systems because comparable data from previous cycles are not available. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only.
For 1995, Korea, Portugal, and Ontario-CAN had National Defined Population covering 90 to 95 percent of National Target Population; England-GBR had National Defined Population that covered less than 90 percent of National Target Population (but at least 77 percent) and met guidelines for sample participation rates only after replacement schools were included; Netherlands, Australia, and Austria did not satisfy guidelines for sample participation rates. For 2007, the United States, Quebec-CAN, Ontario-CAN, and Alberta-CAN had National Defined Population covering 90 to 95 percent of National Target Population; the United States and Denmark met guidelines for sample participation rates only after replacement schools were included; the Netherlands and Dubai-UAE nearly satisfied guidelines for sample participation rates after replacement schools were included; Georgia had a National Target Population that did not include all of the International Target Population; Dubai-UAE tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.
All average scores reported as higher or lower than the U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. Detail may not sum to totals because of rounding. The standard errors of the estimates are shown in table E-3 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2007, and 2011.

Change at grade 8 between 2007 and 2011

At grade 8, among the 34 education systems that participated in both the 2007 and 2011 TIMSS mathematics assessments, the average mathematics score increased in 10 education systems and decreased in 6 education systems (figure 2). In the rest, including the United States, there was no measurable change.

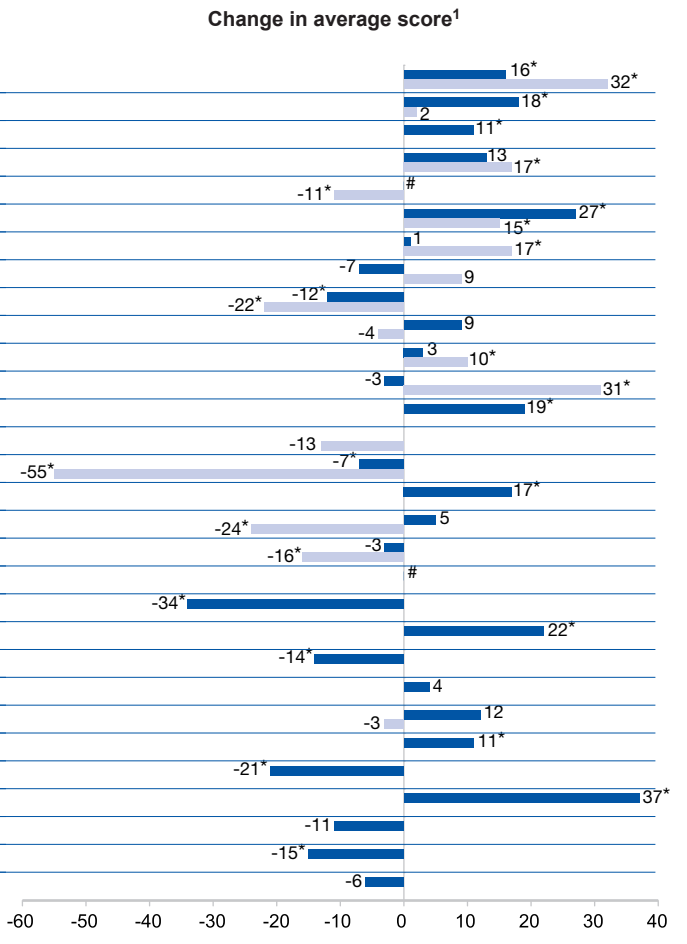
The education systems in which 8th-graders' average scores increased between 2007 and 2011 were the Palestinian National Authority (37 points), the Russian Federation (27 points), Georgia (22 points), Italy (19 points), Singapore (18 points), Ukraine (17 points), Dubai-UAE (17 points), Korea (16 points), Bahrain (11 points), and Chinese Taipei-CHN (11 points). The 27-point increase in the Russian Federation moved their 8th-graders from on a par with their U.S. peers in 2007 to higher than the U.S. national average in 2011. The increases in the other education systems did not change their standing relative to the United States.[14]

Scores decreased during this time at grade 8 in Malaysia (34 points), Jordan (21 points), the Syrian Arab Republic (15 points), Thailand (14 points), Hungary (12 points), and Sweden (7 points). None of these decreases changed these education systems' standing relative to the United States between 2007 and 2011.

[14]Although Australia and Slovenia did not have measurable changes in their average scores, both moved from scoring below the United States in 2007 to being not measurably different in 2011.

Figure 2. Change in average mathematics scores of 8th-grade students, by education system: 2007–2011 and 1995–2011

Grade 8			
Average score			
1995	2007	2011	Education system
581 ▲	597 ▲	613 ▲	Korea, Rep. of
609 ▲	593 ▲	611 ▲	Singapore[2]
	598 ▲	609 ▲	*Chinese Taipei-CHN*
569 ▲	572 ▲	586 ▲	*Hong Kong-CHN*
581 ▲	570 ▲	570 ▲	Japan
524 ▲	512	539 ▲	Russian Federation[2]
492	**508**	**509**	**United States[2]**
498	513	507	*England-GBR[3]*
527 ▲	517	505	Hungary
509 ▲	496 ▼	505	Australia
494	501 ▼	505	Slovenia
472 ▼	506	502	Lithuania[4]
	480 ▼	498 ▼	Italy
501		488 ▼	New Zealand
540 ▲	491 ▼	484 ▼	Sweden
	462 ▼	479 ▼	Ukraine
498	469 ▼	475 ▼	Norway
474 ▼	461 ▼	458 ▼	Romania
	449 ▼	449 ▼	Lebanon
	474 ▼	440 ▼	Malaysia
	410 ▼	431 ▼	Georgia[4,5]
	441 ▼	427 ▼	Thailand
	420 ▼	425 ▼	Tunisia
418 ▼	403 ▼	415 ▼	Iran, Islamic Rep. of[6]
	398 ▼	409 ▼	Bahrain[6]
	427 ▼	406 ▼	Jordan[6]
	367 ▼	404 ▼	*Palestinian Nat'l Auth.[6]*
	397 ▼	386 ▼	Indonesia[6]
	395 ▼	380 ▼	Syrian Arab Republic[6]
	372 ▼	366 ▼	Oman[6]



See notes at end of table.

Change at grade 8 between 1995 and 2011

At grade 8, among the 20 education systems that participated in both the 1995 and 2011 TIMSS mathematics assessments, the average mathematics score increased in 8 education systems, including the United States, and decreased in 7 education systems (figure 2). In the rest, there was no measurable change between 1995 and 2011.

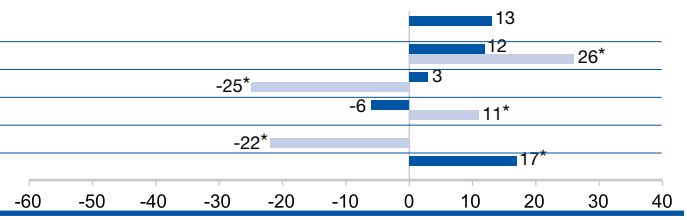
The U.S. increase in average mathematics score at grade 8 between 1995 and 2011 was 17 score points (from 492 to 509). Only Korea (32 points) had a larger increase than the United States during this time. However, the increases in both the Lithuanian and the U.S. average scores meant that the U.S. average performance went from above that of Lithuania in 1995 to being not measurably different in 2011. None of the other education systems' increases changed their standing relative to the United States between 1995 and 2011.

Average scores decreased at grade 8 during this time in Sweden (55 points), Quebec-CAN (25 points), Norway (24 points), Alberta-CAN (22 points), Hungary (22 points), Romania (16 points), and Japan (11 points). As a result, the average U.S. performance at grade 8 went from below that of Sweden in 1995 to higher in 2011; from below that of Hungary and Alberta-CAN in 1995 to not measurably different in 2011; and from being not measurably different from Norway in 1995 to higher in 2011.[15]

[15]Although the average score of Australia and New Zealand did not decrease measurably, New Zealand's standing relative to the United States moved from being not measurably different in 1995 to scoring below the United States in 2011; and Australia's standing relative to the United States moved from being above the United States in 1995 to being not measurably different in 2011.

Figure 2. Change in average mathematics scores of 8th-grade students, by education system: 2007–2011 and 1995–2011—Continued

Grade 8			
Average score			Benchmarking education systems
1995	2007	2011	
	547 ▲	561 ▲	*Massachusetts-USA*[2,4]
518 ▲	532 ▲	545 ▲	*Minnesota-USA*[4]
556 ▲	528 ▲	532 ▲	*Quebec-CAN*
501	517	512	*Ontario-CAN*[2]
527 ▲		505	*Alberta-CAN*[2]
	461 ▼	478 ▼	*Dubai-UAE*



▲ Score is higher than U.S. score.
▼ Score is lower than U.S. score.
Change from 2007 to 2011.
Change from 1995 to 2011.
Rounds to zero.
*p<.05. Change in average scores is significant.
[1]The change in average score is calculated by subtracting the 2007 or 1995 estimate, respectively, from the 2011 estimate using unrounded numbers.
[2]National Defined Population covers 90 to 95 percent of National Target Population for 2011 (see appendix A).
[3]Nearly satisfied guidelines for sample participation rates after replacement schools were included for 2011.
[4]National Target Population does not include all of the International Target Population for 2011 (see appendix A).
[5]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available for 2011.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation in 2011 exceeds 15 percent, though it is less than 25 percent
NOTE: Education systems are ordered by 2011 average scores. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Data are not shown for some education systems because comparable data from previous cycles are not available. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only.
For 1995, Lithuania's National Target Population did not include all of the International Target Population; the Russian Federation and Lithuania had a National Defined Population that covered 90 to 95 percent of National Target Population; England-GBR had a National Defined Population that covered less than 90 percent of National Target Population (but at least 77 percent); the United States, England-GBR, and Minnesota-USA met guidelines for sample participation rates only after replacement schools were included. For 2007, Lithuania, Georgia, and Indonesia had National Target Populations that did not include all of the International Target Population; Massachusetts-USA, Quebec-CAN, and Ontario-CAN had National Defined Population that covered 90 to 95 percent of National Target Population; Hong Kong-CHN, England-GBR, and Minnesota-USA met guidelines for sample participation rates only after replacement schools were included; Dubai-UAE nearly satisfied guidelines for sample participation rates after replacement schools were included.
All average scores reported as higher or lower than the U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. Detail may not sum to totals because of rounding. The standard errors of the estimates are shown in table E-4 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2007, and 2011.

Content domain scores in 2011

In addition to overall average mathematics scores, TIMSS provides average scores by specific mathematics topics called content domains. At grade 4, TIMSS tested student knowledge in three content domains: *number*, *geometric shapes and measures*, and *data display*. At grade 8, TIMSS tested student knowledge in four content domains: *number*, *algebra*, *geometry*, and *data and chance*.

At grade 4, the U.S. average was higher than the TIMSS scale average of 500 in all three content domains (table 5). In comparison with other education systems, U.S. 4th-graders performed better on average in *number* and *data display* than in *geometric shapes and measures*. That is, fewer education systems had higher average scores than the United States in these two domains than in *geometric shapes and measures*. In both *number* and *data display,* 8 education systems had higher average scores than the United States, whereas 12 education systems had a higher average score than the United States in the *geometric shapes and measures*.

At grade 8, the U.S. average was higher than the TIMSS scale average of 500 in three of the four 8th-grade content domains and below the TIMSS scale average in the fourth—*geometry* (table 6). In comparison with other education systems, U.S. 8th-graders performed better on average in *algebra* than in the other three domains. That is, fewer education systems had higher average scores than the United States in *algebra* than in *data and chance*, *number*, or *geometry*. In *algebra*, 9 education systems had a higher average score than the United States, whereas in both *number* and *data and chance* 14 education systems had higher average scores, and in *geometry* 21 education systems had a higher average score.

Table 5. Average mathematics content domain scores of 4th-grade students, by education system: 2011

Education system	Number	Geometric shapes and measures	Data display
Singapore[1]	619 ▲	589 ▲	588 ▲
Korea, Rep. of	606 ▲	607 ▲	603 ▲
Hong Kong-CHN[1]	604 ▲	605 ▲	593 ▲
Chinese Taipei-CHN	599 ▲	573 ▲	600 ▲
Japan	584 ▲	589 ▲	590 ▲
Northern Ireland-GBR[2]	566 ▲	560 ▲	555 ▲
Belgium (Flemish)-BEL	552 ▲	552 ▲	536 ▼
Finland	545	543 ▲	551
Russian Federation	545	542	533 ▼
Netherlands[2]	543	524 ▼	559 ▲
United States[1]	**543**	**535**	**545**
England-GBR	539	545 ▲	549
Lithuania[1,3]	537	531	526 ▼
Denmark[1]	534 ▼	548 ▲	532 ▼
Ireland	533 ▼	520 ▼	523 ▼
Serbia[1]	529 ▼	497 ▼	503 ▼
Portugal	522 ▼	548 ▲	548
Germany	520 ▼	536	546
Hungary	515 ▼	520 ▼	510 ▼
Kazakhstan[1]	515 ▼	491 ▼	476 ▼
Slovak Republic	511 ▼	500 ▼	504 ▼
Italy	510 ▼	513 ▼	495 ▼
Czech Republic	509 ▼	513 ▼	519 ▼
Australia	508 ▼	534	515 ▼
Austria	506 ▼	512 ▼	515 ▼
Slovenia	503 ▼	526 ▼	532 ▼
Sweden	500 ▼	500 ▼	523 ▼
Malta	498 ▼	487 ▼	498 ▼
Romania	497 ▼	469 ▼	457 ▼
Croatia[1]	491 ▼	490 ▼	488 ▼
Azerbaijan[1,4]	491 ▼	437 ▼	407 ▼
Norway[5]	488 ▼	507 ▼	494 ▼
Spain	487 ▼	476 ▼	479 ▼
Armenia	484 ▼	424 ▼	386 ▼
New Zealand	483 ▼	483 ▼	491 ▼
Poland	480 ▼	475 ▼	489 ▼
Turkey	477 ▼	447 ▼	478 ▼
Georgia[3,4]	473 ▼	411 ▼	433 ▼
Thailand	464 ▼	437 ▼	467 ▼
Chile	462 ▼	455 ▼	465 ▼
Iran, Islamic Rep. of	440 ▼	435 ▼	397 ▼
Bahrain	439 ▼	422 ▼	442 ▼
United Arab Emirates	438 ▼	418 ▼	437 ▼
Qatar[1]	417 ▼	399 ▼	416 ▼
Saudi Arabi	410 ▼	404 ▼	403 ▼
Tunisia[6]	390 ▼	329 ▼	300 ▼
Oman[6]	384 ▼	376 ▼	381 ▼
Morocco[7]	340 ▼	350 ▼	271 ▼
Kuwait[3,7]	333 ▼	321 ▼	347 ▼
Yemen[7]	261 ▼	193 ▼	204 ▼
Benchmarking education systems			
North Carolina-USA[1,3]	564 ▲	536	558 ▲
Florida-USA[3,8]	548	546 ▲	541
Quebec-CAN	531 ▼	536	538
Alberta-CAN[1]	505 ▼	496 ▼	524 ▼
Ontario-CAN	504 ▼	535	536 ▼
Dubai-UAE	474 ▼	449 ▼	471 ▼
Abu Dhabi-UAE	420 ▼	401 ▼	418 ▼

▲ Average score is higher than U.S. score.
▼ Average score is lower than U.S. score.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]Met guidelines for sample participation rates only after replacement schools were included.
[3]National Target Population does not include all of the International Target Population (see appendix A).
[4]Exclusion rates for Azerbaijan and Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[5]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
[8]National Defined Population covers less than 90 percent, but at least 77 percent, of National Target Population (see appendix A).
NOTE: Education systems are ordered by 2011 average score in *number* domain. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All average scores reported as higher or lower than U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-5 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 6. Average mathematics content domain scores of 8th-grade students, by education system: 2011

Education system	Number	Algebra	Geometry	Data and chance
Korea, Rep. of	618 ▲	617 ▲	612 ▲	616 ▲
Singapore[1]	611 ▲	614 ▲	609 ▲	607 ▲
Chinese Taipei-CHN	598 ▲	628 ▲	625 ▲	584 ▲
Hong Kong-CHN	588 ▲	583 ▲	597 ▲	581 ▲
Japan	557 ▲	570 ▲	586 ▲	579 ▲
Russian Federation[1]	534 ▲	556 ▲	533 ▲	511 ▼
Finland	527 ▲	492 ▼	502 ▲	542 ▲
Israel[2]	518	521	496 ▲	515 ▼
United States[1]	**514**	**512**	**485**	**527**
Australia	513	489 ▼	499 ▲	534
England-GBR[3]	512	489 ▼	498 ▲	543 ▲
Slovenia	511	493 ▼	504 ▲	518 ▼
Hungary	510	496 ▼	501 ▲	517
Sweden	504 ▼	459 ▼	456 ▼	504 ▼
Lithuania[4]	501 ▼	492 ▼	500 ▲	515 ▼
Italy	496 ▼	491 ▼	512 ▲	499 ▼
Norway	492 ▼	432 ▼	461 ▼	513 ▼
New Zealand	492 ▼	472 ▼	483	513
Kazakhstan	479 ▼	506	491	444 ▼
Armenia	474 ▼	496 ▼	450 ▼	376 ▼
Ukraine	472 ▼	487 ▼	476	471 ▼
United Arab Emirates	459 ▼	468 ▼	431 ▼	440 ▼
Lebanon	451 ▼	471 ▼	447 ▼	393 ▼
Malaysia	451 ▼	430 ▼	432 ▼	429 ▼
Romania	448 ▼	477 ▼	453 ▼	429 ▼
Georgia[4,5]	435 ▼	450 ▼	406 ▼	392 ▼
Turkey	435 ▼	455 ▼	454 ▼	467 ▼
Tunisia	431 ▼	419 ▼	426 ▼	398 ▼
Thailand	425 ▼	425 ▼	415 ▼	431 ▼
Macedonia, Rep. of[6]	418 ▼	448 ▼	419 ▼	389 ▼
Chile	413 ▼	403 ▼	419 ▼	426 ▼
Qatar[6]	408 ▼	425 ▼	387 ▼	390 ▼
Iran, Islamic Rep. of[6]	402 ▼	422 ▼	437 ▼	393 ▼
Palestinian Nat'l Auth.[6]	400 ▼	419 ▼	416 ▼	368 ▼
Bahrain[6]	397 ▼	424 ▼	398 ▼	407 ▼
Saudi Arabia[6]	393 ▼	399 ▼	364 ▼	387 ▼
Jordan[6]	390 ▼	432 ▼	407 ▼	379 ▼
Morocco[7]	379 ▼	357 ▼	390 ▼	332 ▼
Indonesia[6]	375 ▼	392 ▼	377 ▼	376 ▼
Syrian Arab Republic[6]	373 ▼	391 ▼	386 ▼	343 ▼
Oman[6]	351 ▼	383 ▼	377 ▼	342 ▼
Ghana[7]	321 ▼	358 ▼	315 ▼	296 ▼
Benchmarking education systems				
Massachusetts-USA[1,4]	567 ▲	559 ▲	548 ▲	584 ▲
Minnesota-USA[4]	556 ▲	543 ▲	515 ▲	571 ▲
North Carolina-USA[2,4]	547 ▲	537 ▲	515 ▲	548 ▲
Quebec-CAN	543 ▲	516	529 ▲	549 ▲
Indiana-USA[1,4]	528 ▲	520	498 ▲	545 ▲
Connecticut-USA[1,4]	527 ▲	510	490	546 ▲
Alberta-CAN[1]	523 ▲	485 ▼	485	529
Colorado-USA[4]	521	512	505 ▲	540 ▲
Ontario-CAN[1]	519	497 ▼	512 ▲	531
Florida-USA[1,4]	517	513	499	528
California-USA[1,4]	492 ▼	509	454 ▼	495 ▼
Dubai-UAE	479 ▼	489 ▼	453 ▼	468 ▼
Alabama-USA[4]	463 ▼	471 ▼	443 ▼	480 ▼
Abu Dhabi-UAE	452 ▼	459 ▼	424 ▼	434 ▼

▲ Average score is higher than U.S. average score.
▼ Average score is lower than U.S. average score.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]National Defined Population covers less than 90 percent, but at least 77 percent, of National Target Population (see appendix A).
[3]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[4]National Target Population does not include all of the International Target Population (see appendix A).
[5]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
NOTE: Education systems are ordered by 2011 average score in *number* domain. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All average scores reported as higher or lower than U.S. average score are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-6 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Performance on the TIMSS international benchmarks

The TIMSS international benchmarks provide a way to understand how students' proficiency in mathematics varies along the TIMSS scale (table 7). TIMSS defines four levels of student achievement: *Advanced*, *High*, *Intermediate*, and *Low*. The benchmarks can then be used to describe the kinds of skills and knowledge students at each score cutpoint would need to successfully answer the mathematics items included in the assessment. The descriptions of the benchmarks differ between the two grade levels, as the mathematical skills and knowledge needed to respond to the assessment items reflect the nature, difficulty, and emphasis of the expectations at each grade.

In 2011, higher percentages of U.S. 4th-graders performed at or above each of the four TIMSS international benchmarks than the international medians.[16] For example, 13 percent of U.S. 4th-graders performed at or above the *Advanced* benchmark (625) compared to the international median of 4 percent. Students at the *Advanced* benchmark demonstrated an ability to apply their understanding and knowledge to a variety of relatively complex mathematical situations, explain

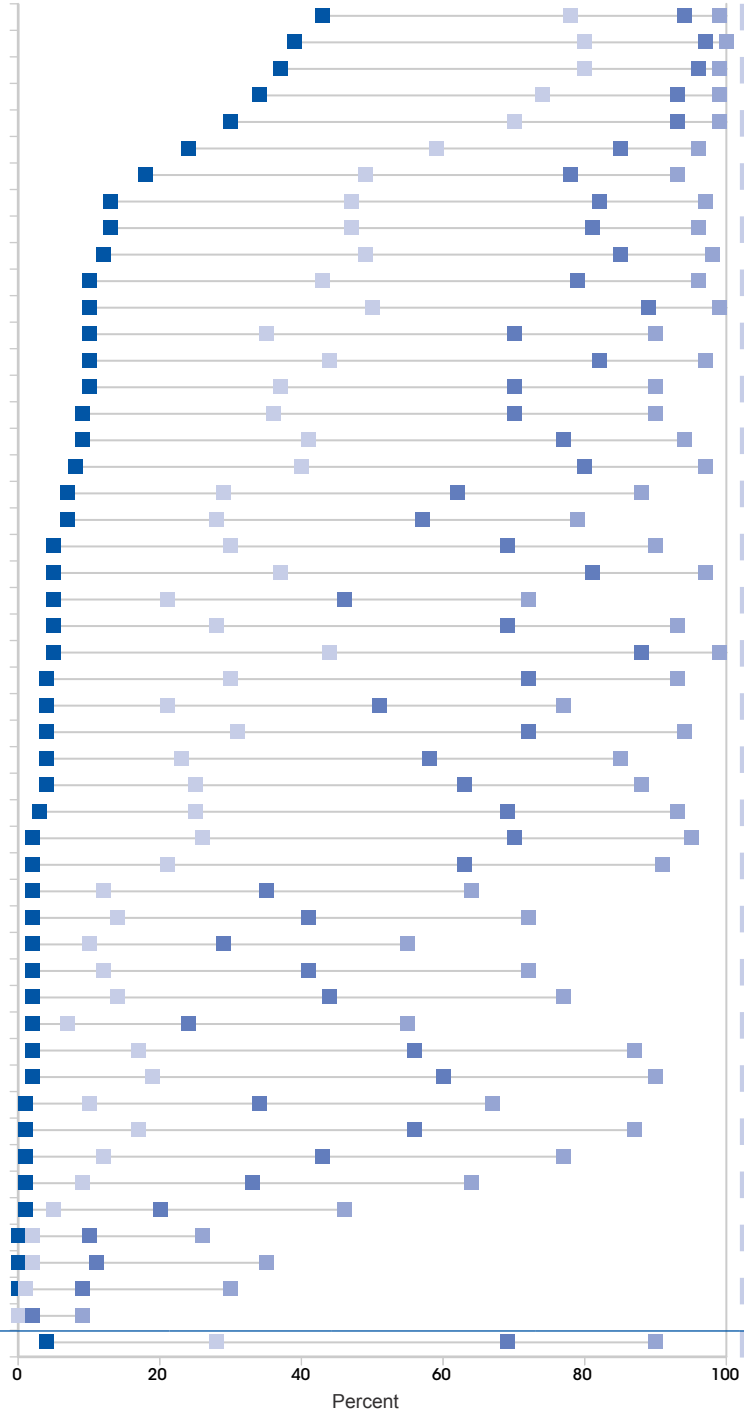
[16]The *international median* is the median percentage for all IEA member countries (see the inset box on page 1 for IEA member countries). Thus, the international median at each benchmark represents the percentage at which half of the participating IEA member countries have that percentage of students at or above the median and half have that percentage of students below the median. For example, the *Low* international benchmark median of 90 percent at grade 4 indicates that half of the countries have 90 percent or more of their students who met the *Low* benchmark, and half have less than 90 percent of their students who met the *Low* benchmark.

Table 7. Description of TIMSS international mathematics benchmarks, by grade: 2011

Benchmark (score cutpoint)	Grade 4
Advanced (625)	*Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning.* They can solve a variety of multi-step word problems involving whole numbers including proportions. Students at this level show an increasing understanding of fractions and decimals. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can draw a conclusion from data in a table and justify their conclusion.
High (550)	*Students can apply their knowledge and understanding to solve problems*. Students can solve word problems involving operations with whole numbers. They can use division in a variety of problem situations. They can use their understanding of place value to solve problems. Students can extend patterns to find a later specified term. Students demonstrate understanding of line symmetry and geometric properties. Students can interpret and use data in tables and graphs tosolve problems. They can use information in pictographs and tally charts to complete bar graphs.
Intermediate (475)	*Students can apply basic mathematical knowledge in straightforward situations.* Students at this level demonstrate an understanding of whole numbers and some understanding of fractions. Students can visualize three-dimensional shapes from two-dimensional representations. They can interpret bar graphs, pictographs, and tables to solve simple problems.
Low (400)	*Students have some basic mathematical knowledge.* Students can add and subtract whole numbers. They have some recognition of parallel and perpendicular lines, familiar geometric shapes, and coordinate maps. They can read and complete simple bar graphs and tables.
	Grade 8
Advanced (625)	*Students can reason with information, draw conclusions, make generalizations, and solve linear equations.* Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can express generalizations algebraically and model situations. They can solve a variety of problems involving equations, formulas, and functions. Students can reason with geometric figures to solve problems. Students can reason with data from several sources or unfamiliar representations to solve multi-step problems.
High (550)	*Students can apply their understanding and knowledge in a variety of relatively complex situations.* Students can use information from several sources to solve problems involving different types of numbers and operations. Students can relate fractions, decimals, and percents to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can use properties of lines, angles, triangles, rectangles, and rectangular prisms to solve problems. They can analyze data in a variety of graphs.
Intermediate (475)	*Students can apply basic mathematical knowledge in straightforward situations.* Students can solve problems involving decimals, fractions, proportions, and percentages. They understand simple algebraic relationships. Students can relate a two-dimensional drawing to a three-dimensional object. They can read, interpret, and construct graphs and tables. They recognize basic notions of likelihood.
Low (400)	*Students have some knowledge of whole numbers and decimals, operations, and basic graphs.*

NOTE: Score cutpoints for the international benchmarks are determined through scale anchoring. Scale anchoring involves selecting benchmarks (scale points) on the achievement scales to be described in terms of student performance, and then identifying items that students scoring at the anchor points can answer correctly. The score cutpoints are set at equal intervals along the achievement scales. The score cutpoints were selected to be as close as possible to the standard percentile cutpoints (i.e., 90th, 75th, 50th, and 25th percentiles). More information on the setting of the score cutpoints can be found in appendix A and Mullis et al. (2012).
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

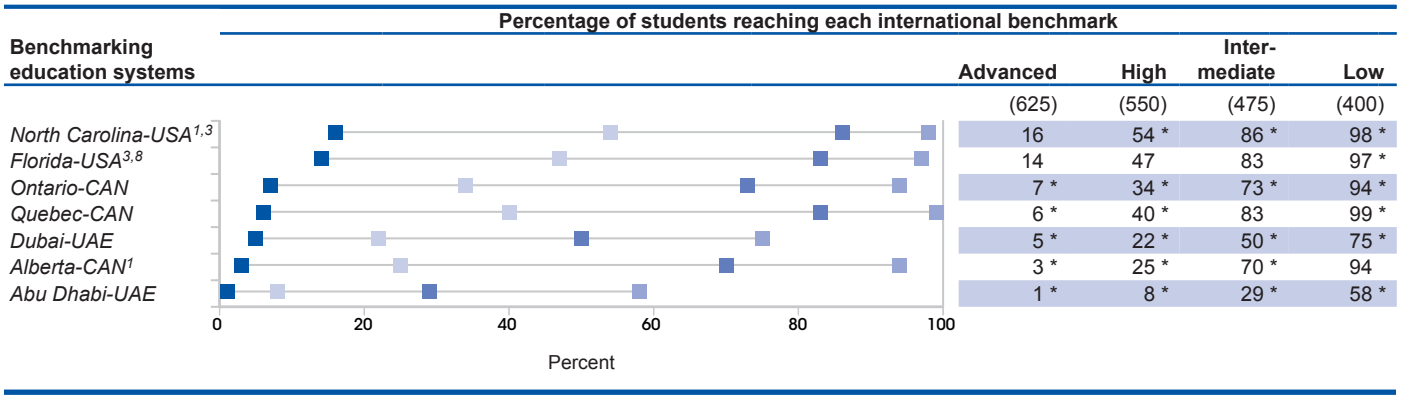
Figure 3. Percentage of 4th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2011



Education system	Percentage of students reaching each international benchmark			
	Advanced	High	Inter-mediate	Low
	(625)	(550)	(475)	(400)
Singapore[1]	43 *	78 *	94 *	99 *
Korea, Rep. of	39 *	80 *	97 *	100 *
Hong Kong-CHN[1]	37 *	80 *	96 *	99 *
Chinese Taipei-CHN	34 *	74 *	93 *	99 *
Japan	30 *	70 *	93 *	99 *
Northern Ireland-GBR[2]	24 *	59 *	85 *	96
England-GBR	18 *	49	78 *	93 *
Russian Federation	13	47	82	97
United States[1]	**13**	**47**	**81**	**96**
Finland	12	49	85 *	98 *
Lithuania[1,3]	10 *	43 *	79	96
Belgium (Flemish)-BEL	10 *	50	89 *	99 *
Australia	10 *	35 *	70 *	90 *
Denmark[1]	10 *	44	82	97
Hungary	10 *	37 *	70 *	90 *
Serbia[1]	9 *	36 *	70 *	90 *
Ireland	9 *	41 *	77 *	94 *
Portugal	8 *	40 *	80	97
Kazakhstan[1]	7 *	29 *	62 *	88 *
Romania	7 *	28 *	57 *	79 *
Slovak Republic	5 *	30 *	69 *	90 *
Germany	5 *	37 *	81	97
Azerbaijan[1,4]	5 *	21 *	46 *	72 *
Italy	5 *	28 *	69 *	93 *
Netherlands[2]	5 *	44	88 *	99 *
Czech Republic	4 *	30 *	72 *	93 *
Turkey	4 *	21 *	51 *	77 *
Slovenia	4 *	31 *	72 *	94 *
New Zealand	4 *	23 *	58 *	85 *
Malta	4 *	25 *	63 *	88 *
Sweden	3 *	25 *	69 *	93 *
Austria	2 *	26 *	70 *	95
Norway[5]	2 *	21 *	63 *	91 *
United Arab Emirates	2 *	12 *	35 *	64 *
Armenia	2 *	14 *	41 *	72 *
Qatar[1]	2 *	10 *	29 *	55 *
Georgia[3,4]	2 *	12 *	41 *	72 *
Chile	2 *	14 *	44 *	77 *
Saudi Arabia	2 *	7 *	24 *	55 *
Poland	2 *	17 *	56 *	87 *
Croatia[1]	2 *	19 *	60 *	90 *
Bahrain	1 *	10 *	34 *	67 *
Spain	1 *	17 *	56 *	87 *
Thailand	1 *	12 *	43 *	77 *
Iran, Islamic Rep. of	1 *	9 *	33 *	64 *
Oman[6]	1 *	5 *	20 *	46 *
Morocco[7]	# *	2 *	10 *	26 *
Kuwait[3,7]	# *	2 *	11 *	35 *
Yemen[7]	# *	1 *	9 *	30 *
Tunisia[6]	# *	# *	2 *	9 *
International Median	**4 ***	**28 ***	**69 ***	**90 ***

See notes at end of table.

Figure 3. Percentage of 4th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2011—Continued



Rounds to zero.
*p<.05. Percentage is significantly different from the U.S. percentage at the same benchmark.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]Met guidelines for sample participation rates only after replacement schools were included.
[3]National Target Population does not include all of the International Target Population (see appendix A).
[4]Exclusion rates for Azerbaijan and Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[5]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
[8]National Defined Population covers less than 90 percent, but at least 77 percent of National Target Population (see appendix A).
NOTE: Education systems are ordered by percentage at *Advanced* international benchmark. Italics indicate participants identified and counted in this report as an education system and not as a separate country. The TIMSS international median represents all participating TIMSS education systems, including the United States, shown in the main part of the figure; benchmarking education systems are not included in the median. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-7 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

their reasoning, and draw and justify conclusions from data (see description in table 7).

The percentage of 4th-graders performing at or above the *Advanced* international mathematics benchmark was higher than in the United States in 7 education systems; was not different in 4 education systems; and was lower than in the United States in 45 education systems.

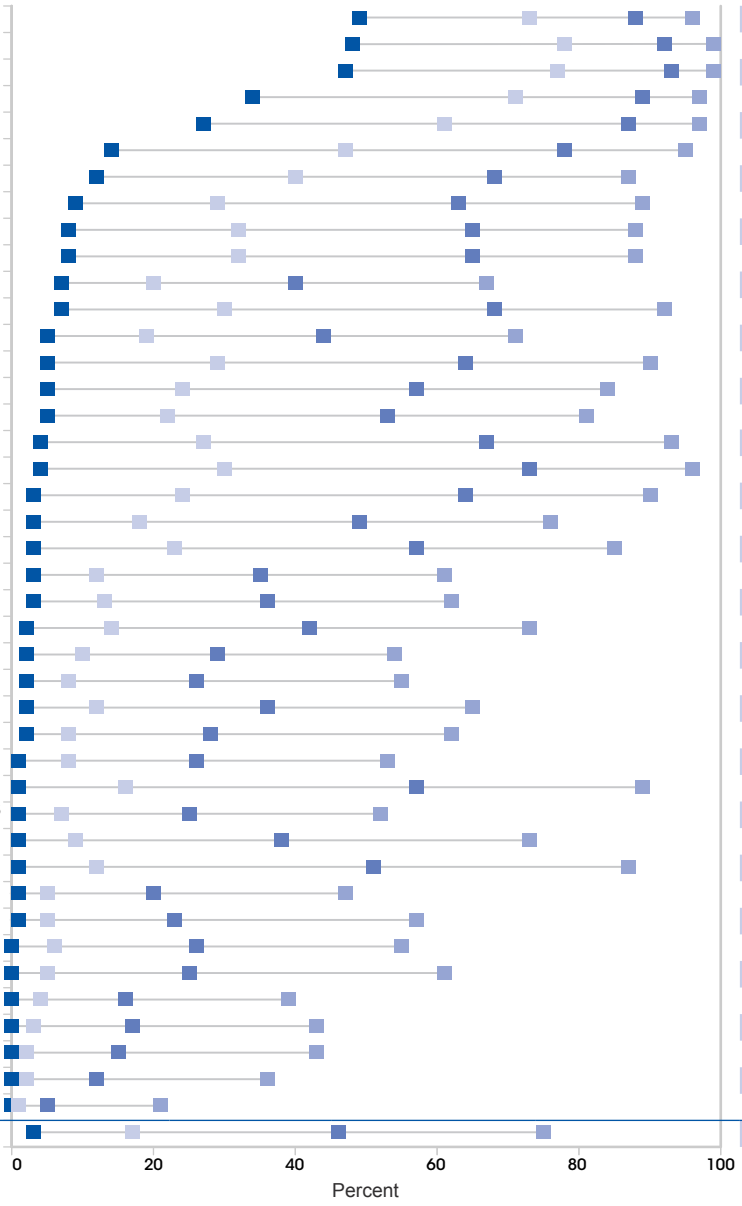
Singapore, Korea, Hong Kong-CHN, Chinese Taipei-CHN, Japan, Northern Ireland-GBR, and England-GBR had a higher percentage of students performing at or above the *Advanced* international mathematics benchmark than the United States at grade 4; and North Carolina-USA, the Russian Federation, Florida-USA, and Finland had percentages not measurably different from the U.S. percentage.

Similar to their 4th-grade counterparts, higher percentages of U.S. 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians (figure 4). For example, 7 percent of U.S. 8th-graders performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent. Students at the *Advanced* benchmark demonstrated an ability to reason with information, draw conclusions, make generalizations, and solve linear equations and multi-step problems (see description in table 7).

The percentage of 8th-graders performing at or above the *Advanced* international mathematics benchmark was higher than the United States in 11 education systems; was not different in 13 education systems; and was lower than the United States in 31 education systems.

Chinese Taipei-CHN, Singapore, Korea, Hong Kong-CHN, Japan, Massachusetts-USA, the Russian Federation, North Carolina-USA, Minnesota-USA, Israel, and Connecticut-USA had a higher percentage of students performing at or above the *Advanced* international mathematics benchmark than the United States at grade 8. Australia, England-GBR, Florida-USA, Colorado-USA, Hungary, Turkey, Indiana-USA, Quebec-CAN, Romania, Lithuania, New Zealand, Dubai-UAE, and California-USA had percentages not measurably different from the U.S. percentage.

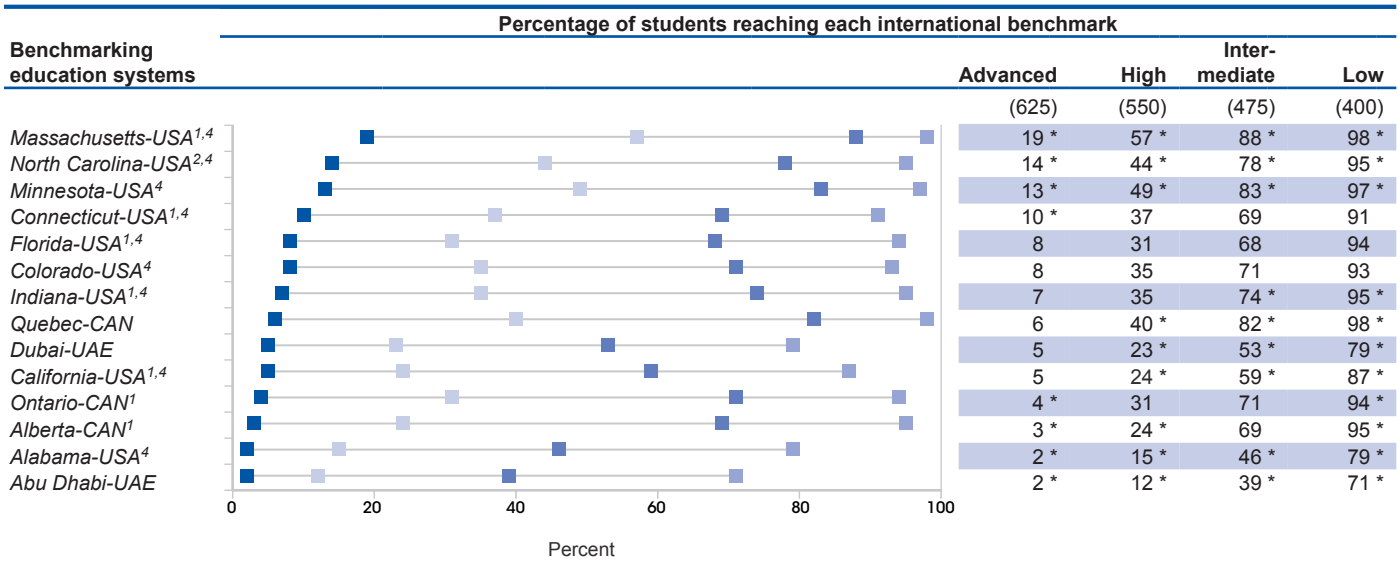
Figure 4. Percentage of 8th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2011



Education system	Percentage of students reaching each international benchmark			
	Advanced (625)	High (550)	Inter-mediate (475)	Low (400)
Chinese Taipei-CHN	49 *	73 *	88 *	96 *
Singapore[1]	48 *	78 *	92 *	99 *
Korea, Rep. of	47 *	77 *	93 *	99 *
Hong Kong-CHN	34 *	71 *	89 *	97 *
Japan	27 *	61 *	87 *	97 *
Russian Federation[1]	14 *	47 *	78 *	95 *
Israel[2]	12 *	40 *	68	87 *
Australia	9	29	63	89 *
England-GBR[3]	8	32	65	88
Hungary	8	32	65	88 *
Turkey	7	20 *	40 *	67 *
United States[1]	**7**	**30**	**68**	**92**
Romania	5	19 *	44 *	71 *
Lithuania[4]	5	29	64	90
New Zealand	5	24 *	57 *	84 *
Ukraine	5 *	22 *	53 *	81 *
Slovenia	4 *	27	67	93
Finland	4 *	30	73 *	96 *
Italy	3 *	24 *	64 *	90
Armenia	3 *	18 *	49 *	76 *
Kazakhstan	3 *	23 *	57 *	85 *
Macedonia, Rep. of[5]	3 *	12 *	35 *	61 *
Georgia[4,6]	3 *	13 *	36 *	62 *
United Arab Emirates	2 *	14 *	42 *	73 *
Qatar[5]	2 *	10 *	29 *	54 *
Iran, Islamic Rep. of[5]	2 *	8 *	26 *	55 *
Malaysia	2 *	12 *	36 *	65 *
Thailand	2 *	8 *	28 *	62 *
Bahrain[5]	1 *	8 *	26 *	53 *
Sweden	1 *	16 *	57 *	89 *
Palestinian Nat'l Auth.[5]	1 *	7 *	25 *	52 *
Lebanon	1 *	9 *	38 *	73 *
Norway	1 *	12 *	51 *	87 *
Saudi Arabia[5]	1 *	5 *	20 *	47 *
Chile	1 *	5 *	23 *	57 *
Jordan[5]	# *	6 *	26 *	55 *
Tunisia	# *	5 *	25 *	61 *
Oman[5]	# *	4 *	16 *	39 *
Syrian Arab Republic[5]	# *	3 *	17 *	43 *
Indonesia[5]	# *	2 *	15 *	43 *
Morocco[7]	# *	2 *	12 *	36 *
Ghana[7]	# *	1 *	5 *	21 *
International Median	**3 ***	**17 ***	**46 ***	**75 ***

See notes at end of table.

Figure 4. Percentage of 8th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2011—Continued



Advanced benchmark
High benchmark
Intermediate benchmark
Low benchmark

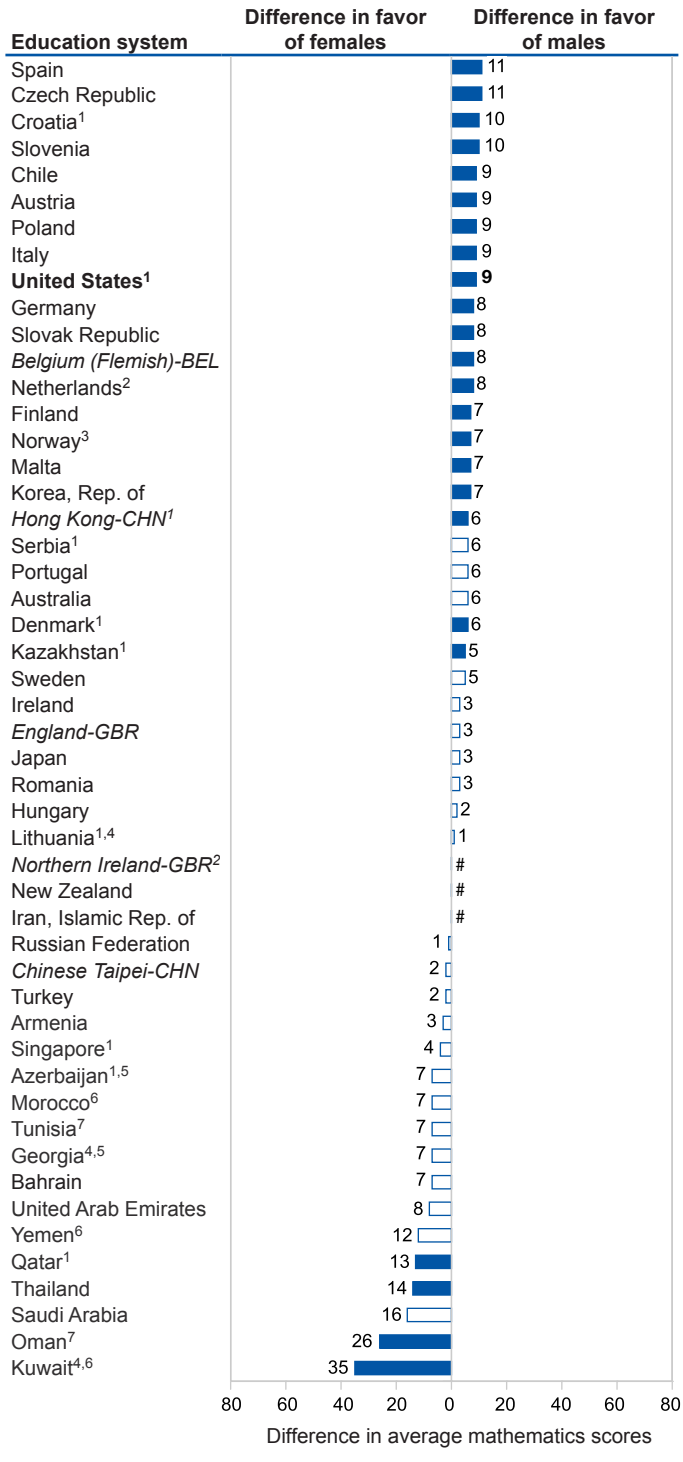
Rounds to zero.
*p<.05. Percentage is significantly different from the U.S. percentage at the same benchmark.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]National Defined Population covers less than 90 percent, but at least 77 percent of National Target Population (see appendix A).
[3]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[4]National Target Population does not include all of the International Target Population (see appendix A).
[5]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[6]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
NOTE: Education systems are ordered by percentage at *Advanced* international benchmark. Italics indicate participants identified and counted in this report as an education system and not as a separate country. The TIMSS international median represents all participating TIMSS education systems, including the United States, shown in the main part of the figure; benchmarking education systems are not included in the median. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. The tests for significance take into account the standard error for the reported difference. Thus, a small difference between the United States and one education system may not be significant while a large difference between the United States and another education system may not be significant. The standard errors of the estimates are shown in table E-8 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

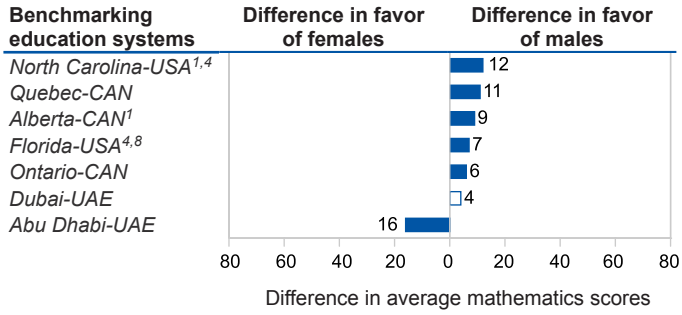
Average scores of male and female students

In 2011, at grade 4, the U.S. average score in mathematics was 9 score points higher for males than for females (figure 5). Among all 57 education systems that participated in TIMSS at grade 4, there were 30 education systems that showed a significant difference in the average mathematics scores of males and females: 25 in favor of males (including Florida-USA and North Carolina-USA, as well as the nation as a whole) and 5 in favor of females. The difference in average scores between males and females ranged from 35 score points in Kuwait in favor of females to 12 score points in North Carolina-USA in favor of males. In 27 education systems, there was no measurable difference between the average mathematics scores of males and females.

At grade 8, there was no statistically significant difference between the average scores of U.S. males and females (figure 6). Among all 56 education systems that participated in TIMSS at grade 8, there were 21 education systems that showed a significant difference in the average mathematics scores of males and females: 8 in favor of males (including Indiana-USA) and 13 in favor of females. The difference in average scores between males and females ranged from 63 score points in Oman in favor of females to 23 score points in Ghana in favor of males. In 35 education systems, there was no statistical difference between the average mathematics scores of males and females (including the U.S. states of Alabama, California, Colorado, Connecticut, Florida, Massachusetts, Minnesota, and North Carolina, as well as the nation as a whole).

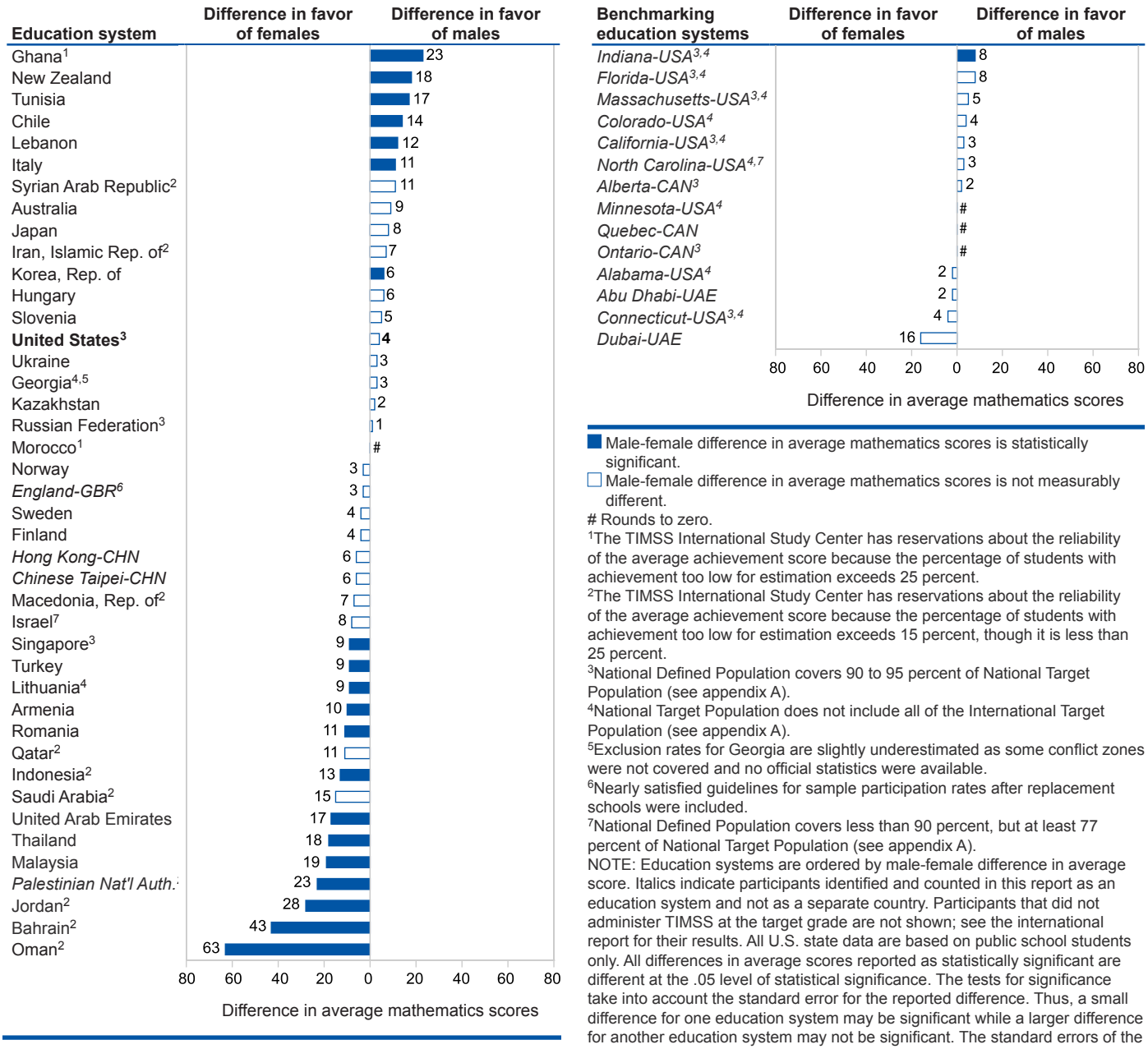
Figure 5. Difference in average mathematics scores of 4th-grade students, by sex and education system: 2011





■ Male-female difference in average mathematics scores is statistically significant.
□ Male-female difference in average mathematics scores is not measurably different.
Rounds to zero.
[1]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).
[2]Met guidelines for sample participation rates only after replacement schools were included.
[3]Nearly satisfied guidelines for sample participation rates after replacement schools were included.
[4]National Target Population does not include all of the International Target Population (see appendix A).
[5]Exclusion rates for Azerbaijan and Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.
[6]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.
[7]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.
[8]National Defined Population covers less than 90 percent, but at least 77 percent of National Target Population (see appendix A).
NOTE: Education systems are ordered by male-female difference in average score. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All differences in average scores reported as statistically significant are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference for one education system may be significant while a larger difference for another education system may not be significant. The standard errors of the estimates are shown in table E-9 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Figure 6. Difference in average mathematics scores of 8th-grade students, by sex and education system: 2011



Male-female difference in average mathematics scores is statistically significant.

Male-female difference in average mathematics scores is not measurably different.

Rounds to zero.

[1]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 25 percent.

[2]The TIMSS International Study Center has reservations about the reliability of the average achievement score because the percentage of students with achievement too low for estimation exceeds 15 percent, though it is less than 25 percent.

[3]National Defined Population covers 90 to 95 percent of National Target Population (see appendix A).

[4]National Target Population does not include all of the International Target Population (see appendix A).

[5]Exclusion rates for Georgia are slightly underestimated as some conflict zones were not covered and no official statistics were available.

[6]Nearly satisfied guidelines for sample participation rates after replacement schools were included.

[7]National Defined Population covers less than 90 percent, but at least 77 percent of National Target Population (see appendix A).

NOTE: Education systems are ordered by male-female difference in average score. Italics indicate participants identified and counted in this report as an education system and not as a separate country. Participants that did not administer TIMSS at the target grade are not shown; see the international report for their results. All U.S. state data are based on public school students only. All differences in average scores reported as statistically significant are different at the .05 level of statistical significance. The tests for significance take into account the standard error for the reported difference. Thus, a small difference for one education system may be significant while a larger difference for another education system may not be significant. The standard errors of the estimates are shown in table E-10 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Performance within the United States

In 2011, TIMSS was administered to enough students and in enough schools in the United States to provide separate average mathematics scores for students by race/ethnicity and schools serving varying percentages of low-income students as measured by the percentage of students eligible for free or reduced-price lunch.In addition, TIMSS was administered to enough students and in enough schools in nine U.S. states to provide each of the states its own separate TIMSS results for public school students at grade 8 and, in two of the states, at grade 4 as well. These state mathematics results are reported at the end of this section.

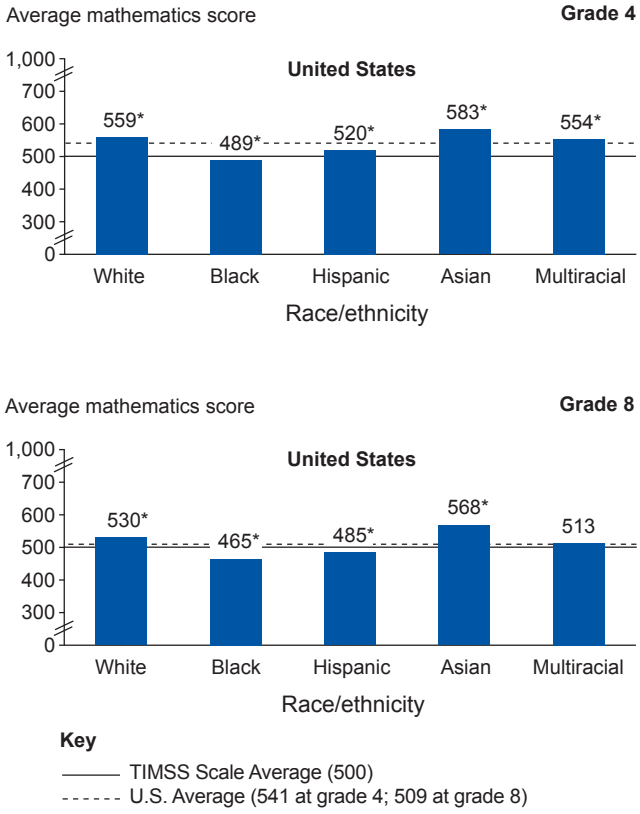
As mentioned in the introduction (and explained in detail in appendix A), separate state public school samples were drawn, at grade 4, for Florida and North Carolina and, at grade 8, for Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina. Some of these states chose to participate as benchmarking participants in order to compare their performance internationally, and others were invited to participate in TIMSS by the National Assessment of Educational Progress (NAEP), which is conducting a study to link TIMSS and NAEP (as explained in appendix A). The states invited to participate at grade 8 were selected based on state enrollment size and willingness to participate, as well as on their general NAEP performance (above or below the national average on NAEP), their previous experience in benchmarking to TIMSS, and their regional distribution.

Average scores of students of different races and ethnicities

In 2011, the average mathematics scores for U.S. White, Hispanic, Asian, and multiracial 4th-graders were higher than the TIMSS scale average, but for U.S. Black 4th-graders it was lower (figure 7). In comparison with the U.S. national average, U.S. White, Asian, and multiracial 4th-graders scored higher, on average, while U.S. Black and Hispanic 4th-graders scored lower, on average.

At grade 8, the average mathematics scores for U.S. White and Asian students were higher than both the TIMSS scale average and the U.S. national average. However, U.S. Black and Hispanic 8th-graders scored lower, on average, than the TIMSS scale average and the U.S. national average. U.S. multiracial 8th-graders' mathematics score was higher, on average, than the TIMSS scale average but not measurably different from the U.S. national average.

Figure 7. Average mathematics scores of U.S. 4th- and 8th-grade students, by race/ethnicity: 2011



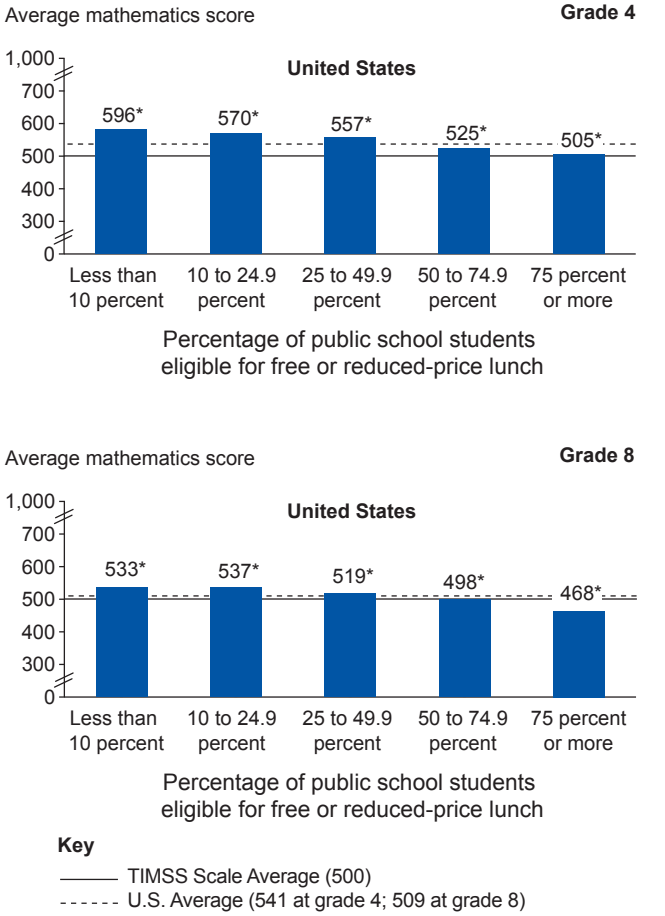
*p<.05. Difference between score and U.S. average score is significant.
NOTE: Reporting standards were not met for American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Although data for some race/ethnicities are not shown separately because the reporting standards were not met, they are included in the U.S. and state totals shown throughout the report. See appendix A in this report for more information. The standard errors of the estimates are shown in table E-11 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Average scores of students attending public schools of various poverty levels

In 2011, the average mathematics score of U.S. 4th-graders in the highest poverty public schools (at least 75 percent of students eligible for free or reduced-price lunch) was not measurably different from the TIMSS scale average; however, the average scores of 4th-graders in each of the other categories of school poverty were higher than the TIMSS scale average (figure 8). Fourth-graders in the highest poverty public schools, as well as those in public schools with at least 50 percent but less than 75 percent of students eligible for free or reduced-price lunch had average scores below the U.S. national average, while those in public schools with lower proportions of low-income students scored higher, on average, than the U.S. national average.

At grade 8, students in the highest poverty public schools had a lower average score than the TIMSS scale average (468 vs. 500), while students in public schools with at least 50 percent but less than 75 percent of students eligible for free or reduced-price lunch had an average score not measurably different from the TIMSS scale average. U.S. 8th-graders attending public schools with less than 50 percent of students eligible for the free or reduced-price lunch program scored higher, on average, than the TIMSS scale average in mathematics. Eighth-graders in public schools with less than 50 percent of students eligible for free or reduced-price lunch scored, on average, above the U.S. national average, while those in public schools with 50 percent or more eligible scored, on average, below the U.S. national average.

Figure 8. Average mathematics scores of U.S. 4th- and 8th-grade students, by percentage of public school students eligible for free or reduced-price lunch: 2011



*p<.05. Difference between score and U.S. average score is significant.
NOTE: Analyses are limited to public schools only, based on school reports of the percentage of students in public school eligible for the federal free or reduced-price lunch program. The standard errors of the estimates are shown in table E-12 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Alabama

Mathematics - Grade 8

- Public school students' average score was 466 at grade 8.
- The percentages of Alabama 8th-graders reaching each of the four TIMSS international benchmarks were not measurably different than the international medians (figure 4).
- Both male and female students in Alabama scored lower, on average, in mathematics than the TIMSS scale average (table 9).
- White, Asian, and multiracial students' average scores were not measurably different from the TIMSS scale average. However, Black and Hispanic students scored lower, on average, than the TIMSS scale average.
- Students in public schools with 25 percent or more of students eligible for free or reduced-price lunch scored lower, on average, than the TIMSS scale average.

Table 8. Average mathematics scores of 8th-grade students in Alabama public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Alabama	
Korea, Rep. of	*Florida-USA*
Singapore	*Ontario-CAN*
Chinese Taipei-CHN	**United States**
Hong Kong-CHN	*England-GBR*
Japan	*Alberta-CAN*
Massachusetts, US	Hungary
Minnesota-USA	Australia
Russian Federation	Slovenia
North Carolina-USA	Lithuania
Quebec-CAN	Italy
Indiana-USA	*California-USA*
Colorado-USA	New Zealand
Connecticut-USA	Kazakhstan
Israel	Sweden
Finland	
Education systems not measurably different from Alabama	
Ukraine	Romania
Dubai-UAE	United Arab Emirates
Norway	Turkey
Armenia	
Education systems lower than Alabama	
Lebanon	Bahrain
Abu Dhabi-UAE	Jordan
Malaysia	*Palestinian Nat'l Auth.*
Georgia	Saudi Arabia
Thailand	Indonesia
Macedonia, Rep. of	Syrian Arab Republic
Tunisia	Morocco
Chile	Oman
Iran, Islamic Rep. of	Ghana
Qatar	

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 9. Average mathematics scores in grade 8 for selected student groups in public schools in Alabama: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Alabama average	**466 ***
Sex	
Female	467 *
Male	465 *
Race/ethnicity	
White	489
Black	428 *
Hispanic	454 *
Asian	509
Multiracial	492
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	536
10 to 24.9 percent	510
25 to 49.9 percent	482 *
50 to 74.9 percent	464 *
75 percent or more	429 *

*p<.05. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-13 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for California

Mathematics - Grade 8

- Public school students' average score was 493 at grade 8.
- Higher percentages of California 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 5 percent of 8th-graders in California performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- White, Asian, and multiracial students' average scores were higher than the TIMSS scale average while Black and Hispanic students scored lower, on average, than the TIMSS scale average.
- Students in public schools with at least 10 percent but less than 50 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scale average, while students in public schools with 75 percent or more students eligible for free or reduced-price lunch scored lower, on average, than the TIMSS scale average.

Table 10. Average mathematics scores of 8th-grade students in California public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than California	
Korea, Rep. of	*Colorado-USA*
Singapore	*Connecticut-USA*
Chinese Taipei-CHN	Israel
Hong Kong-CHN	Finland
Japan	*Florida-USA*
Massachusetts-USA	*Ontario-CAN*
Minnesota-USA	United States
Russian Federation	*Alberta-CAN*
North Carolina-USA	Hungary
Quebec-CAN	Slovenia
Indiana-USA	
Education systems not measurably different from California	
England-GBR	New Zealand
Australia	Kazakhstan
Lithuania	Sweden
Italy	
Education systems lower than California	
Ukraine	Tunisia
Dubai-UAE	Chile
Norway	Iran, Islamic Rep. of
Armenia	Qatar
Alabama-USA	Bahrain
Romania	Jordan
United Arab Emirates	*Palestinian Nat'l Auth.*
Turkey	Saudi Arabia
Lebanon	Indonesia
Abu Dhabi-UAE	Syrian Arab Republic
Malaysia	Morocco
Georgia	Oman
Thailand	Ghana
Macedonia, Rep. of	

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 11. Average mathematics scores in grade 8 for selected student groups in public schools in California: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
California average	**493**
Sex	
Female	491
Male	494
Race/ethnicity	
White	525 *
Black	468 *
Hispanic	470 *
Asian	555 *
Multiracial	519 *
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	524
10 to 24.9 percent	540 *
25 to 49.9 percent	530 *
50 to 74.9 percent	489
75 percent or more	455 *

*$p<.05$. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-14 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Colorado

Mathematics - Grade 8

- Public school students' average score was 518 at grade 8.
- Higher percentages of Colorado 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 8 percent of 8th-graders in Colorado performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- Male and female students in Colorado scored higher, on average, in mathematics than the TIMSS scale average (table 13).
- White and Asian students' average scores were higher than the TIMSS scale average, while Hispanic students scored lower, on average, than the TIMSS scale average.
- Students in public schools with at least 10 percent but less than 50 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scale average, while students in schools with 75 percent or more students eligible for free or reduced-price lunch scored lower, on average, than the TIMSS scale average.

Table 12. Average mathematics scores of 8th-grade students in Colorado public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Colorado	
Korea, Rep. of	*Massachusetts-USA*
Singapore	*Minnesota-USA*
Chinese Taipei-CHN	Russian Federation
Hong Kong-CHN	*North Carolina-USA*
Japan	*Quebec-CAN*
Education systems not measurably different from Colorado	
Indiana-USA	*Ontario-CAN*
Connecticut-USA	United States
Israel	*England-GBR*
Finland	Australia
Florida-USA	
Education systems lower than Colorado	
Alberta-CAN	*Abu Dhabi-UAE*
Hungary	Malaysia
Slovenia	Georgia
Lithuania	Thailand
Italy	Macedonia, Rep. of
California-USA	Tunisia
New Zealand	Chile
Kazakhstan	Iran, Islamic Rep. of
Sweden	Qatar
Ukraine	Bahrain
Dubai-UAE	Jordan
Norway	*Palestinian Nat'l Auth.*
Armenia	Saudi Arabia
Alabama-USA	Indonesia
Romania	Syrian Arab Republic
United Arab Emirates	Morocco
Turkey	Oman
Lebanon	Ghana

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 13. Average mathematics scores in grade 8 for selected student groups in public schools in Colorado: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Colorado average	**518 ***
Sex	
Female	516 *
Male	520 *
Race/ethnicity	
White	544 *
Black	487
Hispanic	480 *
Asian	545 *
Multiracial	522
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	507
10 to 24.9 percent	547 *
25 to 49.9 percent	534 *
50 to 74.9 percent	491
75 percent or more	460 *

*p<.05. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-15 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Connecticut

Mathematics - Grade 8

- Public school students' average score was 518 at grade 8.
- Higher percentages of Connecticut 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 10 percent of 8th-graders in Connecticut performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- Male and female students in Connecticut scored higher, on average, in mathematics than the TIMSS scale average (table 15).
- White and Asian students' average scores were higher than the TIMSS scale average, while Black and Hispanic students scored lower, on average, than the TIMSS scale average.
- Students in public schools with less than 25 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scale average, while students in schools with 50 percent or more scored lower, on average, than the TIMSS scale average.

Table 14. Average mathematics scores of 8th-grade students in Connecticut public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Connecticut	
Korea, Rep. of	*Massachusetts-USA*
Singapore	*Minnesota-USA*
Chinese Taipei-CHN	Russian Federation
Hong Kong-CHN	*North Carolina-USA*
Japan	*Quebec-CAN*
Education systems not measurably different from Connecticut	
Indiana-USA	*Ontario-CAN*
Colorado-USA	United States
Israel	*England-GBR*
Finland	Australia
Florida-USA	
Education systems lower than Connecticut	
Alberta-CAN	*Abu Dhabi-UAE*
Hungary	Malaysia
Slovenia	Georgia
Lithuania	Thailand
Italy	Macedonia, Rep. of
California-USA	Tunisia
New Zealand	Chile
Kazakhstan	Iran, Islamic Rep. of
Sweden	Qatar
Ukraine	Bahrain
Dubai-UAE	Jordan
Norway	*Palestinian Nat'l Auth.*
Armenia	Saudi Arabia
Alabama-USA	Indonesia
Romania	Syrian Arab Republic
United Arab Emirates	Morocco
Turkey	Oman
Lebanon	Ghana

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 15. Average mathematics scores in grade 8 for selected student groups in public schools in Connecticut: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Connecticut average	**518 ***
Sex	
Female	520 *
Male	516 *
Race/ethnicity	
White	543 *
Black	453 *
Hispanic	467 *
Asian	577 *
Multiracial	516
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	567 *
10 to 24.9 percent	535 *
25 to 49.9 percent	490
50 to 74.9 percent	456 *
75 percent or more	420 *

*$p<.05$. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-16 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Florida

Mathematics - Grades 4 and 8

- Public school students' average score was 545 at grade 4 and 513 at grade 8.
- Higher percentages of Florida 4th- and 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 14 percent of 4th-graders and 8 percent of 8th-graders in Florida performed at or above the *Advanced* benchmark (625) compared to the international median of 4 percent at grade 4 and 3 percent at grade 8 (figures 3 and 4).
- Male and female students in Florida scored higher, on average, than the TIMSS scale average in mathematics at grade 4, and males scored higher, on average, at grade 8 (table 17).

Continued on next page

Table 16. Average mathematics scores of 4th- and 8th-grade students in Florida public schools compared with other participating education systems: 2011

Grade 4	
Education systems higher than Florida	
Singapore	
Korea, Rep. of	
Hong Kong-CHN	
Chinese Taipei-CHN	
Japan	
Northern Ireland-GBR	
Education systems not measurably different from Florida	
North Carolina-USA	
Belgium (Flemish)-BEL	
Finland	
England-GBR	
Russian Federation	
United States	
Netherlands	
Education systems lower than Florida	
Denmark	Spain
Lithuania	Romania
Quebec-CAN	Poland
Portugal	Turkey
Germany	*Dubai-UAE*
Ireland	Azerbaijan
Ontario-CAN	Chile
Serbia	Thailand
Australia	Armenia
Hungary	Georgia
Slovenia	Bahrain
Czech Republic	United Arab Emirates
Austria	Iran, Islamic Rep. of
Italy	*Abu Dhabi-UAE*
Slovak Republic	Qatar
Alberta-CAN	Saudi Arabia
Sweden	Oman
Kazakhstan	Tunisia
Malta	Kuwait
Norway	Morocco
Croatia	Yemen
New Zealand	

Grade 8	
Education systems higher than Florida	
Korea, Rep. of	*Minnesota-USA*
Singapore	Russian Federation
Chinese Taipei-CHN	*North Carolina-USA*
Hong Kong-CHN	*Quebec-CAN*
Japan	
Massachusetts-USA	
Education systems not measurably different from Florida	
Indiana-USA	*Alberta-CAN*
Colorado-USA	Hungary
Connecticut-USA	Australia
Israel	Slovenia
Finland	Lithuania
Ontario-CAN	
United States	
England-GBR	
Education systems lower than Florida	
Italy	Qatar
California-USA	Bahrain
New Zealand	Jordan
Kazakhstan	*Palestinian Nat'l Auth.*
Sweden	Saudi Arabia
Ukraine	Indonesia
Dubai-UAE	Syrian Arab Republic
Norway	Morocco
Armenia	Oman
Alabama-USA	Ghana
Romania	
United Arab Emirates	
Turkey	
Lebanon	
Abu Dhabi-UAE	
Malaysia	
Georgia	
Thailand	
Macedonia, Rep. of	
Tunisia	
Chile	
Iran, Islamic Rep. of	

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

- At grade 4, White, Hispanic, Asian, and multiracial students' average scores were higher than the TIMSS scale average.
- At grade 8, White and Asian students' average scores were higher than the TIMSS scale average, while Black students' average scores were lower.
- Students at grade 4 scored higher, on average, than the TIMSS scale average regardless of the level of poverty within public schools. At grade 8 students in public schools with at least 10 percent but less than 50 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scales average.

Table 17. Average mathematics scores in grade 4 and 8 for selected student groups in public schools in Florida: 2011

	Mathematics	
Reporting groups	**Grade 4**	**Grade 8**
TIMSS scale average	**500**	**500**
U.S. average	**541 ***	**509 ***
Florida average	**545 ***	**513 ***
Sex		
Female	542 *	509
Male	549 *	517 *
Race/ethnicity		
White	570 *	531 *
Black	504	484 *
Hispanic	536 *	505
Asian	609 *	615 *
Multiracial	576 *	505
Percentage of public school students eligible for free or reduced-price lunch		
Less than 10 percent	606 *	‡
10 to 24.9 percent	595 *	546 *
25 to 49.9 percent	555 *	529 *
50 to 74.9 percent	538 *	511
75 percent or more	521 *	492

‡ Reporting standards not met.
* $p<.05$. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-17 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Indiana

Mathematics - Grade 8

- Public school students' average score was 522 at grade 8.
- Higher percentages of Indiana 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 7 percent of 8th-graders in Indiana performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- Male and female students in Indiana scored higher in mathematics, on average, than the TIMSS scale average (table 19).
- White and multiracial students' average scores were higher than the TIMSS scale average, while Black students scored lower, on average, than the TIMSS scale average. Hispanic and Asian students' average scores were not measurably different from the TIMSS scale average.
- Students in schools with at least 10 percent but less than 50 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scale average, while students in schools with 75 percent or more students eligible for free or reduced-price lunch scored lower, on average, than the TIMSS scale average.

Table 18. Average mathematics scores of 8th-grade students in Indiana public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Indiana	
Korea, Rep. of	Japan
Singapore	*Massachusetts-USA*
Chinese Taipei-CHN	*Minnesota-USA*
Hong Kong-CHN	Russian Federation
Education systems not measurably different from Indiana	
North Carolina-USA	Finland
Quebec-CAN	*Florida-USA*
Colorado-USA	*Ontario-CAN*
Connecticut-USA	*England-GBR*
Israel	
Education systems lower than Indiana	
United States	Lebanon
Alberta-CAN	*Abu Dhabi-UAE*
Hungary	Malaysia
Australia	Georgia
Slovenia	Thailand
Lithuania	Macedonia, Rep. of
Italy	Tunisia
California-USA	Chile
New Zealand	Iran, Islamic Rep. of
Kazakhstan	Qatar
Sweden	Bahrain
Ukraine	Jordan
Dubai-UAE	*Palestinian Nat'l Auth.*
Norway	Saudi Arabia
Armenia	Indonesia
Alabama-USA	Syrian Arab Republic
Romania	Morocco
United Arab Emirates	Oman
Turkey	Ghana

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 19. Average mathematics scores in grade 8 for selected student groups in public schools in Indiana: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Indiana average	**522 ***
Sex	
Female	518 *
Male	526 *
Race/ethnicity	
White	530 *
Black	467 *
Hispanic	501
Asian	521 *
Multiracial	530
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	‡
10 to 24.9 percent	551 *
25 to 49.9 percent	527 *
50 to 74.9 percent	508
75 percent or more	474 *

‡ Reporting standards not met.
*p<.05. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-18 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Massachusetts

Mathematics - Grade 8

- Public school students' average score was 561 at grade 8.
- Higher percentages of Massachusetts 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 19 percent of 8th-graders in Massachusetts performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- Male and female students scored higher in mathematics, on average, than the TIMSS scale average (table 21).
- White, Asian, and multiracial students' average scores were higher than the TIMSS scale average, while Black and Hispanic students' average scores were not measurably different from the TIMSS scale average.
- Students in public schools with 75 percent or more of students eligible for free or reduced-price lunch did not score measurably different, on average, from the TIMSS scale average. All other groups scored, on average, above the TIMSS scale average.

Table 20. Average mathematics scores of 8th-grade students in Massachusetts public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Massachusetts	
Korea, Rep. of	*Chinese Taipei-CHN*
Singapore	*Hong Kong-CHN*
Education systems not measurably different from Massachusetts	
Japan	
Education systems lower from Massachusetts	
Minnesota-USA	Norway
Russian Federation	Armenia
North Carolina-USA	*Alabama-USA*
Quebec-CAN	Romania
Indiana-USA	United Arab Emirates
Colorado-USA	Turkey
Connecticut-USA	Lebanon
Israel	*Abu Dhabi-UAE*
Finland	Malaysia
Florida-USA	Georgia
Ontario-CAN	Thailand
United States	Macedonia, Rep. of
England-GBR	Tunisia
Alberta-CAN	Chile
Hungary	Iran, Islamic Rep. of
Australia	Qatar
Slovenia	Bahrain
Lithuania	Jordan
Italy	*Palestinian Nat'l Auth.*
California-USA	Saudi Arabia
New Zealand	Indonesia
Kazakhstan	Syrian Arab Republic
Sweden	Morocco
Ukraine	Oman
Dubai-UAE	Ghana

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 21. Average mathematics scores in grade 8 for selected student groups in public schools in Massachusetts: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Massachusetts average	**561 ***
Sex	
Female	558 *
Male	563 *
Race/ethnicity	
White	572 *
Black	516
Hispanic	507
Asian	599 *
Multiracial	567 *
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	584 *
10 to 24.9 percent	576 *
25 to 49.9 percent	542 *
50 to 74.9 percent	559 *
75 percent or more	491

*$p<.05$. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-19 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for Minnesota

Mathematics - Grade 8

- Public school students' average score was 545 at grade 8.
- Higher percentages of Minnesota 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 13 percent of 8th-graders in Minnesota performed at or above the *Advanced* benchmark (625) compared to the international median of 3 percent at grade 8 (figure 4).
- Male and female students scored higher in mathematics, on average, than the TIMSS scale average (table 23).
- White, Asian, and multiracial students' average scores were higher than the TIMSS scale average, while Black and Hispanic students' average scores were not measurably different from the TIMSS scale average.
- Students in public schools with 75 percent or more of students eligible for free or reduced-price lunch did not score measurably different, on average, from the TIMSS scale average. All other groups scored, on average, above the TIMSS scale average.

Table 22. Average mathematics scores of 8th-grade students in Minnesota public schools compared with other participating education systems: 2011

Grade 8	
Education systems higher than Minnesota	
Korea, Rep. of	*Hong Kong-CHN*
Singapore	Japan
Chinese Taipei-CHN	*Massachusetts-USA*
Education systems not measurably different from Minnesota	
Russian Federation	*North Carolina-USA*
Education systems lower than Minnesota	
Quebec-CAN	*Alabama-USA*
Indiana-USA	Romania
Colorado-USA	United Arab Emirates
Connecticut-USA	Turkey
Israel	Lebanon
Finland	*Abu Dhabi-UAE*
Florida-USA	Malaysia
Ontario-CAN	Georgia
United States	Thailand
England-GBR	Macedonia, Rep. of
Alberta-CAN	Tunisia
Hungary	Chile
Australia	Iran, Islamic Rep. of
Slovenia	Qatar
Lithuania	Bahrain
Italy	Jordan
California-USA	*Palestinian Nat'l Auth.*
New Zealand	Saudi Arabia
Kazakhstan	Indonesia
Sweden	Syrian Arab Republic
Ukraine	Morocco
Dubai-UAE	Oman
Norway	Ghana
Armenia	

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 23. Average mathematics scores in grade 8 for selected student groups in public schools in Minnesota: 2011

	Mathematics
Reporting groups	**Grade 8**
TIMSS scale average	**500**
U.S. average	**509 ***
Minnesota average	**545 ***
Sex	
Female	545 *
Male	545 *
Race/ethnicity	
White	558 *
Black	497
Hispanic	496
Asian	536 *
Multiracial	536 *
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	572 *
10 to 24.9 percent	559 *
25 to 49.9 percent	536 *
50 to 74.9 percent	549 *
75 percent or more	470

*p<.05. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-20 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

TIMSS 2011 results for North Carolina

Mathematics - Grades 4 and 8

- Public school students' average score was 554 at grade 4 and 537 at grade 8.
- Higher percentages of North Carolina 4th- and 8th-graders performed at or above each of the four TIMSS international benchmarks than the international medians. For example, 16 percent of 4th-graders and 14 percent of 8th-graders in North Carolina performed at or above the *Advanced* benchmark (625) compared to the international median of 4 percent at grade 4 and 3 percent at grade 8 (figures 3 and 4).
- Males outperformed females by 12 score points, on average, at grade 4. At both grade 4 and 8, males and females scored higher in mathematics, on average, than the TIMSS scale average (table 25).

Table 24. Average mathematics scores of 4th- and 8th-grade students in North Carolina public schools compared with other participating education systems: 2011

Grade 4		Grade 8	
Education systems higher than North Carolina		**Education systems higher than North Carolina**	
Singapore		Korea, Rep. of	*Massachusetts-USA*
Korea, Rep. of		Singapore	
Hong Kong-CHN		*Chinese Taipei-CHN*	
Chinese Taipei-CHN		*Hong Kong-CHN*	
Japan		Japan	
Education systems not measurably different from North Carolina		**Education systems not measurably different from North Carolina**	
Northern Ireland-GBR	*Florida-USA*	*Minnesota-USA*	*Indiana-USA*
Belgium (Flemish)-BEL		Russian Federation	
Finland		*Quebec-CAN*	
Education systems lower than North Carolina		**Education systems lower than North Carolina**	
England-GBR	Croatia	*Colorado-USA*	Romania
Russian Federation	New Zealand	*Connecticut-USA*	United Arab Emirates
United States	Spain	Israel	Turkey
Netherlands	Romania	Finland	Lebanon
Denmark	Poland	*Florida-USA*	*Abu Dhabi-UAE*
Lithuania	Turkey	*Ontario-CAN*	Malaysia
Quebec-CAN	*Dubai, UAE*	United States	Georgia
Portugal	Azerbaijan	*England-GBR*	Thailand
Germany	Chile	*Alberta-CAN*	Macedonia, Rep. of
Ireland	Thailand	Hungary	Tunisia
Ontario-CAN	Armenia	Australia	Chile
Serbia	Georgia	Slovenia	Iran, Islamic Rep. of
Australia	Bahrain	Lithuania	Qatar
Hungary	United Arab Emirates	Italy	Bahrain
Slovenia	Iran, Islamic Rep. of	*California-USA*	Jordan
Czech Republic	*Abu Dhabi, UAE*	New Zealand	*Palestinian Nat'l Auth.*
Austria	Qatar	Kazakhstan	Saudi Arabia
Italy	Saudi Arabia	Sweden	Indonesia
Slovak Republic	Oman	Ukraine	Syrian Arab Republic
Alberta-CAN	Tunisia	*Dubai-UAE*	Morocco
Sweden	Kuwait	Norway	Oman
Kazakhstan	Morocco	Armenia	Ghana
Malta	Yemen	*Alabama-USA*	
Norway			

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

- At grade 4, all racial/ethnic groups performed above the TIMSS scale average. At grade 8, White, Asian, and multiracial students' average scores were above the TIMSS scale average, while Black and Hispanic students' average scores were not measurably different from the TIMSS scale average (table 25).
- In general, students at grade 4 scored higher, on average, than the TIMSS scale average. At grade 8 students in public schools with less than 50 percent of students eligible for free or reduced-price lunch scored higher, on average, than the TIMSS scale average, while average scores for students in public schools with 50 percent or more students eligible for free or reduced-price lunch were not measurably different from the TIMSS scale average.

Table 25. Average mathematics scores in grade 4 and 8 for selected student groups in public schools in North Carolina: 2011

	Mathematics	
Reporting groups	**Grade 4**	**Grade 8**
TIMSS scale average	**500**	**500**
U.S. average	**541 ***	**509 ***
North Carolina average	**554 ***	**537 ***
Sex		
Female	548 *	535 *
Male	560 *	539 *
Race/ethnicity		
White	577 *	563 *
Black	512 *	495
Hispanic	538 *	510
Asian	613 *	605 *
Multiracial	572 *	525 *
Percentage of public school students eligible for free or reduced-price lunch		
Less than 10 percent	‡	605 *
10 to 24.9 percent	587 *	572 *
25 to 49.9 percent	568 *	543 *
50 to 74.9 percent	550 *	521
75 percent or more	519 *	516

‡ Reporting standards not met.
* $p<.05$. Difference between score and TIMSS scale average is significant.
NOTE Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-21 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

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