PISA 2018 U.S. Results

PISA results for reading, mathematics, and science literacy are in!

The Program for International Student Assessment (PISA) is a study of 15-year-old students’ performance in reading, mathematics, and science literacy conducted every 3 years. The PISA 2018 results provide us with a global view of U.S. students’ performance compared to their peers in nearly 80 countries and education systems.

In PISA 2018, the major domain was reading literacy, although mathematics and science literacy were also assessed. The results for an optional domain assessed in 2018—financial literacy—will be released separately in spring 2020.

Click on the three buttons below to explore the PISA 2018 results by subject area. Make sure to continue reading down the page for more information about PISA.

**Reading literacy** was the major domain in PISA 2018. As the major domain, about half of the assessment was devoted to reading literacy items designed to measure students' ability to engage with texts across a variety of scenarios and tasks, including digital contexts. [See an example reading item.](#)

**Mathematics literacy** was a minor domain in PISA 2018. As one of the two minor domains, about one-quarter of the assessment was devoted to mathematics literacy items designed to measure students’ capacity to formulate, employ, and interpret mathematics in a variety of contexts.

**Science literacy** was a minor domain in PISA 2018. As one of the two minor domains, about one-quarter of the assessment was devoted to science literacy items designed to measure students’ ability to engage with science-related issues, and with the ideas of science, as a reflective citizen.

By design, PISA aims to measure how well students can apply knowledge obtained both in and out of school to real-world tasks as they are nearing the end of compulsory schooling. First conducted in 2000, PISA rotates the focus of the assessment among reading, mathematics, and science literacy in each cycle, with one being the major domain and the other two being minor domains. [Read about the PISA cycle of domains.](#)

PISA is conducted in the United States by NCES and is coordinated by the Organization for Economic Cooperation and Development (OECD), an intergovernmental organization of industrialized countries. The PISA assessment was administered to students on computers in the United States and most of the other participating education systems. Data collection for the most recent assessment was completed in fall 2018 for the United States.

Further information about PISA can be found in the [technical notes], [questionnaires], [list of participating OECD and non-OECD countries], [released assessment items], and [FAQs].

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PISA 2018 Reading Literacy Results

Explore How U.S. Reading Performance Compared Internationally in 2018

Reading literacy was the major domain in PISA 2018, as it was in 2000 and 2009. For 2018, the PISA reading literacy framework was updated to reflect the evolution and growing influence of technology. Reading involves not only the printed page but also digital formats. Increasingly, it requires readers to distinguish between fact and opinion, synthesize and interpret texts from multiple sources, and deal with conflicting information across source materials.

In PISA 2018, reading literacy is defined as students’ capacity to understand, use, evaluate, reflect on, and engage with texts in order to achieve one’s goals; develop one’s knowledge and potential; and participate in society.

To take better advantage of the administration of PISA on computer and to improve the measurement of the subject, the PISA 2018 assessment of reading literacy included multi-stage adaptive testing for the first time. Instead of using fixed, predetermined test booklets, as in previous cycles, the PISA 2018 reading assessment was dynamically determined, based on how a student performed in prior stages. Read more about the multi-stage adaptive testing design used in PISA.

International Comparisons of Student Achievement

How does the performance of U.S. 15-year-olds in reading compare internationally?

Compared to the 76 other education systems in PISA 2018, the U.S. average reading literacy score was lower than the average in 8 education systems, higher than the average in 57 education systems, and not measurably different from the average in 11 education systems.

- The U.S. average score (505) was higher than the OECD average score (487).
- Compared to the 35 other OECD members, the U.S. average in reading literacy was lower than the average in 4 education systems, higher than in 21, and not measurably different than in 10.
- On a scale of 0 to 1,000, average scores in reading literacy across the education systems ranged from 555 in B-S-J-Z (China) to 340 in the Philippines.

See table R1 on the next page.
Table R1. Average scores of 15-year-old students on the PISA reading literacy scale, by education system: 2018

Use buttons to filter view: [All education systems] [OECD only]

<table>
<thead>
<tr>
<th>Education system</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>487</td>
</tr>
<tr>
<td>B-S-3-2 (China)</td>
<td>555</td>
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<td>Singapore</td>
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<tr>
<td>Macao (China)</td>
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<td>Philippines</td>
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</table>

Average score is higher than U.S. average score at the .05 level of statistical significance.
Average score is lower than U.S. average score at the .05 level of statistical significance.

1 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
2 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Education systems are ordered by 2018 average score. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. In the case of reading literacy, the 2018 OECD average does not include Spain due to issues with its PISA 2018 reading literacy data. Although Spain’s PISA 2018 data met international technical standards, its reading literacy data show unusual student response behavior that prevents its data from being reported at this time. Scores are reported on a scale from 0 to 1000. Italics indicate non-OECD countries and education systems. B-S-3-2 (China) refers to the four PISA participating China provinces Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

What is the percentage of 15-year-olds reaching the PISA proficiency levels in reading?

In addition to scale scores, PISA describes student performance in each subject area in terms of levels of proficiency, from the lowest level (Level 1) to the highest (Level 6). Students were classified into proficiency levels based on their scores. Descriptions of the skills and knowledge of students at each proficiency level can be found here.

In the United States, 14 percent of 15-year-old students in 2018 were top performers in reading literacy, scoring at proficiency levels 5 and above; 19 percent were low performers in reading literacy, scoring below proficiency level 2.

- The United States had a larger percentage of top performers in reading literacy than the OECD average (14 vs. 9 percent, respectively). The U.S. percentage was larger than in 63 education systems, smaller than in 2 education systems, and not measurably from 11 education systems. The percentages of top-performing 15-year-old students in reading literacy ranged from 26 percent in Singapore to nearly 0 percent in 16 education systems.

- The United States had a smaller percentage of low performers in reading literacy than the OECD average (19 vs. 23 percent, respectively). The U.S. percentage was smaller than in 51 education systems, larger than in 12 education systems, and not measurably different from 13 education systems. The percentages of low-performing 15-year-old students in reading literacy ranged from 5 percent in B-S-J-Z (China) to 81 percent in the Philippines.

See figure R2 on the next page.
Figure R2. Percentage of 15-year-old students performing below level 2 or reaching reading literacy proficiency levels 5 and above, by education system, 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>Below level 2</th>
<th>Levels 5 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>23%</td>
<td>17%</td>
</tr>
<tr>
<td>Singapore</td>
<td>13%</td>
<td>26%</td>
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<tr>
<td>B-S-3-2 (China)</td>
<td>5%</td>
<td>22%</td>
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<tr>
<td>Canada</td>
<td>14%</td>
<td>15%</td>
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<tr>
<td>Hong Kong (China)</td>
<td>15%</td>
<td>12%</td>
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<tr>
<td>Finland</td>
<td>14%</td>
<td>12%</td>
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<tr>
<td>Estonia</td>
<td>15%</td>
<td>11%</td>
</tr>
<tr>
<td>Macau (China)</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>United States</td>
<td>19%</td>
<td>10%</td>
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<tr>
<td>Sweden</td>
<td>18%</td>
<td>18%</td>
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<td>Korea, Republic of</td>
<td>15%</td>
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<tr>
<td>New Zealand</td>
<td>19%</td>
<td>18%</td>
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<tr>
<td>Australia</td>
<td>21%</td>
<td>15%</td>
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<tr>
<td>Poland</td>
<td>18%</td>
<td>13%</td>
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<tr>
<td>Ireland</td>
<td>15%</td>
<td>10%</td>
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<tr>
<td>United Kingdom</td>
<td>17%</td>
<td>17%</td>
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<td>Germany</td>
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<tr>
<td>Norway</td>
<td>19%</td>
<td>17%</td>
</tr>
<tr>
<td>China (Taiwan)</td>
<td>18%</td>
<td>17%</td>
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<tr>
<td>Israel</td>
<td>13%</td>
<td>20%</td>
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<tr>
<td>Japan</td>
<td>11%</td>
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<tr>
<td>Belgium</td>
<td>21%</td>
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<tr>
<td>France</td>
<td>21%</td>
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<tr>
<td>Netherlands</td>
<td>14%</td>
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<td>Denmark</td>
<td>16%</td>
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<td>Czech Republic</td>
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<td>Switzerland</td>
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<tr>
<td>Slovenia</td>
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<td>Luxembourg</td>
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<td>Portugal</td>
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<tr>
<td>Hungary</td>
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<tr>
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<td>Latvia</td>
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<tr>
<td>United Arab Emirates</td>
<td>43%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Below level 2
Levels 5 and above

* Rounds to zero.

1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).
2 Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
3 p < .05. Significantly different from the U.S. percentage at the .05 level of statistical significance.
4 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
5 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Education systems are ordered by 2018 percentages of 15-year-olds in levels 5 and above. To reach a particular proficiency level, a student must correctly answer a majority of items at that level. Students were classified into reading proficiency levels according to their scores. Exact cut scores are as follows: below level 2 is a score less than or equal to 427.93; level 5 and above is a score equal to or greater than 625.83. See descriptions of each proficiency level [here]. Scores are reported on a scale from 0 to 1,000. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national percentages of the OECD member countries, with each country weighted equally. In the case of reading literacy, the 2018 OECD average does not include Spain due to its PISA 2018 reading literacy data. Although Spain’s PISA 2018 data meet international technical standards, its reading literacy data show unusual student response behavior that prevents its data from being reported at this time. Italics indicate non-OECD countries and education systems. B-S-3-2 (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018 technical problems with its data prevent results from being discussed in this report.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

How large is the gap in reading performance between top and bottom performers?

Score gaps between top and bottom performers provide one indication of equity within an education system. The distribution of U.S. student scores in reading literacy showed a score gap of 282 points between the 90th and 10th percentiles.

- The U.S. score gap between the 90th and 10th percentiles (282 points) was larger than the score gap across the OECD countries on average (260 points).
- The U.S. score gap was smaller than the gap in 3 education systems, larger than the gap in 58, and not measurably different from the gap in 15 education systems.
- Internationally, score gaps between the 90th and 10th percentiles ranged from 177 points in Kosovo to 332 points in Israel.

See figure R3 on next page.
Figure R3. Average scores and 10th and 90th percentile scores of 15-year-old students on the PISA reading literacy scale and percentile score gaps, by education system: 2018

Move the slider to switch between showing and hiding scores or click on an education system label to view its scores.

<table>
<thead>
<tr>
<th>Education system</th>
<th>10th</th>
<th>Avg. score</th>
<th>90th</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>348</td>
<td>526</td>
<td>722</td>
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<td>B-S-S-Z (China)</td>
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<td>736</td>
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</table>

1. p < .05. Score gap is significantly different from the U.S. 90th to 90th percentile score gap at the .05 level of statistical significance.
2. At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
3. Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: This figure shows the threshold (or cut) scores for the following: (a) 10th percentile—the bottom 10 percent of students; (b) 50th percentile—the top 10 percent of students; the score gap for each education system is the difference between its 90th and 10th percentile scores. 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 average score from largest to smallest. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. In the case of reading literacy, the 2018 OECD average does not include Spain due to issues with its PISA 2016 reading literacy data. Although Spain’s PISA 2016 data met international technical standards, its reading literacy data showed unusual student response behavior that prevented its data from being reported at this time. Scores are reported on a scale from 0 to 1,000. Italics indicate non-OECD countries and education systems. B-S-S-Z (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018 technical problems with its data prevent results from being discussed in this report.

Has there been any change in 15-year-olds’ performance in reading over time?

LONG-TERM TREND

Compared to the first administration of PISA in 2000, the average reading literacy score of U.S. 15-year-olds in 2018 (505) was not measurably different from the average score in 2000 (504).

- Among the 36 other education systems that participated in both 2000 and 2018, there were 10 education systems that reported higher average reading literacy scores in 2018 than in 2000. In these education systems, score increases ranged from 14 points in Germany to 73 points in Peru.

- In 11 education systems, average reading literacy scores for 15-year-olds were lower in 2018 than in 2000. In these education systems, score declines ranged from 11 points in Italy to 38 points in Thailand.

See table R4a on the next page.
# Table R4a. Average scores and changes in average scores of 15-year-old students on the PISA reading literacy scale, by education system: 2000 and 2018

Use buttons to filter view:  All education systems  OECD only

<table>
<thead>
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<th>2000 score</th>
<th>2018 score</th>
<th>Score difference</th>
</tr>
</thead>
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<td>Thailand</td>
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- 2018 score is higher than 2000 score at the 0.05 level of statistical significance
- 2018 score is lower than 2000 score at the 0.05 level of statistical significance
- Rounds to zero

1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (>80 percent and <50 percent).
2 Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
3 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Data shown for education systems that participated in both cycles of PISA in 2000 and 2018. Education systems are ordered by 2018-2000 difference in average score. Scores are reported on a scale from 0 to 1000. Education systems are marked as OECD countries if they were OECD members in 2018. Although Spain’s PISA 2018 data met international technical standards, its reading literacy data show unusual student response behavior that prevents its data from being reported at this time. Italicics indicate non-OECD countries and education systems.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

SHORT-TERM TREND

Compared to the most recent PISA score in reading (in 2015), the average reading literacy score of U.S. 15-year-olds in 2018 (505) was not measurably different from the U.S. average score in 2015 (497).

- Among the 62 other education systems that participated in both 2015 and 2018, there were 4 education systems that reported higher average reading literacy scores for 15-year-olds in 2018 than in 2015. In these education systems, score increases ranged from 14 points in Singapore to 41 points in North Macedonia.
- In 13 education systems, average reading literacy scores for 15-year-olds were lower in 2018 than in 2015. In these education systems, score decreases ranged from 9 points in Latvia to 26 points in Indonesia.

See table R4b on the next page.
### Table R4b. Average scores and changes in average scores of 15-year-old students on the PISA reading literacy scale; by education system: 2015 and 2018

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<td><strong>Andorra</strong></td>
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<td>-26</td>
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</tbody>
</table>

* 2015 score is higher than 2016 score at the 95% level of statistical significance.
* 2015 score is lower than 2016 score at the 95% level of statistical significance.
* Rounds to zero.
* Integers data with caution; estimate is unreliable due high coefficient of variation (68 percent and 108 percent).
* Integers data with caution; estimate is unreliable due high coefficient of variation (68 percent and 108 percent).

Note: Data shown for education systems that participated in both cycles of PISA in 2015 and 2018. Education systems are ordered by 2015-2016 difference in average score. Scores are reported on a scale from 0 to 600. Education systems are ranked as OECD countries. If they were OECD members in 2006, ranks include non-OECD countries and education systems. Although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their samples prevent results from being discussed in this report, and although Spain’s PISA 2016 data met international technical standards, its reading literacy data show unusual student response behavior that prevents results from being reported at this time. Although Vietnam participated in PISA 2015, technical problems with its data prevent results from being discussed in this report.

Has there been any change over time in the reading performance of U.S. 15-year-olds’ scores at selected percentiles?

In 2018, U.S. students at the 90th and 75th percentiles performed, on average, higher in reading literacy than U.S. students in the same percentile groups in 2015, 2012, and 2009, and students at the 90th percentile also scored higher in 2018 than in 2003. There was no measurable difference between the 10th percentile cut score in 2018 (361) and the cut scores in 2015, 2009, and 2000. However, it was lower than the 10th percentile cut score in 2012 (378). No measurable differences were observed for the cut scores associated with the 25th percentile group in 2018 compared to any of the preceding cycles.

- Looking at the distribution of U.S. scores in reading literacy, the cut score associated with the 90th percentile in 2018 (643) was higher than the 90th percentile cut scores in 2015 (624), 2012 (614), 2009 (625), and 2003 (622). There was no measurable difference between the U.S. 90th percentile cut scores in 2018 and 2000.
- The cut score associated with the U.S. 75th percentile in 2018 (584) was also higher than the 75th percentile cut scores in 2015 (568), 2012 (561), and 2009 (569). There was no measurable difference between the U.S. 75th percentile cut scores in 2018 and 2003, nor was there a difference between the cut scores at this percentile in 2018 and 2000.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
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- Looking at the distribution of U.S. scores in reading literacy, the cut score associated with the 90th percentile in 2018 (643) was higher than the 90th percentile cut scores in 2015 (624), 2012 (614), 2009 (625), and 2003 (622). There was no measurable difference between the U.S. 90th percentile cut scores in 2018 and 2000.
- The cut score associated with the U.S. 75th percentile in 2018 (584) was also higher than the 75th percentile cut scores in 2015 (568), 2012 (561), and 2009 (569). There was no measurable difference between the U.S. 75th percentile cut scores in 2018 and 2003, nor was there a difference between the cut scores at this percentile in 2018 and 2000.

---

* p < .05. Significantly different from the 2018 score at the .05 level of statistical significance.

NOTE: This figure shows the threshold (or cut) score for the following: (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; (d) 90th percentile—the top 10 percent of students. The PISA 2006 reading literacy results are not reported for the United States because of an error in printing the test booklets. For more details, see Bilkis et al. 2007 (available at [https://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2008019]). Scores are reported on a scale from 0 to 1000.

Achievement by Student Groups

Are there gender differences in reading performance among 15-year-olds?

In 2018, the U.S. female-male score difference (24 points) was not measurably different than the score difference across the OECD countries on average (30 points). Female students scored higher, on average, than male students on the reading literacy scale in all 77 PISA education systems with reading literacy data.

- The U.S. gender score gap was smaller than the score gaps in 27 education systems (12 OECD countries and 15 non-OECD education systems), larger than the gaps in 5 education systems (2 OECD countries and 3 non-OECD education systems), and not measurably different from the gaps in 44 education systems (21 OECD countries and 23 non-OECD education systems).
- The gender score gap ranged from a difference of 10 score points in Colombia to 65 score points in Qatar.

See figure R6 on the next page.
### Figure R6. Difference in average scores of 15-year-old male and female students on the PISA reading literacy scale, by education system: 2018

<table>
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<tr>
<th>Education system</th>
<th>Difference in favor of females</th>
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</thead>
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</tr>
<tr>
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<td>10</td>
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<tr>
<td>Peru</td>
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<td>11</td>
</tr>
<tr>
<td>Mexico</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>B+G-P2 (China)</td>
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</tr>
<tr>
<td>Panama</td>
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<td>Costa Rica</td>
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<td>Macau (China)</td>
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<td>Korea, Republic of</td>
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<td>Portugal</td>
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</tr>
<tr>
<td>Netherlands</td>
<td>29</td>
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</tr>
</tbody>
</table>

**Difference in average reading literacy scores**

- Male-female difference in average reading literacy scores is statistically significant at the .05 level of significance.

1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (>50 percent and ≤50 percent).
2 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
3 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

**NOTE:** Education systems are ordered by absolute male-female difference in 2018 average scores. Differences were computed using unrounded numbers. Scores are reported on a scale from 0 to 1000. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national average differences of the OECD member countries, with each country weighted equally. In the case of reading literacy, the 2018 OECD average does not include Spain due to issues with its PISA 2018 reading literacy data. Although Spain’s PISA 2018 data met international technical standards, its reading literacy data show unusual student response behavior that prevent its data from being reported at this time. Italicics indicate non-OECD countries and education systems. B+G-P2 (China) refers to the four PISA participating China provinces (Beijing, Shanghai, Jiangsu, and Zhejiang). Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

How does the reading performance of U.S. 15-year-olds vary by race/ethnicity?

In 2018, White and Asian students in the United States scored higher than the overall U.S. average in reading literacy, while Hispanic and Black students scored lower.

- Asian and White students, on average, had higher reading literacy scores (556 and 531, respectively) than the overall U.S. average score (505). The average reading literacy score of students reporting Two or more races (501) was not measurably different than the U.S. average score. Hispanic and Black students had lower average scores (481 and 448, respectively) than the U.S. average score.

Figure R7. Average scores of U.S. 15-year-old students on the PISA reading literacy scale, by race/ethnicity: 2018

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: Scores are reported on a scale from 0 to 1000. Reporting standards were not met for American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. 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. Although data for some race/ethnicities were not shown separately because the reporting standards were not met, they are included in the U.S. totals.

How does the reading performance of U.S. 15-year-olds vary by measures of poverty?

ECONOMIC, SOCIAL, AND CULTURAL STATUS

The PISA 2018 questionnaire collected data on two measures of poverty: the economic, social, and cultural status (ESCS) index and a U.S.-only free or reduced-price lunch (FRPL) variable. The ESCS index is a student-level, international measure of socioeconomic status, while FRPL is a school-level, U.S.-only variable of school poverty for public schools only. In 2018, U.S. 15-year-old students had a higher average reading literacy score than the OECD average score within each of the four ESCS quarters.

- Students were grouped into four quarters using the distribution of ESCS scores specific to each education system. Those in the bottom ESCS quarter report the highest levels of poverty while those in the top quarter report the lowest levels of poverty.
- Score differences between the United States and OECD average scores were 15, 12, 17, and 25 points in the bottom, second, third, and top ESCS quarters, respectively.
- Average scores in reading by students' socioeconomic status show that U.S. 15-year-olds in the top ESCS quarter performed 99 points higher than those in the bottom quarter. Across the OECD countries on average, this score gap was 89 points.
- The U.S. score gap between the top and the bottom ESCS quarters was lower than the score gaps in 2 education systems and higher than the score gaps in 34 education systems.
- The score gap between the top and the bottom ESCS quarters ranged from 31 points in Macau (China) to 122 points in Luxembourg.

See figure R8 on the next page.
Figure R8. Average scores of 15-year-old students on the PISA reading literacy scale, by national quarters of the PISA index of economic, social, and cultural status (ESCS): 2018

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

NOTE: The PISA index of economic, social, and cultural status (ESCS) was created using student reports on parental occupation, the highest level of parental education, and an index of home possessions related to family wealth, home educational resources and possessions related to “classical” culture in the family home. The home possessions relating to “classical” culture in the family home included possessions such as works of classical literature, books of poetry, and works of art (e.g., paintings). The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Education systems are included in the OECD average if they were OECD members in 2018. In the case of reading literacy, the 2018 OECD average does not include Spain due to issues with its PISA 2018 reading literacy data. Although Spain’s PISA 2018 data met international technical standards, its reading literacy data show unusual student response behavior that prevent its data from being reported at this time. Average scores by quarter are calculated based on the distribution of student scores within each education system. Scores are reported on a scale from 0 to 1,000.


For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework
FREE OR REDUCED-PRICED LUNCH

In 2018, students in U.S. public schools with the highest levels of poverty (75 percent or more of students eligible for FRPL) scored, on average, 50 points lower than the overall U.S. average in reading literacy, whereas students in U.S. public schools with the lowest levels of poverty (less than 10 percent eligible for FRPL) scored 62 points higher on average than the overall U.S. average.

- Students in public schools in which at least half of all students were eligible for FRPL (50 to 74.9 percent and 75 percent or more) scored, on average, lower than the overall U.S. average score (489 and 456, respectively, vs. 505).
- Students in public schools in which less than half of all students were FRPL-eligible (less than 10 percent, 10 to 24.9 percent, and 25 to 49.9 percent) scored, on average, higher than the overall U.S. average score (567, 559, and 517, respectively, vs. 505).

Figure R9. Average scores of U.S. 15-year-old public school students on the PISA reading literacy scale, by percentage of students enrolled in schools eligible for free or reduced-price lunch, based on principals’ reports: 2018

1 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: Scores are reported on a scale from 0 to 1,000. The National School Lunch Program provides free or reduced-price lunch 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.

PISA 2018 Mathematics Literacy Results

Explore How U.S. Mathematics Performance Compared Internationally in 2018

Mathematics literacy was a minor domain in PISA 2018. For 2018, the PISA mathematics literacy assessment component included only trend items used in prior cycles of PISA, including the 2003 and 2012 cycles, when mathematics literacy was the major domain. Read more about the latest version of the mathematics literacy framework for PISA 2018.

In PISA, the assessment of mathematics literacy focuses on students’ capacity to formulate, use, and interpret mathematics in a variety of contexts. In PISA, proficiency in mathematics is more than the ability to reproduce the knowledge of mathematical concepts and procedures; it is conceptualized as students’ ability to extrapolate from what they know and apply their knowledge in both familiar and unfamiliar situations.

In PISA 2018, mathematics literacy is defined as students’ capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena.

International Comparisons of Student Achievement

How does the performance of U.S. 15-year-olds in mathematics compare internationally?

Compared to the 77 other education systems in PISA 2018, the U.S. average mathematics literacy score was lower than the average in 30 education systems, higher than the average in 39 education systems, and not measurably different from the average in 8 education systems.

- The U.S. average score (478) was lower than the OECD average score (489).
- Compared to the 36 other OECD members, the U.S. average in mathematics literacy was lower than the average in 24 education systems, higher than in 6, and not measurably different than in 6.
- On a scale of 0 to 1,000, average scores in mathematics literacy across the education systems ranged from 591 in B-S-J-Z (China) to 325 in the Dominican Republic.

See table M1 on the next page.
Table M1. Average scores of 15-year-old students on the PISA mathematics literacy scale, by education system: 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>489</td>
</tr>
<tr>
<td>B-S-Z (China)</td>
<td>591</td>
</tr>
<tr>
<td>Singapore</td>
<td>569</td>
</tr>
<tr>
<td>Macau (China)</td>
<td>558</td>
</tr>
<tr>
<td>Hong Kong (China)</td>
<td>531</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>527</td>
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<tr>
<td>Japan</td>
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<tr>
<td>Korea, Republic of</td>
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<tr>
<td>Estonia</td>
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<td>Poland</td>
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<td>United Kingdom</td>
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<td>Norway</td>
<td>501</td>
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<td>Germany</td>
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<td>Ireland</td>
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<td>Czech Republic</td>
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<td>Slovak Republic</td>
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<td>Spain</td>
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<tr>
<td><strong>United States</strong></td>
<td><strong>475</strong></td>
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<td>Belarus</td>
<td>472</td>
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<tr>
<td>Malta</td>
<td>472</td>
</tr>
</tbody>
</table>

Average score is higher than U.S. average score at the .05 level of statistical significance.
Average score is lower than U.S. average score at the .05 level of statistical significance.
1 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
2 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Education systems are ordered by 2018 average score. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1,000; italics indicate non-OECD countries and education systems. B-S-Z (China) refers to the four PISA participating China provinces, Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

What is the percentage of 15-year-olds reaching the PISA proficiency levels in mathematics?

In addition to scale scores, PISA describes student performance in each subject area in terms of levels of proficiency, from the lowest level (Level 1) to the highest (Level 6). Students were classified into proficiency levels based on their scores. Descriptions of the skills and knowledge of students at each proficiency level can be found here.

In the United States, 8 percent of 15-year-old students in 2018 were top performers in mathematics literacy, scoring at proficiency levels 5 and above; 27 percent were low performers in mathematics literacy, scoring below proficiency level 2.

- The United States had a smaller percentage of top performers in mathematics literacy than the OECD average (8 vs. 11 percent, respectively). The U.S. percentage was larger than in 38 education systems, smaller than in 29 education systems, and not measurably different from 10 education systems. The percentages of top-performing 15-year-old students in mathematics literacy ranged from 44 percent in B-S-J-Z (China) to nearly 0 percent in 9 education systems.

- The United States had a larger percentage of low performers in mathematics literacy than the OECD average (27 vs. 24 percent, respectively). The U.S. percentage was larger than in 30 education systems, smaller than in 39 education systems, and not measurably different from 8 education systems. The percentages of low-performing 15-year-old students in mathematics literacy ranged from 2 percent in B-S-J-Z (China) to 91 percent in the Dominican Republic.

See figure M2 on the next page.
Figure M2. Percentage of 15-year-old students performing below level 2 or reaching mathematics literacy proficiency levels 5 and above, by education system: 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>Below level 2</th>
<th>Levels 5 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>B-S-J-Z (China)</td>
<td>22%</td>
<td>64%</td>
</tr>
<tr>
<td>Singapore</td>
<td>37%</td>
<td>56%</td>
</tr>
<tr>
<td>Hong Kong (China)</td>
<td>37%</td>
<td>53%</td>
</tr>
<tr>
<td>Macau (China)</td>
<td>33%</td>
<td>64%</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>34%</td>
<td>62%</td>
</tr>
<tr>
<td>Korea, Republic of Netherlands</td>
<td>36%</td>
<td>63%</td>
</tr>
<tr>
<td>Japan</td>
<td>17%</td>
<td>63%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>34%</td>
<td>65%</td>
</tr>
<tr>
<td>Poland</td>
<td>17%</td>
<td>56%</td>
</tr>
<tr>
<td>Belgium</td>
<td>20%</td>
<td>56%</td>
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<tr>
<td>Estonia</td>
<td>26%</td>
<td>45%</td>
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<tr>
<td>Canada</td>
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<td>56%</td>
</tr>
<tr>
<td>Slowenia</td>
<td>24%</td>
<td>62%</td>
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<tr>
<td>Germany</td>
<td>20%</td>
<td>61%</td>
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<tr>
<td>United Kingdom</td>
<td>17%</td>
<td>61%</td>
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<tr>
<td>Czech Republic</td>
<td>22%</td>
<td>59%</td>
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<tr>
<td>Sweden</td>
<td>19%</td>
<td>60%</td>
</tr>
<tr>
<td>Austria</td>
<td>17%</td>
<td>60%</td>
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<tr>
<td>Norway</td>
<td>19%</td>
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<tr>
<td>Denmark</td>
<td>15%</td>
<td>62%</td>
</tr>
<tr>
<td>Portugal</td>
<td>25%</td>
<td>57%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>27%</td>
<td>53%</td>
</tr>
<tr>
<td>Finland</td>
<td>15%</td>
<td>60%</td>
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<tr>
<td>France</td>
<td>22%</td>
<td>58%</td>
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<tr>
<td>Luxembourg</td>
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<td>Slovak Republic</td>
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<tr>
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<tr>
<td>Lithuania</td>
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<td>61%</td>
</tr>
<tr>
<td>United States</td>
<td>17%</td>
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<tr>
<td>Ireland</td>
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<tr>
<td>Russian Federation</td>
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<td>58%</td>
</tr>
<tr>
<td>Hungary</td>
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<td>62%</td>
</tr>
<tr>
<td>Belarus</td>
<td>25%</td>
<td>69%</td>
</tr>
</tbody>
</table>

# Rounds to zero
1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (>30 percent and ≤50 percent).
2 Interpretable with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
3 p < .05. Significantly different from the U.S. percentage at the 0.5% level of statistical significance.
4 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
5 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Education systems are ordered by 2018 percentages of 15-year-olds in levels 5 and above. To reach a particular proficiency level, a student must correctly answer a majority of items at that level. Students were classified into mathematics proficiency levels according to their scores. Exact cut scores are as follows. Below Level 2 is a score less than 420.00; Levels 5 and above is a score equal to or greater than 655.99. See descriptions of each proficiency level here. Scores are reported on a scale from 0 to 1,000. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national percentages of the OECD member countries, with each country weighted equally. Italics indicate non-OECD countries and education systems. B-S-J-Z (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

How large is the gap in mathematics performance between top and bottom performers?

Score gaps between top and bottom performers provide one indication of equity within an education system. The distribution of U.S. student scores in mathematics literacy showed a score gap of 241 points between the 90th and 10th percentiles.

- The U.S. score gap between the 90th and 10th percentiles (241 points) was not measurably different than the score gap across the OECD countries on average (235 points).
- The U.S. score gap was smaller than the gap in 6 education systems, larger than the gap in 31, and not measurably different than the gap in 40 education systems.
- Internationally, score gaps between the 90th and 10th percentiles ranged from 181 points in the Dominican Republic to 285 points in Israel.

See figure M3 on the next page.
Figure M3. Average scores and 10th and 90th percentile scores of 15-year-old students on the PISA mathematics literacy scale and percentile score gaps, by education system: 2018

Move the slider to switch between showing and hiding scores or click on an education system label to view its scores.

Education system | 10th | Avg. score | 90th
--- | --- | --- | ---
OECD average | | | |
B-S-3-Z (China)* | | | |
Singapore | | | |
Macao (China)* | | | |
Hong Kong (China) | | | |
Chinese Taipei* | | | |
Japan* | | | |
Korea, Republic of | | | |
Estonia* | | | |
Netherlands | | | |
Poland | | | |
Switzerland | | | |
Canada | | | |
Denmark* | | | |
Slovenia | | | |
Belgium | | | |
Finland* | | | |
Sweden | | | |
United Kingdom | | | |
Norway | | | |
Germany | | | |
Ireland* | | | |
Czech Republic | | | |
Austria | | | |
Latvia* | | | |
France | | | |
Iceland | | | |
New Zealand | | | |
Portugal | | | |
Australia | | | |
Russian Federation* | | | |
Italy | | | |
Slovak Republic | | | |
Luxembourg* | | | |
Spain | | | |
Lithuania | | | |
Hungary | | | |
Belarus | | | |
Malta* | | | |
Croatia* | | | |
Israel* | | | |
Turkey* | | | |
Ukraine | | | |
Greece | | | |
Cyprus | | | |
Serbia | | | |
Malaysia* | | | |
Albania* | | | |
Bulgaria1 | | | |
United Arab Emirates* | | | |
Brunei Darussalam | | | |
Romania | | | |
Montenegro, Republic of | | | |
Kazakhstan* | | | |
Moldova, Republic of | | | |
Baku (Azerbaijan)2 | | | |
Thailand* | | | |
Uruguay* | | | |
Chile* | | | |
Qatar | | | |
Mexico* | | | |
Bosnia and Herzegovina* | | | |
Costa Rica* | | | |
Peru* | | | |
Jordan* | | | |
Georgia | | | |
North Macedonia | | | |
Lebanon* | | | |
Colombia* | | | |
Brazil* | | | |
Argentina* | | | |
Indonesia* | | | |
Saudi Arabia* | | | |
Morocco* | | | |
Kosovo* | | | |
Panama* | | | |
Philippines* | | | |
Dominican Republic* | | | |

1 p < .05. Score gap is significantly different from the U.S. 90th to 10th percentile score gap at the .05 level of statistical significance.

2 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.

NOTE: This figure shows the threshold (cut) scores for the following: (a) 10th percentile—the bottom 10 percent of students; (b) 90th percentile—the top 10 percent of students. The score gap for each education system is the difference between its 90th and 10th percentile scores. 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 average score from largest to smallest. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1,000. Italics indicate non-OECD countries and education systems. B-S-3-Z (China) refers to the four PISA participating China provinces (Beijing, Shanghai, Jiangsu, and Zhejiang). Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

Trend in Student Achievement

Has there been any change in 15-year-olds’ performance in mathematics over time?

LONG-TERM TRENDS

PISA 2018 literacy scores can be compared to scores from previous cycles. For mathematics literacy, the earliest cycle to which 2018 scores can be compared is 2003. Compared to the earliest comparable PISA score in mathematics (in 2003), the average mathematics literacy score of U.S. 15-year-olds in 2018 (478) was not measurably different than the average score in 2003 (483).

- Among the 36 other education systems that participated in both 2003 and 2018, there were 10 education systems that reported higher average mathematics literacy scores in 2018 than in 2003. In these education systems, score increases from 2003 to 2018 ranged from 13 points in Latvia to 30 points each in Turkey and Macau (China).
- In 13 education systems, average mathematics literacy scores for 15-year-olds were lower in 2018 than in 2003. In these education systems, score decreases from 2003 to 2018 ranged from 10 points in Luxembourg to 37 points in Finland.

See table M4a on the next page.
### Figure M44a. Average scores and changes in average scores of 15-year-old students on the PISA mathematics literacy scale, by education system: 2003 and 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>2003 score</th>
<th>2018 score</th>
<th>Score difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macau (China)</td>
<td>527</td>
<td>558</td>
<td>30</td>
</tr>
<tr>
<td>Turkey</td>
<td>423</td>
<td>454</td>
<td>30</td>
</tr>
<tr>
<td>Brazil</td>
<td>356</td>
<td>354</td>
<td>2</td>
</tr>
<tr>
<td>Portugal</td>
<td>486</td>
<td>492</td>
<td>6</td>
</tr>
<tr>
<td>Poland</td>
<td>490</td>
<td>516</td>
<td>26</td>
</tr>
<tr>
<td>Mexico</td>
<td>395</td>
<td>409</td>
<td>24</td>
</tr>
<tr>
<td>Italy</td>
<td>486</td>
<td>487</td>
<td>1</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>486</td>
<td>488</td>
<td>2</td>
</tr>
<tr>
<td>Indonesia</td>
<td>360</td>
<td>379</td>
<td>19</td>
</tr>
<tr>
<td>Latvia</td>
<td>483</td>
<td>496</td>
<td>13</td>
</tr>
<tr>
<td>Greece</td>
<td>445</td>
<td>451</td>
<td>6</td>
</tr>
<tr>
<td>Norway</td>
<td>495</td>
<td>501</td>
<td>6</td>
</tr>
<tr>
<td>Thailand</td>
<td>417</td>
<td>419</td>
<td>2</td>
</tr>
<tr>
<td>Hong Kong (China)</td>
<td>550</td>
<td>551</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>503</td>
<td>500</td>
<td>3</td>
</tr>
<tr>
<td>Ireland</td>
<td>503</td>
<td>500</td>
<td>3</td>
</tr>
<tr>
<td>Spain</td>
<td>485</td>
<td>481</td>
<td>4</td>
</tr>
<tr>
<td>Uruguay</td>
<td>422</td>
<td>418</td>
<td>5</td>
</tr>
<tr>
<td><strong>United States</strong></td>
<td><strong>483</strong></td>
<td><strong>478</strong></td>
<td><strong>-5</strong></td>
</tr>
<tr>
<td>Denmark</td>
<td>514</td>
<td>509</td>
<td>-5</td>
</tr>
<tr>
<td>Sweden</td>
<td>509</td>
<td>502</td>
<td>-7</td>
</tr>
<tr>
<td>Austria</td>
<td>506</td>
<td>499</td>
<td>-7</td>
</tr>
<tr>
<td>Japan</td>
<td>334</td>
<td>327</td>
<td>-7</td>
</tr>
<tr>
<td>Hungary</td>
<td>490</td>
<td>481</td>
<td>-9</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>493</td>
<td>483</td>
<td>-10</td>
</tr>
<tr>
<td>Switzerland</td>
<td>527</td>
<td>515</td>
<td>-11</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>498</td>
<td>486</td>
<td>-12</td>
</tr>
<tr>
<td>France</td>
<td>511</td>
<td>495</td>
<td>-15</td>
</tr>
<tr>
<td>Korea, Republic of</td>
<td>342</td>
<td>326</td>
<td>-16</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>516</td>
<td>499</td>
<td>-17</td>
</tr>
<tr>
<td>Netherlands</td>
<td>536</td>
<td>519</td>
<td>-19</td>
</tr>
<tr>
<td>Iceland</td>
<td>515</td>
<td>495</td>
<td>-20</td>
</tr>
<tr>
<td>Canada</td>
<td>532</td>
<td>512</td>
<td>-20</td>
</tr>
<tr>
<td>Belgium</td>
<td>529</td>
<td>508</td>
<td>-21</td>
</tr>
<tr>
<td>New Zealand</td>
<td>523</td>
<td>494</td>
<td>-29</td>
</tr>
<tr>
<td>Australia</td>
<td>524</td>
<td>491</td>
<td>-33</td>
</tr>
<tr>
<td>Finland</td>
<td>544</td>
<td>507</td>
<td>-37</td>
</tr>
</tbody>
</table>

*2003 score is higher than 2018 score at the .05 level of statistical significance.
*2018 score is lower than 2003 score at the .05 level of statistical significance.

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

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

3 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.

**NOTE:** Data shown for education systems that participated in both cycles of PISA in 2003 and 2018. Education systems are ordered by 2018-2003 difference in average score. The PISA math framework was revised in 2004. Because of changes in the framework, it is not possible to compare math learning outcomes from PISA 2000 with those from PISA 2003, 2006, 2009, 2012, 2015, and 2018. Scores are reported on a scale from 0 to 1000. Education systems are marked as OECD countries if they were OECD members in 2018. Italics indicate non-OECD countries and education systems.

**SOURCE:** Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2008 and 2018.
For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

SHORT-TERM TREND

Compared to the most recent comparable PISA score in mathematics (in 2015), the average mathematics literacy score of U.S. 15-year-olds in 2018 (478) was not measurably different from the U.S. average score in 2015 (470).

- Among the 63 other education systems that participated in both 2015 and 2018, there were 14 education systems that reported higher average mathematics literacy scores for 15-year-olds in 2018 than in 2015. In these education systems, score increases from 2015 to 2018 ranged from 7 points in Iceland to 33 points in Turkey.
- In three education systems, average mathematics literacy scores for 15-year-olds were lower in 2018 than in 2015. In these education systems, score decreases from 2015 to 2018 ranged from 7 points in Malta to 14 points in Romania.

See table M4b on the next page.
<table>
<thead>
<tr>
<th>Education system</th>
<th>2019 score</th>
<th>2018 score</th>
<th>Score difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iceland</td>
<td>468</td>
<td>465</td>
<td>3</td>
</tr>
<tr>
<td>Latvia</td>
<td>427</td>
<td>427</td>
<td>0</td>
</tr>
<tr>
<td>Estonia</td>
<td>450</td>
<td>450</td>
<td>0</td>
</tr>
<tr>
<td>France</td>
<td>479</td>
<td>477</td>
<td>2</td>
</tr>
<tr>
<td>Hungary</td>
<td>477</td>
<td>477</td>
<td>0</td>
</tr>
<tr>
<td>Ireland</td>
<td>468</td>
<td>465</td>
<td>3</td>
</tr>
<tr>
<td>Ireland (3)</td>
<td>471</td>
<td>466</td>
<td>5</td>
</tr>
<tr>
<td>Italy</td>
<td>471</td>
<td>466</td>
<td>5</td>
</tr>
<tr>
<td>Japan</td>
<td>402</td>
<td>402</td>
<td>0</td>
</tr>
<tr>
<td>Latvia (3)</td>
<td>427</td>
<td>427</td>
<td>0</td>
</tr>
<tr>
<td>Lithuania</td>
<td>478</td>
<td>476</td>
<td>2</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>457</td>
<td>456</td>
<td>1</td>
</tr>
<tr>
<td>Netherlands</td>
<td>512</td>
<td>514</td>
<td>-2</td>
</tr>
<tr>
<td>New Zealand</td>
<td>467</td>
<td>465</td>
<td>2</td>
</tr>
<tr>
<td>Norway</td>
<td>502</td>
<td>500</td>
<td>2</td>
</tr>
<tr>
<td>Norway (3)</td>
<td>471</td>
<td>466</td>
<td>5</td>
</tr>
<tr>
<td>Poland</td>
<td>439</td>
<td>439</td>
<td>0</td>
</tr>
<tr>
<td>Portugal</td>
<td>443</td>
<td>443</td>
<td>0</td>
</tr>
<tr>
<td>Portugal (3)</td>
<td>457</td>
<td>456</td>
<td>1</td>
</tr>
<tr>
<td>Romania</td>
<td>454</td>
<td>454</td>
<td>0</td>
</tr>
<tr>
<td>Singapore</td>
<td>460</td>
<td>460</td>
<td>0</td>
</tr>
<tr>
<td>Slovenia</td>
<td>478</td>
<td>476</td>
<td>2</td>
</tr>
<tr>
<td>Spain</td>
<td>466</td>
<td>466</td>
<td>0</td>
</tr>
<tr>
<td>Sweden</td>
<td>423</td>
<td>423</td>
<td>0</td>
</tr>
<tr>
<td>Switzerland</td>
<td>471</td>
<td>466</td>
<td>5</td>
</tr>
<tr>
<td>United States</td>
<td>456</td>
<td>454</td>
<td>2</td>
</tr>
<tr>
<td>United States (3)</td>
<td>471</td>
<td>466</td>
<td>5</td>
</tr>
</tbody>
</table>

**NOTES:**
- Data shown for education systems that participated in both cycles of PISA in 2015 and 2018. Education systems are ordered by 2018-2015 difference in average score. Scores are reported on a scale from 0 to 600. Education systems are marked as OECD (2019) countries if they were OECD members in 2018. Boxes indicate non-OECD countries and education systems, although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their samples prevent results from being discussed in this report although Vietnam participated in PISA 2018. Technical problems result in data present results from being discussed in this report.
- All countries are education systems that participated in both cycles of PISA in 2015 and 2018. Education systems are ordered by 2018-2015 difference in average score. Scores are reported on a scale from 0 to 600. Education systems are marked as OECD (2019) countries if they were OECD members in 2018. Boxes indicate non-OECD countries and education systems, although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their samples prevent results from being discussed in this report although Vietnam participated in PISA 2018. Technical problems result in data present results from being discussed in this report.

**Source:** Organisation for Economic Co-operation and Development (OECD), Program for International Student Assessment (PISA), 2019 and 2018.
Has there been any change over time in the mathematics performance of U.S. 15-year-olds’ scores at selected percentiles?

In 2018, U.S. students at the 75th and 90th percentiles performed, on average, higher in mathematics literacy than U.S. students in the same percentile groups in 2015. No measurable differences were observed for the average mathematics cut scores associated with the 25th and the 10th percentile groups in 2018 and in any of the preceding cycles.

Looking at the distribution of U.S. scores in mathematics literacy in 2018, the cut scores associated with the 90th percentile (598) and the 75th percentile (543) were higher than the corresponding cut scores at the 90th percentile (585) and the 75th percentile (532) in 2015. There was no measurable difference between any of the U.S. percentile cut scores in 2018 and in 2012, 2009, 2006, and 2003.

![Figure M5. Average scores and percentile scores of U.S. 15-year-old students on the PISA mathematics literacy scale at selected percentiles: Selected years 2003–2018](https://nces.ed.gov/surveys/pisa/pisa2018/index.asp#/)
Achievement by Student Groups

Are there gender differences in mathematics performance among 15-year-olds?

In 2018 in the United States, male 15-year-olds scored higher than their female peers. Among the 78 education systems, male students scored higher, on average, than female students in 32 education systems, and female students scored higher, on average, than male students on the mathematics literacy scale in 14 education systems.

- On average across OECD countries, male students outperformed female students in mathematics by 5 points.
- In 14 education systems, females outperformed males on average, with score gaps ranging from 6 points in Finland to 24 points in Qatar.
- In 32 education systems, males outperformed females on average, with score gaps ranging from 5 points in the Russian Federation and Canada to 20 points in Colombia.

See figure M6 on the next page.
Figure M6. Difference in average scores of 15-year-old male and female students on the PISA mathematics literacy scale, by education system: 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>Difference in favor of females</th>
<th>Difference in favor of males</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Colombia¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costa Rica¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peru¹</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Italy</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Argentina</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Austria</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Belgium</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Mexico¹</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>B-S-J-Z (China)</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Japan</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Portugal</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>New Zealand</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Hungary</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Croatia</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>United States</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Brazil²</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Estonia</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Uruguay</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Montenegro, Republic of Montenegro</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Panama¹</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Baku (Azerbaijan)²</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Chile</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Switzerland</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Germany</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Ukraine</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Latvia</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Spain</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>France</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Belarus</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Australia</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Ireland</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Romania¹</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Turkey¹</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Canada</td>
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<td>5</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Kosovo</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTE: Education systems are ordered by absolute male-female difference in 2018 average scores. Differences were computed using unrounded numbers. Scores are reported on a scale from 0 to 1,000. Education systems are ranked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national average differences of the OECD member countries, with each country weighted equally. Italics indicate non-OECD countries and education systems. B-S-J-Z (China) refers to the four PISA participating China provinces, Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

How does the mathematics performance of U.S. 15-year-olds vary by race/ethnicity?

In 2018, White and Asian students in the United States scored higher than the overall U.S. average in mathematics literacy, while Hispanic and Black students scored lower.

- Asian and White students, on average, had higher mathematics literacy scores (539 and 503, respectively) than the overall U.S. average score (478). The average mathematics literacy score of students reporting Two or more races (474) was not measurably different than the overall U.S. average score. Hispanic and Black students had lower average scores (452 and 419, respectively) than the U.S. average score.

Figure M7. Average scores of U.S. 15-year-old students on the PISA mathematics literacy scale, by race/ethnicity: 2018

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>Average score</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>539</td>
<td>25*</td>
</tr>
<tr>
<td>Black</td>
<td>480</td>
<td>-59*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>503</td>
<td>-27*</td>
</tr>
<tr>
<td>Asian</td>
<td>479</td>
<td>61*</td>
</tr>
<tr>
<td>Two or more races</td>
<td>474</td>
<td>-41!</td>
</tr>
</tbody>
</table>

!! 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: Scores are reported on a scale from 0 to 1,000. Reporting standards were not met for American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. 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. Although data for some race/ethnicities were not shown separately because the reporting standards were not met, they are included in the U.S. totals.

How does the mathematics performance of U.S. 15-year-olds vary by measures of poverty?

ECONOMIC, SOCIAL, AND CULTURAL STATUS

The PISA 2018 questionnaire collected data on two measures of poverty: the economic, social, and cultural status (ESCS) index and a U.S.-only free or reduced-price lunch (FRPL) variable. The ESCS index is a student-level, international measure of socioeconomic status, while FRPL is a school-level, U.S.-only variable of school poverty. In 2018, U.S. 15-year-old students had lower average mathematics literacy scores than the OECD average scores in the bottom, second, and third ESCS quarters. There was no measurable difference between U.S. students’ average score and the OECD average score in the top ESCS quarter.

- Students were grouped into four quarters using the distribution of ESCS scores specific to each education system. Those in the bottom ESCS quarter report the highest levels of poverty while those in the top quarter report the lowest levels of poverty.
- U.S. students in the bottom ESCS quarter scored 16 points lower, on average, than the OECD average score in the bottom ESCS quarter.
- Average scores in mathematics by students’ socioeconomic status show that U.S. 15-year-olds in the top ESCS quarter performed 98 points higher than those in the bottom quarter. Across the OECD countries on average, this score gap was smaller, at 87 points.
- The U.S. score gap between the top and the bottom ESCS quarters was smaller than the score gaps in 4 education systems and higher than the score gaps in 39 education systems.

See figure M8 on the next page.
In 2018, students in U.S. public schools with the highest levels of poverty (75 percent or more of students eligible for FRPL) scored, on average, 50 points lower than the overall U.S. average in mathematics literacy, whereas students in U.S. public schools with the lowest levels of poverty (less than 10 percent eligible for FRPL) scored 68 points higher than the overall U.S. average.

- Students in public schools in which at least half of all students were eligible for FRPL (50 to 74.9 percent and 75 percent or more) scored, on average, lower than the overall U.S. average (463 and 429, respectively, vs. 478).
• Students in public schools in which less than half of all students were FRPL-eligible (less than 10 percent, 10 to 24.9 percent, and 25 to 49.9 percent) scored, on average, higher than the overall U.S. average (547, 531, and 489, respectively, vs. 478).

Figure M9. Average scores of U.S. 15-year-old public school students on the PISA mathematics literacy scale, by percentage of students enrolled in schools eligible for free or reduced-price lunch, based on principals’ reports: 2018

For More Information

• For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
• See Technical Notes (including Coverage of Target Population Table A-4)
• Visit the OECD website
• Read the International PISA 2018 Report and Assessment Framework
PISA 2018 Science Literacy Results

Explore How U.S. Science Performance Compared Internationally in 2018

Science literacy was a minor domain in PISA 2018. For 2018, the PISA science literacy assessment component administered to students included only trend items used in prior cycles of PISA, including the 2006 and 2015 cycles, when science literacy was the major domain. Read more about the latest version of the science literacy framework for PISA 2018.

In PISA, the assessment of science literacy focuses on students’ ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. It requires students to engage in reasoned discourse about science and technology utilizing their knowledge of facts and theories to explain phenomena scientifically. It also requires students to know the standard methodological procedures and patterns of reasoning used in science to evaluate or design scientific inquiries and interpret evidence.

In PISA 2018, science literacy is defined as students’ ability to engage with science-related issues, and with the ideas of science, as a reflective citizen. A scientifically literate person is willing to engage in reasoned discourse about science and technology, which requires the competencies to explain phenomena scientifically, evaluate and design scientific inquiry, and interpret data and evidence scientifically.

International Comparisons of Student Achievement

How does the performance of U.S. 15-year-olds in science compare internationally?

Compared to the 77 other education systems in PISA 2018, the U.S. average science literacy score was lower than the average in 11 education systems, higher than the average in 55 education systems, and not measurably different from the average in 11 education systems

- The U.S. average score (502) was higher than the OECD average score (489).
- Compared to the 36 other OECD members, the U.S. average in science literacy was lower than the average in 6 education systems, higher than in 19, and not measurably different than in 11.
- On a scale of 0 to 1,000, average scores in science literacy across the education systems ranged from 590 points in B-S-J-Z (China) to 336 points in the Dominican Republic.

See table S1 on the next page.
Table S1. Average scores of 15-year-old students on the PISA science literacy scale, by education system: 2018

<table>
<thead>
<tr>
<th>Education system</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD average</td>
<td>490</td>
</tr>
<tr>
<td>B-S-I-Z (China)</td>
<td>590</td>
</tr>
<tr>
<td>Singapore</td>
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<tr>
<td>Macao (China)</td>
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<td>Japan</td>
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<tr>
<td>Finland</td>
<td>522</td>
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<tr>
<td>Korea, Republic of</td>
<td>519</td>
</tr>
<tr>
<td>Canada</td>
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<tr>
<td>Hong Kong (China)</td>
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<td>Chinese Taipei</td>
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<td>Poland</td>
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<td>469</td>
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<tr>
<td>Turkey</td>
<td>468</td>
</tr>
</tbody>
</table>

1 Average score is higher than U.S. average score at the 0.05 level of statistical significance.
2 Average score is lower than U.S. average score at the 0.05 level of statistical significance.
3 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
4 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

Note: Education systems are ordered by 2018 average score. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1000. Italics indicate non-OECD countries and education systems. Italics indicate non-OECD countries and education systems. B-S-I-Z (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

What is the percentage of 15-year-olds reaching the PISA proficiency levels in science?

In addition to scale scores, PISA describes student performance in each subject area in terms of levels of proficiency, from the lowest level (Level 1) to the highest (Level 6). Students were classified into proficiency levels based on their scores. Descriptions of the skills and knowledge of students at each proficiency level can be found here.

In the United States, 9 percent of 15-year-old students in 2018 were top performers in science literacy, scoring at proficiency levels 5 and above; 19 percent were low performers in science literacy, scoring below proficiency level 2.

- The United States had a larger percentage of top performers in science literacy than the OECD average (9 vs. 7 percent, respectively). The U.S. percentage was larger than in 56 education systems, smaller than in 10 education systems, and not measurably different from 11 education systems. The percentages of top-performing 15-year-old students in science literacy ranged from 32 percent in B-S-J-Z (China) to nearly 0 percent in 18 education systems.

- The United States had a smaller percentage of low performers in science literacy than the OECD average (19 vs. 22 percent, respectively). The U.S. percentage was smaller than in 49 education systems, larger than in 12 education systems, and not measurably different from 16 education systems. The percentages of low-performing 15-year-old students in science literacy ranged from 2 percent in B-S-J-Z (China) to 85 percent in the Dominican Republic.

See figure S2 on the next page.
Figure S2. Percentage of 15-year-old students performing below level 2 or reaching science literacy proficiency levels 5 and above, by education system: 2018

<table>
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<th>Education system</th>
<th>Below level 2</th>
<th>Levels 5 and above</th>
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<td>OECD average</td>
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<tr>
<td>B-S-3-Z (China)</td>
<td>24%</td>
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<tr>
<td>Singapore</td>
<td>19%</td>
<td>12%</td>
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<tr>
<td>Macau (China)</td>
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</tr>
<tr>
<td>Japan</td>
<td>17%</td>
<td>12%</td>
</tr>
<tr>
<td>Finland</td>
<td>15%</td>
<td>10%</td>
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<tr>
<td>Estonia</td>
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<td>8%</td>
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<tr>
<td>Korea, Republic of</td>
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<td>12%</td>
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<tr>
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<tr>
<td>New Zealand</td>
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<td>Kazakhstan</td>
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<td>9%</td>
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<tr>
<td>Montenegro, Republic of</td>
<td>48%</td>
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<td>Bosnia and Herzegovina</td>
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<td>Kosovo</td>
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</tbody>
</table>

2 Rounds to zero
1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (> 30 percent and ≤ 50 percent)
2 Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate
3 p < .05 Significantly different from the U.S. percentage at the 0.05 level of statistical significance
4 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample
5 Less than 50 percent of the 15-year-old population is covered by the PISA sample

NOTE: Education systems are ordered by 2018 percentages of 15-year-olds in levels 2 and above. To reach a particular proficiency level, a student must correctly answer a majority of items at that level. Students were classified into science proficiency levels according to their scores. Exact cut scores are as follows: Below Level 2 (a score less than 400.54); Levels 3 and above is a score equal to or greater than 653.33. See descriptions of each proficiency level in the report. Scores are reported on a scale from 0 to 1,000. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national percentages of the OECD member countries, with each country weighted equally. Italics indicate non-OECD countries and education systems. B-S-3-Z (China) refers to the four PISA participating China provinces Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

How large is the gap in science performance between top and bottom performers?

Score gaps between top and bottom performers provide one indication of equity within an education system. The distribution of U.S. student scores in science literacy showed a score gap of 259 points between the 90th and 10th percentiles.

- The U.S. score gap between the 90th and 10th percentiles (259 points) was larger than the score gap across the OECD countries on average (244 points).
- The U.S. score gap was smaller than the gap in 2 education systems, larger than the gap in 50, and not measurably different than the gap in 25 education systems.
- Internationally, score gaps between the 90th and 10th percentiles ranged from 165 points in Kosovo to 293 points in Israel.

See figure S3 on the next page.
Figure S3. Average scores and 10th and 90th percentile scores of 15-year-old students on the PISA science literacy scale and percentile score gaps, by education system: 2018

Move the slider to switch between showing and hiding scores or click on an education system label to view its scores.

<table>
<thead>
<tr>
<th>Education system</th>
<th>10th</th>
<th>Avg. score</th>
<th>90th</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OECD average</strong></td>
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<td>529</td>
<td>535</td>
</tr>
<tr>
<td>B-9-3-Z (China)</td>
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<td>Ukraine</td>
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</tr>
<tr>
<td>Turkey</td>
<td>654</td>
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</tbody>
</table>

* p < 0.05. Score gap is significantly different from the U.S. 90th to 10th percentile score gap at the 0.05 level of statistical significance.

1 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.

2 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: This figure shows the threshold (or cut) scores for the following: (a) 10th percentile—the bottom 10 percent of students; (b) 90th percentile—the top 10 percent of students. The score gap for each education system is the difference between its 90th and 10th percentile scores. 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 average score from largest to smallest. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national averages of the OECD member countries, with each country weighted equally. Scores are reported on a scale from 0 to 1,000. Italics indicate non-OECD countries and education systems. B-9-3-Z (China) refers to the four PISA participating China provinces (Beijing, Shanghai, Jiangsu, and Zhejiang). Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

Has there been any change in 15-year-olds’ performance in science over time?

**LONG-TERM TREND**

PISA 2018 literacy scores can be compared to scores from previous cycles. For science literacy, the earliest cycle to which 2018 scores can be compared is 2006. Compared to the earliest comparable PISA score in science (in 2006), the average science literacy score of U.S. 15-year-olds in 2018 (502) was higher than the average score in 2006 (489).

- Among the 52 other education systems that participated in both 2006 and 2018, there were 7 education systems that reported higher average science literacy scores in 2018 than in 2006. In these education systems, score increases ranged from 13 points in Poland and Brazil to 70 points in Qatar.
- In 22 education systems, average science literacy scores for 15-year-olds were lower in 2018 than in 2006. In these education systems, score decreases from 2006 to 2018 ranged from 10 points in Bulgaria, Luxembourg, and the United Kingdom to 41 points in Finland.

See table S4a on the next page.
<table>
<thead>
<tr>
<th>Country</th>
<th>2006 Score</th>
<th>2018 Score</th>
<th>Score Difference</th>
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</thead>
<tbody>
<tr>
<td>Qatar</td>
<td>349</td>
<td>419</td>
<td>70</td>
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<tr>
<td>Turkey</td>
<td>424</td>
<td>468</td>
<td>44</td>
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<tr>
<td>Moos (China)</td>
<td>571</td>
<td>644</td>
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<td>Portugal</td>
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<td>562</td>
<td>88</td>
</tr>
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<td>United States</td>
<td>488</td>
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<td>14</td>
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<tr>
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<td>419</td>
<td>9</td>
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<td>Israel</td>
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<td>562</td>
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<td>Parice</td>
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<td>Austria</td>
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<td>Greece</td>
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1. Interpret data with caution: Estimate is unstable due to high coefficient of variation (>50 percent and >30 percent).
2. All the values are statistically significant at the 0.05 level.
3. OECD countries are marked with an asterisk (*).
For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
- Visit the OECD website
- Read the International PISA 2018 Report and Assessment Framework

SHORT-TERM TREND

**Compared to the most recent comparable PISA score in science (in 2015), the average science literacy score of U.S. 15-year-olds in 2018 (502) was not measurably different from the U.S. average score in 2015 (496).**

- Among the 63 other education systems that participated in both 2015 and 2018, there were 6 education systems that reported higher average science literacy scores for 15-year-olds in 2018 than in 2015. In these education systems, score increases ranged from 6 points in Cyprus to 43 points in Turkey.

- In 20 education systems, average science literacy scores for 15-year-olds were lower in 2018 than in 2015. In these education systems, score decreases ranged from 6 points in Slovenia to 28 points in Georgia.

See table S4b on the next page.
<table>
<thead>
<tr>
<th>Education system</th>
<th>2015 score</th>
<th>2018 score</th>
<th>Score difference</th>
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<td>United States</td>
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<td>492</td>
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</table>

* OECD score is higher than US score at the 0.5 level of statistical significance.
* OECD score is lower than US score at the 0.5 level of statistical significance.
* Value is zero.
* Interpret data with caution. Estimate is unstable because the standard error is greater than the estimate.
* Interpret data with caution. Estimate is unstable because the standard error is greater than the estimate.

Note: Data shown for education systems that participated in both cycles of PISA in 2015 and 2018. Education systems are ordered by 2015-2018 difference in average score. Scores are reported on a scale from 0 to 600. Education systems are marked as OECD countries if they were OECD members in 2015. Each * indicates a OECD countries and education systems, although Argentina, Malaysia, and Kazakhstan participated in PISA 2015, technical problems with their sample plans resulted in being discussed in this report. Although Vietnam participated in PISA 2015, technical problems with their data prevented results from being discussed in this report.

Has there been any change over time in the science performance of U.S. 15-year-olds' scores at selected percentiles?

In 2018, U.S. students at the 10th and 25th percentiles performed, on average, higher in science literacy than U.S. students in the same percentile groups in 2006. No measurable differences were observed for the average science scores and cut scores associated with the 75th and 90th percentile groups in 2018 and in any preceding cycles.

- Looking at the distribution of U.S. scores in science literacy, the cut score associated with the 25th percentile in 2018 (433) was higher than the 25th percentile cut score in 2006 (412). There was no measurable difference between the U.S. 25th percentile cut score in 2018 and the corresponding cut scores in 2015, 2012, and 2009.
- The cut score associated with the U.S. 10th percentile in 2018 (371) was also higher than the 10th percentile cut score in 2006 (349). There was no measurable difference between the U.S. 10th percentile cut score in 2018 and the corresponding cut scores in 2015, 2012, and 2009.
- There were no measurable differences between the 75th and 95th percentile cut scores in 2018 and the corresponding cut scores in 2015, 2012, 2009, and 2006.

Figure S5. Average scores and percentile scores of U.S. 15-year-old students on the PISA science literacy scale at selected percentiles: Selected years 2006-2018

* p < .05. Significantly different from the 2018 score at the .05 level of statistical significance.

NOTE: This figure shows the threshold (or cut) score for the following: (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; (d) 90th percentile—the top 10 percent of students. Scores are reported on a scale from 0 to 1000. Although science was assessed in 2000 and 2009, because the science framework was revised for 2016, it is possible to look at changes in science only from 2006 forward.

Achievement by Student Groups

Are there gender differences in science performance among 15-year-olds?

In the United States, there was no measurable difference between the average science scores of male and female students in 2018. Female students scored higher, on average, than male students on the science literacy scale in 34 education systems, and male students scored higher in 6 education systems.

- On average across OECD countries, females outperformed male students in science by 2 points.
- In 34 education systems, females outperformed males on average, with score gaps ranging from 5 points in Luxembourg, Estonia, and Baku (Azerbaijan) to 39 points in Qatar.
- In 6 education systems, males outperformed females on average, with score gaps ranging from 13 points in Peru and B-S-J-Z (China) to 9 points in Costa Rica and Mexico.

See figure S6 on the next page.
Figure S6. Difference in average scores of 15-year-old male and female students on the PISA science literacy scale, by education system: 2018

Education system | Difference in favor of females | Difference in favor of males
---|---|---
OECD average | 2% |
Puerto Rico | 13% |
B-S-2-Z (China) | 12% |
Colombia | 10% |
Argentina | 9% |
Costa Rica | 9% |
Mexico | 0% |
Hungary | 6% |
Portugal | 5% |
Belgium | 5% |
Korea, Republic of | 4% |
Singapore | 4% |
Chile | 3% |
Italy | 3% |
Uruguay | 3% |
Belarus | 3% |
Japan | 3% |
Austria | 2% |
Ukraine | 2% |
New Zealand | 2% |
Australia | 2% |
Spain | 1% |
United Kingdom | 1% |
Chinese Taipei | 1% |
Russian Federation | 1% |
United States | 1% |
Panama | 1% |
Poland | #1 |
Switzerland | #1 |
Romania | #1 |
Bosnia and Herzegovina | #1 |
Germany | #1 |
Ireland | #1 |
Brazil | #1 |
Czech Republic | #1 |
France | #1 |
Macao (China) | #1 |
Denmark | #1 |
Canada | #1 | Philippines | #1 |

Croatia | 41% | Montenegro, Republic of | 31% |
Luxembourg | 28% | Lebanon | 27% |
Estonia | 25% | Serbia | 25% |
Baku (Azerbaijan) | 25% | Kosovo | 25% |
Slovak Republic | 25% | Lithuania | 27% |
Malaysia | 25% | Brunei Darussalam | 21% |
Indonesia | 21% | Kazakhstan | 21% |
Turkey | 21% | Sweden | 21% |
Netherlands | 21% | Latvia | 21% |
iceland | 21% | Hong Kong (China) | 19% |
Morocco | 19% | Dominican Republic | 19% |
Slovenia | 19% | Norway | 19% |
Moldova, Republic of | 19% | Greece | 19% |
Georgia | 19% | Bulgaria | 19% |
Albania | 19% | North Macedonia | 19% |
Israel | 19% | Thailand | 19% |
Malta | 19% | Cyprus | 19% |
Finland | 19% | United Arab Emirates | 19% |
Saudi Arabia | 19% | Jordan | 19% |
Qatar | 19% |

# Ranks to zero.
1 Interpret data with caution. Estimate is unstable due to high coefficient of variation (>35 percent and ≤50 percent).
2 Interpret data with caution. Estimate is unstable because the standard error represents more than 50 percent of the estimate.
1 At least 50 percent but less than 75 percent of the 15-year-old population is covered by the PISA sample.
2 Less than 50 percent of the 15-year-old population is covered by the PISA sample.

NOTE: Education systems are ordered by absolute male-female difference in 2018 average scores. Differences were computed using unrounded numbers. Scores are reported on a scale from 0 to 1000. Education systems are marked as OECD countries if they were OECD members in 2018. The OECD average is the average of the national average differences of the OECD member countries, with each country weighted equally. Italics indicate non-OECD countries and education systems. B-S-2-Z (China) refers to the four PISA participating China provinces: Beijing, Shanghai, Jiangsu, and Zhejiang. Although Vietnam participated in PISA 2018, technical problems with its data prevent results from being discussed in this report.

For More Information

- For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
- See Technical Notes (including Coverage of Target Population Table A-4)
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- Read the International PISA 2018 Report and Assessment Framework

How does the science performance of U.S. 15-year-olds vary by race/ethnicity?

In 2018, White and Asian students in the United States scored higher than the overall U.S. average in science literacy, while Hispanic and Black students scored lower.

- Asian and White students, on average, had higher science literacy scores (551 and 529, respectively) than the overall U.S. average score (502). The average science literacy score of students reporting Two or more races (502) was not measurably different from the U.S. average score. Hispanic and Black students had lower average scores (478 and 440, respectively) than the U.S. average score.
How does the science performance of U.S. 15-year-olds vary by measures of poverty?

ECONOMIC, SOCIAL, AND CULTURAL STATUS

The PISA 2018 questionnaire collected data on two measures of poverty: the economic, social, and cultural status (ESCS) index and a U.S.-only free or reduced-price lunch (FRPL) variable. The ESCS index is a student-level, international measure of socioeconomic status, while FRPL is a school-level, U.S.-only variable of school poverty. In 2018, U.S. 15-year-old students had a higher average science literacy score than the OECD average score within each of the four ESCS quarters.

- Students were grouped into four quarters using the distribution of ESCS scores specific to each education system. Those in the bottom ESCS quarter report the highest levels of poverty while those in the top quarter report the lowest levels of poverty.
- Score differences between the U.S. and OECD average scores were 13, 9, 12, and 18 points in the bottom, second, third, and top ESCS quarters, respectively.
- Average scores in science by students’ socioeconomic status show that U.S. 15-year-olds in the top ESCS quarter performed 92 points higher than those in the bottom quarter. Across the OECD countries on average, this score gap was 87 points.
- The U.S. score gap between the top and the bottom ESCS quarters was smaller than the score gaps in 6 education systems and higher than the score gaps in 35 education systems.

See figure S8 on the next page.
FREE OR REDUCED-PRICE LUNCH

In 2018, students in U.S. public schools with the highest levels of poverty (75 percent or more of students eligible for FRPL) scored, on average, 48 points lower than the overall U.S. average in science literacy, whereas students in U.S. public schools with the lowest levels of poverty (less than 10 percent eligible for FRPL) scored 57 points higher than the overall U.S. average.

- Students in public schools in which at least half of all students were eligible for FRPL (50 to 74.9 percent and 75 percent or more) scored, on average, lower than the overall U.S. average (487 and 454, respectively, vs. 502).
• Students in public schools in which less than half of all students were FRPL-eligible (less than 10 percent, 10 to 24.9 percent, and 25 to 49.9 percent) scored, on average, higher than the overall U.S. average (560, 554, and 516, respectively, vs. 502).

Figure S9. Average scores of U.S. 15-year-old public school students on the PISA science literacy scale, by percentage of students enrolled in schools eligible for free or reduced-price lunch, based on principals’ reports: 2018

For More Information

• For the Accessible version of this table/figure, please see the corresponding data table (Download Excel file)
• See Technical Notes (including Coverage of Target Population Table A-4)
• Visit the OECD website
• Read the International PISA 2018 Report and Assessment Framework