



# 2011 Trends in International Mathematics and Science Study (TIMSS) Grades 4 and 8 Results

TIMSS is designed to assess the mathematics and science knowledge and skills of 4<sup>th</sup> and 8<sup>th</sup> graders. TIMSS is administered every four years in approximately 60 countries and education systems and is broadly aligned with the curricula of those entities. In 2011, TIMSS assessed 600,000 students in 63 countries and 14 benchmarking participants (regions of countries). TIMSS 2011 was the fifth administration since the program began in 1995. TIMSS is directed by the International Association for the Evaluation of Educational Achievement's (IEA) TIMSS & PIRLS International Study Center at Boston College. IEA is an independent international cooperative of national research institutions and government agencies with nearly 70 member countries worldwide.

## Mathematics

The TIMSS 2011 mathematics assessment is based on a comprehensive framework developed collaboratively with the participating countries. As described in the mathematics chapter of the [TIMSS 2011 Assessment Frameworks](#), the mathematics framework is organized around two dimensions at each grade: (1) a content dimension specifying the domains or subject matter to be assessed, and (2) a cognitive dimension specifying the domains or thinking processes to be assessed.

- Grade 4 content domains: number properties and operations, geometric shapes and measures, and data display
- Grade 8 content domains: number properties and operations, algebra, geometry, and data analysis, statistics, and probability
- Cognitive domains at grades 4 and 8: knowing, applying, and reasoning

Questions are also categorized according to mathematical complexity. Mathematical complexity describes what level of cognitive demand (low, moderate, or high) is required for students to answer each question correctly. Students in the assessment respond to both multiple-choice and constructed-response items designed to assess the framework objectives.

## Science

The TIMSS 2011 science assessment is based on a comprehensive framework developed collaboratively with the participating countries that is designed to measure how well students master the essential science content, concepts, and procedures that countries expect their students to learn as they progress through primary and lower secondary school. As described in the science chapter of the [TIMSS 2011 Assessment Frameworks](#), the science framework is organized around two dimensions at each grade: (1) a content dimension specifying the domains or subject matter to be assessed, and (2) a cognitive dimension specifying the domains or thinking processes to be assessed.

- Grade 4 content domains: life science, physical science, and Earth science
- Grade 8 content domains: biology, chemistry, physics, and Earth science
- Cognitive domains at grades 4 and 8: knowing, applying, and reasoning

Another dimension of the science framework is defined by four science practices: (1) identifying scientific principles, (2) using scientific principles, (3) using scientific inquiry, and (4) using technological design.

Students respond to both multiple-choice and constructed-response items. Although not included in 2011, some administrations have included hands-on performance tasks and interactive computer tasks.

## 2011 TIMSS Results Overview

Results are provided below for the 57 countries and other education systems that participated at grade 4 and the 56 countries and other education systems that participated at grade 8. In the United States, these totals include Florida and North Carolina in grades 4 and 8; and Alabama, California, Colorado, Connecticut, Indiana, Massachusetts, and Minnesota in grade 8 only. The scores are reported on a scale of 0 to 1,000 with the TIMSS scale centerpoint set at 500 and a standard deviation of 100. TIMSS reports achievement at four points along the scale as international benchmarks: Advanced International Benchmark (625), High International Benchmark (550), Intermediate International Benchmark (475), and Low International Benchmark (400).

### Grade 4 Mathematics

- The average score for students in the United States (541) was higher than the TIMSS scale centerpoint of 500. Only 8 education systems had significantly higher averages (Singapore, Republic of Korea, Hong Kong-CHN, Chinese Taipei-CHN, Japan, Northern Ireland-GBR, North Carolina-USA, and Belgium[Flemish]-BEL) and 42 had significantly lower averages. Florida (545) scored above the TIMSS scale average but not significantly different from the United States average.
- Thirteen percent of students in the United States performed at or above the Advanced TIMSS international mathematics benchmark. Seven education systems had percentages that were higher (Singapore, Republic of Korea, Hong Kong-SAR, Chinese Taipei-CHN, Japan, Northern Ireland-GBR, and England-GBR) and 45 had percentages lower than the United States. Florida's percentage (14) was not significantly different from that of the United States, but it was above the TIMSS median percentage (4).

## 2011 TIMSS Mathematics Grade 4

Exhibit 1: Average Scale Scores

Education System		Average Score
Top 4	Singapore	606*
	Republic of Korea	605*
	Hong Kong-CHN	602*
	Chinese Taipei-CHN	591*
Florida-USA		545‡
United States		541
TIMSS scale centerpoint		500^
Bottom 4	Tunisia	359^
	Kuwait	342^
	Morocco	335^
	Yemen	248^

Significantly higher than U.S.\*

Not significantly different from the U.S. ‡

Significantly lower than U.S.^

Exhibit 2: percentage at or above Advanced (625)

Education System		Percentage performing at or above Advanced
Top 4	Singapore	43*
	Republic of Korea	39*
	Hong Kong-CHN	37*
	Chinese Taipei-CHN	34*
Florida-USA		14‡
United States		13
TIMSS median percentage		4^
Bottom 4	Morocco	<1^
	Kuwait	<1^
	Yemen	<1^
	Tunisia	<1^

### Mathematics Grade 4 Achievement Levels:

- Advanced (625 and above) – Students can apply their understanding and knowledge in a wide variety of relatively complex situations
- High (between 550 and 625) – Students can apply their knowledge and understanding to solve problems
- Intermediate (between 475 and 550) - Students can apply basic mathematical knowledge in straightforward situations
- Low (between 400 and 475) – Students have some basic mathematical knowledge

## Grade 8 Mathematics

- The average score for students in the United States (509) was higher than the TIMSS scale centerpoint of 500. Only 11 education systems had significantly higher averages (Republic of Korea, Singapore, Chinese Taipei-CHN, Hong Kong-CHN, Japan, Massachusetts-USA, Minnesota-USA, Russian Federation, North Carolina-USA, Quebec-CAN, and Indiana-USA), and 32 had significantly lower averages. Florida (517) scored above the TIMSS scale centerpoint but not significantly different from the United States average.
- Seven percent of students in the United States performed at or above the Advanced TIMSS benchmark. Eleven education systems had percentages that were higher (Chinese Taipei-CHN, Singapore, Republic of Korea, Hong Kong-CHN, Japan, Massachusetts-USA, Russian Federation, North Carolina-USA, Minnesota-USA, Israel, and Connecticut-USA), and 31 had percentages lower than the United States. Florida's percentage (8) was not significantly different from that of the United States, but it was above the TIMSS median percentage (3).

### 2011 TIMSS Mathematics Grade 8

Exhibit 3: Average Scale Scores

Education System		Average Score
Top 4	Republic of Korea	613*
	Singapore	611*
	Chinese Taipei-CHN	609*
	Hong Kong-CHN	586*
Florida-USA		513‡
<i>United States</i>		509
TIMSS scale centerpoint		500^
Bottom 4	Syrian Arab Republic	380^
	Morocco	371^
	Oman	366^
	Ghana	331^

Significantly higher than U.S. \*

Not significantly different from the U.S. ‡

Significantly lower than U.S. ^

Exhibit 4: percentage at or above Advanced (625)

Education System		Percentage performing at or above Advanced
Top 4	Chinese Taipei-CHN	49*
	Singapore	48*
	Republic of Korea	47*
	Hong Kong-CHN	34*
Florida-USA		8‡
<i>United States</i>		7
TIMSS median percentage		3^
Bottom 4	Syrian Arab Republic	<1^
	Indonesia	<1^
	Morocco	<1^
	Ghana	<1^

### Mathematics Grade 8 Achievement Levels:

- Advanced (625 and above) - Students can organize information, make generalizations, solve non-routine problems, and draw and justify conclusions
- High (between 550 and 625) – Students can apply their knowledge and understanding in a wide variety of relatively complex situations
- Intermediate (between 475 and 550) - Students can apply basic mathematical knowledge in straightforward situations
- Low (between 400 and 475) – Students have some basic mathematical knowledge

## Grade 4 Science

- The average score for students in the United States (544) was higher than the TIMSS scale centerpoint of 500. Only 6 education systems had significantly higher averages (Republic of Korea, Singapore, Finland, Japan, Russian Federation, and Chinese Taipei-CHN), and 47 had significantly lower averages. Florida (545) scored above the TIMSS scale centerpoint but not significantly different from the United States average.
- Fifteen percent of students in the United States performed at or above the Advanced TIMSS benchmark. Three education systems had percentages that were higher (Singapore, Republic of Korea, and Finland), and 47 had percentages lower than the United States. Florida's percentage (14) was not significantly different from that of the United States, but it was above the TIMSS median percentage (5).

### 2011 TIMSS Science Grade 4

Exhibit 5: Average Scale Scores

Education System		Average Score
Top 4	Republic of Korea	587*
	Singapore	583*
	Finland	570*
	Japan	559*
Florida-USA		545‡
United States		544
TIMSS scale centerpoint		500^
Bottom 4	Kuwait	347^
	Tunisia	346^
	Morocco	264^
	Yemen	209^

Exhibit 6: percentage at or above Advanced (625)

Education System		Percentage performing at or above Advanced
Top 4	Singapore	33*
	Republic of Korea	29*
	Finland	20*
	Russian Federation	16‡
United States		15
Florida-USA		14‡
TIMSS median percentage		5^
Bottom 4	Kuwait	1^
	Morocco	<1^
	Tunisia	<1^
	Yemen	<1^

Significantly higher than U.S. *
Not significantly different from the U.S. ‡
Significantly lower than U.S. ^

### Science Grade 4 Achievement Levels:

- Advanced (625 and above) – Students can apply knowledge and understanding to beginning inquiry
- High (between 475 and 550) – Students can apply knowledge and understanding to explain everyday phenomena
- Intermediate (between 475 and 550) - Students can apply basic knowledge and understanding to practical situations in the sciences
- Low (between 400 and 475) – Students have some elementary knowledge of the earth, life, and physical sciences

## Grade 8 Science

- The average score for students in the United States (525) was higher than the TIMSS scale centerpoint of 500. Twelve education systems had significantly higher averages (Singapore, Massachusetts-USA, Chinese Taipei-CHN, Republic of Korea, Japan, Minnesota-USA, Finland, Alberta-CAN, Slovenia, Colorado-USA, Russian Republic, and Hong Kong-CHN), and 33 had significantly lower averages. Florida (530) scored above the TIMSS scale centerpoint but not significantly different from the United States average.
- Fifteen percent of students in the United States performed at or above the *Advanced* TIMSS international benchmark. Twelve education systems had percentages that were higher (Singapore, Massachusetts-USA, Chinese Taipei-CHN, Republic of Korea, Japan, Minnesota-USA, Colorado-USA, Connecticut-USA, Russian Federation, England-GBR, Slovenia, and Finland) and 33 had percentages lower than the United States. Florida's percentage (13) was not significantly different from that of the United States, but it was above the TIMSS median percentage (4).

### 2011 TIMSS Science Grade 8

Exhibit 7: Average Scale Scores

Education System		Average Score
Top 4	Singapore	590*
	Massachusetts-USA	567*
	Chinese Taipei-CHN	564*
	Republic of Korea	560*
Florida-USA		530‡
<i>United States</i>		525
TIMSS scale centerpoint		500^
Bottom 4	Lebanon	406^
	Indonesia	406^
	Morocco	376^
	Ghana	306^

Exhibit 8: percentage at or above Advanced (625)

Education System		Percentage performing at or above Advanced
Top 4	Singapore	40*
	Massachusetts-USA	24*
	Chinese Taipei-CHN	24*
	Republic of Korea	20*
Florida-USA		13‡
<i>United States</i>		10
TIMSS median percentage		4^
Bottom 4	Tunisia	<1^
	Indonesia	<1^
	Morocco	<1^
	Ghana	<1^

Significantly higher than U.S. *
Not significantly different from the U.S. ‡
Significantly lower than U.S. ^

### Science Grade 8 Achievement Levels:

- Advanced (625 and above) – Students demonstrate a grasp of some complex and abstract science concept
- High (between 550 and 625) – Students demonstrate conceptual understanding of some science cycles, systems, and principles
- Intermediate (between 475 and 550) - Students demonstrate some conceptual understanding of some science cycles, systems, and principles
- Low (between 400 and 475) – Students recognize basic facts from the life and physical sciences