

the condition of education 2005



INDICATOR 11

International Comparison of 4th- and 8th-Grade Performance in Mathematics

The indicator and corresponding tables are taken directly from *The Condition of Education 2005*. Therefore, the page numbers may not be sequential.

Additional information about the survey data and supplementary notes can be found in the full report. For a copy of *The Condition of Education 2005*, visit the NCES website (<http://nces.ed.gov/pubsearch/pubsinfo.sap?pubid=2005094>) or contact ED PUBs at 1-877-4ED-PUBS.

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Academic Outcomes

International Comparison of 4th- and 8th-Grade Performance in Mathematics

U.S. 4th-graders showed no measurable change in mathematics from 1995 to 2003, while 8th-graders showed improvement over this period.

The Trends in International Mathematics and Science Study (TIMSS) conducted in 2003 assessed students' mathematics performance at grade 4 in 25 countries and at grade 8 in 45 countries. The assessment is curriculum based and measures what students have actually learned against what is expected to be typically taught in the participating countries by the end of grades 4 and 8.

U.S. students at grades 4 and 8 scored above the international average in 2003 (see supplemental table 11-1). U.S. 4th-graders scored higher, on average, than students in 13 countries, while students in 11 countries outperformed U.S. students. At grade 8, the average U.S. mathematics score was higher than those of students in 25 countries, but below the average scores of students in 9 countries.

While the international average scores of males and females were similar at grades 4 and 8 in 2003, there were measurable differences in a few countries. At grade 4, males outperformed females in the United States and two other countries, while females outperformed males only in Armenia. At grade 8, no measurable difference was detected between the U.S. average scores of males and females;

males outperformed females in five countries and females outperformed males in four countries.

TIMSS previously assessed students in mathematics at grade 4 in 1995 and at grade 8 in 1995 and 1999. Comparing 2003 scores with these scores provides additional perspective on U.S. students' performance. For example, although there was no measurable difference between U.S. 4th-graders' average scores in 1995 and 2003, the United States' standing declined relative to the 14 other countries participating in both assessments. In 1995, students in four of these countries outperformed U.S. students on average, compared with students in seven countries outperforming U.S. students in 2003 (see supplemental table 11-2).

At grade 8, average U.S. mathematics scores increased from 1995 to 2003. No difference was detected in average scores between 1999 and 2003, indicating that the increase occurred primarily between 1995 and 1999. The standing of U.S. 8th-graders between 1995 and 2003 increased relative to the 22 other countries participating in both assessments: in 1995, students in 12 countries outperformed U.S. students, while students in 7 countries outperformed U.S. students in 2003.

¹ Hong Kong is a Special Administrative Region (SAR) of the People's Republic of China.

² Met international guidelines for participation rates only after replacement schools were included.

³ Country did not meet international sampling or other guidelines.

⁴ National desired population does not cover all of the international desired population.

⁵ The international average reported here differs from that reported in Mullis et al. (2004) because England was deleted from the international average for not satisfying guidelines for sample participation rates.

NOTE: Countries were required to sample students in the upper of the two grades that contained the larger number of 9- and 13-year-olds. In the United States and most countries, this corresponds to grades 4 and 8. See *supplemental note 5* for more information on this study. For information on differences between TIMSS and the National Assessment of Educational Progress (NAEP) used in *indicators 9 and 10* and the Program for International Student Assessment (PISA) used in *indicator 13*, see http://nces.ed.gov/timss/pdf/naep_timss_pisa_comp.pdf.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005-005), table 3. Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.



FOR MORE INFORMATION:

Supplemental Note 5
Supplemental Tables 11-1,
11-2

NCES 2005-112

Mullis et al. 2004

INTERNATIONAL MATHEMATICS PERFORMANCE: Average mathematics scores of 8th-grade students, by country: 2003

Average score relative to the United States	Country and score					
Significantly higher	Singapore	605	Chinese Taipei	585	Netherlands ²	536
	Korea, Republic of	589	Japan	570	Estonia	531
	Hong Kong SAR ^{1,2}	586	Belgium-Flemish	537	Hungary	529
	Malaysia	508	Australia	505	Scotland ²	498
Not significantly different	Latvia	508	United States³	504	Israel ³	496
	Russian Federation	508	Lithuania ⁴	502	New Zealand	494
	Slovak Republic	508	Sweden	499		
	Slovenia	493	Cyprus	459	Palestinian National Authority	390
Significantly lower	Italy	484	Macedonia, Republic of ³	435	Chile	387
	Armenia	478	Lebanon	433	Morocco ³	387
	Serbia	477	Jordan	424	Philippines	378
	Bulgaria	476	Iran, Islamic Republic of	411	Botswana	366
	Romania	475	Indonesia ⁴	411	Saudi Arabia	332
	<i>International average⁵</i>	<i>466</i>	Tunisia	410	Ghana	276
	Norway	461	Egypt	406	South Africa	264
	Moldova, Republic of	460	Bahrain	401		

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table 11-1. Average mathematics scores of 4th- and 8th-grade students, by sex and country: 2003

Country	Grade 4				Grade 8			
	Total	Sex		Male-female difference ¹	Total	Sex		Male-female difference ¹
		Male	Female			Male	Female	
International average ²	495*	496	495	1	466*	466	467	-1
Armenia	456*	450	462	-12	478*	473	483	-10
Australia ³	499*	500	497	3	505	511	499	13
Bahrain	—	—	—	†	401*	385	417	-33
Belgium-Flemish	551*	552	549	2	537*	542	532	11
Botswana	—	—	—	†	366*	365	368	-3
Bulgaria	—	—	—	†	476*	477	476	1
Chile	—	—	—	†	387*	394	379	15
Chinese Taipei	564*	564	564	-1	585*	582	589	-7
Cyprus	510*	514	505	9	459*	452	467	-16
Egypt	—	—	—	†	406*	406	407	-1
England ³	531*	532	530	2	—	—	—	†
Estonia	—	—	—	†	531*	530	532	-2
Ghana	—	—	—	†	276*	283	266	17
Hong Kong SAR ^{3,4}	575*	575	575	#	586*	585	587	-2
Hungary	529*	530	527	3	529*	533	526	7
Indonesia ⁵	—	—	—	†	411*	410	411	-1
Iran, Islamic Republic of	389*	386	394	-8	411*	408	417	-9
Israel ⁶	—	—	—	†	496	500	492	8
Italy	503*	507	498	9	484*	486	481	6
Japan	565*	566	563	4	570*	571	569	3
Jordan	—	—	—	†	424*	411	438	-27
Korea, Republic of	—	—	—	†	589*	592	586	5
Latvia	536*	536	536	-1	508	506	511	-6
Lebanon	—	—	—	†	433*	439	429	10
Lithuania ⁵	534*	536	535	1	502	499	503	-5
Macedonia, Republic of ⁶	—	—	—	†	435*	431	439	-9
Malaysia	—	—	—	†	508	505	512	-8
Moldova, Republic of	504*	499	510	-11	460*	455	465	-10
Morocco ⁶	347*	350	344	6	387*	393	381	12
Netherlands ³	540*	543	537	6	536*	540	533	7
New Zealand	493*	494	493	#	494	493	495	-3
Norway	451*	454	449	5	461*	460	463	-3
Palestinian National Authority	—	—	—	†	390*	386	394	-8
Philippines	358*	352	364	-12	378*	370	383	-13
Romania	—	—	—	†	475*	473	477	-4
Russian Federation	532*	534	530	4	508	507	510	-3
Saudi Arabia	—	—	—	†	332*	336	326	10
Scotland ³	490*	496	485	11	498	495	500	-5
Serbia	—	—	—	†	477*	473	480	-7
Singapore	594*	590	599	-8	605*	601	611	-10

See notes at end of table.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table 11-1. Average mathematics scores of 4th- and 8th-grade students, by sex and country: 2003—Continued

Country	Grade 4				Grade 8			
	Total	Sex		Male-female difference ¹	Total	Sex		Male-female difference ¹
		Male	Female			Male	Female	
Slovak Republic	—	—	—	†	508	508	508	#
Slovenia	479*	481	477	5	493*	491	495	-3
South Africa	—	—	—	†	264*	264	262	3
Sweden	—	—	—	†	499	499	499	1
Tunisia	339*	337	342	-5	410*	423	399	24
United States ^{3,6}	518	522	514	8	504	507	502	6

— Not available.

† Not applicable.

Rounds to zero.

* Significantly different from the United States ($p < .05$).

¹ Difference is calculated by subtracting the average for females from the average for males using unrounded numbers.

² At the 8th-grade level, the international average reported here differs from that reported in Mullis et al. (2004) because England was deleted from the international average for not satisfying guidelines for sample participation rates.

³ Met international guidelines for participation in 2003 only after replacement schools were included. England at grade 8 did not meet international guidelines for participation rates even after replacement schools were included.

⁴ Hong Kong is a Special Administrative Region (SAR) of the People's Republic of China.

⁵ National desired population does not cover all of the international desired population.

⁶ Country did not meet international sampling or other guidelines in 2003.

NOTE: Countries were required to sample students in the upper of the two grades that contained the larger number of 9- and 13-year-olds. In the United States and most countries, this corresponds to grades 4 and 8. Detail may not sum to totals because of rounding. See *supplemental note 5* for more information on this study.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005-005), tables 2, 3, C1, C2, C7, and C10 and unpublished tabulation (November 2004). Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table 11-2. Average mathematics scores of 4th-grade students in 1995 and 2003 and of 8th-grade students in 1995, 1999, and 2003 and change in score since 1995 in grade 4 and since 1995 and 1999 in grade 8, by country

Country	Grade 4			Grade 8				
	1995	2003	1995–2003 difference ¹	1995	1999	2003	1995–2003 difference ¹	1999–2003 difference ¹
Australia ^{2,3,4}	495*	499*	4	509*	—	505	-4	†
Belgium-Flemish	—	—	†	550*	558*	537*	-13**	-21**
Bulgaria ²	—	—	†	527*	511	476*	-51**	-34**
Chile	—	—	†	—	392*	387*	†	-6
Chinese Taipei	—	—	†	—	585*	585*	†	#
Cyprus	475*	510*	35**	468*	476*	459*	-8**	-17**
England ³	484*	531*	47**	—	—	—	†	†
Hong Kong SAR ^{3,5}	557*	575*	18**	569*	582*	586*	17**	4
Hungary ²	521	529*	7	527*	532*	529*	3	-2
Indonesia ⁶	—	—	†	—	403*	411*	†	8
Iran, Islamic Republic of	387*	389*	2	418*	422*	411*	-7	-11**
Israel ⁷	—	—	†	—	466*	496	†	29**
Italy ⁷	—	—	†	—	479*	484*	†	4
Japan	567*	565*	-3	581*	579*	570*	-11**	-9**
Jordan	—	—	†	—	428*	424*	†	-3
Korea, Republic of	—	—	†	581*	587*	589*	8**	2
Latvia-LSS ^{2,8}	499*	533*	34**	488	505	505	17**	#
Lithuania ⁶	—	—	†	472*	482*	502	30**	20**
Macedonia, Republic of ²	—	—	†	—	447*	435*	†	-12**
Malaysia	—	—	†	—	519*	508	†	-11
Moldova, Republic of	—	—	†	—	469*	460*	†	-9
Netherlands ^{2,3}	549*	540*	-9**	529*	540*	536*	7	-4
New Zealand ⁹	469*	496*	26**	501	491	494	-7	3
Norway	476*	451*	-25**	498	—	461*	-37**	†
Philippines	—	—	†	—	345*	378*	†	33**
Romania ²	—	—	†	474*	472*	475*	2	3
Russian Federation	—	—	†	524*	526*	508	-16**	-18**

See notes at end of table.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table 11-2. Average mathematics scores of 4th-grade students in 1995 and 2003 and of 8th-grade students in 1995, 1999, and 2003 and change in score since 1995 in grade 4 and since 1995 and 1999 in grade 8, by country—Continued

Country	Grade 4			Grade 8				
	1995	2003	1995–2003 difference ¹	1995	1999	2003	1995–2003 difference ¹	1999–2003 difference ¹
Scotland ^{2,3}	493*	490*	-3	493	—	498	4	†
Singapore	590*	594*	4	609*	604*	605*	-3	1
Slovak Republic	—	—	†	534*	534*	508	-26**	-26**
Slovenia ^{2,4}	462*	479*	17**	494	—	493*	-2	†
South Africa ¹⁰	—	—	†	—	275*	264*	†	-11
Sweden	—	—	†	540*	—	499	-41**	†
Tunisia	—	—	†	—	448*	410*	†	-38**
United States ^{2,3}	518	518	#	492	502	504	12**	3

— Not available.

† Not applicable.

Rounds to zero.

* Significantly different from the United States ($p < .05$).

** Average in 2003 is significantly different from the average in 1995 or 1999, respectively ($p < .05$).

¹ Difference is calculated by subtracting 1995 or 1999 estimate from 2003 estimate using unrounded numbers.

² Country did not meet international sampling or other guidelines in 1995, 1999, or 2003.

³ Met international guidelines for participation rates in 2003 only after replacement schools were included. England at grade 8 did not meet international guidelines for participation rates even after replacement schools were included.

⁴ Because of national-level changes in the starting age/date for school, 1999 data for Australia and Slovenia cannot be compared with 2003 data.

⁵ Hong Kong is a Special Administrative Region (SAR) of the People's Republic of China.

⁶ National desired population does not cover all of the international desired population.

⁷ Because of changes in the population tested, 1995 data for Israel and Italy are not shown.

⁸ Designated LSS (Latvian-speaking schools) because only Latvian-speaking schools were included in 1995. For this analysis, only Latvian-speaking schools are included in the 2003 average.

⁹ In 1995, Maori-speaking students did not participate. Estimates in this table are computed for students taught in English only, which represents between 98 and 99 percent of the student population in both years.

¹⁰ Because within classroom sampling was not accounted for, 1995 data are not shown for South Africa.

NOTE: Countries were required to sample students in the upper of the two grades that contained the larger number of 9- and 13-year-olds. In the United States and most countries, this corresponds to grades 4 and 8. Detail may not sum to totals because of rounding. See *supplemental note 5* for more information on this study.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005–005), tables 4, 5, C3, and C4. Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table S11. Standard errors for the average mathematics scores of 8th-grade students, by country: 2003

Country	Grade 8
International average	0.5
Armenia	3.0
Australia	4.6
Bahrain	1.7
Belgium-Flemish	2.8
Botswana	2.6
Bulgaria	4.3
Chile	3.3
Chinese Taipei	4.6
Cyprus	1.7
Egypt	3.5
Estonia	3.0
Ghana	4.7
Hong Kong SAR	3.3
Hungary	3.2
Indonesia	4.8
Iran, Islamic Republic of	2.4
Israel	3.4
Italy	3.2
Japan	2.1
Jordan	4.1
Korea, Republic of	2.2
Latvia	3.2
Lebanon	3.1
Lithuania	2.5
Macedonia, Republic of	3.5
Malaysia	4.1
Moldova, Republic of	4.1
Morocco	2.5
Netherlands	3.8
New Zealand	5.3
Norway	2.5
Palestinian National Authority	3.1
Philippines	5.2
Romania	4.8
Russian Federation	3.7
Saudi Arabia	4.6
Scotland	3.7
Serbia	2.6
Singapore	3.6
Slovak Republic	3.3
Slovenia	2.2
South Africa	5.5
Sweden	2.6
Tunisia	2.2
United States	3.3

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005–005), table C2. Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table S11-1. Standard errors for the average mathematics scores of 4th- and 8th-grade students, by sex and country: 2003—Continued

Country	Grade 4				Grade 8			
	Total	Sex		Male-female difference	Total	Sex		Male-female difference
		Male	Female			Male	Female	
Slovak Republic	—	—	—	†	3.3	4.0	3.4	†
Slovenia	2.6	3.5	3.0	3.8	2.2	2.6	2.6	2.8
South Africa	—	—	—	†	5.5	6.4	6.2	5.8
Sweden	—	—	—	†	2.6	2.7	3.0	2.2
Tunisia	4.7	4.9	5.0	2.8	2.2	2.2	2.6	1.9
United States	2.4	2.7	2.4	1.6	3.3	3.5	3.4	1.9

— Not available.

† Not applicable.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005–005), tables C1, C2, C7, and C10 and unpublished tabulation (November 2004). Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.

International Comparison of 4th- and 8th-Grade Performance in Mathematics

Table S11-2. Standard errors for the average mathematics scores of 4th-grade students in 1995 and 2003 and of 8th-grade students in 1995, 1999, and 2003 and change in score since 1995 in grade 4 and since 1995 and 1999 in grade 8, by country

Country	Grade 4			Grade 8				
	1995	2003	1995–2003 difference	1995	1999	2003	1995–2003 difference	1999–2003 difference
Australia	3.4	3.9	5.2	3.7	—	4.6	6.0	†
Belgium-Flemish	—	—	†	5.9	3.3	2.8	6.5	4.1
Bulgaria	—	—	†	5.8	5.8	4.3	7.2	7.3
Chile	—	—	†	—	4.4	3.3	†	5.2
Chinese Taipei	—	—	†	—	4.0	4.6	†	†
Cyprus	3.2	2.4	4.1	2.2	1.8	1.7	3.0	2.4
England	3.3	3.7	5.0	—	—	—	†	†
Hong Kong SAR	4.0	3.2	5.0	6.1	4.3	3.3	7.0	5.4
Hungary	3.6	3.1	4.8	3.2	3.7	3.2	4.5	4.9
Indonesia	—	—	†	—	4.9	4.8	†	6.8
Iran, Islamic Republic of	5.0	4.2	6.5	3.9	3.4	2.4	4.5	4.2
Israel	—	—	†	—	3.9	3.4	†	5.2
Italy	—	—	†	—	3.8	3.2	†	4.9
Japan	1.9	1.6	2.5	1.6	1.7	2.1	2.6	2.6
Jordan	—	—	†	—	3.6	4.1	†	5.5
Korea, Republic of	—	—	†	2.0	2.0	2.2	3.0	2.9
Latvia	4.6	3.1	5.5	3.6	3.4	3.8	5.2	†
Lithuania	—	—	†	4.1	4.3	2.5	4.8	5.0
Macedonia, Republic of	—	—	†	—	4.2	3.5	†	5.5
Malaysia	—	—	†	—	4.4	4.1	†	6.0
Moldova, Republic of	—	—	†	—	3.9	4.0	†	5.5
Netherlands	3.0	2.1	3.7	6.1	7.1	3.8	7.3	8.1
New Zealand	4.4	2.1	4.9	4.7	5.2	5.3	7.1	7.5
Norway	3.0	2.3	3.7	2.2	—	2.5	3.3	†
Philippines	—	—	†	—	6.0	5.2	†	7.8
Romania	—	—	†	4.6	5.8	4.8	6.6	7.4
Russian Federation	—	—	†	5.3	5.9	3.7	6.5	7.1
Scotland	4.2	3.3	5.3	5.7	—	3.7	6.7	†
Singapore	4.5	5.6	7.2	4.0	6.3	3.6	5.4	7.2
Slovak Republic	—	—	†	3.1	4.0	3.3	4.4	5.1
Slovenia	3.1	2.6	4.1	2.9	—	2.2	3.7	†
South Africa	—	—	†	—	6.8	5.5	†	8.4
Sweden	—	—	†	4.3	—	2.6	5.0	†
Tunisia	—	—	†	—	2.4	2.2	†	3.4
United States	2.9	2.4	†	4.7	4.0	3.3	5.8	5.2

— Not available.

† Not applicable.

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2004). *Highlights From the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005–005), tables C3 and C4. Data from the International Association for the Evaluation of Educational Achievement (IEA), TIMSS 1995, 1999, and 2003 assessments.