The TIMSS 2019 U.S. Highlights Web Report was designed to be a web-based interactive report, not a print report. The intended use of this PDF is to allow readers to easily print all report text; however, for optimal figure viewing, please view the web report. The "Share" button on each figure provides high-quality images of the figures.

TIMSS 2019 U.S. Results

Explore how U.S. 4th- and 8th-grade students' mathematics and science performance compared internationally in 2019!

The Trends in International Mathematics and Science Study (TIMSS) is an international comparative study that measures trends in mathematics and science achievement at the 4th and 8th grades every 4 years. TIMSS is designed to align broadly with mathematics and science curricula in the participating education systems and, therefore, to reflect students' school-based learning. The United States has participated in every administration of TIMSS since its inception in 1995, and the study provides valuable information on how U.S. students compare to students around the world.

In 2019, a total of 64 education systems participated in TIMSS at the 4th grade, while 46 systems participated at the 8th grade. Most of these education systems are **member countries** of the International Association for the Evaluation of Educational Achievement (IEA), the group that sponsors TIMSS internationally; a small number at each grade are nonmember subnational entities that have joined TIMSS as "**benchmarking participants**." Both groups are included in the discussion of results and counts of education systems.

As the 2019 TIMSS results show, the United States had higher average scores than most participating countries in both mathematics and science at both the 4th and 8th grades. However, in 2019, the United States had relatively large score gaps between the top- and bottom-performing students in both TIMSS subjects and grades. In 8th-grade mathematics, only 1 of the 45 other education systems (Turkey) had a larger score gap between the top-performing (90th percentile) and bottom-performing (10th percentile) students than the United States. Moreover, except in grade 4 science, the U.S. score gaps increased from most prior administrations of TIMSS, related in part to drops in the 2019 performance of the bottom performers from the prior two administrations. Gender differences in the United States in 2019 were not consistent, and while boys outperformed girls at the 4th grade in both mathematics and science, there were no gender differences at the 8th grade in either subject.

Looking at changes over time in mathematics at both grades 4 and 8, U.S. average scores have increased over the long term—with higher average scores in 2019 than in 1995—but show no significant changes between 2015 and 2019. In science, U.S. average scores show no significant changes over the long term (from 1995 to 2019) or over the short term (from 2015 to 2019) at the 8th grade. However, at the 4th grade, the U.S. average score in science in 2019 has decreased since the last administration in 2015. The lack of change in 8th-graders' average scores over the recent time period is related to the simultaneously rising scores of top performers and declining scores of bottom performers.

Member countries include countries, which are complete, independent political entities, such as the United States or Japan, as well as subnational entities, such as England, Hong King, or the Flemish Community of Belgium. Subnational entities are indicated in the tables and figures with the three-letter international abbreviation for their country following their name, such as England-GBR, Hong Kong-CHN, or Belgium-Flemish (BEL). For convenience, this report uses the generic term "education systems" when summarizing the results.

Benchmarking participants are subnational entities that are not IEA member countries, such as Abu Dhabi or Ontario, but that participate in TIMSS to assess their comparative international standing. Subnational entities are indicated in the tables and figures with the three-letter international abbreviation for their country following their name. Benchmarking participants are included in the figures and indicated with italics and pink shading. For convenience, this report uses the generic term "education systems" when summarizing results.

The results in this web report present descriptive data on student achievement designed to provide useful information to a broad audience, including members of the general public. The report does not investigate more complex hypotheses, account for interrelationships among variables, or support causal inferences.

Additional information about TIMSS, technical notes, questionnaires, a list of participating countries, and FAQs are available.

Suggested Citation: *TIMSS 2019 U.S. Highlights Web Report* (NCES 2021-021). U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. Available at https://nces.ed.gov/timss/results19/index.asp.

Overview of Student Achievement—Mathematics

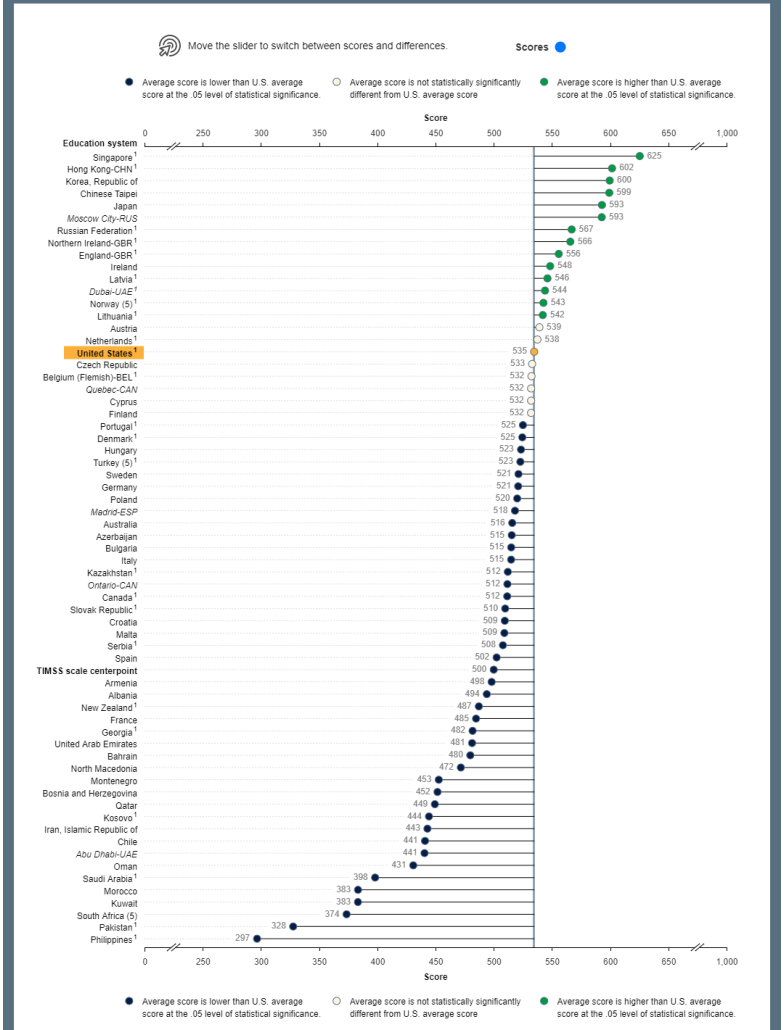
How do U.S. students perform in mathematics compared to their international peers?

GRADE 4

In 2019, U.S. 4th-graders' average score on the TIMSS mathematics scale (535) was higher than the average scores of their peers in 42 education systems and lower than the scores of those in 14 education systems.

- U.S. 4th-graders ranked 15th among the 64 participating education systems in average TIMSS mathematics score. The U.S. average score (535) was not significantly different from the average scores of students in 7 education systems.
- On a scale of 0 to 1,000, U.S. 4th-graders' average TIMSS mathematics score was 535. Average scores ranged from 297 in the lowest performing education system (the Philippines) to 625 in the highest performing education system (Singapore). The U.S. average score was 91 points lower than Singapore's and 238 points higher than the Philippines'.
- Of the 14 education systems that had higher average TIMSS mathematics scores than the United States, the scores ranged from 542 points in Lithuania to 625 points in Singapore.

Figure M1a. Average scores and difference in average scores of 4th-grade students on the TIMSS mathematics scale, by education system: 2019



[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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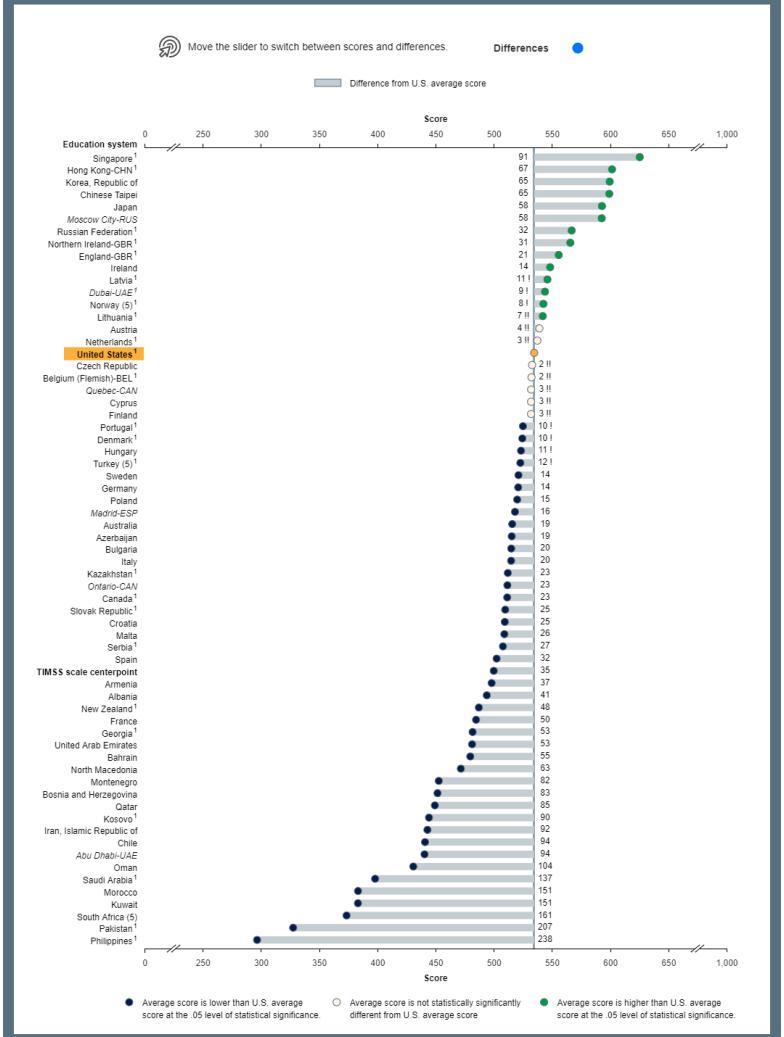

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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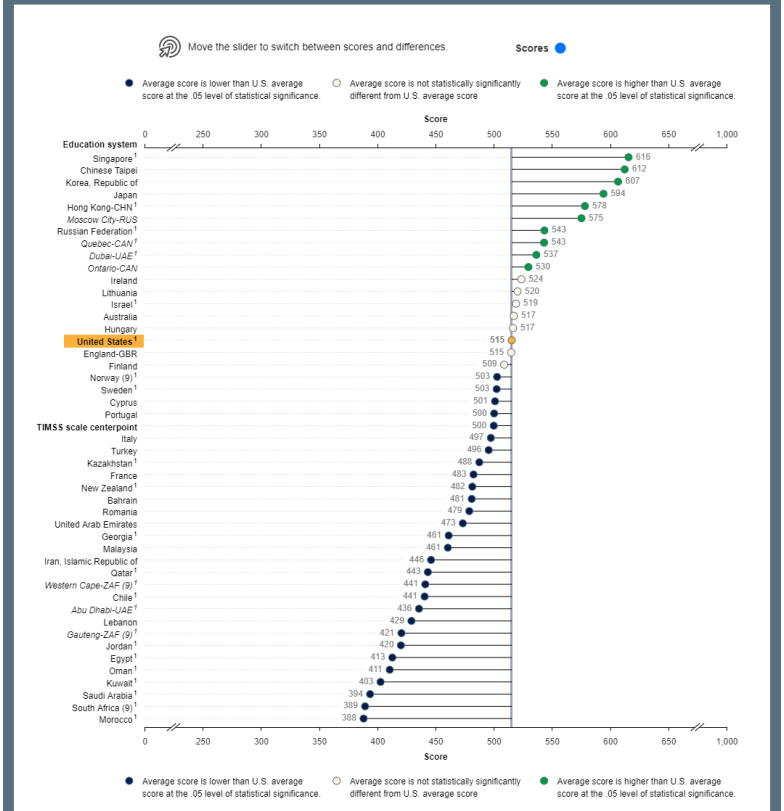
GRADE 8

In 2019, U.S. 8th-graders' average score on the TIMSS mathematics scale (515) was higher than the average scores of their peers in 28 education systems and lower than the scores of those in 10 education systems.

- U.S. 8th-graders ranked 11th among the 46 participating education systems in average TIMSS mathematics score. The U.S. average score (515) was not significantly different from the average scores of students in 7 education systems.
- On a scale of 0 to 1,000, U.S. 8th-graders' average TIMSS mathematics score was 515. Average scores ranged from 388 in Morocco to 616 in Singapore. The U.S. average score was 100 points lower than Singapore's average score and 127 points higher than Morocco's average score.
- Of the 10 education systems that had higher average TIMSS mathematics scores than the United States, the scores ranged from 530 points in Ontario-CAN to 616 points in Singapore.

Figure M1b. Average scores and difference in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 2019



[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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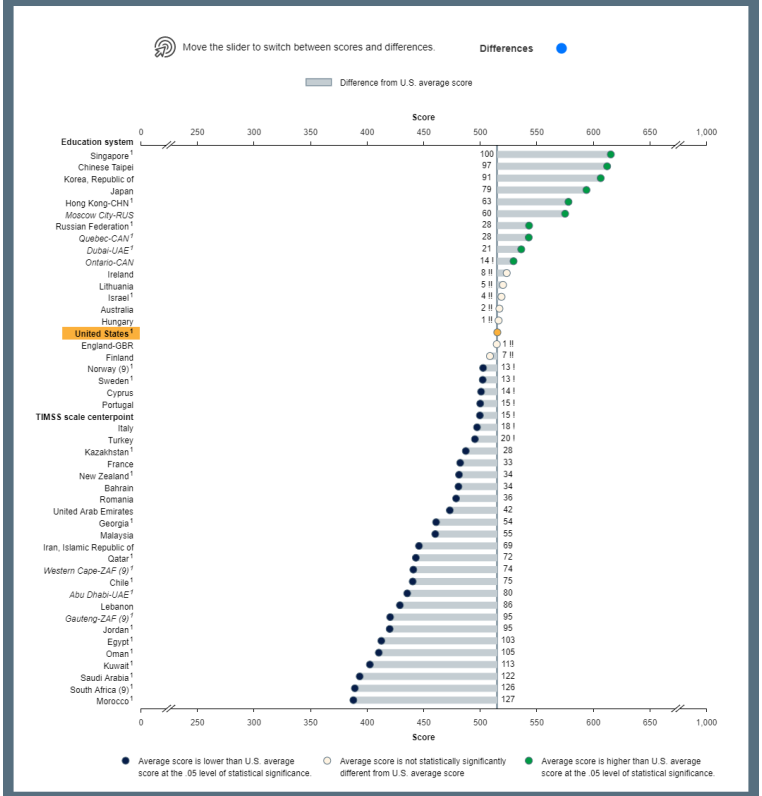
Figure M1b. Average scores and difference in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 2019



I Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

II Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

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How large is the score gap between top and bottom performers in mathematics in the United States and other education systems?

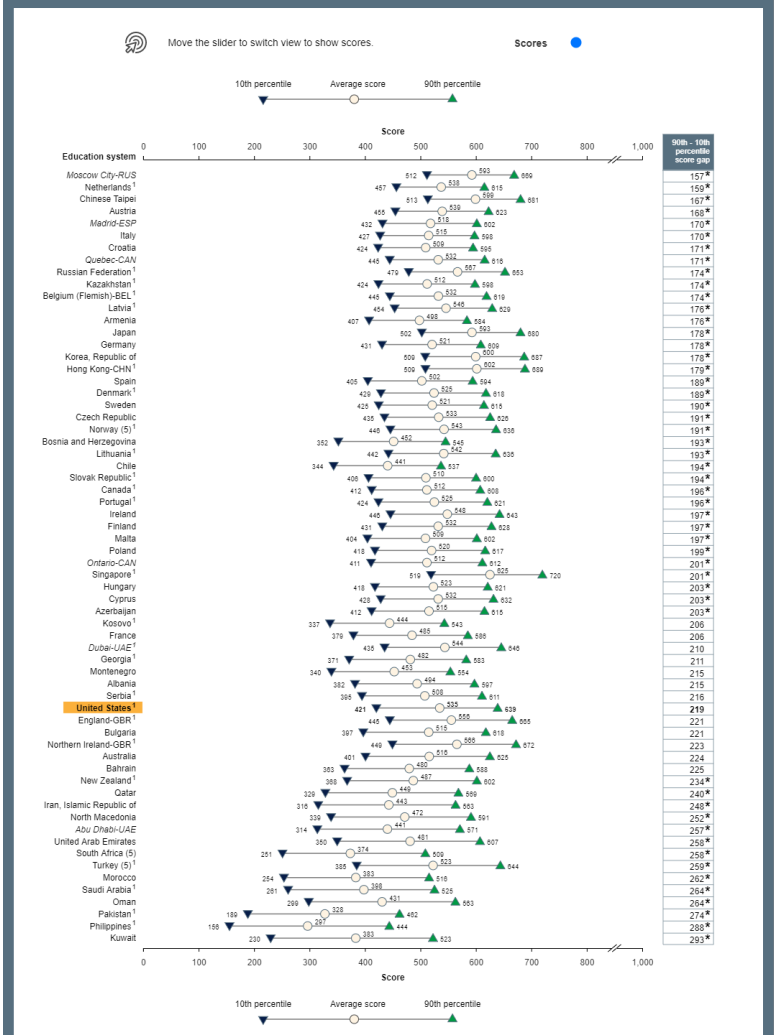
GRADE 4

In the United States, the score gap between top- and bottom-performing 4th-graders on the TIMSS mathematics scale in 2019 was 219 points, which was larger than the gap in 37 education systems and smaller than that in 14 education systems. This gap is measured by the difference between the scores of students at the 90th and 10th percentiles of the distribution and can be one indication of equity within an education system.

- Score gaps between the top- and bottom-performing 4th-graders (those at the 90th and 10th percentiles on the TIMSS mathematics scale) ranged from 157 points in Moscow City-RUS to 293 in Kuwait; the U.S. score gap was 219 points.
- The scores for top-performing 4th-graders (those at the 90th percentile on the TIMSS mathematics scale) ranged from 444 points in the Philippines to 720 points in Singapore; for U.S. 4th-graders, the 90th percentile score was 639 points.
- The scores for bottom-performing 4th-graders (those at the 10th percentile on the TIMSS mathematics scale) ranged from 156 points in the Philippines to 519 points in Singapore; for U.S. 4th-graders, the 10th percentile score was 421.

See grade 4 figure on the next page.

Figure M2a. Average scores and 10th and 90th percentile scores of 4th-grade students on the TIMSS mathematics scale and percentile score gaps, by education system: 2019



* $p < .05$. Significantly different from the U.S. 90th-10th percentile score gap at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: In addition to average scores, this figure shows the scores for the (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The percentile ranges are specific to each education system's distribution of scores, enabling users to compare scores across education systems. Education systems are ordered by 90th-10th percentile score gap. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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GRADE 8

In the United States, the score gap between top- and bottom-performing 8th-graders on the TIMSS mathematics scale in 2019 was 256 points, which was larger than the gap in most education systems (31 of the 45 other participating education systems). This gap is measured by the difference between the scores of students at the 90th and 10th percentiles of the distribution and can be one indication of equity within an education system.

- Score gaps between top- and bottom-performing 8th-graders (those at the 90th and 10th percentiles on the TIMSS mathematics scale) ranged from 170 points in Quebec-CAN to 282 points in Turkey. The U.S. score gap of 256 points was smaller only than Turkey's score gap.
- The scores for top-performing 8th-graders (those at the 90th percentile on the TIMSS mathematics scale) ranged from 482 points in Morocco to 731 points in Chinese Taipei; for U.S. 8th-graders, the 90th percentile score was 642 points.
- The scores for bottom-performing 8th-graders (those at the 10th percentile on the TIMSS mathematics scale) ranged from 281 points in Oman to 487 points in Singapore; for U.S. 8th-graders, the 10th percentile score was 385 points.

Figure M2b. Average scores and 10th and 90th percentile scores of 8th-grade students on the TIMSS mathematics scale and percentile score gaps, by education system: 2019

* $p < .05$. Significantly different from the U.S. 90th-10th percentile score gap at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: In addition to average scores, this figure shows the scores for the (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The percentile ranges are specific to each education system's distribution of scores, enabling users to compare scores across education systems. Education systems are ordered by 90th-10th percentile score gap. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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What levels of mathematics achievement have U.S. students and their international peers reached?

GRADE 4

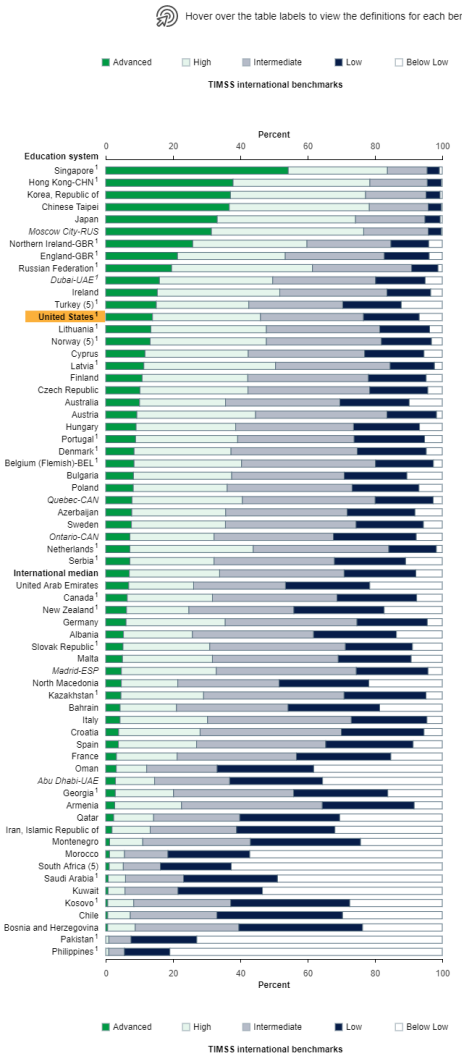
To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade4-math-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark, as shown in the table below. In the figure, the cumulative percentage at or above a given benchmark is represented by the full length of the bar to that benchmark and is, thus, inclusive of any higher levels. Students who did not reach the *Low* level are indicated as "Below *Low*" and indicated by the white segments.

In the United States, 14 percent of 4th-graders in 2019 were at or above the *Advanced* international benchmark (i.e., demonstrated proficiency with the specific mathematics knowledge and skills at the *Advanced* level); 46 percent were at or above the *High* international benchmark, and 77 percent were at or above the *Intermediate* international benchmark. These three percentages were each higher than the international median for these levels (7 percent, 34 percent, and 71 percent, respectively). The percentage of U.S. 4th-graders at or above the *Low* international benchmark (93 percent) was not significantly different from the international median (92 percent).

- The percentage of 4th-graders who were at or above the *Advanced* international benchmark in mathematics in the United States (14 percent) was higher than in 48 of the 63 other education systems and lower than in 9 education systems. In the 9 education systems where proportionately more 4th-graders reached the *Advanced* benchmark than in the United States, the percentages ranged from 20 percent in the Russian Federation to 54 percent in Singapore.
- Ninety-three percent of U.S. 4th-graders were at or above the *Low* international benchmark in mathematics, which was higher than in 26 education systems and lower than in 25 education systems. In the 25 education systems where proportionately more 4th-graders reached at least the *Low* benchmark than in the United States, the percentages ranged from 95 percent (in 5 education systems) to 100 percent (in 3 education systems).

See grade 4 figure on the next page.

Figure M3a. Percentages of 4th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2019



Education system	Advanced (625)	High (550)	Intermediate (475)	Low (400)
Singapore[1]	54*	84*	96*	99*
Hong Kong-CHN[1]	38*	78*	96*	100*
Korea, Republic of	37*	77*	95*	99*
Chinese Taipei	37*	78*	96*	100*
Japan	33*	74*	95*	99*
Moscow City-RUS	31*	77*	96*	100*
Northern Ireland-GBR[1]	26*	60*	85*	98*
England-GBR[1]	21*	53*	83*	96*
Russian Federation[1]	20*	61*	91*	99*
Dubai-UAE[1]	16	50*	80*	95*
Ireland	15	52*	84*	97*
Turkey (5)[1]	15	43	70*	88*
United States[1]	14	46	77	93
Lithuania[1]	13	48	81*	96*
Norway (5)[1]	13	48	82*	97*
Cyprus	12	42	77	95
Latvia[1]	11*	50*	85*	98*
Finland	11*	42*	78	95*
Czech Republic	10*	42	78	96*
Australia	10*	36*	70*	90*
Austria	9*	45	84*	98*
Hungary	9*	39*	74	93
Portugal[1]	9*	39*	74	95
Denmark[1]	8*	37*	75	95*
Belgium (Flemish)-BEL[1]	8*	40*	80*	97*
Bulgaria	8*	37*	71*	90*
Poland	8*	36*	73	93
Quebec-CAN	8*	41*	80*	97*
Azerbaijan	8*	36*	72*	92
Sweden	8*	36*	74	94
Ontario-CAN	7*	32*	68*	92
Netherlands[1]	7*	44	84*	98*
Serbia[1]	7*	32*	68*	89*
International median	7*	34*	71*	92
United Arab Emirates	7*	26*	53*	78*
Canada[1]	6*	32*	69*	92
New Zealand[1]	6*	25*	56*	83*
Germany	6*	36*	75	96*
Albania	5*	26*	62*	86*
Slovak Republic[1]	5*	31*	71*	91
Malta	5*	32*	69*	91*
Madrid-ESP	5*	33*	74	96*
North Macedonia	5*	21*	52*	78*
Kazakhstan[1]	5*	29*	71*	95*
Bahrain	4*	21*	54*	81*
Italy	4*	30*	73*	95*
Croatia	4*	28*	70*	95
Spain	4*	27*	65*	91
France	3*	21*	57*	85*
Oman	3*	12*	33*	62*
Abu Dhabi-UAE	3*	15*	37*	64*
Georgia[1]	3*	20*	56*	84*
Armenia	3*	23*	64*	92
Qatar	2*	14*	40*	70*
Iran, Islamic Republic of	2*	13*	39*	68*
Montenegro	1*	11*	43*	76*
Morocco	‡ ‼*	6*	18*	43*
South Africa (5)	1*	5*	16*	37*
Saudi Arabia[1]	1*	6*	23*	51*
Kuwait	‡ ‼*	6*	21*	47*
Kosovo[1]	1*	8*	37*	73*
Chile	1*	7*	33*	70*
Bosnia and Herzegovina	1*	9*	40*	76*
Pakistan[1]	# ‼*	‡ ! *	8*	27*
Philippines[1]	# ‼*	1*	6*	19*

Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

‼ Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significantly different from the U.S. percentage at the same benchmark level at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by the percentage of students reaching the *Advanced* international benchmark in mathematics. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The international median represents all participating TIMSS education systems, except the benchmarking participants. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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GRADE 8

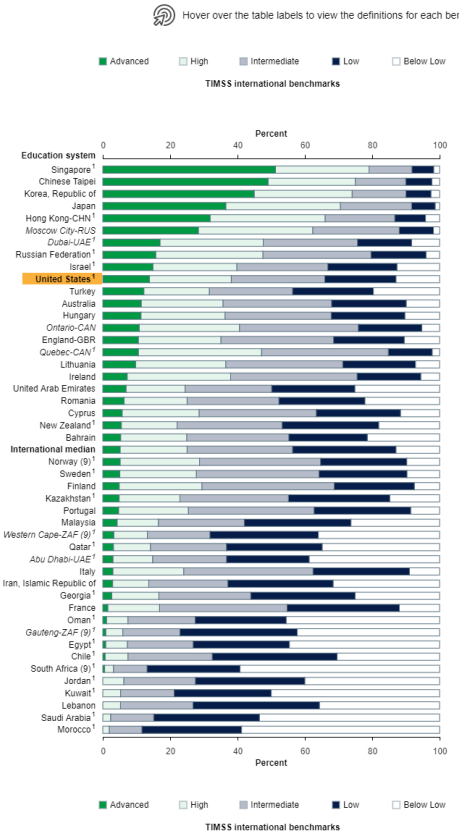
To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade8-math-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark, as shown in the table below. In the figure, the cumulative percentage at or above a given benchmark is represented by the full length of the bar to that benchmark and is, thus, inclusive of any higher levels. Students who did not reach the *Low* level are indicated as "Below *Low*" and indicated by the white segments.

In the United States, 14 percent of 8th-graders were at or above the *Advanced* international benchmark (i.e., demonstrated proficiency with the specific mathematics knowledge and skills at the *Advanced* level), 38 percent were at or above the *High* international benchmark, and 66 percent were at or above the *Intermediate* international benchmark in 2019. These three percentages were each higher than the international median for these levels (5 percent, 25 percent, and 56 percent, respectively). The percentage at or above the *Low* international benchmark was not significantly different from the international median (both 87 percent).

- The percentage of 8th-graders who were at or above the *Advanced* international benchmark in mathematics in the United States (14 percent) was higher than in 30 of the 45 other education systems and lower than in 7 education systems. In the education systems where proportionately more 8th-graders reached the *Advanced* benchmark than in the United States, the percentages ranged from 17 percent in Dubai-UAE to 51 percent in Singapore.
- Eighty-seven percent of U.S. 8th-graders were at or above the *Low* international benchmark in mathematics, which was higher than in 21 education systems and lower than in 16 education systems. In the 16 education systems where proportionately more 8th-graders reached at least the *Low* benchmark than in the United States, the percentages ranged from 90 percent in Norway to 99 percent in Japan.

See grade 8 figure on the next page.

Figure M3b. Percentages of 8th-grade students reaching the TIMSS international benchmarks in mathematics, by education system: 2019



Education system	Advanced (625)	High (550)	Intermediate (475)	Low (400)
Singapore[1]	51*	79*	92*	98*
Chinese Taipei	49*	75*	90*	98*
Korea, Republic of	45*	74*	90*	97*
Japan	37*	71*	92*	99*
Hong Kong-CHN[1]	32*	66*	87*	96*
Moscow City-RUS	28*	62*	88*	98*
Dubai-UAE[1]	17*	48*	76*	92*
Russian Federation[1]	16	48*	80*	96*
Israel[1]	15	40	67	87
United States[1]	**14**	**38**	**66**	**87**
Turkey	12	32*	56*	80*
Australia	11	36	68	90
Hungary	11	36	68	90
Ontario-CAN	11	41	76*	95*
England-GBR	11	35	69	90
Quebec-CAN[1]	11	47*	85*	98*
Lithuania	10*	37	71*	93*
Ireland	7*	38	76*	94*
United Arab Emirates	7*	24*	50*	75*
Romania	6*	25*	52*	78*
Cyprus	6*	29*	63	88
New Zealand[1]	6*	22*	53*	82*
Bahrain	5*	25*	55*	79*
International median	5*	25*	56*	87
Norway (9)[1]	5*	29*	65	90*
Sweden[1]	5*	28*	64	90
Finland	5*	29*	69	93*
Kazakhstan[1]	5*	23*	55*	85
Portugal	5*	25*	63	91*
Malaysia	4*	17*	42*	74*
Western Cape-ZAF (9)[1]	3*	13*	32*	64*
Qatar[1]	3*	14*	37*	65*
Abu Dhabi-UAE[1]	3*	15*	37*	61*
Italy	3*	24*	62	91*
Iran, Islamic Republic of	3*	14*	37*	68*
Georgia[1]	3 ǁ*	17*	44*	75*
France	2*	17*	55*	88
Oman[1]	1*	7*	27*	54*
Gauteng-ZAF (9)[1]	1*	6*	23*	58*
Egypt[1]	1*	7*	27*	55*
Chile[1]	1*	7*	33*	70*
South Africa (9)[1]	1*	3*	13*	41*
Jordan[1]	# ǀ*	6*	28*	60*
Kuwait[1]	# ǀ*	5*	21*	50*
Lebanon	# ǁ*	5*	27*	64*
Saudi Arabia[1]	#*	2*	15*	47*
Morocco[1]	# ǁ*	2*	12*	41*

Rounds to zero.

ǀ Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

ǁ Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significantly different from the U.S. percentage at the same benchmark level at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by the percentage of students reaching the *Advanced* international benchmark in mathematics. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The international median represents all participating TIMSS education systems, except the benchmarking participants. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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Overview of Student Achievement—Science

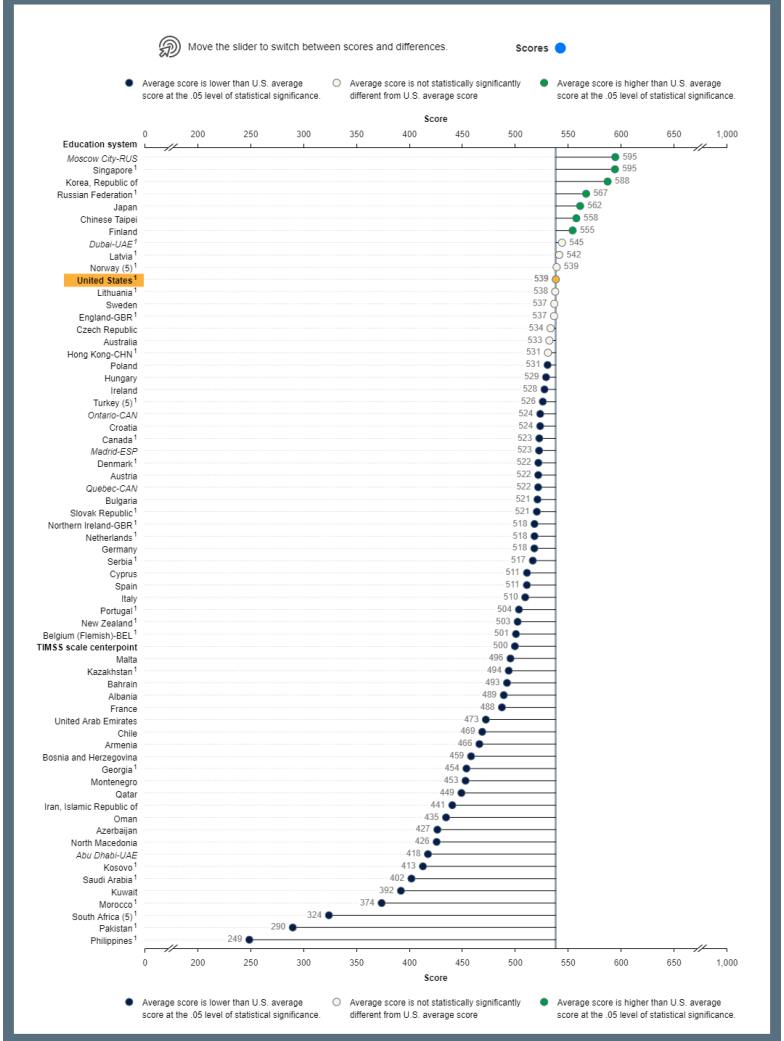
How do U.S. students perform in science compared to their international peers?

GRADE 4

In 2019, U.S. 4th-graders' average score on the TIMSS science scale (539) was higher than the average scores of their peers in 47 education systems and lower than the scores of those in 7 education systems.

- U.S. 4th-graders ranked 8th among the 64 participating education systems in average TIMSS science score. The U.S. average score (539) was not significantly different from the average scores of students in 9 education systems.
- On a scale of 0 to 1,000, U.S. 4th-graders' average TIMSS science score was 539. Average scores ranged from 249 in the lowest performing education system (the Philippines) to 595 in the highest performing education systems (Singapore and Moscow City-RUS). The U.S. average score was 56 points lower than the latter two education systems' average scores and 290 points higher than the Philippines' average score.
- Of the 7 education systems that had higher average TIMSS science scores than the United States, the scores ranged from 555 points in Finland to 595 points in Singapore and Moscow City-RUS.

Figure S1a. Average scores and difference in average scores of 4th-grade students on the TIMSS science scale, by education system: 2019



[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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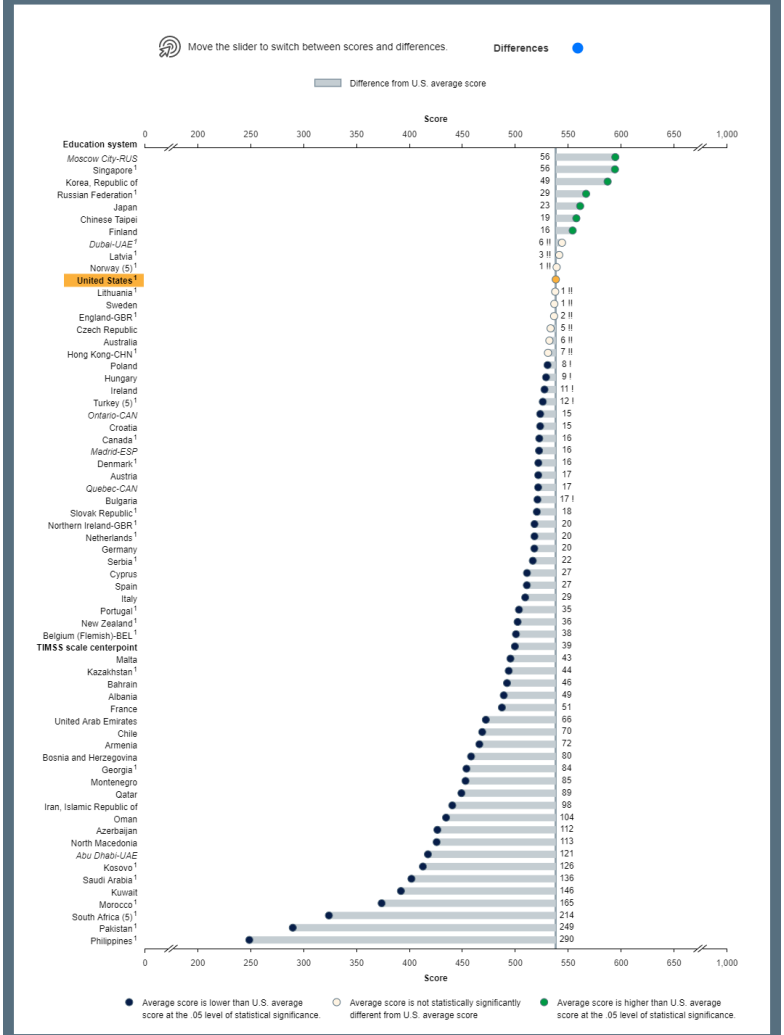
See alternate view of this figure on the next page.

Figure S1a. Average scores and difference in average scores of 4th-grade students on the TIMSS science scale, by education system: 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#issues)

NOTE: Education systems are ordered by average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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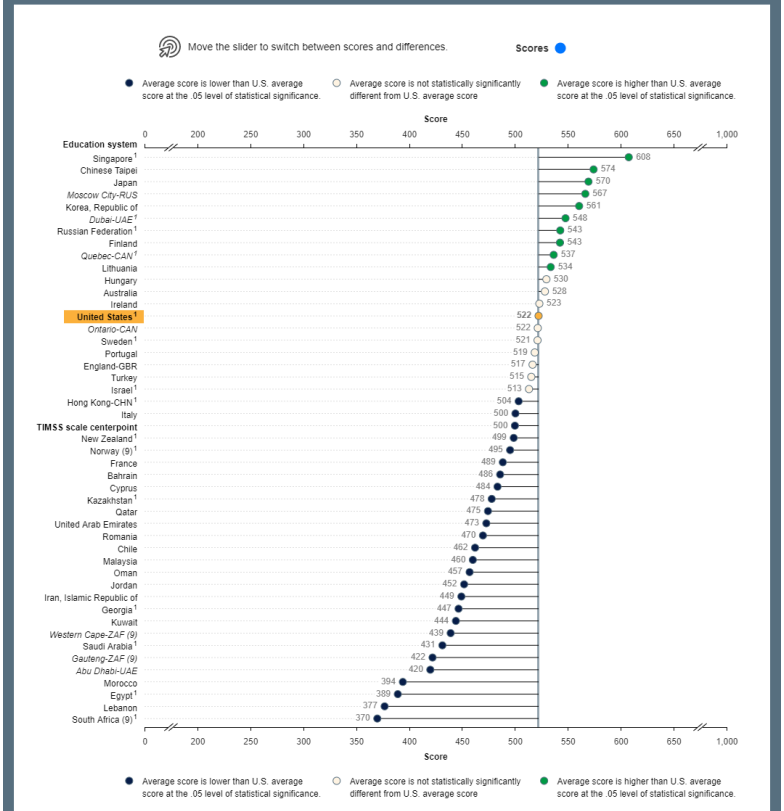
GRADE 8

In 2019, U.S. 8th-graders' average score on the TIMSS science scale (522) was higher than the average scores of their peers in 26 education systems and lower than the scores of those in 10 education systems.

- U.S. 8th-graders ranked 11th among the 46 participating education systems in average TIMSS science score. The U.S. average score (522) was not significantly different from the average scores of students in 9 education systems.
- On a scale of 0 to 1,000, U.S. 8th-graders' average TIMSS science score was 522. Average scores ranged from 370 in the lowest performing education system (South Africa) to 608 in the highest performing education system (Singapore). The U.S. average score was 85 points lower than Singapore's average score and 152 points higher than South Africa's average score.
- Of the 10 education systems that had higher average TIMSS science scores than the United States, the scores ranged from 534 points in Lithuania to 608 points in Singapore.

Figure S1b. Average scores and difference in average scores of 8th-grade students on the TIMSS science scale, by education system: 2019



[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points), thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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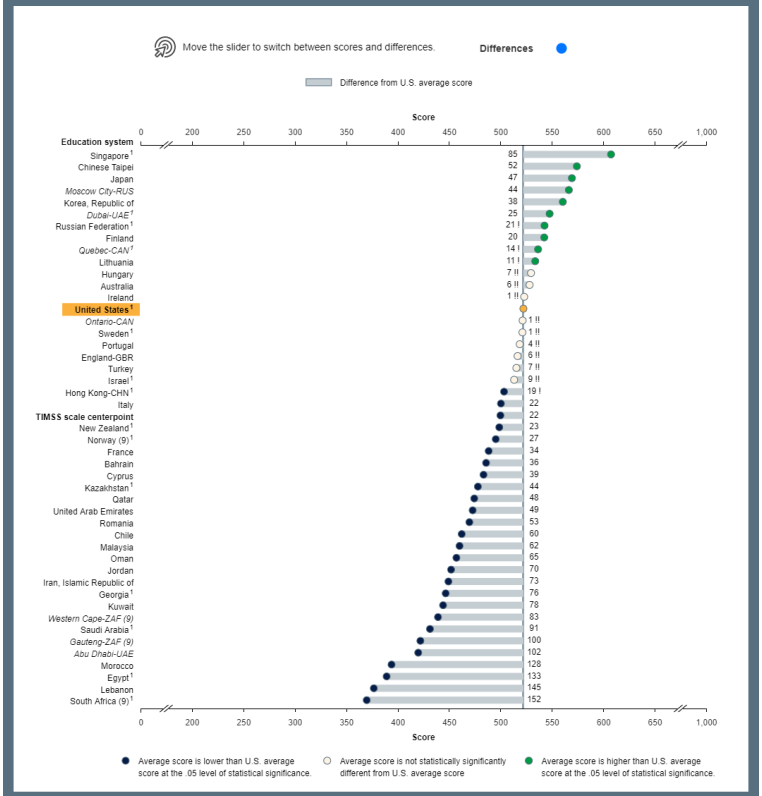
Figure S1b. Average scores and difference in average scores of 8th-grade students on the TIMSS science scale, by education system: 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The TIMSS scale centerpoint is set at 500 and represents the mean of the overall achievement distribution in 1995. The standard deviation of the scale is set to 100. The TIMSS scale is the same in each administration (0 to 1,000 points); thus, a value of 500 in 2019 equals 500 in 1995. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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How large is the score gap between top and bottom performers in science in the United States and other education systems?

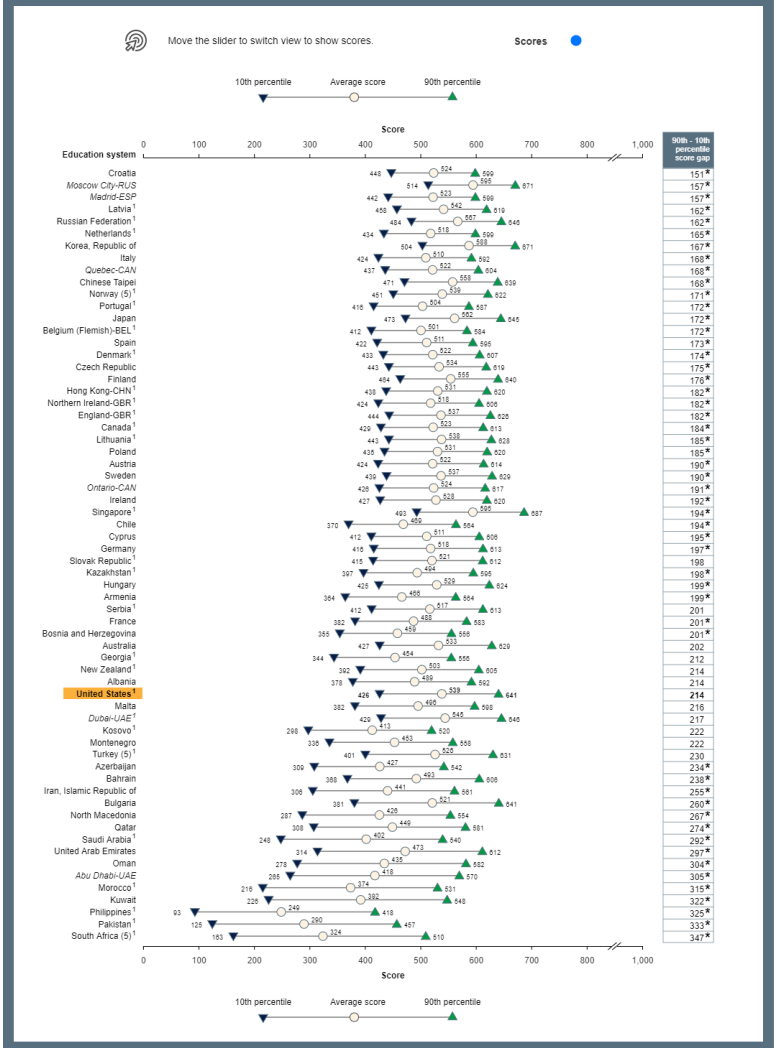
GRADE 4

In the United States, the score gap between top- and bottom-performing 4th-graders on the TIMSS science scale in 2019 was 214 points, which was larger than the gap in 37 education systems and smaller than that in 15 education systems. This gap is measured by the difference between the scores of students at the 90th and 10th percentiles of the distribution and can be one indication of equity within an education system.

- Score gaps between the top- and bottom-performing 4th-graders (those at the 90th and 10th percentiles on the TIMSS science scale) ranged from 151 points in Croatia to 347 points in South Africa; the U.S. score gap was 214 points.
- The scores for top-performing 4th-graders (those at the 90th percentile on the TIMSS science scale) ranged from 418 points in the Philippines to 687 points in Singapore; for U.S. 4th-graders, the 90th percentile score was 641 points.
- The scores for bottom-performing 4th graders (those at the 10th percentile on the TIMSS science scale) ranged from 93 in the Philippines to 514 points in Moscow City-RUS; for U.S. 4th-graders, the 10th percentile score was 426.

See grade 4 figure on the next page.

Figure S2a. Average scores and 10th and 90th percentile scores of 4th-grade students on the TIMSS science scale and percentile score gaps, by education system: 2019



* $p < .05$. Significantly different from the U.S. 90th-10th percentile score gap at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: In addition to average scores, this figure shows the scores for the (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The percentile ranges are specific to each education system's distribution of scores, enabling users to compare scores across education systems. Education systems are ordered by 90th-10th percentile score gap. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

See grade 8 findings for this question on the next page.

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GRADE 8

In the United States, the score gap between top- and bottom-performing 8th-graders on the TIMSS science scale was 254 points in 2019, which was larger than the gap in 24 education systems and lower than the gap in 4 education systems. This gap is measured by the difference between the scores of students at the 90th and 10th percentiles of the distribution and can be one indication of equity within an education system.

- Score gaps between top- and bottom-performing 8th-graders (those at the 90th and 10th percentiles on the TIMSS science scale) ranged from 175 points in Moscow City-RUS to 359 points in Abu Dhabi-UAE. The U.S. score gap was 254 points.
- The scores for top-performing 8th-graders (those at the 90th percentile on the TIMSS science scale) ranged from 503 points in Morocco to 708 points in Singapore; for U.S. 8th-graders, the 90th percentile score was 642 points.
- The scores for bottom-performing 8th-graders (those at the 10th percentile on the TIMSS science scale) ranged from 236 points in Abu Dhabi-UAE to 485 points in Singapore; for U.S. 8th-graders, the 10th percentile score was 388.

Figure S2b. Average scores and 10th and 90th percentile scores of 8th-grade students on the TIMSS science scale and percentile score gaps, by education system: 2019

* $p < .05$. Significantly different from the U.S. 90th-10th percentile score gap at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: In addition to average scores, this figure shows the scores for the (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The percentile ranges are specific to each education system's distribution of scores, enabling users to compare scores across education systems. Education systems are ordered by 90th-10th percentile score gap. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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What levels of science achievement have U.S. students and their international peers reached?

GRADE 4

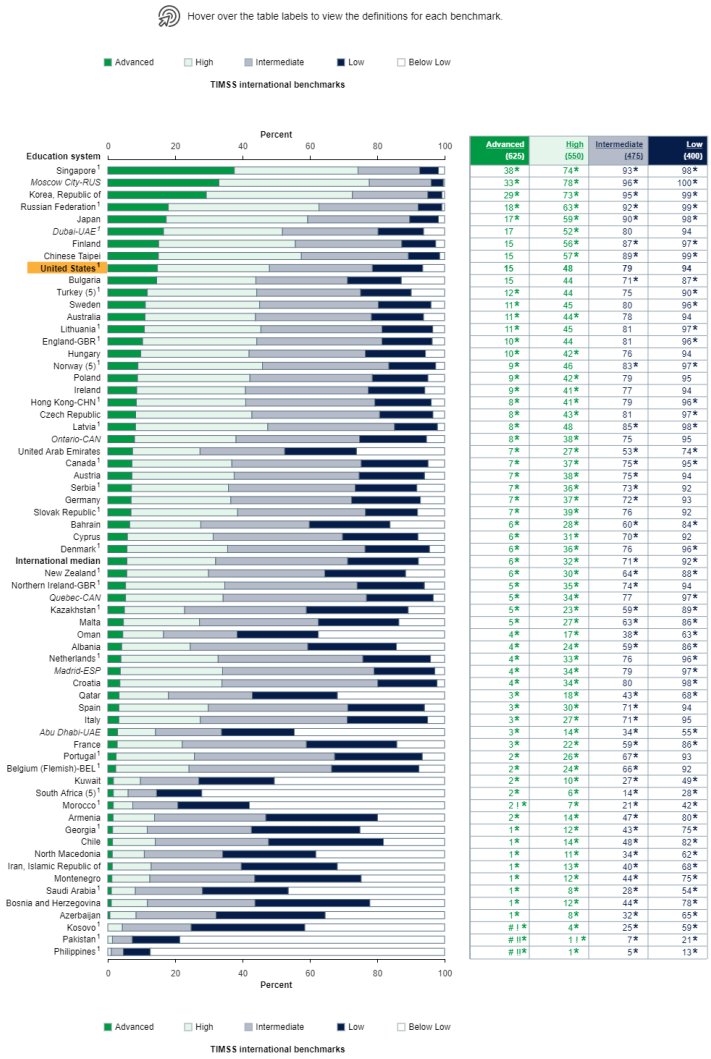
To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade4-science-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark, as shown in the table below. In the figure, the cumulative percentage at or above a given benchmark is represented by the full length of the bar to that benchmark and is, thus, inclusive of any higher levels. Students who did not reach the *Low* level are indicated as "Below *Low*" and indicated by the white segments.

In the United States in 2019, the percentage of 4th-graders at or above each of the international benchmarks in science (*Advanced*, *High*, *Intermediate*, and *Low*) was higher than the respective international median at each benchmark.

- In 2019, 15 percent of U.S. 4th-graders were at or above the *Advanced* international benchmark in science, which was higher than in 54 of the 63 other education systems and lower than in 5 education systems. In the 5 education systems where proportionately more 4th-graders reached the *Advanced* benchmark than in the United States, the percentages ranged from 17 percent in Japan to 38 percent in Singapore.
- Ninety-four percent of U.S. 4th-graders were at or above the *Low* international benchmark in science, which was higher than in 27 education systems and lower than in 20 education systems. In the 20 educations systems where proportionately more 4th-graders reached at least the *Low* benchmark than in the United States, the percentages ranged from 95 percent in Canada to nearly 100 percent in Moscow City-RUS.

See grade 4 figure on the next page.

Figure S3a. Percentages of 4th-grade students reaching the TIMSS international benchmarks in science, by education system: 2019



Education system	Advanced (625)	High (550)	Intermediate (475)	Low (400)
Singapore[1]	38*	74*	93*	98*
Moscow City-RUS	33*	78*	96*	100*
Korea, Republic of	29*	73*	95*	99*
Russian Federation[1]	18*	63*	92*	99*
Japan	17*	59*	90*	98*
Dubai-UAE[1]	17	52*	80	94
Finland	15	56*	87*	97*
Chinese Taipei	15	57*	89*	99*
United States[1]	**15**	**48**	**79**	**94**
Bulgaria	15	44	71*	87*
Turkey (5)[1]	12*	44	75	90*
Sweden	11*	45	80	96*
Australia	11*	44*	78	94
Lithuania[1]	11*	45	81	97*
England-GBR[1]	10*	44	81	96*
Hungary	10*	42*	76	94
Norway (5)[1]	9*	46	83*	97*
Poland	9*	42*	79	95
Ireland	9*	41*	77	94
Hong Kong-CHN[1]	8*	41*	79	96*
Czech Republic	8*	43*	81	97*
Latvia[1]	8*	48	86*	98*
Ontario-CAN	8*	38*	75	95
United Arab Emirates	7*	27*	53*	74*
Canada[1]	7*	37*	75*	95*
Austria	7*	38*	75*	94
Serbia[1]	7*	36*	73*	92
Germany	7*	37*	72*	93
Slovak Republic[1]	7*	39*	76	92
Bahrain	6*	28*	60*	84*
Cyprus	6*	31*	70*	92
Denmark[1]	6*	36*	76	96*
International median	6*	32*	71*	92*
New Zealand[1]	6*	30*	64*	88*
Northern Ireland-GBR[1]	5*	35*	74*	94
Quebec-CAN	5*	34*	77	97*
Kazakhstan[1]	5*	23*	59*	89*
Malta	5*	27*	63*	86*
Oman	4*	17*	38*	63*
Albania	4*	24*	59*	86*
Netherlands[1]	4*	33*	76	96*
Madrid-ESP	4*	34*	79	97*
Croatia	4*	34*	80	98*
Qatar	3*	18*	43*	68*
Spain	3*	30*	71*	94
Italy	3*	27*	71*	95
Abu Dhabi-UAE	3*	14*	34*	55*
France	3*	22*	59*	86*
Portugal[1]	2*	26*	67*	93
Belgium (Flemish)-BEL[1]	2*	24*	66*	92
Kuwait	2*	10*	27*	49*
South Africa (5)[1]	2*	6*	14*	28*
Morocco[1]	2 ! *	7*	21*	42*
Armenia	2*	14*	47*	80*
Georgia[1]	1*	12*	43*	75*
Chile	1*	14*	48*	82*
North Macedonia	1*	11*	34*	62*
Iran, Islamic Republic of	1*	13*	40*	68*
Montenegro	1*	12*	44*	75*
Saudi Arabia[1]	1*	9*	28*	54*
Bosnia and Herzegovina	1*	12*	44*	78*
Azerbaijan	1*	8*	32*	65*
Kosovo[1]	# ! *	4*	25*	59*
Pakistan[1]	# !! *	1 ! *	7*	21*
Philippines[1]	# !! *	1*	5*	13*

Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significantly different from the U.S. percentage at the same benchmark level at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by the percentage of students reaching the *Advanced* international benchmark in science. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The international median represents all participating TIMSS education systems, except the benchmarking participants. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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- Read the International TIMSS 2019 Report

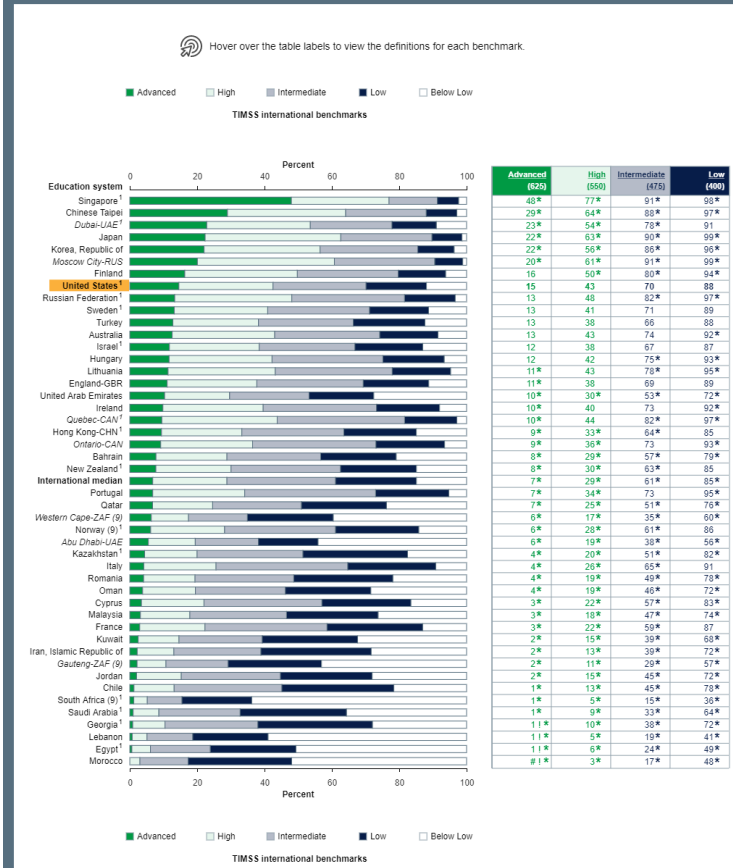
GRADE 8

To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade8-math-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark, as shown in the table below. In the figure, the cumulative percentage at or above a given benchmark is represented by the full length of the bar to that benchmark and is, thus, inclusive of any higher levels. Students who did not reach the *Low* level are indicated as "Below *Low*" and indicated by the white segments.

In the United States, the percentage of 8th-graders at or above each of the international benchmarks in science (*Advanced*, *High*, *Intermediate*, and *Low*) was higher than the respective international median at or above each benchmark in 2019.

- The percentage of 8th-graders who were at or above the *Advanced* international benchmark in science in the United States (15 percent) was higher than in 32 of the 45 other education systems and lower than in 6 education systems. In the education systems where proportionately more 8th-graders reached the *Advanced* benchmark than in the United States, the percentages ranged from 20 percent in Moscow City-RUS to 48 percent in Singapore.
- Eighty-eight percent of U.S. 8th-graders were at or above the *Low* international benchmark in science, which was higher than in 21 education systems and lower than in 14 education systems. In the 14 education systems where proportionately more 8th-graders reached at least the *Low* benchmark than in the United States, percentages ranged from 92 percent in Australia and Ireland to 99 percent in Japan and Moscow City-RUS.

Figure S3b. Percentages of 8th-grade students reaching the TIMSS international benchmarks in science, by education system: 2019



Education system	Advanced (625)	High (550)	Intermediate (475)	Low (400)
Singapore[1]	48*	77*	91*	98*
Chinese Taipei	29*	64*	88*	97*
Dubai-UAE[1]	23*	54*	78*	91
Japan	22*	63*	90*	99*
Korea, Republic of	22*	56*	86*	96*
Moscow City-RUS	20*	61*	91*	99*
Finland	16	50*	80*	94*
United States[1]	15	43	70	88
Russian Federation[1]	13	48	82*	97*
Sweden[1]	13	41	71	89
Turkey	13	38	66	88
Australia	13	43	74	92*
Israel[1]	12	38	67	87
Hungary	12	42	75*	93*
Lithuania	11*	43	78*	95*
England-GBR	11*	38	69	89
United Arab Emirates	10*	30*	53*	72*
Ireland	10*	40	73	92*
Quebec-CAN[1]	10*	44	82*	97*
Hong Kong-CHN[1]	9*	33*	64*	85
Ontario-CAN	9*	36*	73	93*
Bahrain	8*	29*	57*	79*
New Zealand[1]	8*	30*	63*	85
International median	7*	29*	61*	85*
Portugal	7*	34*	73	95*
Qatar	7*	25*	51*	76*
Western Cape-ZAF (9)	6*	17*	35*	60*
Norway (9)[1]	6*	28*	61*	86
Abu Dhabi-UAE	6*	19*	38*	56*
Kazakhstan[1]	4*	20*	51*	82*
Italy	4*	26*	65*	91
Romania	4*	19*	49*	78*
Oman	4*	19*	46*	72*
Cyprus	3*	22*	57*	83*
Malaysia	3*	18*	47*	74*
France	3*	22*	59*	87
Kuwait	2*	15*	39*	68*
Iran, Islamic Republic of	2*	13*	39*	72*
Gauteng-ZAF (9)	2*	11*	29*	57*
Jordan	2*	15*	45*	72*
Chile	1*	13*	45*	78*
South Africa (9)[1]	1*	5*	15*	36*
Saudi Arabia[1]	1*	9*	33*	64*
Georgia[1]	1 ! *	10*	38*	72*
Lebanon	1 ! *	5*	19*	41*
Egypt[1]	1 ! *	6*	24*	49*
Morocco	# ! *	3*	17*	48*

Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

* $p < .05$. Significantly different from the U.S. percentage at the same benchmark level at the .05 level of statistical significance.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#issues)

NOTE: Education systems are ordered by the percentage of students reaching the *Advanced* international benchmark in science. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The international median represents all participating TIMSS education systems, except the benchmarking participants. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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Trends in Student Achievement—Mathematics

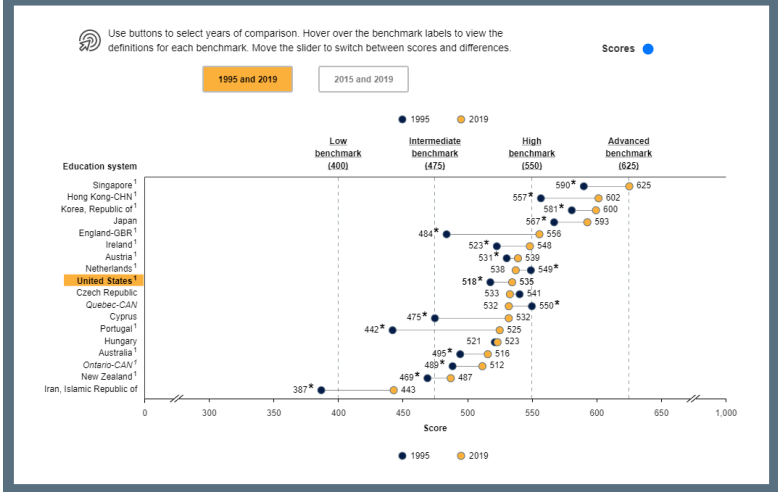
How has mathematics achievement changed over time in the United States and other education systems?

GRADE 4

U.S. 4th-graders' average mathematics score was 17 points higher in 2019 than in 1995 (when TIMSS was first administered) but was not significantly different from the score in 2015.

- Among the 18 education systems that participated in both the 1995 and 2019 administrations of TIMSS, 14 education systems (including the United States) saw increases in average 4th-grade mathematics scores over the time period while 2 education systems saw decreases. The U.S. average score increased from 518 points in 1995 to 535 points in 2019.
- Between 1995 and 2019, increases in average 4th-grade mathematics scores ranged from 9 points in Austria to 83 points in Portugal, compared with 17 points in the United States.
- Among the 49 education systems that participated in both the 2015 and 2019 administrations of TIMSS, 16 education systems saw increases in average 4th-grade mathematics scores over the time period, while 8 education systems saw decreases. The U.S. average score in 2015 (539) was not significantly different from the score in 2019 (535).
- Between 2015 and 2019, increases in 4th-graders' average mathematics scores ranged from 7 points in Croatia to 33 points in Dubai-UAE. Decreases in average scores ranged from 8 points in the Republic of Korea to 18 points in Chile.

Figure M4a. Average scores and changes in average scores of 4th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The dotted lines indicate the threshold score for the TIMSS international benchmarks. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

See alternate view of the figure for comparisons of 1995 and 2019 on the next page.

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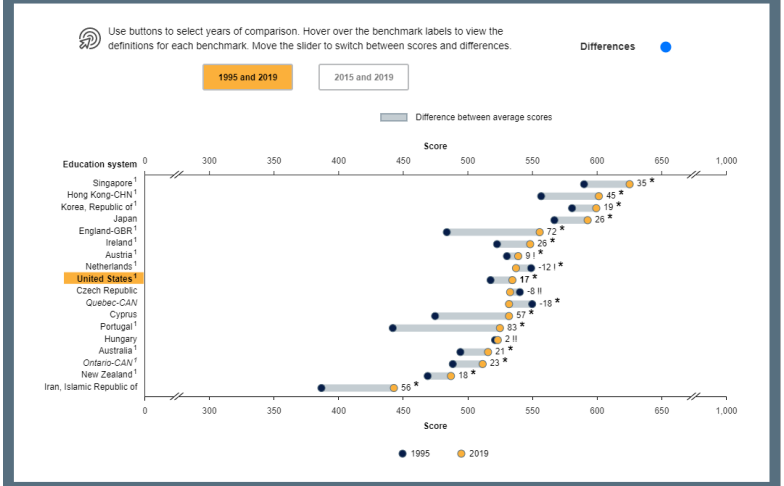
Figure M4a. Average scores and changes in average scores of 4th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



I Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

II Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

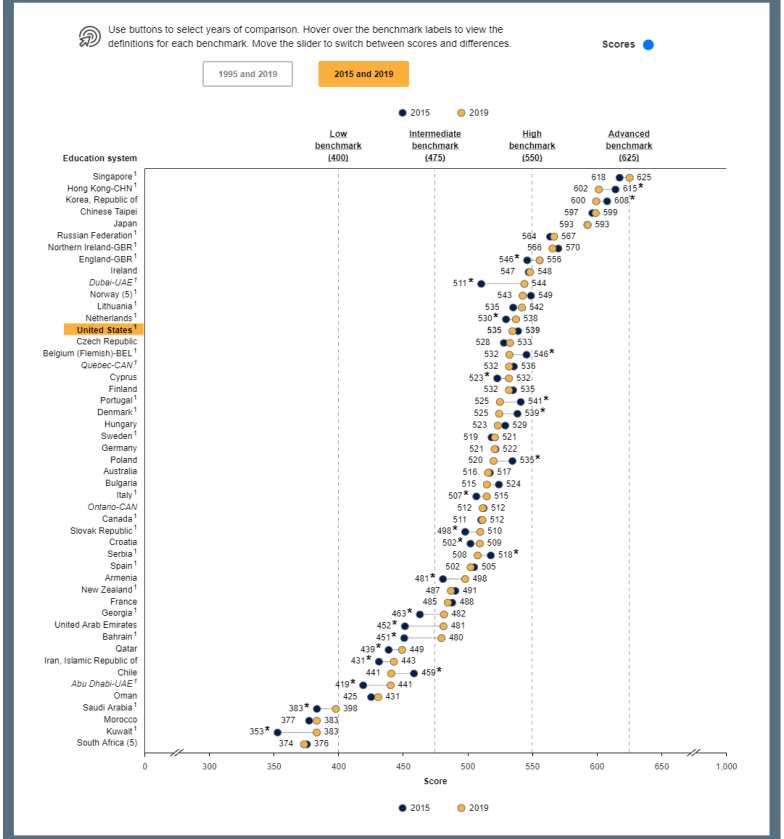
1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

See comparisons of 2015 and 2019 below.

Figure M4a. Average scores and changes in average scores of 4th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). The dotted lines indicate the threshold score for the TIMSS international benchmarks. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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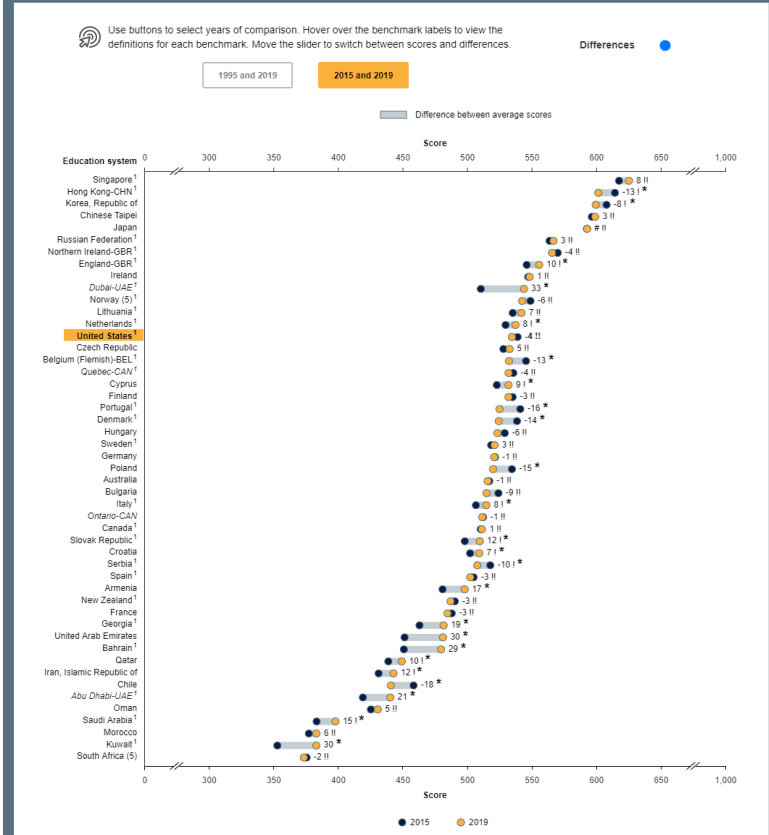
See alternate view of the figure for comparisons of 2015 and 2019 on the next page.

Figure M4a. Average scores and changes in average scores of 4th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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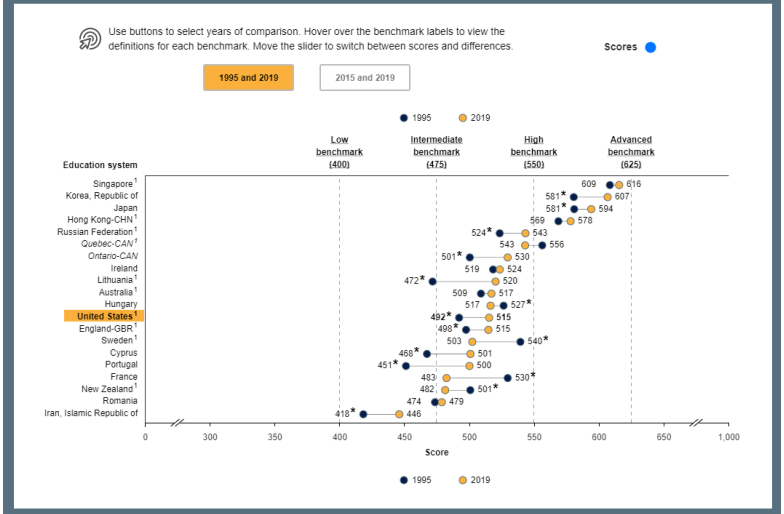
GRADE 8

U.S. 8th-graders' average mathematics score in 2019 was 23 points higher than in 1995 but was not significantly different from the score in 2015.

- Among the 20 education systems that participated in both the 1995 and 2019 administrations of TIMSS, 10 education systems (including the United States) saw increases in average 8th-grade mathematics scores over the time period while 4 education systems saw decreases. The U.S. average score increased from 492 points in 1995 to 515 points in 2019.
- Between 1995 and 2019, increases in average 8th-grade mathematics scores ranged from 13 points in Japan to 49 points in Portugal and Lithuania, compared with 23 points in the United States.
- Among the 37 education systems that participated in both the 2015 and 2019 administrations of TIMSS, 14 education systems saw increases in average 8th-grade mathematics scores over the time period, while 4 education systems saw decreases. The U.S. average score in 2015 (518) was not significantly different from the score in 2019 (515).
- Between 2015 and 2019, increases in 8th-graders' average mathematics scores ranged from 8 points in Japan and Oman to 38 points in Turkey. Decreases in average scores ranged from 9 points in Norway to 16 points in Hong Kong-CHN.

See comparisons of 1995 and 2019 on the next page.

Figure M4b. Average scores and changes in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). The dotted lines indicate the threshold score for the TIMSS international benchmarks. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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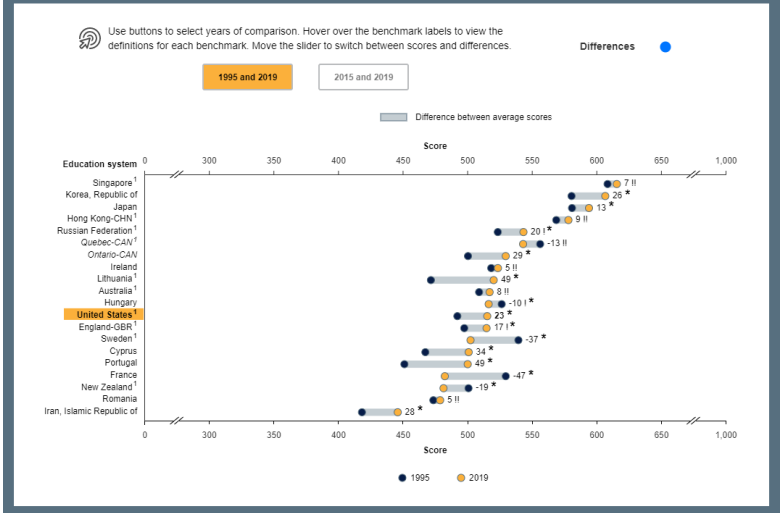
Figure M4b. Average scores and changes in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



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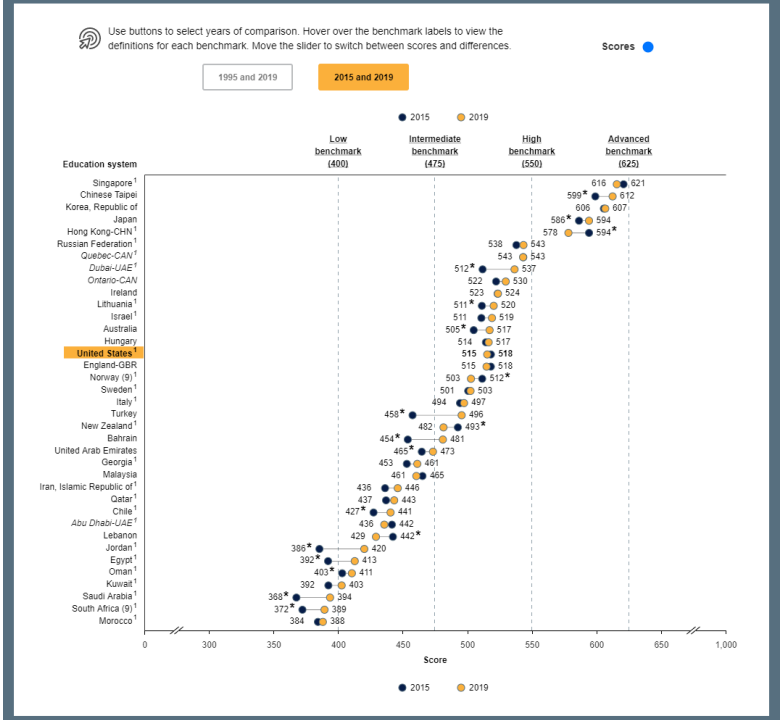
See comparisons of 2015 and 2019 on the next page.

Figure M4b. Average scores and changes in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

¹ Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

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SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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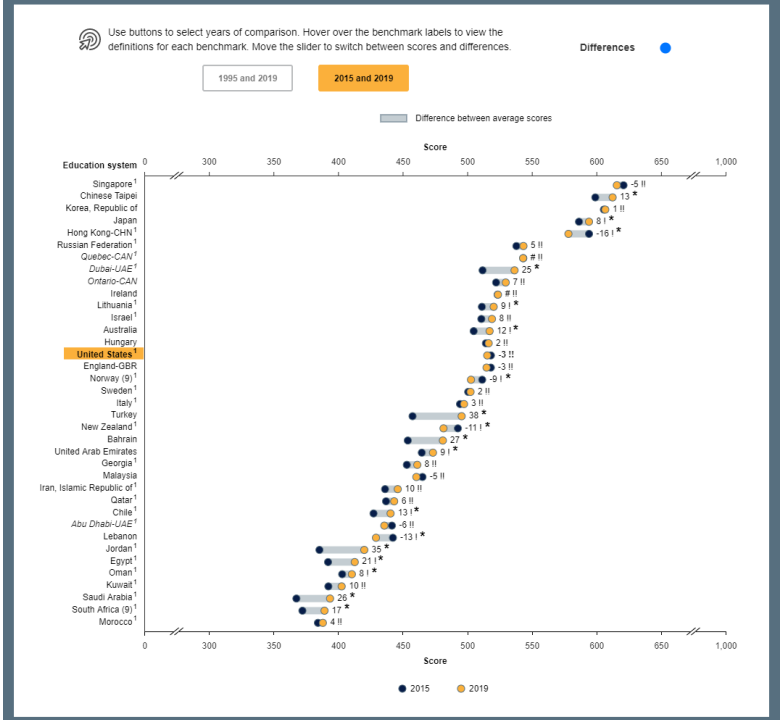
Figure M4b. Average scores and changes in average scores of 8th-grade students on the TIMSS mathematics scale, by education system: 1995, 2015, and 2019



\# Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

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NOTE: Education systems are ordered by 2019 average mathematics score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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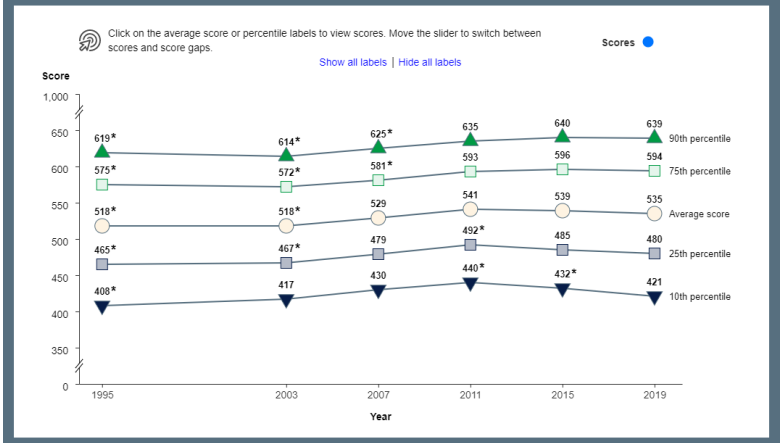
Are U.S. students making progress in mathematics at selected percentiles?

GRADE 4

Compared to the first administration of TIMSS in 1995, U.S. 4th-graders' mathematics scores increased across all levels of ability, with higher scores in 2019 than in 1995 at the 10th, 25th, 75th, and 90th percentiles. However, scores were lower in 2019 than in 2011 at the lower end of the distribution.

- U.S. 4th-graders' scores at the higher end of the mathematics distribution (i.e., the 75th and 90th percentiles) were higher in 2019 than in 1995, 2003, and 2007, although they were not significantly different from 2011 or 2015.
- Despite long-term increases between 1995 and 2019, U.S. 4th-graders' 10th and 25th percentile scores in mathematics were lower in 2019 than in 2011. The 2019 score at the 10th percentile was also lower than in 2015.
- Looking at the gap between the scores of U.S. 4th-graders at the 90th and 10th percentiles of the TIMSS mathematics scale, there was no significant change between the 2019 score gap (219 points) and the 1995 score gap (210 points). However, the 2019 score gap was larger than those in 2003, 2007, and 2011 (198, 195, and 195 points, respectively).

Figure M5a. Trends in average scores and selected percentile scores of U.S. 4th-grade students on the TIMSS mathematics scale: Selected years, 1995–2019

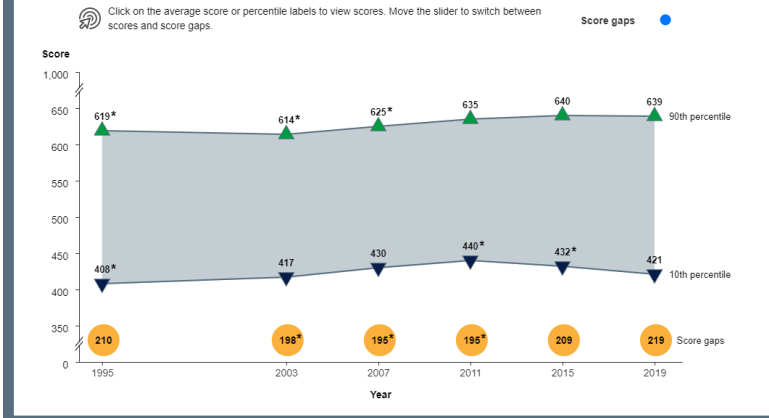


* $p < .05$. Significantly different from the 2019 score at the .05 level of statistical significance.

NOTE: In addition to average scores, this figure shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

Figure M5a. Trends in average scores and selected percentile scores of U.S. 4th-grade students on the TIMSS mathematics scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 estimate at the .05 level of statistical significance.

NOTE: In addition to average scores, this figure shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The yellow circles indicate the score gap between the 90th and 10th percentiles. TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

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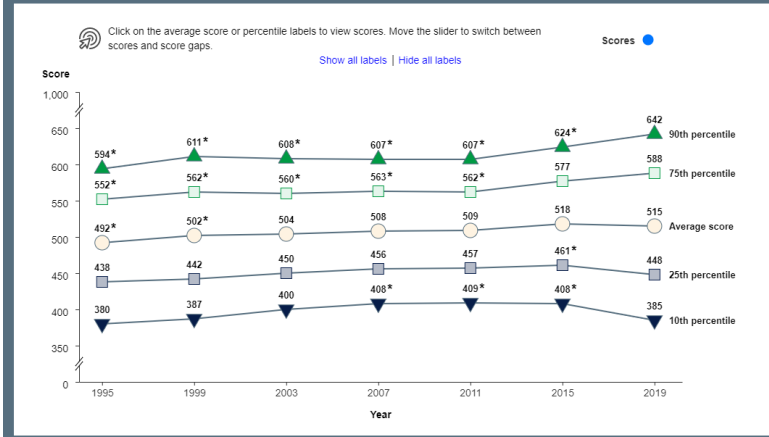
See grade 8 findings for this question on the next page.

GRADE 8

U.S. 8th-graders' mathematics scores increased for top performers, with higher scores in 2019 than in all prior administrations of TIMSS for students at the 90th percentile. However, at the 10th percentile, 2019 scores decreased from 2007, 2011, and 2015.

- U.S. 8th-graders' score at the high end of the mathematics distribution (i.e., the 90th percentile) was higher in 2019 than in all prior administrations of TIMSS, by up to 47 points (in 1995). The score of students at the 75th percentile was also higher in 2019 than in all prior administrations except 2015.
- Although not statistically different from the scores in the first three administrations of TIMSS, U.S. 8th-graders' 10th percentile score in mathematics in 2019 was lower than the scores in 2007, 2011, and 2015, by up to 24 points (in 2011).
- The score gap between U.S. 8th-graders at the 90th and 10th percentiles of the TIMSS mathematics scale was larger in 2019 than in all prior administrations of TIMSS, by up to 59 points (in 2011).

Figure M5b. Trends in average scores and selected percentile scores of U.S. 8th-grade students on the TIMSS mathematics scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 score at the .05 level of statistical significance.

NOTE: In addition to average scores, this table shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. It also shows the 90th-10th percentile score gaps. In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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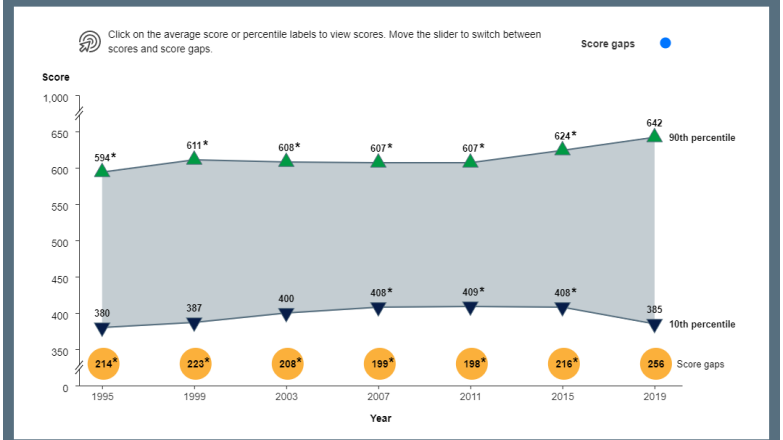
Figure M5b. Trends in average scores and selected percentile scores of U.S. 8th-grade students on the TIMSS mathematics scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 estimate at the .05 level of statistical significance.

NOTE: In addition to average scores, this table shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. It also shows the 90th-10th percentile score gaps. In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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Have levels of U.S. students' mathematics achievement changed over time?

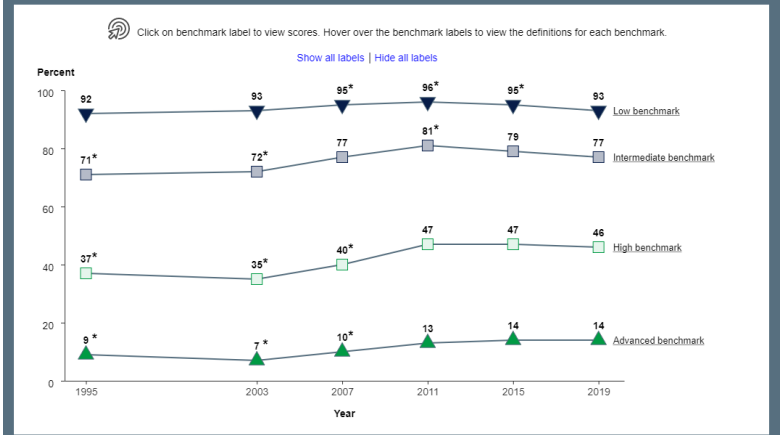
GRADE 4

To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade4-math-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark.

Compared to the two earliest administrations of 4th-grade TIMSS (in 1995 and 2003), higher percentages of U.S. students were at or above the *Advanced*, *High*, and *Intermediate* international benchmarks in mathematics in 2019. The percentage of students at or above the *Low* international benchmark in 2019 was statistically unchanged from 1995 and 2003, although it decreased from the three most recent administrations (2007, 2011, and 2015).

- The percentages of U.S. 4th-graders at or above the *Advanced* and *High* international benchmarks in mathematics followed similar patterns over time. In 2019, about 14 percent of U.S. 4th-graders were at or above the *Advanced* benchmark and 46 percent were at or above the *High* benchmark, both of which were higher than the percentages in 1995, 2003, and 2007 and not significantly different from those in 2011 and 2015.
- The percentage of U.S. 4th-graders who were at or above the *Low* international benchmark in mathematics in 2019 (93 percent) declined from recent years: 2007, 2011, and 2015 (from 95, 96, and 95 percent, respectively).

Figure M6a. Trends in percentages of U.S. 4th-grade students reaching the TIMSS international benchmarks in mathematics: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 percentage at the same benchmark level at the .05 level of statistical significance.

NOTE: TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

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See grade 8 findings for this question on the next page.

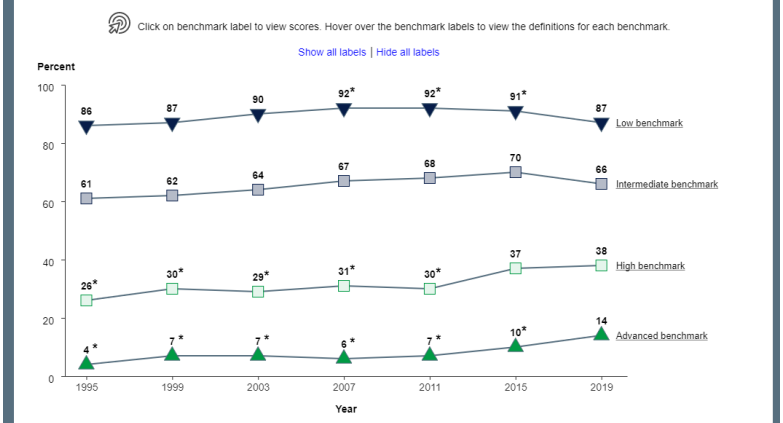
GRADE 8

To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade8-math-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark.

Compared to most prior administrations of TIMSS, higher percentages of U.S. 8th-graders were at or above the *Advanced* and *High* international benchmarks in mathematics in 2019. However, the percentage at or above the *Low* international benchmark in 2019 decreased from the three most recent administrations (2007, 2011, and 2015).

- In 2019, the percentage of U.S. 8th-graders at or above the *Advanced* international benchmark in mathematics (14 percent) was higher than in 1995 (4 percent) and in all other administrations of TIMSS (6 to 10 percent). Similarly, the percentage at or above the *High* international benchmark (38 percent) was higher than in all years except 2015.
- The percentage of U.S. 8th-graders at or above the *Low* international benchmark in mathematics in 2019 (87 percent) declined from the percentages in 2007, 2011, and 2015 (92, 92, and 91 percent, respectively).

Figure M6b. Trends in percentages of U.S. 8th-grade students reaching the TIMSS international benchmarks in mathematics: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 percentage at the same benchmark level at the .05 level of statistical significance.

NOTE: In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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Trends in Student Achievement—Science

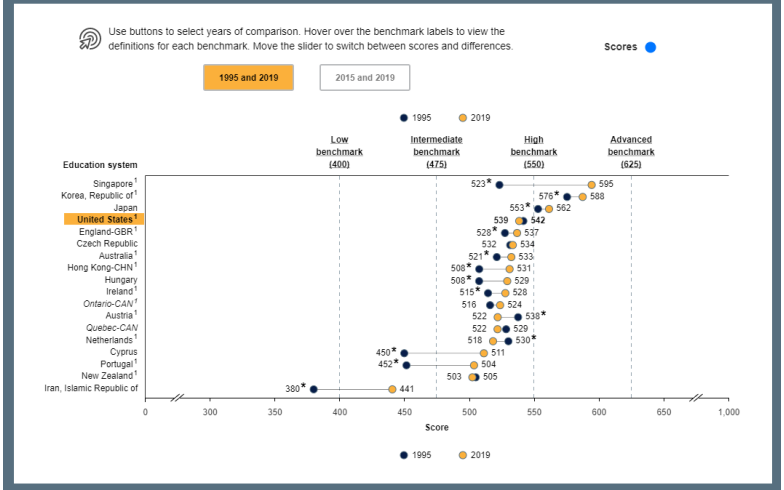
How has science achievement changed over time in the United States and other education systems?

GRADE 4

U.S. 4th-graders' average science score in 2019 was not significantly different from their score in 1995 (when TIMSS was first administered) but was 7 points lower than in 2015.

- Among the 18 education systems that participated in both the 1995 and 2019 administrations of TIMSS, 11 education systems saw increases in average 4th-grade science scores over the time period while 2 education systems saw decreases. The U.S. average scores in 1995 (542) and 2019 (539) were not significantly different.
- Between 1995 and 2019, increases in average 4th-grade science scores ranged from 8 points in Japan to 71 points in Singapore.
- Among the 48 education systems that participated in both the 2015 and 2019 administrations of TIMSS, 11 education systems saw increases in average 4th-grade science scores over the time period, while 10 education systems (including the United States) saw decreases. The U.S. average score decreased from 546 points in 2015 to 539 points in 2019.
- Between 2015 and 2019, increases in 4th-graders' average science scores ranged from 9 points in Australia to 55 points in Kuwait. Decreases in average scores ranged from 7 points in Spain, the United States, and Japan to 25 points in Hong Kong-CHN.

Figure S4a. Average scores and changes in average scores of 4th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Trend data for 2015–2019 are not available for South Africa because it did not participate in the 2015 assessment in science (although it did participate in the 2015 assessment in mathematics). The dotted lines indicate the threshold score for the TIMSS international benchmarks. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

See alternate view of this figure with long-term differences on the next page.

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- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
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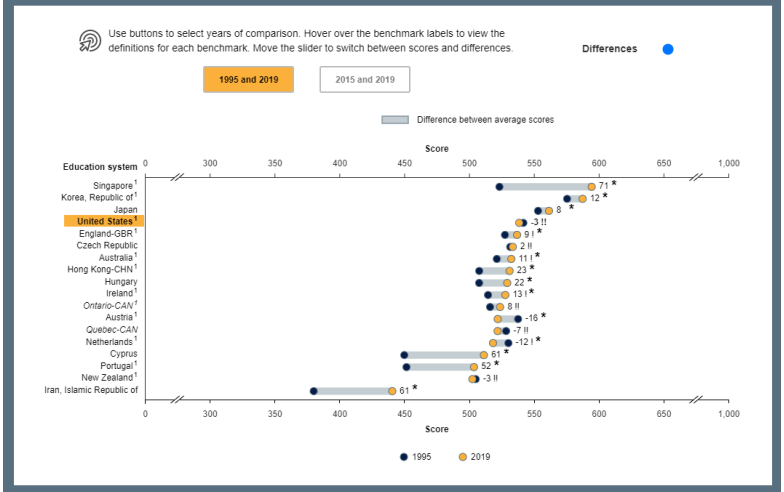
Figure S4a. Average scores and changes in average scores of 4th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Trend data for 2015–2019 are not available for South Africa because it did not participate in the 2015 assessment in science (although it did participate in the 2015 assessment in mathematics). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

See comparisons of 2015 and 2019 below.

FOR MORE INFORMATION

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
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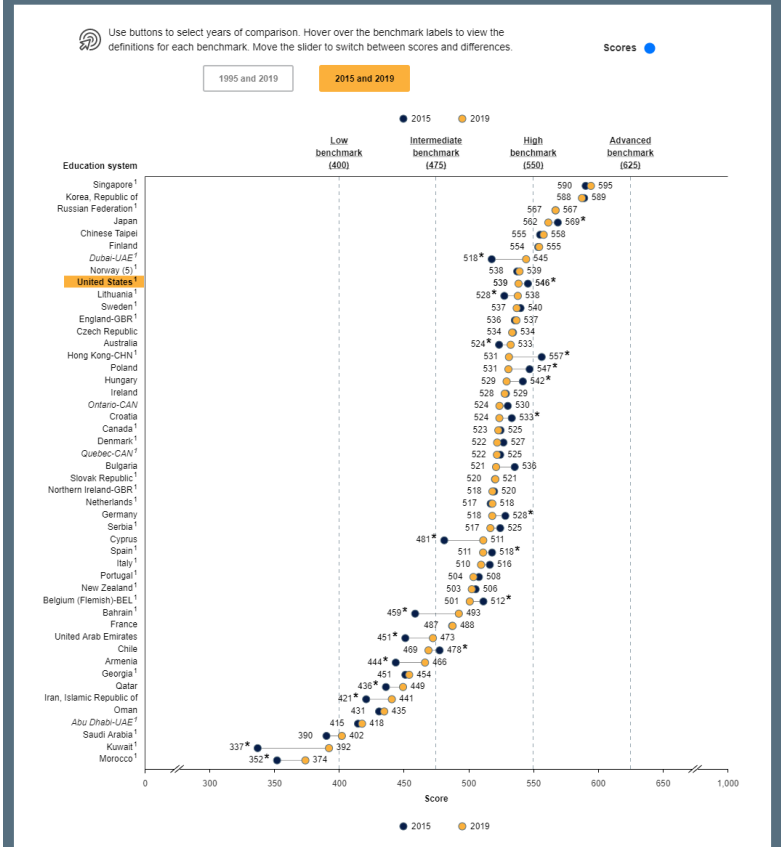
Figure S4a. Average scores and changes in average scores of 4th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

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SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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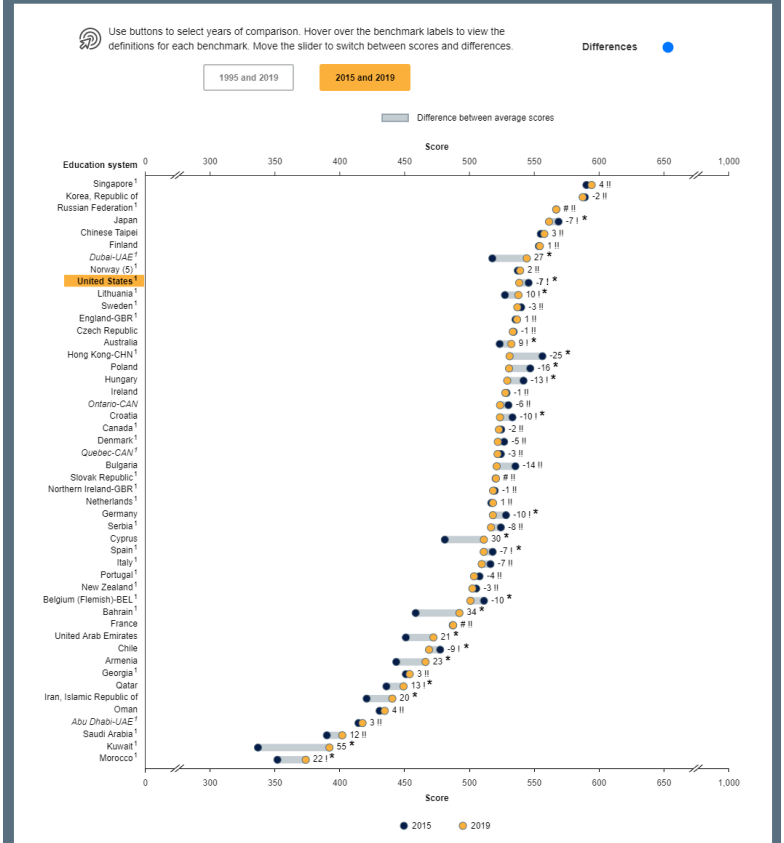
See alternate view of this figure with short-term differences on the next page.

Figure S4a. Average scores and changes in average scores of 4th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Trend data for 2015–2019 are not available for South Africa because it did not participate in the 2015 assessment in science (although it did participate in the 2015 assessment in mathematics). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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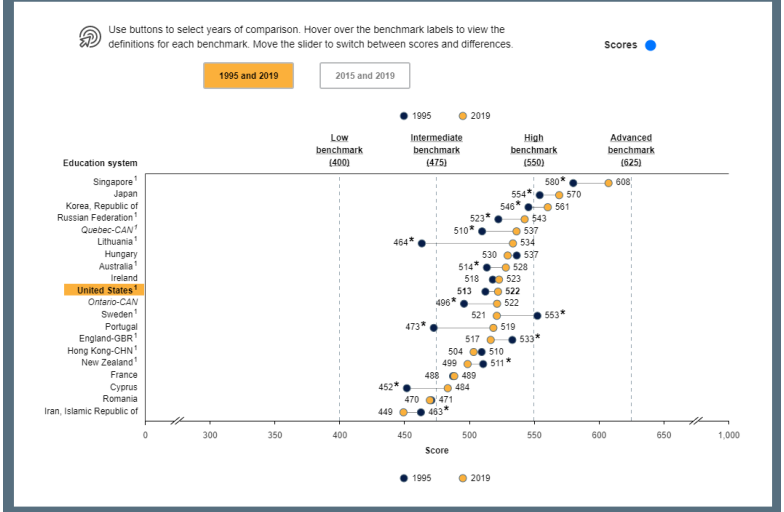
GRADE 8

U.S. 8th-graders' average science score in 2019 was not significantly different from their average score in 1995, when TIMSS was first administered, or, more recently, from their average score in 2015.

- Among the 20 education systems that participated in both the 1995 and 2019 administrations of TIMSS, 10 saw increases in average 8th-grade science scores between the two years, while 4 saw decreases. The U.S. average scores in 1995 (513) and 2019 (522) were not significantly different.
- From 1995 to 2019, increases in average 8th-grade science scores ranged from 15 points in Japan, the Republic of Korea, and Australia to 70 points in Lithuania. Decreases ranged from 12 points in New Zealand to 31 points in Sweden.
- Among the 37 education systems that participated in both the 2015 and 2019 administrations of TIMSS, 12 education systems saw increases in average 8th-grade science scores between the 2 years, while 6 education systems saw decreases. The U.S. average score in 2015 (530) was not significantly different from the average score in 2019 (522).
- Between 2015 and 2019, increases in 8th-graders' average science scores ranged from 8 points in Chile to 35 points in Saudi Arabia. Decreases in average scores ranged from 13 points in Norway to 42 points in Hong Kong-CHN.

See comparisons of 1995 and 2019 on the next page.

Figure S4b. Average scores and changes in average scores of 8th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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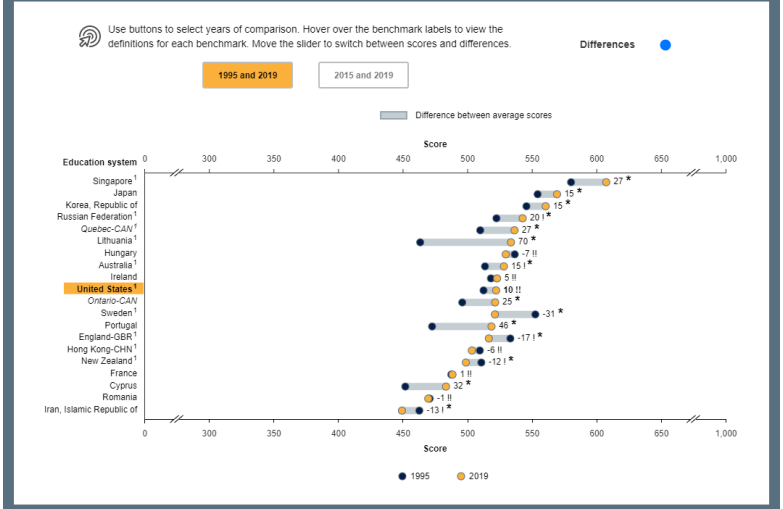
Figure S4b. Average scores and changes in average scores of 8th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#issues)

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SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2015, 2019.

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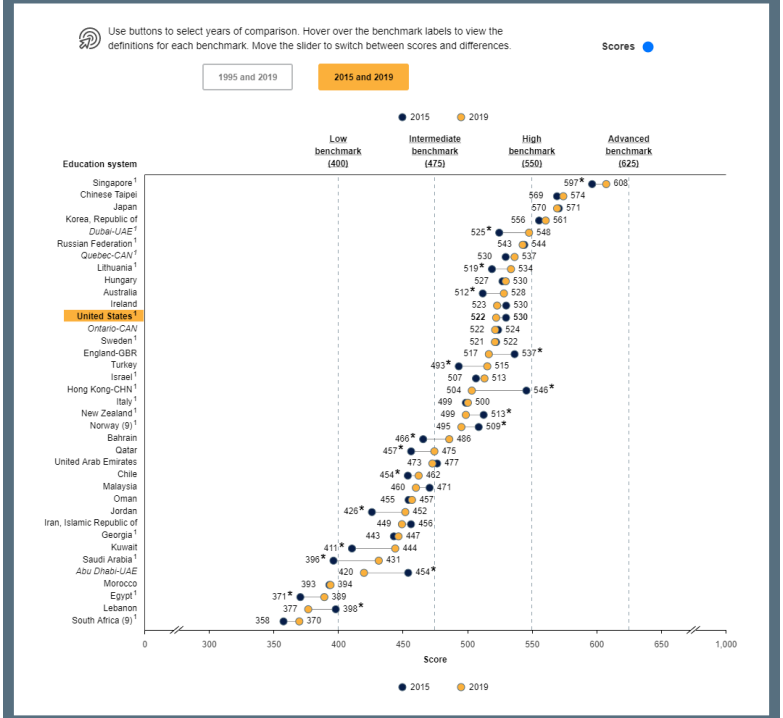
See comparisons of 2015 and 2019 on the next page.

Figure S4b. Average scores and changes in average scores of 8th-grade students on the TIMSS science scale, by education system: 1995, 2015, and 2019



* $p < .05$. Significantly different from the 2019 average score.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

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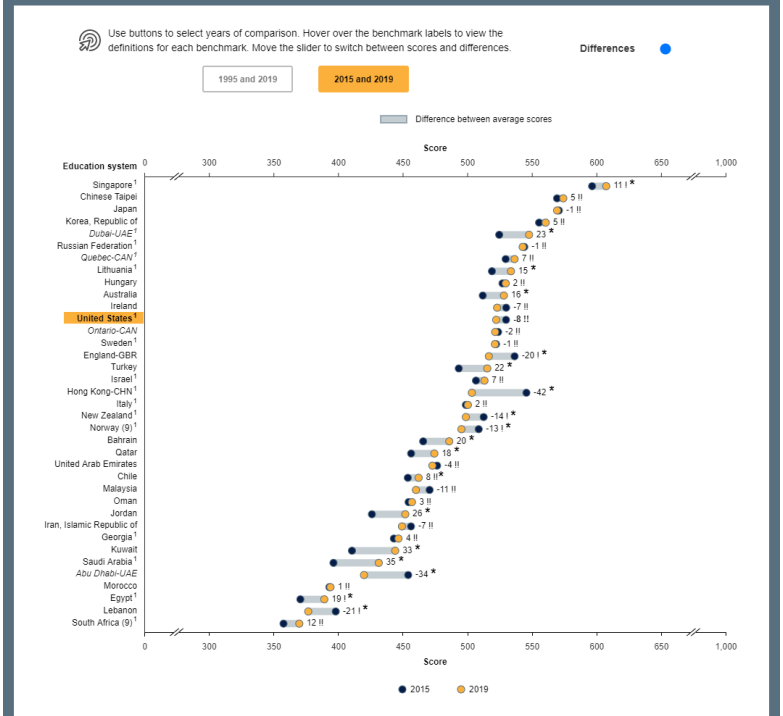

I Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

II Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Change in average scores within the education system is significant at the .05 level of statistical significance.

1 Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by 2019 average science score. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

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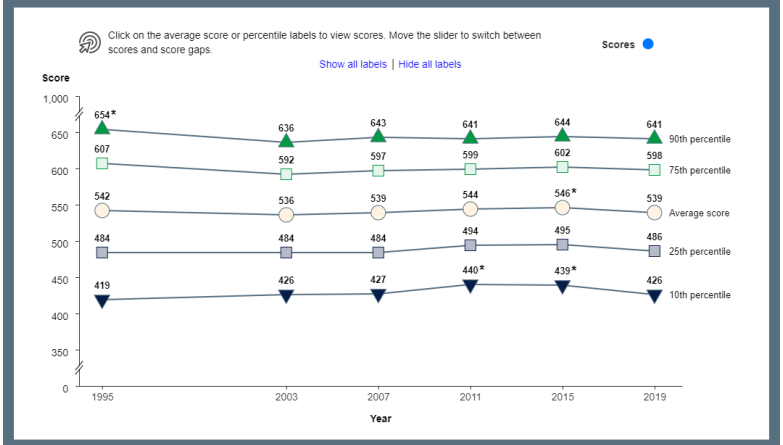
Are U.S. students making progress in science at selected percentiles?

GRADE 4

Over time, U.S. 4th-grade science scores have decreased at both the top and bottom ends of the range of ability. The score at the top end changed over the long term, with the U.S. 90th percentile score lower in 2019 than in 1995; the score at the bottom end changed over the shorter term, with the U.S. 10th percentile score lower than in 2011 and 2015.

- U.S. 4th-graders' score at the high end of the science distribution (i.e., the 90th percentile) was lower in 2019 than in 1995, although the score did not significantly change from any of the more recent administrations of TIMSS.
- U.S. 4th-graders' 2019 score at the low end of the science distribution (i.e., the 10th percentile) was lower than in 2011 and 2015, although it was statistically unchanged from earlier administrations of TIMSS.
- Looking at the gap between the scores of U.S. 4th-graders at the 90th and 10th percentiles of the TIMSS science scale, the score gap in 2019 (214 points) was smaller than in 1995 (235 points) but larger than in 2011 (201 points).

Figure S5a. Trends in average scores and selected percentile scores of U.S. 4th-grade students on the TIMSS science scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 score at the .05 level of statistical significance.

NOTE: In addition to average scores, this figure shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

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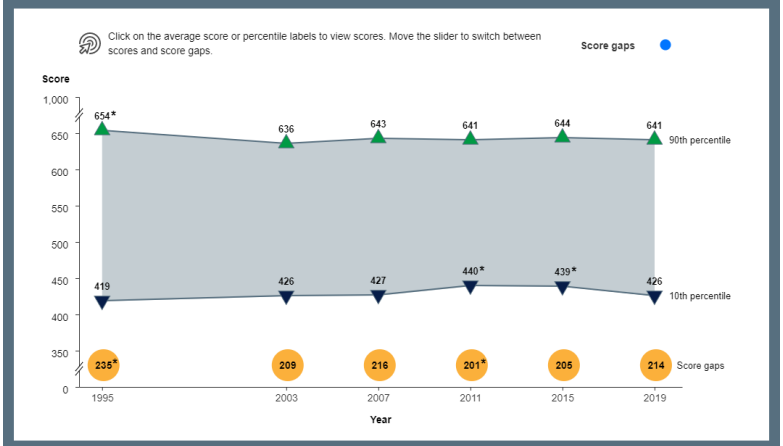
Figure S5a. Trends in average scores and selected percentile scores of U.S. 4th-grade students on the TIMSS science scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 estimate at the .05 level of statistical significance.

NOTE: In addition to average scores, this figure shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; and (b) 90th percentile—the top 10 percent of students. The yellow circles indicate the score gap between the 90th and 10th percentiles. TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

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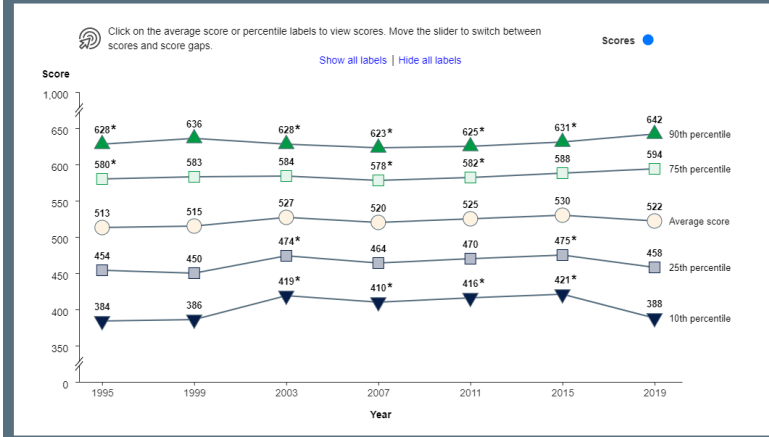
GRADE 8

From 2015 to 2019, U.S. 8th-graders' scores increased at the top end of the distribution (i.e., the 90th percentile) of science achievement and decreased at the lower ends of distribution (i.e., the 10th and 25th percentiles).

- U.S. 8th-graders' score at the high end of the science distribution (i.e., the 90th percentile) was higher in 2019 than in all prior administrations of TIMSS except 1999.
- U.S. 8th-graders' score at the low end of the science distribution (i.e., the 10th percentile) was lower in 2019 than in 2015, 2011, 2007, and 2003, although it was statistically unchanged from 1995 or 1999. The 2019 score at the 25th percentile was lower than the scores in 2003 and 2015.
- The score gap between U.S. 8th-graders at the 90th and 10th percentiles of the TIMSS science scale was larger in 2019 than in the four prior administrations of TIMSS (2003, 2007, 2011, and 2015), by up to 45 points (in 2003 and 2011).

Figure S5b. Trends in average scores and selected percentile scores of U.S. 8th-grade students on the TIMSS science scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 score at the .05 level of statistical significance.

NOTE: In addition to average scores, this table shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. It also shows the 90th-10th percentile score gaps. In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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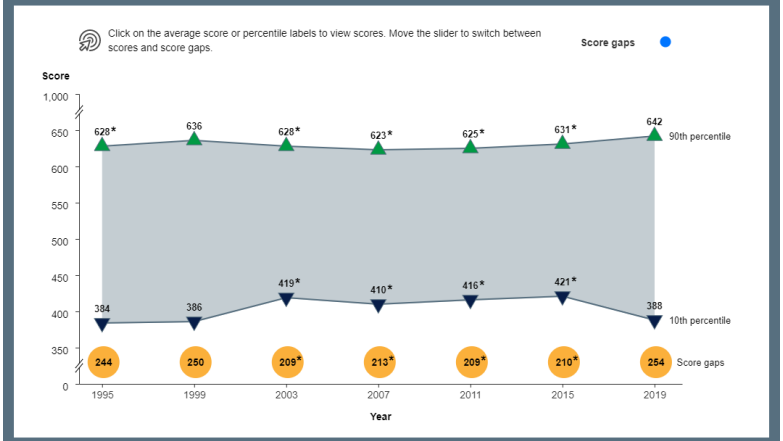
Figure S5b. Trends in average scores and selected percentile scores of U.S. 8th-grade students on the TIMSS science scale: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 estimate at the .05 level of statistical significance.

NOTE: In addition to average scores, this table shows the scores for the: (a) 10th percentile—the bottom 10 percent of students; (b) 25th percentile—the bottom 25 percent of students; (c) 75th percentile—the top 25 percent of students; and (d) 90th percentile—the top 10 percent of students. It also shows the 90th-10th percentile score gaps. In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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Have levels of U.S. students' science achievement changed over time?

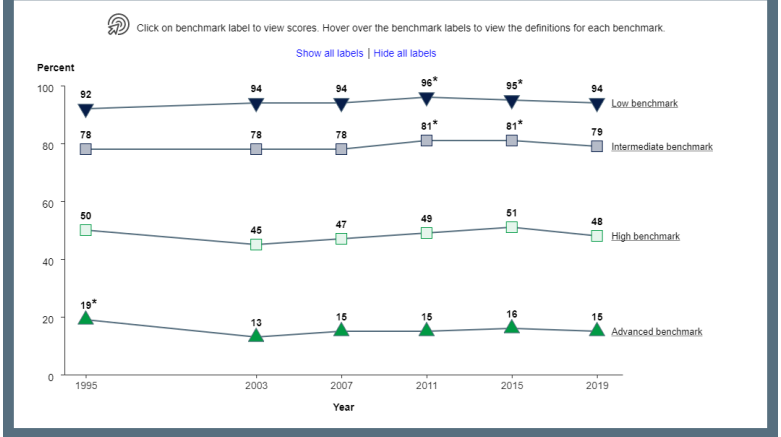
GRADE 4

To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade4-science-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark.

In 2019, there was a decrease in the percentage of U.S. 4th-graders at or above the *Advanced* international benchmark in science (compared to 1995), as well as in the percentage at or above the *Intermediate* and *Low* international benchmarks (compared to 2011 and 2015).

- The percentage of U.S. 4th-graders at or above the *Advanced* international benchmark in science (15 percent) in 2019 was lower than the 19 percent who did so in 1995 but not statistically different from the percentages in 2003, 2007, 2011, or 2015.
- The percentages of U.S. 4th-graders at or above the *Intermediate* (79 percent) and *Low* (94 percent) international benchmarks in science followed similar patterns over time: decreases in 2019 from 2011 and 2015 but no statistical difference from the earlier administrations (1995, 2003, and 2007).

Figure S6a. Trends in percentages of U.S. 4th-grade students reaching the TIMSS international benchmarks in science: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 percentage at the same benchmark level at the .05 level of statistical significance.

NOTE: TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

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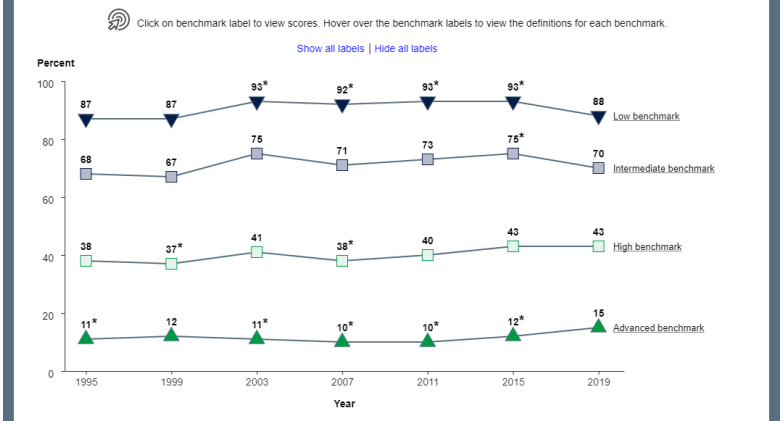
GRADE 8

To provide a concrete interpretation of TIMSS scale scores, TIMSS defines four levels of student achievement, referred to as international benchmarks (https://nces.ed.gov/timss/results19/doc/grade8-science-definitions.pdf): *Advanced* (625), *High* (550), *Intermediate* (475), and *Low* (400). Each successive point, or benchmark, is associated with specific types of knowledge and skills that students successfully demonstrate at each level. Thus, TIMSS international benchmarks provide a way to understand how student proficiency varies at different points on the scale. This report focuses on the cumulative percentages of students at or above each benchmark.

From 2015 to 2019, the percentage of U.S. 8th-graders at or above the *Advanced* international benchmark in science increased, while the percentages at or above the *Low* and *Intermediate* international benchmarks decreased.

- In 2019, the percentage of U.S. 8th-graders at or above the *Advanced* international benchmark in science (15 percent) was higher than in 2015 (12 percent) and all other administrations of TIMSS, except 1999.
- The percentage of U.S. 8th-graders at or above the *Low* international benchmark in 2019 (88 percent) declined from 2003, 2007, 2011, and 2015 (92 to 93 percent). The percentage of U.S. 8th-graders at or above the *Intermediate* international benchmark in 2019 (70 percent) was also lower than in 2015 (75 percent).
- Over the long term, from 1995 to 2019, there were no significant differences in the percentages of U.S. 8th-graders who were at or above the *Low, Intermediate,* or *High* international benchmarks in science, but there was an increase in the percentage of those at or above the *Advanced* international benchmark.

Figure S6b. Trends in percentages of U.S. 8th-grade students reaching the TIMSS international benchmarks in science: Selected years, 1995–2019



* $p < .05$. Significantly different from the 2019 percentage at the same benchmark level at the .05 level of statistical significance.

NOTE: In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

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Achievement by Student Groups—Mathematics

Are there differences in mathematics performance between boys and girls in the United States and other education systems?

GRADE 4

In the United States and 30 other education systems, 4th-grade boys scored higher on average than girls on the TIMSS mathematics scale in 2019. In four education systems, 4th-grade girls scored higher on average than boys.

- In the United States, 4th-grade boys scored 11 points higher on average than 4th-grade girls on the TIMSS mathematics scale (540 vs. 529 points, respectively).
- Across the 30 other education systems where, on average, 4th-grade boys outperformed 4th-grade girls on the TIMSS mathematics scale, score differences ranged from 5 points in the Republic of Korea to 19 points in Canada and Cyprus. In education systems where differences favored girls, score differences ranged from 14 points in Oman to 35 points in the Philippines.
- As supplemental data in the table show, in the United States, there have been score differences between boys and girls in 4th-grade mathematics in every prior administration of TIMSS, with the score difference in 2019 (11 points) being significantly greater than the score difference in 1995 (3 points).

Table M7a-US. Average scores and difference in average scores of U.S. 4th-grade boys and girls on the TIMSS mathematics scale: Selected years, 1995–2019

Gender and boy-girl difference	1995		2003		2007		2011		2015		2019	
	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*
Boy	520	*3.1*	522	*2.7*	532	*2.7*	545	*2.0*	543	*2.6*	540	*2.9*
Girl	516	*3.0*	514	*2.4*	526	*2.8*	536	*2.1*	536	*2.3*	529	*3.0*
Boy-girl difference	3 !!*▼	*1.8*	8 *	*1.8*	6 !*	*2.3*	9 *	*1.6*	7 *	*1.9*	11 *	*2.9*

▼ Boy-girl difference is lower than the 2019 difference at the .05 level of significance.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

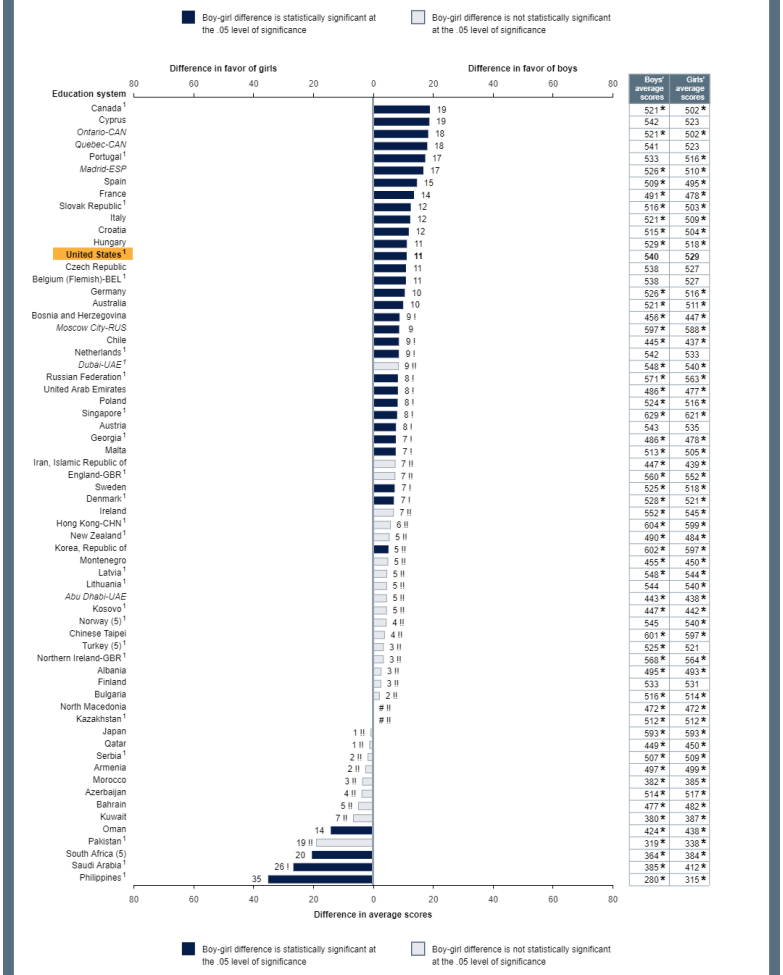
* $p < .05$. Boy-girl difference is significant within year at the .05 level of significance.

NOTE: TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates. Standard error is abbreviated as *s.e.*

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

See grade 4 figure on the next page.

Figure M7a. Average scores and difference in average scores of 4th-grade boys and girls on the TIMSS mathematics scale, by education system: 2019



Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

‼ Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

¹ Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by the boy-girl difference in average scores. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

See grade 8 findings for this question on the next page.

FOR MORE INFORMATION

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
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GRADE 8

In the United States and most other education systems (30 of 45), there were no significant differences between 8th-grade boys' and girls' average mathematics scores in 2019. However, in 15 education systems, there were significant gender differences in performance.

- In the United States, on average, 8th-grade boys scored 514 points on the TIMSS mathematics scale, and 8th-grade girls scored 517 points; these scores were not significantly different.
- In 7 education systems, 8th-grade boys scored higher on average than girls on the TIMSS mathematics scale, with score differences ranging from 5 points in Morocco to 17 points in Moscow City-RUS. In 8 education systems, differences favored girls, with 8th-grade girls outperforming boys on average by up to 41 points in Oman.
- As supplemental data in the table show, there were significant gender differences in the United States in 8th-grade mathematics only in 1999 and 2003, when boys outscored girls on average by 7 and 6 points, respectively.

Table M7b-US. Average scores and difference in average scores of U.S. 8th-grade boys and girls on the TIMSS mathematics scale: Selected years, 1995–2019

Gender and boy-girl difference	1995		1999		2003		2007		2011		2015		2019	
	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*
Boy	495	*5.4*	505	*4.8*	507	*3.5*	510	*3.1*	511	*2.8*	519	*3.2*	514	*6.1*
Girl	490	*4.7*	498	*3.8*	502	*3.4*	507	*3.1*	508	*3.0*	517	*3.3*	517	*4.0*
Boy-girl difference	5 !!	*3.1*	7 !*▲	*3.5*	6 !*▲	*1.9*	4 !!	*2.3*	4 !!	*2.3*	2 !!	*2.0*	-4 !!	*3.9*

▲ Boy-girl difference is higher than the 2019 difference at the .05 level of significance.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

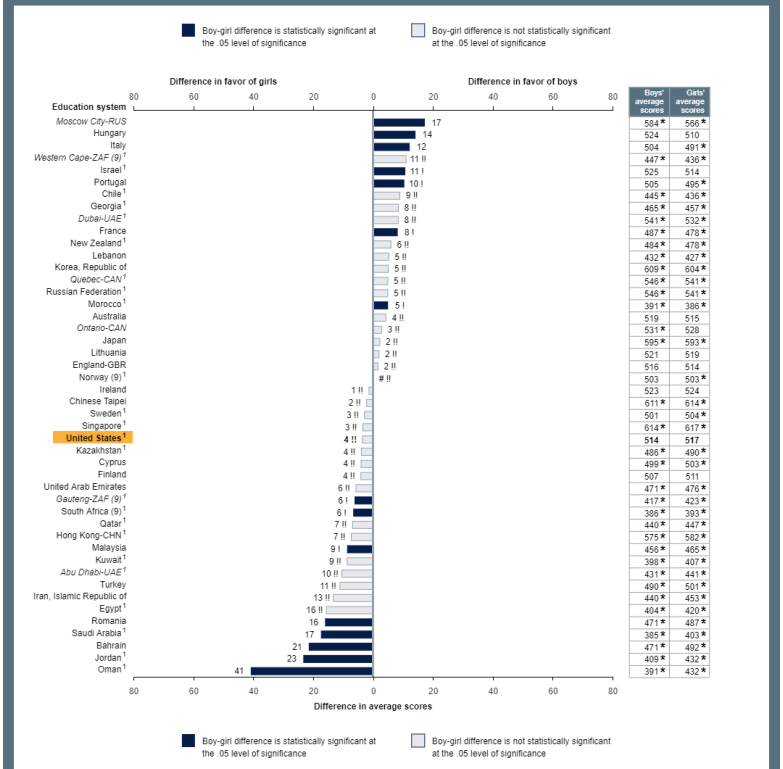
* $p < .05$. Boy-girl difference is significant within year at the .05 level of significance.

NOTE: In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Although rounded numbers are displayed, data shown are based on unrounded estimates. Standard error is abbreviated as *s.e.*

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

See grade 8 figure on the next page.

Figure M7b. Average scores and difference in average scores of 8th-grade boys and girls on the TIMSS mathematics scale, by education system: 2019



Rounds to zero.
! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).
!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.
¹ Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#issues)

NOTE: Education systems are ordered by the boy-girl difference in average scores. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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Hows does the mathematics achievement of U.S. students vary by race/ethnicity?

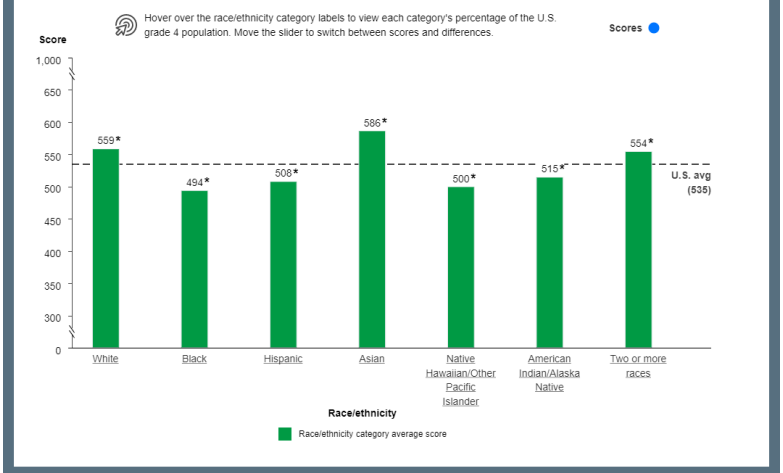
GRADE 4

In the United States in 2019, White and Asian 4th-graders, and those of Two or more races, scored higher than the U.S. average in mathematics, while Black, Hispanic, Native Hawaiian/Other Pacific Islander, and American Indian/Alaska Native 4th-graders scored lower.

- The average mathematics scores of 4th-graders who were Asian, White, or of Two or more races were 586, 559, and 554 points, respectively, which were higher than the U.S. average score by 52, 24, and 20 points, respectively.
- The average mathematics scores of 4th-graders who were American Indian/Alaska Native (515), Hispanic (508), Native Hawaiian/Other Pacific Islander (500), or Black (494) were lower than the U.S. average score by 20 to 41 points.

See grade 4 figure on the next page.

Figure M8a. Average scores and difference in average scores of U.S. 4th-grade students on the TIMSS mathematics scale, by race/ethnicity: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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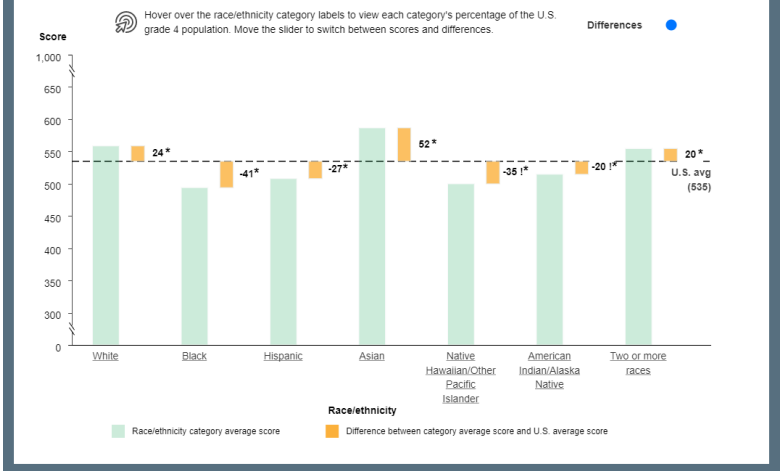
Figure M8a. Average scores and difference in average scores of U.S. 4th-grade students on the TIMSS mathematics scale, by race/ethnicity: 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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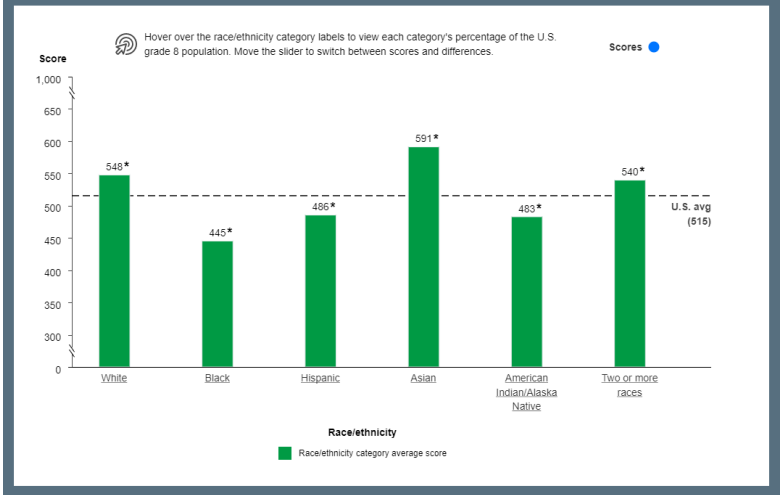
See grade 8 findings for this question on the next page.

GRADE 8

In the United States in 2019, White and Asian 8th-graders, and those of Two or more races, scored higher than the U.S. average in mathematics, while Black, Hispanic, and American Indian/Alaska Native 8th-graders scored lower.

- The average mathematics scores of 8th-graders who were Asian, White, or of Two or more races were 591, 548, and 540 points, respectively, which were higher than the U.S. average score by 76, 32, and 24 points, respectively.
- The average mathematics scores of 8th-graders who were Hispanic (486), American Indian/Alaska Native (483), or Black (445) were lower than the U.S. average score by 30 to 70 points.

Figure M8b. Average scores and difference in average scores of U.S. 8th-grade students on the TIMSS mathematics scale, by race/ethnicity: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: Reporting standards were not met for Native Hawaiian/Other Pacific Islander (too few cases for a reliable estimate). Data for these students are not shown separately in the figure, but are included in the U.S. average. Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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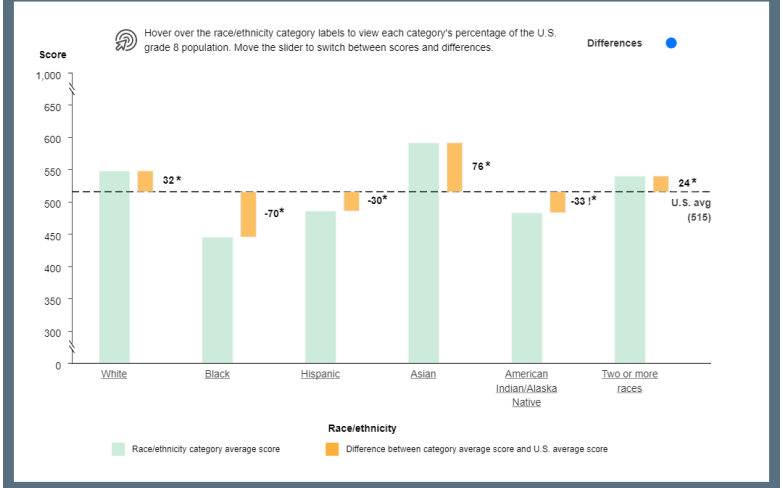
Figure M8b. Average scores and difference in average scores of U.S. 8th-grade students on the TIMSS mathematics scale, by race/ethnicity: 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: Reporting standards were not met for Native Hawaiian/Other Pacific Islander (too few cases for a reliable estimate). Data for these students are not shown separately in the figure, but are included in the U.S. average. Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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How does the mathematics achievement of U.S. students vary by school poverty?

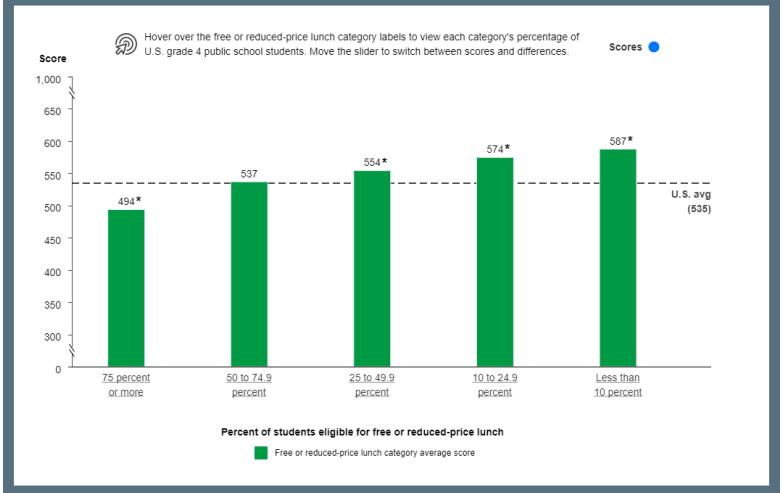
GRADE 4

The TIMSS 2019 U.S. school questionnaire, which was completed by principals, included a question to approximate the level of poverty among students at the school. It asked what percentage of students during the previous school year were eligible for free or reduced-price lunch (FRPL) through the National School Lunch Program. These data were used to identify FRPL categories of public schools for analysis.

In the United States in 2019, 4th-graders in public schools with lower levels of poverty (those in which less than 50 percent of students were eligible for FRPL) scored higher in mathematics than the U.S. average, while those in public schools with the highest level of poverty (75 percent or more of students eligible for FRPL) scored lower than the U.S. average.

- In U.S. public schools with the lowest level of poverty (less than 10 percent of students eligible for FRPL), 4th-graders scored 587 points on average, which was higher than the U.S. average by 53 points. In other schools with poverty below 50 percent (10 to 24.9 percent eligible for FRPL and 25 to 49.9 percent eligible), U.S. 4th-graders scored higher than the U.S. average by 40 and 19 points, respectively.
- In U.S. public schools with the highest level of poverty (75 percent or more of students eligible for FRPL), 4th-graders' average score on the TIMSS mathematics scale was 494 points, 41 points lower than the U.S. average.
- U.S. 4th-graders in public schools with the highest level of poverty (75 percent or more eligible for FRPL) scored lower, on average, than students from all other FRPL categories of schools, by up to 94 points (in schools with less than 10 percent eligible for FRPL).

Figure M9a. Average scores and difference in average scores of U.S. 4th-grade public school students on the TIMSS mathematics scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

See alternative view of this figure on the next page.

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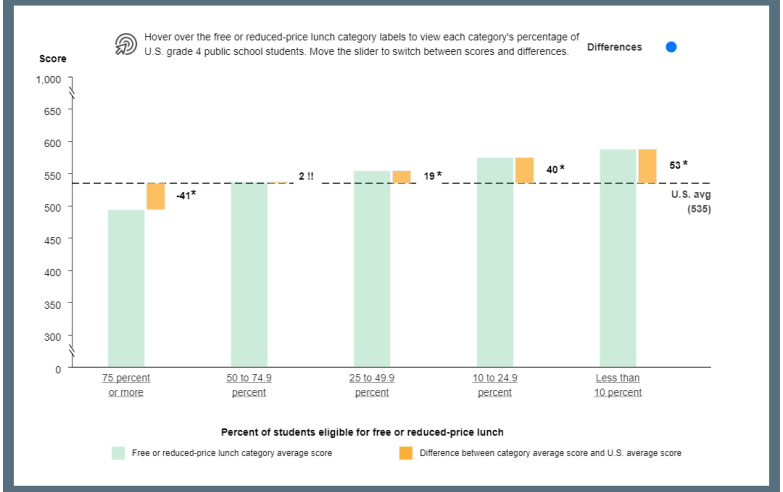
Figure M9a. Average scores and difference in average scores of U.S. 4th-grade public school students on the TIMSS mathematics scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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GRADE 8

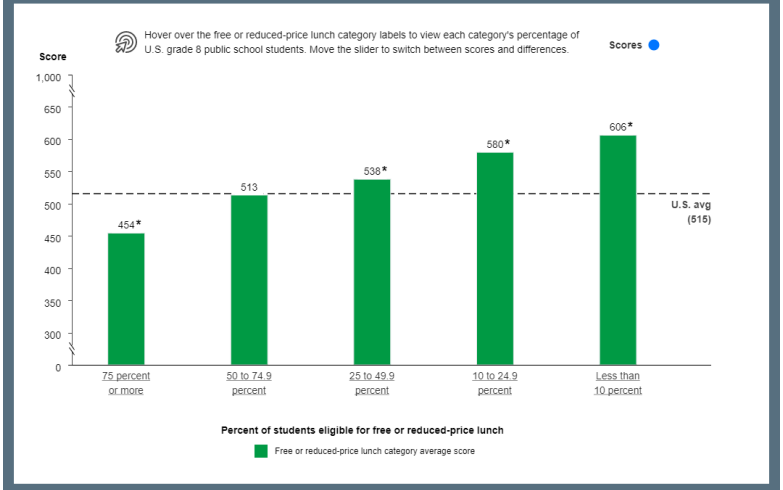
The TIMSS 2019 U.S. school questionnaire, which was completed by principals, included a question to approximate the level of poverty among students at the school. It asked what percentage of students during the previous school year were eligible for free or reduced-price lunch (FRPL) through the National School Lunch Program. These data were used to identify FRPL categories of public schools for analysis.

In the United States in 2019, 8th-graders in public schools with lower levels of poverty (those in which less than 50 percent of students were eligible for FRPL) scored higher in mathematics than the U.S. average, while those in public schools with the highest levels of poverty (75 percent or more of students eligible for FRPL) scored lower than the U.S. average.

- In U.S. public schools with the lowest level of poverty (less than 10 percent eligible for FRPL), 8th-graders scored 606 points on average, which was higher than the U.S. average by 91 points. In other schools with poverty below 50 percent (10 to 24.9 percent of students eligible for FRPL and 25 to 49.9 percent eligible), U.S. 8th-graders scored higher than the U.S. average by 64 and 22 points, respectively.
- In public schools with the highest level of poverty (75 percent or more of students eligible for FRPL), 8th-graders' average score on the TIMSS mathematics scale was 454 points, 61 points lower than the U.S. average.
- U.S. 8th-graders in public schools with the highest level of poverty (75 percent or more eligible for FRPL) scored lower, on average, than students from all other FRPL categories of schools, by up to 152 points (in schools with less than 10 percent eligible for FRPL).

See grade 8 figure on the next page.

Figure M9b. Average scores and difference in average scores of U.S. 8th-grade public school students on the TIMSS mathematics scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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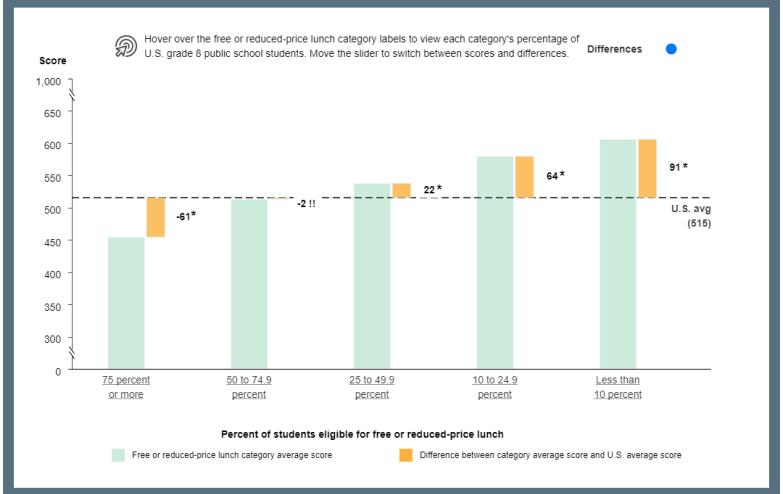
Figure M9b. Average scores and difference in average scores of U.S. 8th-grade public school students on the TIMSS mathematics scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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Achievement by Student Groups—Science

Are there differences in science performance between boys and girls in the United States and other education systems?

GRADE 4

In the United States and 7 other education systems, 4th-grade boys scored higher on average than girls on the TIMSS science scale in 2019. However, in 18 education systems, 4th-grade girls scored higher on average than boys.

- In the United States, 4th-grade boys scored 5 points higher on average than 4th-grade girls on the TIMSS science scale (541 vs. 536 points).
- Across the 7 other education systems where, on average, 4th-grade boys outperformed girls on the TIMSS science scale, score differences ranged from 5 points in Canada to 9 points in the Republic of Korea. In education systems where differences favored girls, score differences ranged from 6 points in Japan, Montenegro, and Kazakhstan to 60 points in Saudi Arabia.
- As supplemental data in the table show, there have been score differences between boys and girls in the United States in 4th-grade science in almost every prior administration of TIMSS, ranging from 4 points (in 2015) to 12 points (in 1995). The 2019 score difference was not statistically significant from that at any prior time point, however.

Table S7a-US. Average scores and difference in average scores of U.S. 4th-grade boys and girls on the TIMSS science scale: Selected years, 1995–2019

Gender and boy-girl difference	1995		2003		2007		2011		2015		2019	
	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*
Boy	548	*3.4*	538	*2.8*	541	*3.0*	549	*2.1*	548	*2.5*	541	*3.2*
Girl	536	*3.7*	533	*2.5*	536	*3.0*	539	*2.4*	544	*2.4*	536	*3.0*
Boy-girl difference	12 *	*2.5*	5 !*	*1.7*	5 !!	*2.6*	10 *	*1.6*	4 !!*	*2.0*	5 !!*	*2.7*

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

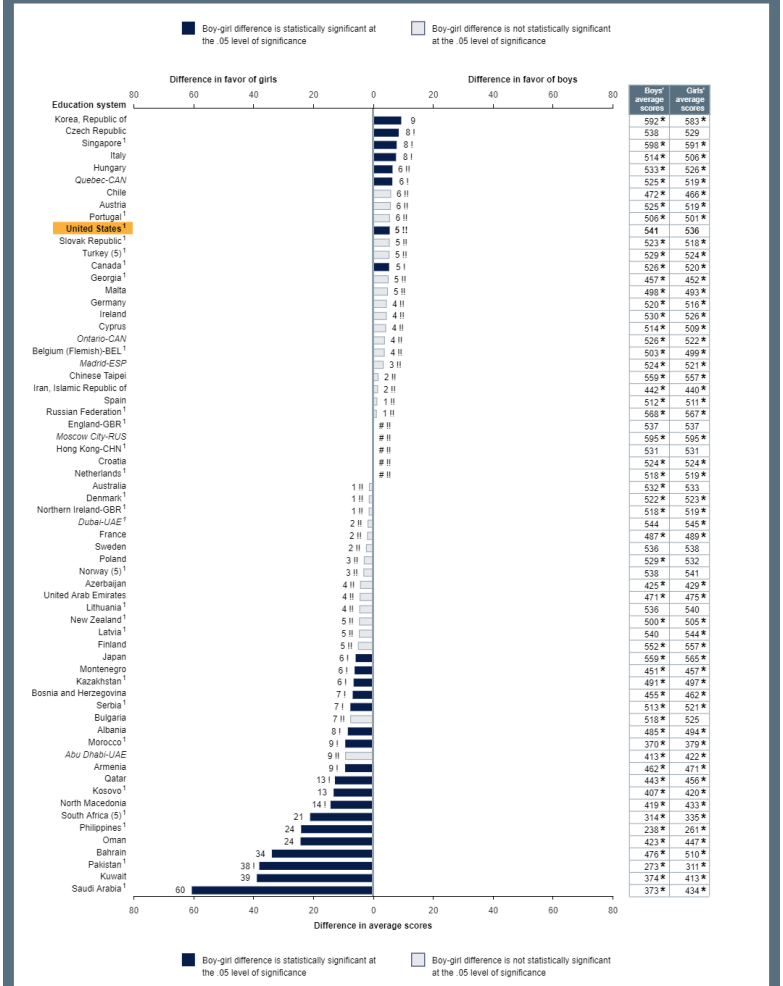
* $p < .05$. Boy-girl difference is significant within year at the .05 level of statistical significance.

NOTE: TIMSS was not administered at the fourth grade in 1999. In 2003, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. In 2007, 2011, 2015, and 2019, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates. Standard error is abbreviated as *s.e.*

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 2003, 2007, 2011, 2015, 2019.

See grade 4 figure on the next page.

Figure S7a. Average scores and difference in average scores of 4th-grade boys and girls on the TIMSS science scale, by education system: 2019



Rounds to zero.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

‼ Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

¹ Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/ timss/results19/index.asp#/issues)

NOTE: Education systems are ordered by the boy-girl difference in average scores. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(5)" after their name, 5 indicates the years of formal schooling; these education systems chose to administer TIMSS at a different grade than other education systems (4 years of formal schooling). Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

See grade 8 findings for this question on the next page.

FOR MORE INFORMATION

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- Read the International TIMSS 2019 Report

GRADE 8

In the United States and 21 other education systems, there were no significant differences between 8th-grade boys' and girls' average science scores in 2019. However, in 24 education systems, there were significant gender differences in performance, most often favoring girls.

- In the United States, on average, 8th-grade boys scored 520 points on the TIMSS science scale, and 8th-grade girls scored 525 points; these scores were not significantly different.
- In 7 education systems, 8th-grade boys scored higher on average than girls on the TIMSS science scale, with score differences ranging from 6 points in Portugal to 20 points in Hungary. In 17 education systems, score differences favored girls and ranged from 9 points in Kazakhstan to 54 points in Oman.
- As supplemental data in the table show, in the United States, 2019 was the first year in which there were no significant gender differences in 8th-grade science in TIMSS. In the prior administrations of TIMSS, boys scored higher than girls by as few as 5 points in 2015 and as much as 19 points in 1999.

Table S7b-US. Average scores and difference in average scores of U.S. 8th-grade boys and girls on the TIMSS science scale: Selected years, 1995–2019

Gender and boy-girl difference	1995		1999		2003		2007		2011		2015		2019	
	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*	Score points	*s.e.*
Boy	520	*5.9*	524	*5.2*	536	*3.4*	526	*3.1*	530	*2.7*	533	*3.0*	520	*6.1*
Girl	505	*5.5*	505	*4.6*	519	*3.2*	514	*3.2*	519	*2.7*	527	*3.1*	525	*3.9*
Boy-girl difference	14 *▲	*3.0*	19 *▲	*4.1*	16 *▲	*2.1*	12 *▲	*2.4*	12 *▲	*2.4*	5 !*▲	*2.0*	-5 !!	*4.3*

▲ Boy-girl difference is higher than the 2019 difference at the .05 level of significance.

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

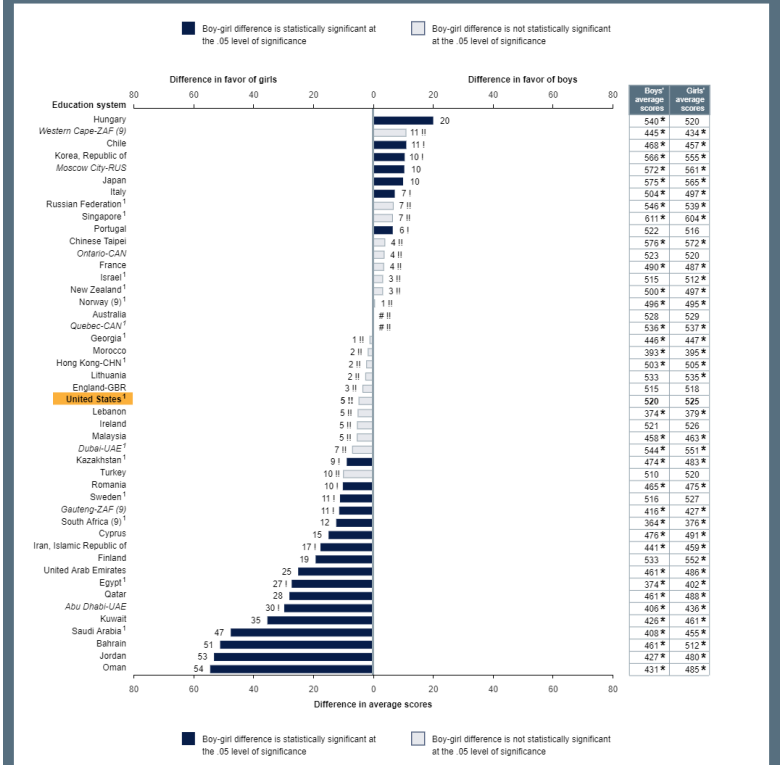
* $p < .05$. Boy-girl difference is significant within year at the .05 level of statistical significance.

NOTE: In 1995, 2007, 2015, and 2019, the United States met guidelines for sample participation rates only after replacement schools were included. The United States nearly satisfied guidelines for sample participation rates after replacement schools were included in 2003. In 2007 and 2011, the United States' National Defined Population covered 90 to 95 percent of the National Target Population. Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates. Standard error is abbreviated as *s.e.*

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 1995, 1999, 2003, 2007, 2011, 2015, 2019.

See grade 8 figure on the next page.

Figure S7b. Average scores and difference in average scores of 8th-grade boys and girls on the TIMSS science scale, by education system: 2019



Education system	Boys' average scores	Girls' average scores
Hungary	540 *	520
Western Cape-ZAF (9)	445 *	434 *
Chile	468 *	457 *
Korea, Republic of	566 *	555 *
Moscow City-RUS	572 *	561 *
Japan	575 *	565 *
Italy	504 *	497 *
Russian Federation [1]	546 *	539 *
Singapore [1]	611 *	604 *
Portugal	522	516
Chinese Taipei	576 *	572 *
Ontario-CAN	523	520
France	490 *	487 *
Israel [1]	515	512 *
New Zealand [1]	500 *	497 *
Norway (9) [1]	496 *	495 *
Australia	528	529
Quebec-CAN [1]	536 *	537 *
Georgia [1]	446 *	447 *
Morocco	393 *	395 *
Hong Kong-CHN [1]	503 *	505 *
Lithuania	533	535 *
England-GBR	515	518
United States [1]	**520**	**525**
Lebanon	374 *	379 *
Ireland	521	526
Malaysia	458 *	463 *
Dubai-UAE [1]	544 *	551 *
Kazakhstan [1]	474 *	483 *
Turkey	510	520
Romania	465 *	475 *
Sweden [1]	516	527
Gauteng-ZAF (9)	416 *	427 *
South Africa (9) [1]	364 *	376 *
Cyprus	476 *	491 *
Iran, Islamic Republic of	441 *	459 *
Finland	533	552 *
United Arab Emirates	461 *	486 *
Egypt [1]	374 *	402 *
Qatar	461 *	488 *
Abu Dhabi-UAE	406 *	436 *
Kuwait	426 *	461 *
Saudi Arabia [1]	408 *	455 *
Bahrain	461 *	512 *
Jordan	427 *	480 *
Oman	431 *	485 *

Rounds to zero.
‡ Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).
‼ Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.
[1] Education system had coverage, sampling, or reliability issues, including issues with the national defined population coverage, issues with satisfying sampling guidelines, and/or concerns about estimation because the percentage of students whose performance is too low to estimate exceeds certain thresholds. Details can be found here. (https://nces.ed.gov/timss/results19/index.asp#/issues)
NOTE: Education systems are ordered by the boy-girl difference in average scores. Education systems that are not countries are designated by the appended three-letter international abbreviation for their country. Benchmarking participants are indicated with italics and pink shading. For education systems with a "(9)" after their name, 9 indicates the years of formal schooling, these education systems chose to administer TIMSS at a different grade than other education systems (8 years of formal schooling). Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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Hows does the science achievement of U.S. students vary by race/ethnicity?

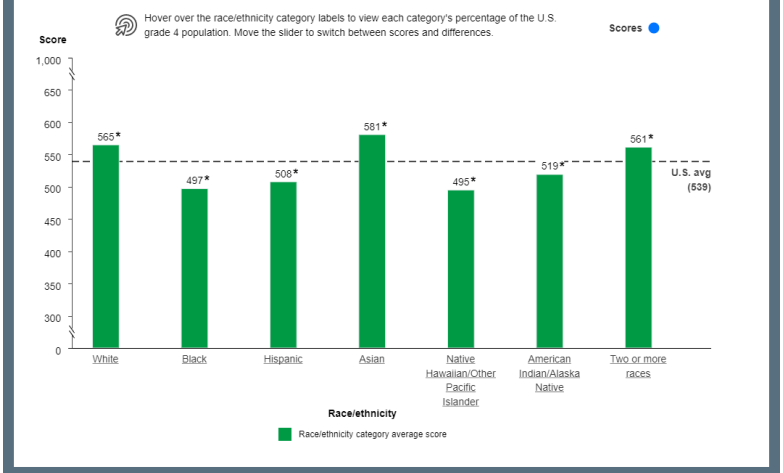
GRADE 4

In the United States in 2019, White and Asian 4th-graders, and those of Two or more races, scored higher than the U.S. average in science, while Black, Hispanic, Native Hawaiian/Other Pacific Islander, and American Indian/Alaska Native 4th-graders scored lower.

- The average science scores of 4th-graders who were Asian, White, or of Two or more races were 581, 565, and 561 points, respectively, which were higher than the U.S. average score by 42, 26, and 23 points, respectively.
- The average science scores of 4th-graders who were American Indian/Alaska Native (519), Hispanic (508), Black (497), or Native Hawaiian/Other Pacific Islander (495) were lower than the U.S. average score by 20 to 44 points.

See grade 4 figure on the next page.

Figure S8a. Average scores and difference in average scores of U.S. 4th-grade students on the TIMSS science scale, by race/ethnicity: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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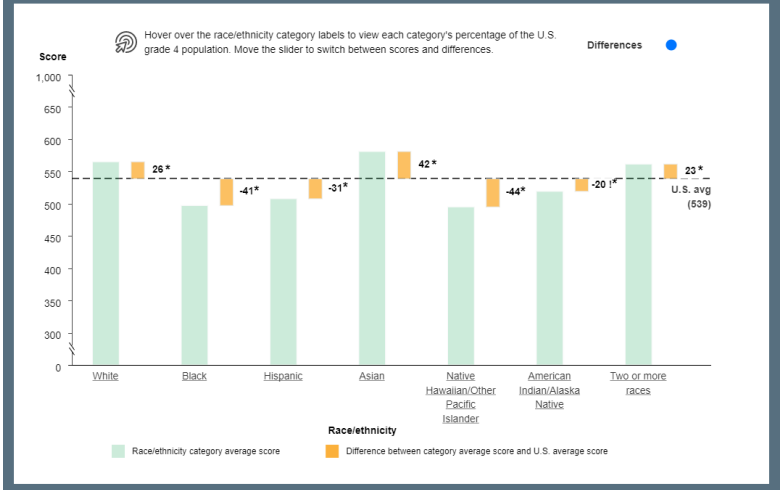

! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

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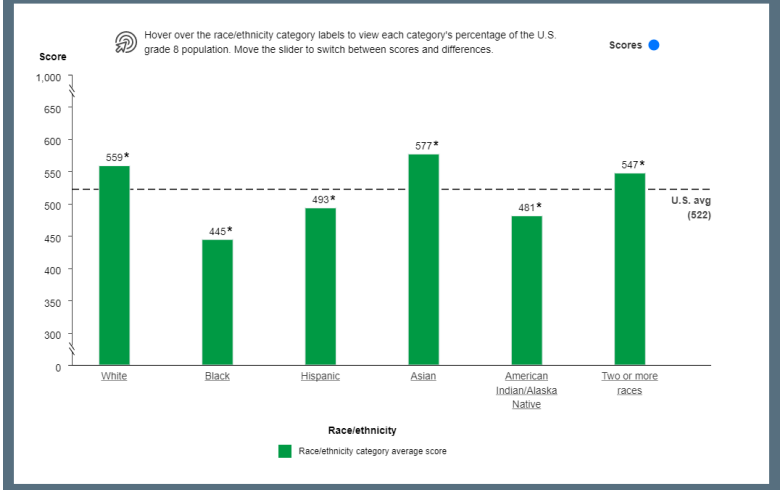
See grade 8 findings for this question on the next page.

GRADE 8

In the United States in 2019, White and Asian 8th-graders, and those of Two or more races, scored higher than the U.S. average in science, while Black, Hispanic, and American Indian/Alaska Native 8th-graders scored lower.

- The average science scores of 8th-graders who were Asian, White, or of Two or more races were 577, 559, and 547 points, respectively, which were higher than the U.S. average score by 55, 36, and 25 points, respectively.
- The average science scores of 8th-graders who were Hispanic (493), American Indian/Alaska Native (481), or Black (445) were lower than the U.S. average score by 29 to 78 points.

Figure S8b. Average scores and difference in average scores of U.S. 8th-grade students on the TIMSS science scale, by race/ethnicity: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: Reporting standards were not met for Native Hawaiian/Other Pacific Islander (too few cases for a reliable estimate). Data for these students are not shown separately in the figure, but are included in the U.S. average. Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

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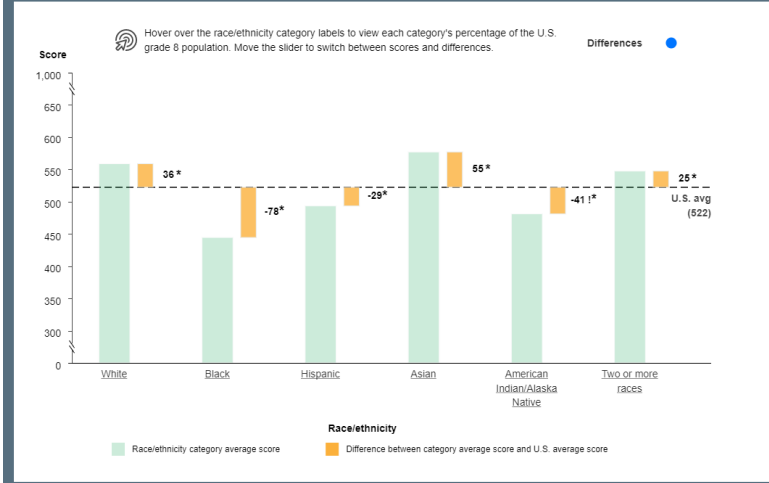
Figure S8b. Average scores and difference in average scores of U.S. 8th-grade students on the TIMSS science scale, by race/ethnicity: 2019



! Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: Reporting standards were not met for Native Hawaiian/Other Pacific Islander (too few cases for a reliable estimate). Data for these students are not shown separately in the figure, but are included in the U.S. average. Black includes African American, and Hispanic includes Latino. Students who identified themselves as being of Hispanic origin were classified as Hispanic, regardless of their race. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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How does the science achievement of U.S. students vary by school poverty?

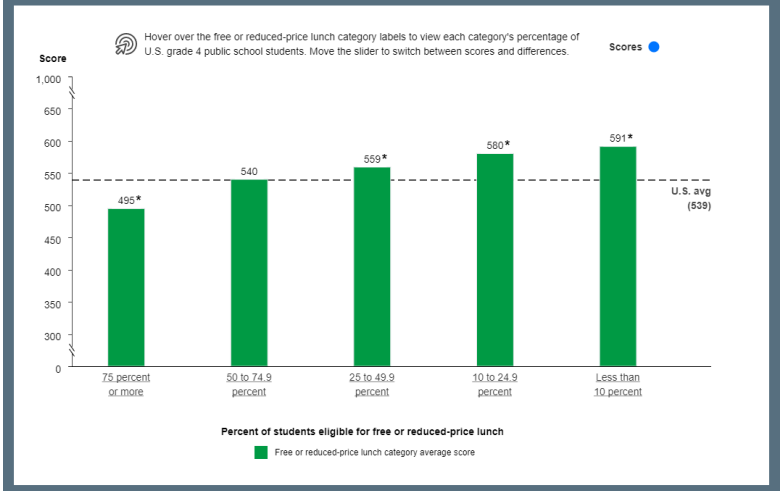
GRADE 4

The TIMSS 2019 U.S. school questionnaire, which was completed by principals, included a question to approximate the level of poverty among students at the school. It asked what percentage of students during the previous school year were eligible for free or reduced-price lunch (FRPL) through the National School Lunch Program. These data were used to identify FRPL categories of public schools for analysis.

In the United States in 2019, 4th-graders in public schools with lower levels of poverty (less than 50 percent of students eligible for FRPL) scored higher than the U.S. average in science, while those in public schools with the highest level of poverty (75 percent or more of students eligible for FRPL) scored lower than the U.S. average.

- In U.S. public schools with the lowest level of poverty (less than 10 percent of students eligible for FRPL) 4th-graders scored 591 points on average, which was higher than the U.S. average by 53 points. In other schools with poverty below 50 percent (10 to 24.9 percent eligible for FRPL and 25 to 49.9 percent eligible), U.S. 4th-graders scored higher than the U.S. average by 42 and 21 points, respectively.
- In U.S. public schools with the highest level of poverty (75 percent or more of students eligible for FRPL), 4th-graders' average score on the TIMSS science scale was 495 points, 44 points lower than the U.S. average.
- U.S. 4th-graders in public schools with the highest level of poverty (75 percent or more eligible for FRPL) scored lower on average than students from all other FRPL categories of schools, by up to 96 points (in schools with less than 10 percent eligible for FRPL).

Figure S9a. Average scores and difference in average scores of U.S. 4th-grade public school students on the TIMSS science scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

See alternate view of this figure on the next page.

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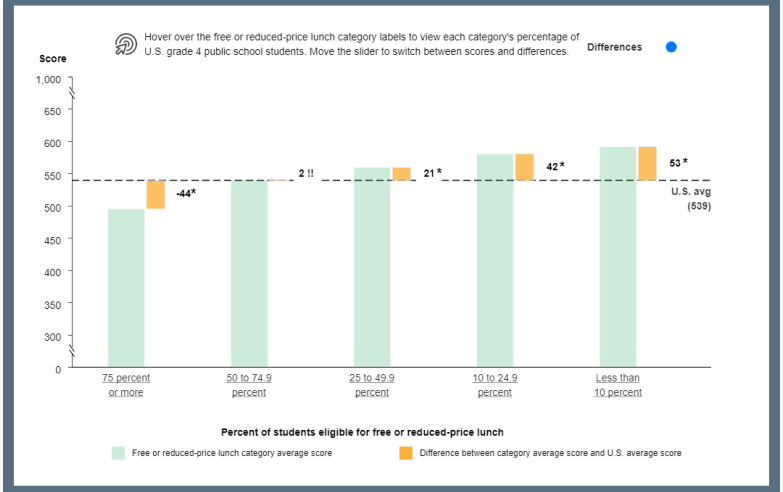
Figure S9a. Average scores and difference in average scores of U.S. 4th-grade public school students on the TIMSS science scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale of 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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GRADE 8

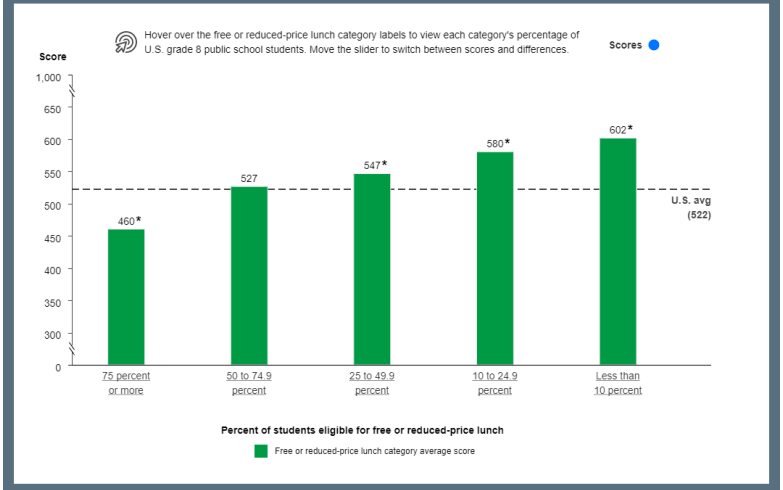
The TIMSS 2019 U.S. school questionnaire, which was completed by principals, included a question to approximate the level of poverty among students at the school. It asked what percentage of students during the previous school year were eligible for free or reduced-price lunch (FRPL) through the National School Lunch Program. These data were used to identify FRPL categories of public schools for analysis.

In the United States in 2019, 8th-graders in public schools with lower levels of poverty (those in which less than 50 percent of students were eligible for FRPL) scored higher in science than the U.S. average, while those in public schools with the highest poverty (75 percent or more of students eligible for FRPL) scored lower than the U.S. average.

- In U.S. public schools with the lowest level of poverty (less than 10 percent eligible for FRPL), 8th-graders scored 602 points on average, which was higher than the U.S. average by 79 points. In other schools with poverty lower than 50 percent (10 to 24.9 percent eligible for FRPL and 25 to 49.9 percent eligible), U.S. 8th-graders scored higher than the U.S. average by 58 and 24 points, respectively.
- In public schools with the highest level of poverty (75 percent or more of students eligible for FRPL), 8th-graders' average score on the TIMSS science scale was 460 points, 62 points lower than the U.S. average.
- U.S. 8th-graders in public schools with the highest poverty (75 percent or more eligible for FRPL) scored lower on average than students from all other FRPL categories of schools, by up to 141 points (in schools with less than 10 percent eligible for FRPL).

See grade 8 figure on the next page.

Figure S9b. Average scores and difference in average scores of U.S. 8th-grade public school students on the TIMSS science scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



!! Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.

* $p < .05$. Significant at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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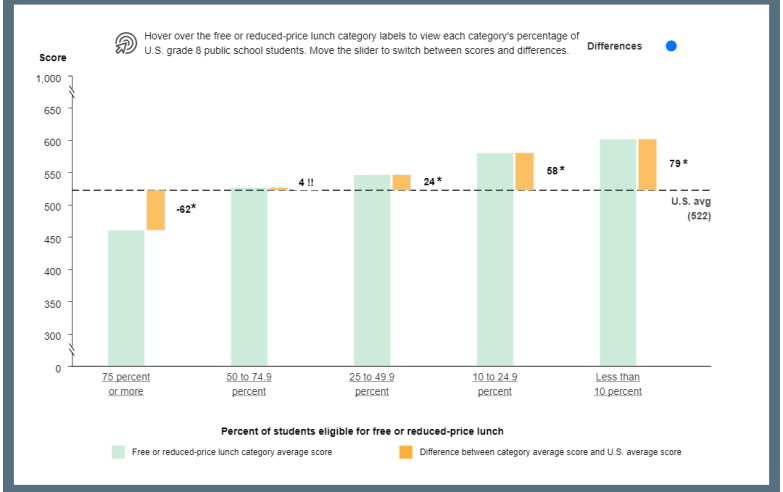
Figure S9b. Average scores and difference in average scores of U.S. 8th-grade public school students on the TIMSS science scale, by the percentage of students in the school eligible for free or reduced-price lunch: 2019



* $p < .05$. Significantly different from the U.S. average score at the .05 level of statistical significance.

NOTE: The National School Lunch Program provides free or reduced-price lunch (FRPL) for students meeting certain income guidelines. The percentage of students eligible for this program is an indicator of the socioeconomic level of families served by the school. Data in this figure are based on principals' responses to a question in the school questionnaire that asked the approximate percentage of eligible students in the school during the previous school year. Free or reduced-price lunch data are for public schools only. U.S. average includes both public and private schools. Scores are reported on a scale from 0 to 1,000, with a TIMSS centerpoint of 500 and standard deviation of 100. Although rounded numbers are displayed, data shown are based on unrounded estimates.

SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2019.

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