Programme for International Student Assessment

PISA 2022
Reporting Australia’s results

VOLUME I
Student performance and equity in education

Lisa De Bortoli
Catherine Underwood
Sue Thomson

Australian Council for Educational Research

Programme for International
Student Assessment

PISA 2022
Reporting Australia's results

VOLUME I
Student performance and equity in education

Lisa De Bortoli
Catherine Underwood
Sue Thomson

Australian Council for Educational Research

PISA 2022. Reporting Australia's results. Volume I: Student performance and equity in education

Lisa De Bortoli, Catherine Underwood & Sue Thomson

ISBN: 978-1-74286-725-0

This publication has been produced by the Australian Council for Educational Research (ACER) under contract with the Australian Government Department of Education. Funding was provided jointly by the Australian Government and all Australian state and territory governments.

Recommended attribution
PISA 2022. Reporting Australia's results. Volume I: Student performance and equity in education by Lisa De Bortoli, Catherine Underwood & Sue Thomson (Australian Council for Educational Research) under contract with the Commonwealth of Australia as represented by the Department of Education.

Recommended citation
De Bortoli, L., Underwood, C., & Thomson, S. (2023). *PISA 2022. Reporting Australia's results. Volume I: Student performance and equity in education*. Australian Council for Educational Research. https://doi.org/10.37517/978-1-74286-725-0.

The data contained in this report is consistent with data provided by the OECD as of 1 November 2023. There is the potential for minor revisions to the data in this report; please check the online version of the report at www.acer.org/pisa for any revisions.

Contents

List of figures

List of tables

Acknowledgements

The funding for Australia's participation in PISA 2022 was provided jointly by the Australian Government and the state and territory governments. All of Australia's share of the international overheads and half of the basic funding for PISA within Australia was contributed by the Australian Government Department of Education, while each state and territory government education department provided funding in proportion to the numbers of 15-year-old students enrolled in their schools.

In Australia, PISA is managed by a team from the Australian Council for Educational Research (ACER) and guided by the International Assessments Joint National Advisory Committee (IAJNAC). ACER wishes to thank the IAJNAC members for their interest and commitment throughout PISA 2022. Their involvement included reviewing the frameworks and assessment items, assisting with the implementation of PISA in schools from their state or territory, and providing valuable information to ensure the continued success of PISA 2022 in Australia.

The undertaking of the PISA 2022 cycle was a collaborative effort undertaken in unprecedented times with the 2021 field trial taking place during the COVID-19 global pandemic, and the main survey taking place as schools were re-establishing the daily school routine following periods of remote learning due to lockdowns.

A national assessment such as PISA could not be successful without the cooperation of school systems, principals, teachers, students and parents and our dedicated team of Test Administrators. Although Australia was not able to satisfy the internationally set response criteria fully for PISA 2022, ACER gratefully acknowledges the assistance of education system officials Australia-wide, and the principals, teachers and students in the participating schools who so generously gave their time and support to the project.

Executive summary

The Programme for International Student Assessment (PISA) is an international comparative study of student performance directed by the Organisation for Economic Co-operation and Development (OECD). PISA measures the cumulative outcomes of education by assessing how well 15-year-olds,[1] who have nearly completed compulsory schooling in most participating educational systems, are prepared to use their knowledge and skills in particular areas to meet real-world opportunities and challenges.

PISA commenced in 2000 and for the first 7 cycles (2000 to 2018), was conducted every 3 years. The eighth cycle, originally planned for 2021, was postponed to 2022 to accommodate the constraints that many education systems experienced because of the COVID-19 pandemic.

PISA measures 3 core domains of reading literacy, mathematical literacy, and scientific literacy. The assessment focuses on young people's ability to apply their knowledge and skills to real-world problems and situations. The term 'literacy' reflects a focus on broader skills. As a concept, literacy is more than simply being able to read and write.

Eighty-one countries or economies, involving around 690,000 students, participated in PISA 2022. In Australia, 743 schools and a total of 13,437 students (representing the full population of around 265,000 15-year-old students) completed the assessment.

In Australia, PISA is managed by the Australian Council for Educational Research and is jointly funded by the Australian Government and all state and territory governments. PISA is a key part of Australia's National Assessment Program.

This report presents the results for Australia as a whole, for the Australian states and territories and for the other groups in PISA 2022. The results can be viewed in an international context, and student performance can be monitored over time. The results also allow for nationally comparable reports of student outcomes against the *Alice Springs (Mparntwe) education declaration*. (Education Council, 2019)

1 Students who were aged between 15 years and 3 (complete) months and 16 years and 2 (complete) months at the time of the assessment.

This section summarises the detailed findings in the report. Differences are only reported if tests of statistical significance showed that these were likely to be real differences; that is, differences were unlikely to be caused by chance.

How results are reported in PISA

International comparative studies allow the similarities and differences between educational policies and practices to be observed. Policymakers, researchers and others can see what is possible for students to achieve and what environments are most likely to facilitate student learning. PISA provides regular information on educational outcomes within and across countries by providing insight into the range of skills and knowledge in the different assessment domains.

This report provides the results for mathematical, scientific and reading literacy. Results are presented as mean (average) scores, as distributions of scores in percentiles and as distributions of students across described proficiency levels in percentages.

Each of the proficiency levels contain descriptions of the skills typically shown by students achieving at each level, as defined by international subject matter experts. In PISA 2022, there were 8 levels of mathematical and reading literacy, and 7 levels of scientific literacy. Students who are proficient at Level 5 or Level 6 are highly proficient in the assessment domain and are considered to be high performers. Students who have performed below proficiency Level 2 (the PISA baseline proficiency level) are considered low performers and have not begun to demonstrate the competencies in mathematical, scientific or reading literacy that will enable them to participate in and contribute to society effectively. Students who are proficient at Level 3 or above are considered to have attained the National Proficient Standard and demonstrated more than the minimal skills expected in the domain.

Australia's results in an international context

PISA has strict criteria for school and student response rates to ensure the reported results for each country are accurate and internationally comparable. In PISA 2022, Australia successfully achieved the required school response rate; however, for the first time, Australia did not achieve the required student response rate. Given that the school response rate standard was met, and the student response rate was close to the international standard, weighting adjustments substantially reduced the risk of bias as shown by non-response bias analysis. It is therefore unlikely that the PISA results for Australia are inaccurate. However, it is not possible to exclude the possibility of a small upward bias. Hence, care should be taken when interpreting the results.[2]

2 For more information about Australia's non-response bias, please refer to the Reader's guide.

Performance in PISA 2022

Singapore was the highest performing country in all assessment domains in PISA 2022.

Mean scores for Australia, the OECD average and Singapore

Mathematical literacy

Australia	**487**
OECD average	**472**
Highest country: **Singapore**	**575**

Australia's mean score was:

↓ **88 pts** than **Singapore's**

↑ **15 pts** than **OECD** average.

Scientific literacy

Australia	**507**
OECD average	**485**
Highest country: **Singapore**	**561**

Australia's mean score was:

↓ **54 pts** than **Singapore's**

↑ **22 pts** than **OECD** average.

Reading literacy

Australia	**498**
OECD average	**476**
Highest country: **Singapore**	**543**

Australia's mean score was:

↓ **45 pts** than **Singapore's**

↑ **22 pts** than **OECD** average.

International comparisons

Lower than
9 countries including:
- Singapore
- Macao (China)
- Chinese Taipei
- Hong Kong (China)
- Japan
- Korea
- Estonia
- Switzerland
- Canada

The same as
12 countries including:
- Netherlands
- Ireland
- Belgium
- Denmark
- United Kingdom
- Poland
- Austria
- Czech Republic
- Slovenia
- Finland
- Latvia
- Sweden

Higher than
59 countries including:
- New Zealand
- Lithuania
- Germany

Lower than
8 countries including:
- Singapore
- Japan
- Macao (China)
- Chinese Taipei
- Korea
- Estonia
- Hong Kong (China)
- Canada

The same as
4 countries including:
- Finland
- New Zealand
- Ireland
- Switzerland

Higher than
69 countries including:
- Slovenia
- United Kingdom
- United States

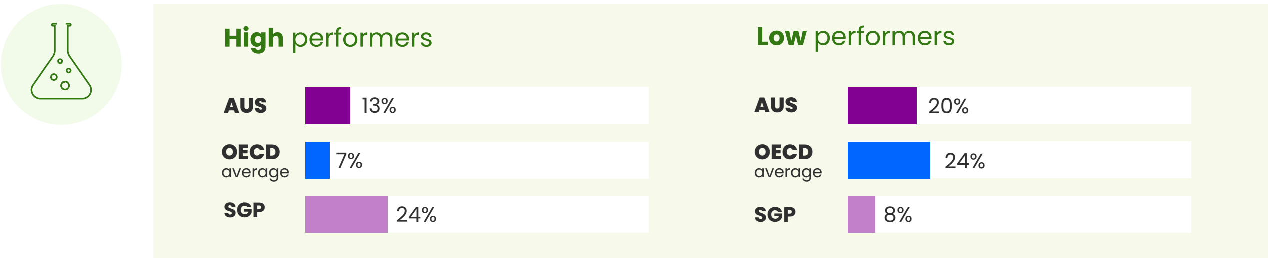
Lower than
8 countries including:
- Singapore
- Ireland
- Japan
- Korea
- Chinese Taipei
- Estonia
- Macao (China)
- Canada

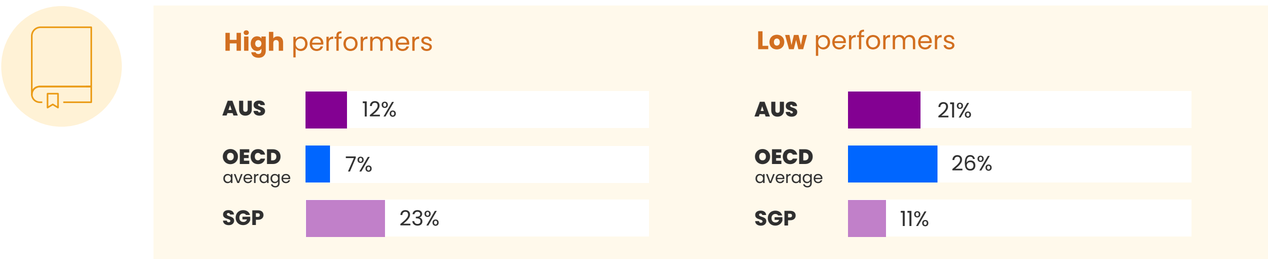
The same as
4 countries including:
- United States
- New Zealand
- Hong Kong (China)
- United Kingdom

Higher than
68 countries including:
- Finland
- Denmark
- Poland

Proficiency in PISA 2022

- In all assessment domains, Australia's proportion of high performers (students who attained Level 5 or 6) was higher than the OECD average, but lower than Singapore's proportion of high performers.
- In all assessment domains, Australia's proportion of low performers (students who did not attain Level 2) was lower than the OECD average, but higher than Singapore's proportion of low performers.
- More than half the Australian students attained the National Proficient Standard (students who attained Level 3 or above) in each domain:
  - 51% in mathematical literacy
  - 58% in scientific literacy
  - 57% in reading literacy.





Performance over time

Between PISA 2015 and 2022

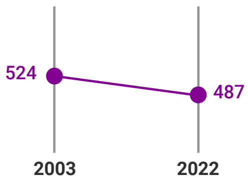
Australia's mean mathematical performance was not different

Australia's mean scientific performance was not different

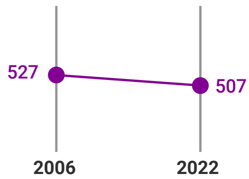
Australia's mean reading performance was not different

Between first time as a major domain and 2022

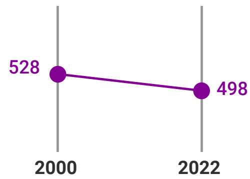
Australia's mean mathematical performance **decreased by 37 points**



Australia's mean scientific performance **decreased by 20 points**



Australia's mean reading performance **decreased by 30 points**



Australia's performance relative to other countries over time

Mathematical literacy

Singapore, Hong Kong (China), Chinese Taipei, Korea, and Canada have all consistently performed at higher levels than Australia. Japan outperformed Australia in all cycles other than 2006. As did Macao (China) and Switzerland in all cycles other than 2003.

Most countries, including the United States, performed lower than Australia in their first undertaking of PISA, and their performances continued to be lower than Australia's in 2022.

There were a number of countries whose relative performance to Australia's has changed over time, including:

- Finland and the Netherlands performed at a higher level than Australia between PISA 2003 and 2018, but in 2022 their performances were similar to Australia's.
- New Zealand performed at a similar level to Australia between PISA 2003 and 2018, but in 2022 their performance was lower than Australia's.
- Ireland, Denmark, the United Kingdom, Poland, Austria, Slovenia, Latvia, and Sweden performed at a lower level than Australia when they first participated in PISA, but in 2022 their performances were not different to Australia's.

Scientific literacy

Singapore, Macao (China), Chinese Taipei, Korea, Hong Kong (China), and Canada have all consistently performed at higher levels than Australia. Japan outperformed Australia in all cycles other than 2006, as did Estonia in all cycles other than 2006 and 2009. Switzerland and Finland outperformed Australia in all cycles other than 2022.

Most countries, including the United Kingdom and the United States, performed lower than Australia in their first undertaking of PISA, and their performances continued to be lower than Australia's in 2022.

There were a number of countries whose relative performance to Australia's has changed over time, including:

- The Netherlands performed at a higher level than Australia between PISA 2006 and 2018; but in 2022 their performance was lower than Australia's.
- New Zealand has consistently performed at a similar level to Australia.
- Ireland performed at a lower level than Australia in 2006 and 2009; but in 2022 their performance was similar to Australia's.

Reading literacy

Singapore has consistently performed at higher levels than Australia. Finland outperformed Australia in all cycles except 2022, where their performance was lower than Australia's. Korea outperformed Australia in all cycles other than 2000, and Canada outperformed Australia in all cycles except for 2000 and 2003.

Most countries performed at a lower level than Australia in their first undertaking of PISA, and their performances continued to be lower than Australia's in 2022.

There were a number of countries whose relative performance to Australia's has changed over time:

- Ireland, Japan, New Zealand, Canada and Hong Kong (China) performed at similar levels to Australia in 2000, but in 2022 Ireland, Japan's and Canada's performances were higher than Australia's, while the performances for New Zealand and Hong Kong (China) were at similar levels to Australia's.
- Chinese Taipei, Estonia, Macao (China), the United States and the United Kingdom performed at lower levels than Australia in their first undertaking of PISA, but in 2022 the performances of Chinese Taipei, Estonia, and Macao (China) were higher than Australia's, and the performances of United States and the United Kingdom were at similar levels to Australia's.

Between the first time as a major domain and 2022

The proportion of low performers has increased while the proportion of high performers has decreased in mathematical, scientific, and reading literacy.

The proportion of students who attained the National Proficient Standard has decreased in each domain.

Changes in …	**PISA 2003–2022**	**PISA 2006–2022**	**PISA 2000–2022**
High performers	▼ 8 pp	▼ 2 pp	▼ 5 pp
Low performers	▲ 12 pp	▲ 7 pp	▲ 9 pp
National Proficient Standard	▼ 16 pp	▼ 9 pp	▼ 12 pp

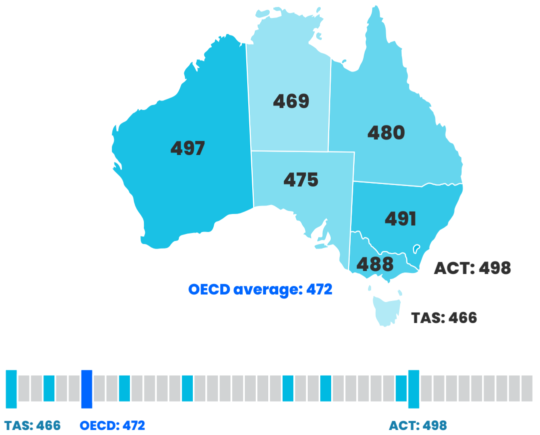
pp percentage points

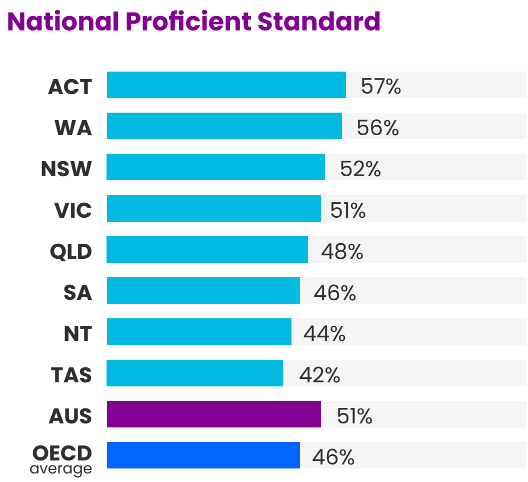
Australia’s results in a national context

Performance in PISA 2022

In all assessment domains, the Australian Capital Territory, Western Australia, Victoria, New South Wales and Queensland performed at a higher level than the OECD average, and Tasmania and the Northern Territory performed at a similar level to the OECD average. However, in scientific and reading literacy, South Australia performed at a higher level than the OECD average, and in mathematical literacy, performed at a similar level to the OECD average.

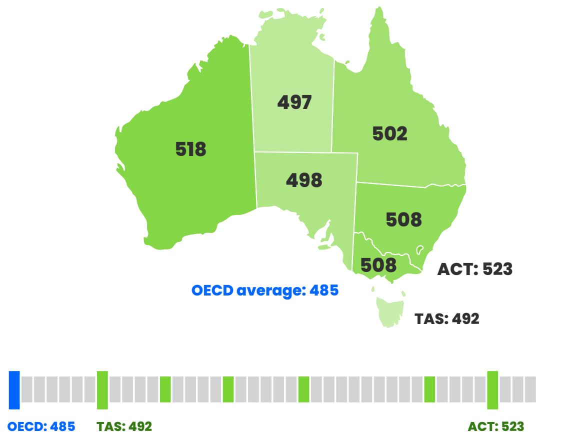
Mathematical literacy

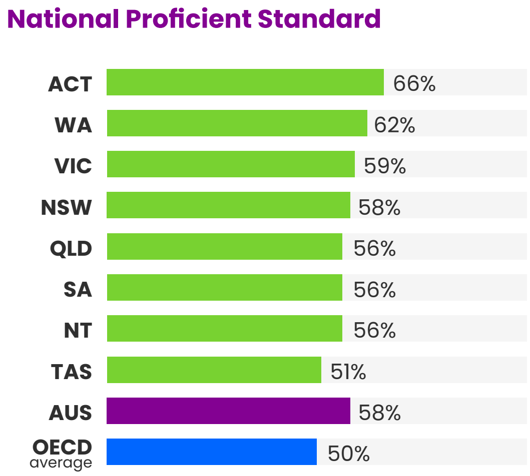




- Students in the Australian Capital Territory performed at a similar level in mathematical literacy to students in Western Australia, New South Wales and Victoria, and at a higher level than students in all other jurisdictions.
- Students in Western Australia and New South Wales performed at a higher level in mathematical literacy than students in Queensland, South Australia, the Northern Territory and Tasmania. Students in Victoria performed at a higher level than students in South Australia, the Northern Territory and Tasmania.
- Students in Queensland performed at a higher level in mathematical literacy than students in Tasmania.

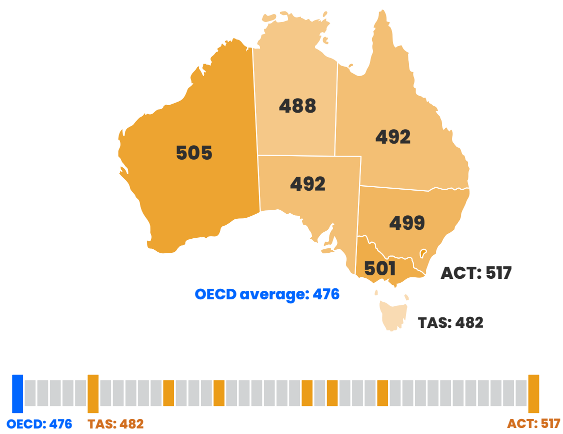
Scientific literacy

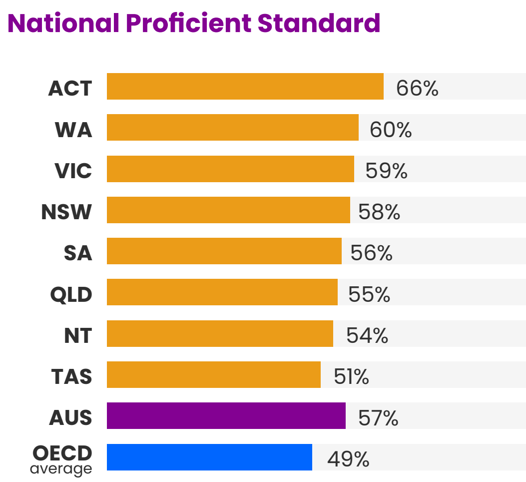




- Students in the Australian Capital Territory performed at a similar level in scientific literacy to students in Western Australia, and at a higher level than students in all other jurisdictions.
- Western Australia performed at a similar level in scientific literacy to students in Victoria and New South Wales and at a higher level than students in Queensland, South Australia,the Northern Territory and Tasmania.
- Victoria, New South Wales, Queensland, South Australia, and the Northern Territory performed at a similar level in scientific literacy. Victoria and New South Wales performed at a higher level than Tasmania. Queensland, South Australia, and the Northern Territory performed at a similar level to Tasmania.

Reading literacy





- Students in the Australian Capital Territory performed at a higher level in reading literacy than students in any other jurisdictions.
- Students in Western Australia performed at a higher level in reading literacy than students in South Australia, Queensland and Tasmania.
- Students in Victoria and New South Wales performed at a higher level in reading literacy than students in Tasmania and performed at a similar level to students in Western Australia, South Australia, Queensland and the Northern Territory.
- Students in the Northern Territory performed at similar levels in reading literacy to all jurisdictions, except for the Australian Capital Territory. This was due to the large standard error associated with the mean score for the Northern Territory.

Proficiency in PISA 2022

Mathematical literacy

- The proportion of high performers ranged from 8% in Tasmania and the Northern Territory to 14% in New South Wales and Western Australia.
- The proportion of low performers ranged from 20% in the Australian Capital Territory to 34% in Tasmania.
- The proportion of students who attained the National Proficient Standard ranged from 42% in Tasmania to 57% in the Australian Capital Territory.

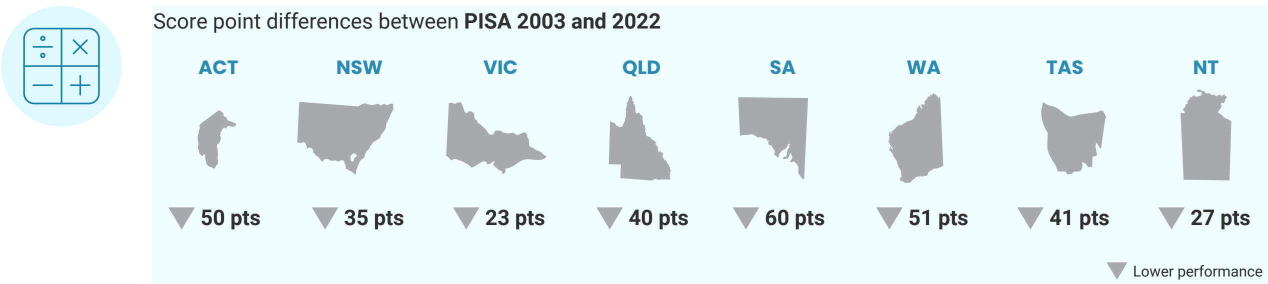
Scientific literacy

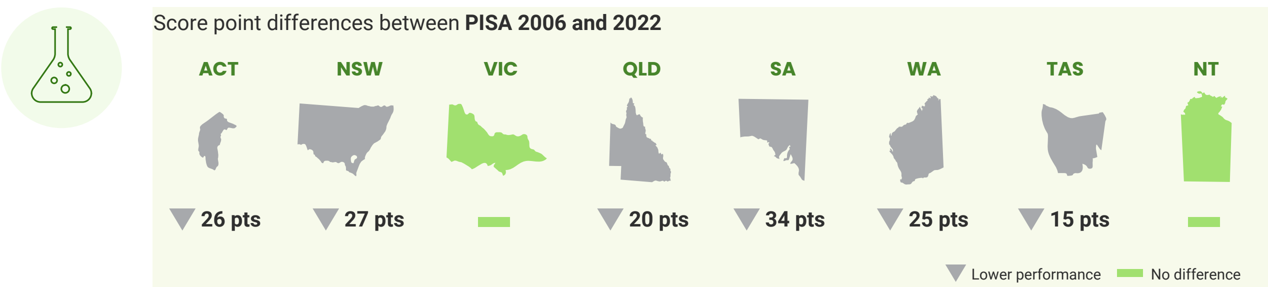
- The proportion of high performers ranged from ranged from 10% in South Australia and Tasmania to 15% in the Australian Capital Territory.
- The proportion of low performers ranged from 14% in the Australian Capital Territory to 24% in the Northern Territory.
- The proportion of students who attained the National Proficient Standard ranged from 51% in Tasmania to 66% in the Australian Capital Territory.

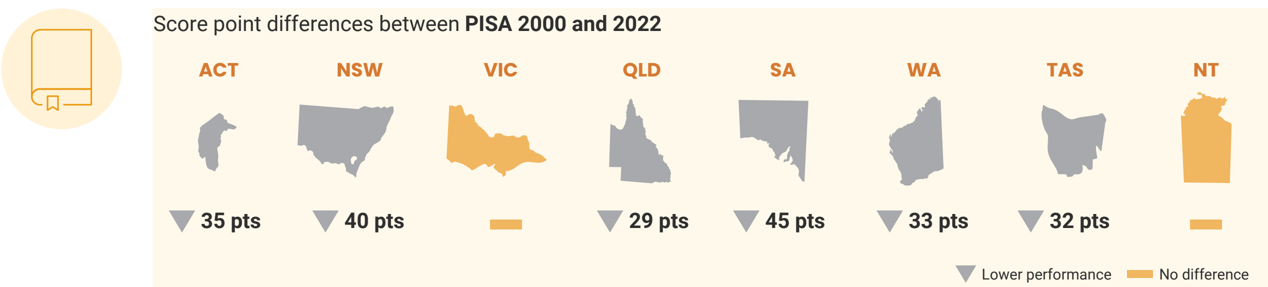
Reading literacy

- The proportion of high performers ranged from 10% in South Australia, Tasmania and the Northern Territory to 15% in the Australian Capital Territory.
- The proportion of low performers ranged from ranged from 16% in the Australian Capital Territory to 26% in Tasmania.
- The proportion of students who attained the National Proficient Standard ranged from 51% in Tasmania to 66% in the Australian Capital Territory.

Performance over time







Results for the school sectors

Performance and proficiency in PISA 2022

- Student performance results across the 3 school sectors (government, Catholic and independent) were compared using the mean scores and adjusted scores, after accounting for student- and school-level socioeconomic background.
- On average, students in the independent school sector performed higher than students in Catholic schools and government schools, and students in Catholic schools performed higher than students in government schools.
- Irrespective of the assessment domain, when student-level socioeconomic background was accounted for, students in independent schools still performed at a higher level than students in government and Catholic schools, although the differences were smaller. However, there was no difference in performance between students in government schools and students in Catholic schools.
- In mathematical and scientific literacy, when student-level and school-level socioeconomic background were accounted for, students in government schools performed at a higher level than students in Catholic schools, and students in independent schools performed at a higher level than students in Catholic schools. There was no difference in performance between students in independent schools and students in government schools.
- In reading literacy, when student-level and school-level socioeconomic background were accounted for, students in government schools performed at a higher level than students in Catholic schools. There was no difference in performance between students in independent schools and students in government schools, and between students in independent schools and students in Catholic schools.

	Government schools	Catholic schools	Independent schools
Mean score	475 pts	490 pts	519 pts
High performers	11%	10%	19%
Low performers	32%	22%	16%
National Proficient Standard	45%	52%	65%

	Government schools	Catholic schools	Independent schools
Mean score	494 pts	511 pts	538 pts
High performers	11%	11%	19%
Low performers	24%	16%	12%
National Proficient Standard	53%	60%	70%

	Government schools	Catholic schools	Independent schools
Mean score	485 pts	504 pts	526 pts
High performers	11%	11%	17%
Low performers	26%	17%	14%
National Proficient Standard	52%	60%	68%

Performance over time

Between PISA 2009 and 2022, there were the following changes in the mean performance in each of the domains:

- mathematical literacy decreased by 24 points in government schools, by 37 points in Catholic schools and by 29 points in independent schools.
- scientific literacy decreased by 17 points in government schools, by 29 points in Catholic schools and by 28 points in independent schools.
- reading literacy decreased by 28 points in Catholic schools and by 27 points in independent schools. There was no difference in the mean performance for students in government schools during this time.

Results for female and male students

Performance and proficiency in PISA 2022

- Female students performed at a higher level than male students in reading literacy, but they performed at a lower level than male students in mathematical literacy. Female and male students performed at similar levels in scientific literacy.
- There were fewer female high performers than male high performers in mathematical and scientific literacy.
- There were fewer female low performers than male low performers in reading literacy.
- More female than male students attained the National Proficient Standard in reading literacy, but fewer female students than male students attained the Standard in mathematical literacy. An equal proportion of female and male students attained the National Proficient Standard in scientific literacy.

481 493 **Males performed higher** than females in mathematical literacy	27% 26% **No difference** in male low performers and female low performers	10% 15% More **male high performers** than female high performers	48% 53% More **males** achieved the **National Proficient Standard**
506 508 **No difference** between females and males in scientific literacy	19% 21% **No difference** between female and male low performers	11% 14% More **male high performers** than female high performers	58% 58% **No difference** between females and males achieving the **National Proficient Standard**
509 487 **Females performed higher** than males in reading literacy	17% 25% More **male low performers** than female low performers	13% 11% **No difference** between female and male high performers	61% 54% More **females** achieved the **National Proficient Standard**

Performance over time

Mathematical literacy	Scientific literacy	Reading literacy
Between **PISA 2003 and 2022**, mean performance for	Between **PISA 2006 and 2022**, mean performance for	Between **PISA 2000 and 2022**, mean performance for
female students ↓ **41** pts	**female** students ↓ **21** pts	**female** students ↓ **37** pts
male students ↓ **34** pts	**male** students ↓ **19** pts	**male** students ↓ **26** pts

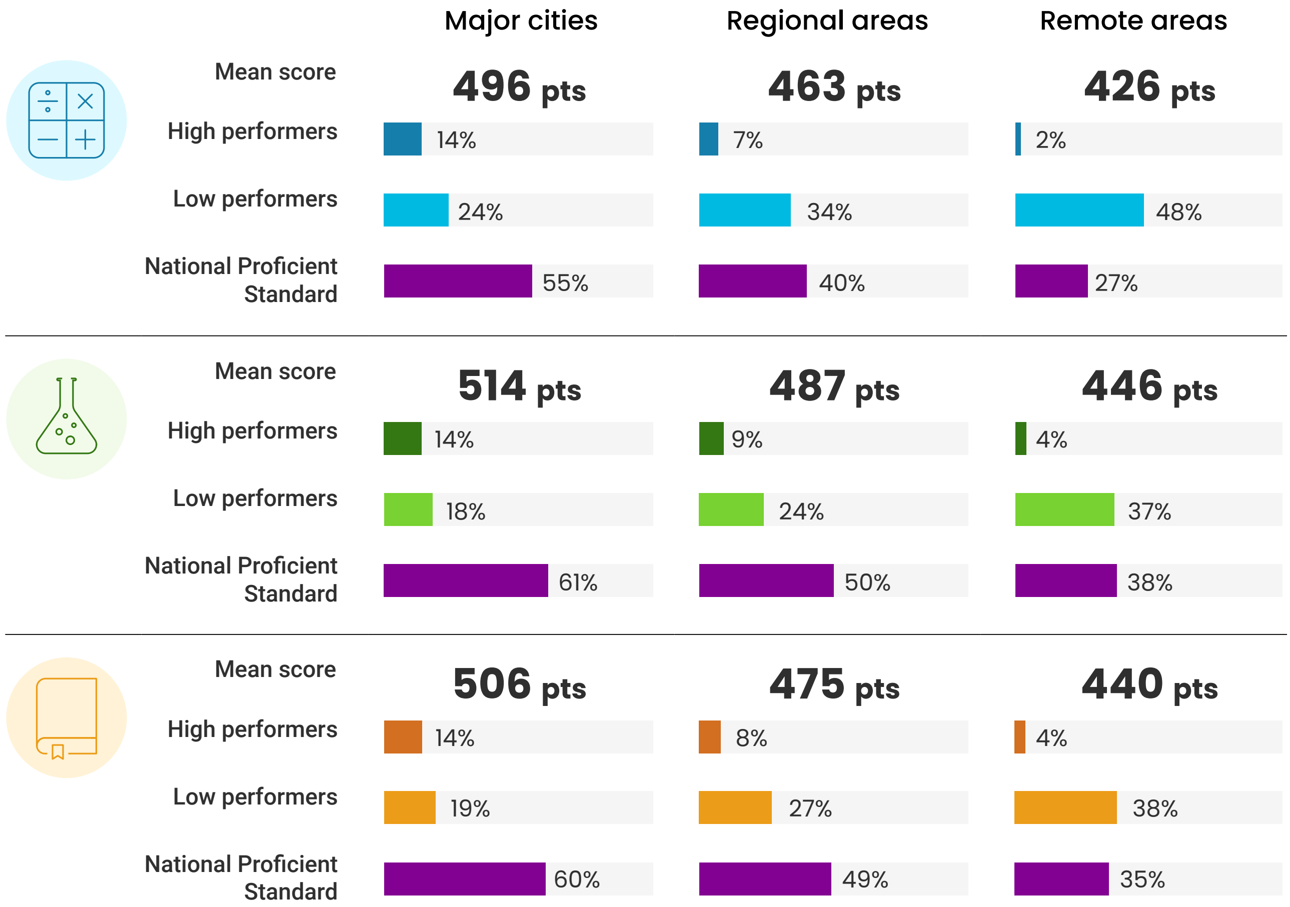
Results for geographic location

The locations of participating schools were coded using the Australian Bureau of Statistics (ABS) *Australian statistical geography standard* (ASGS) (2011).[3] Seventy-five per cent of the PISA 2022 student population attended schools in major cities, 24% attended schools in regional areas, and the remaining 1% of students attended schools in remote areas.

Performance and proficiency in PISA 2022

- In all assessment domains, students in major city schools performed at a higher level than students in regional schools, and in turn, students in regional schools performed higher than students in remote schools.
- In all assessment domains, there were more high performers in major city schools than students in regional or remote schools, and there were more high performers in regional schools than in remote schools. Similarly, there were fewer low performers in major city schools than in regional or remote schools, and there were fewer low performers in regional schools than in remote schools. The exception was scientific literacy, where there was no difference between low performers in regional schools and remote schools.
- Irrespective of the assessment domain, more students in major city schools attained the National Proficient Standard than students in regional or remote schools. There were more students in regional schools who attained the National Proficient Standard than students in remote schools.

3 For more information about the *Australian Bureau of Statistics' Australian statistical geography standard*, please refer to the Reader's guide. Since PISA 2018, the ASGS has been used to measure geographical location. This means that performance can only be reported between 2018 and 2022.



Performance and proficiency over time

Between PISA 2018 and 2022, there were the following changes in mean performance:

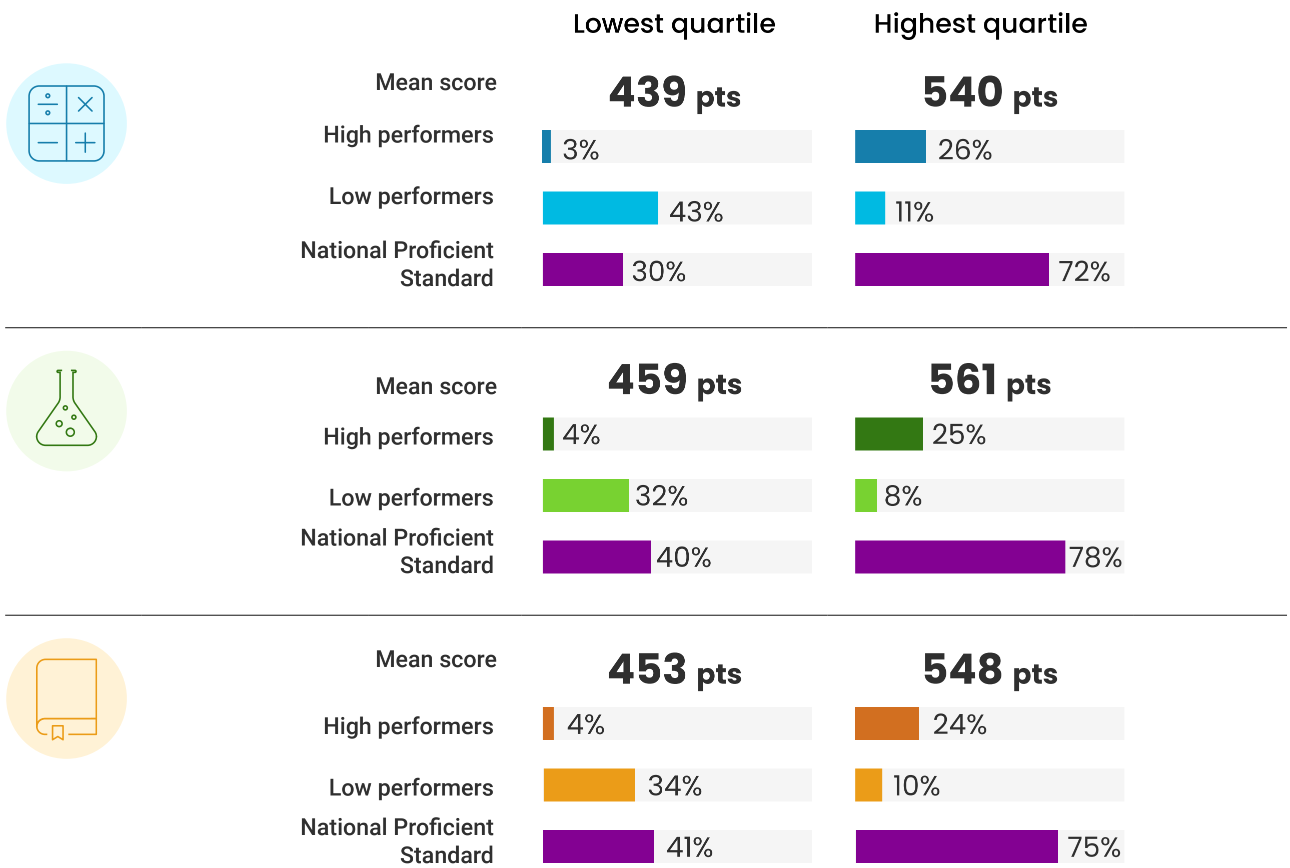
- mathematical and scientific literacy was not different for students in any schools across the different geographic locations
- reading literacy decreased by 12 points in regional schools but was not different for students in major city schools or students in the remote schools.

Results for socioeconomic background

Information about socioeconomic background is based on the index that measures socioeconomic background: the economic, social and cultural status index (ESCS).[4] Using this index, participating students were distributed into quartiles of socioeconomic background.

Performance and proficiency in PISA 2022

- In all assessment domains, students from higher socioeconomic backgrounds performed at a higher level than students from lower socioeconomic backgrounds. The score difference between one quartile and the next was between 28 and 37 points on average.
- In all assessment domains, with each increasing increment in socioeconomic quartile, there were more high performers and fewer low performers. There were also more students who attained the National Proficient Standard with each increasing increment in socioeconomic quartile.



Performance over time

- Between PISA 2003 and 2022, the mean mathematical literacy performance decreased by 40 points for students in the lowest quartile and by 33 points for students in the highest quartile.
- Between PISA 2006 and 2022, the mean scientific literacy performance decreased by 24 points for students in the lowest quartile and by 13 points for students in the highest quartile.
- Between PISA 2000 and 2022, the mean reading literacy performance decreased by 31 points for students in the lowest quartile and by 38 points for students in the highest quartile.

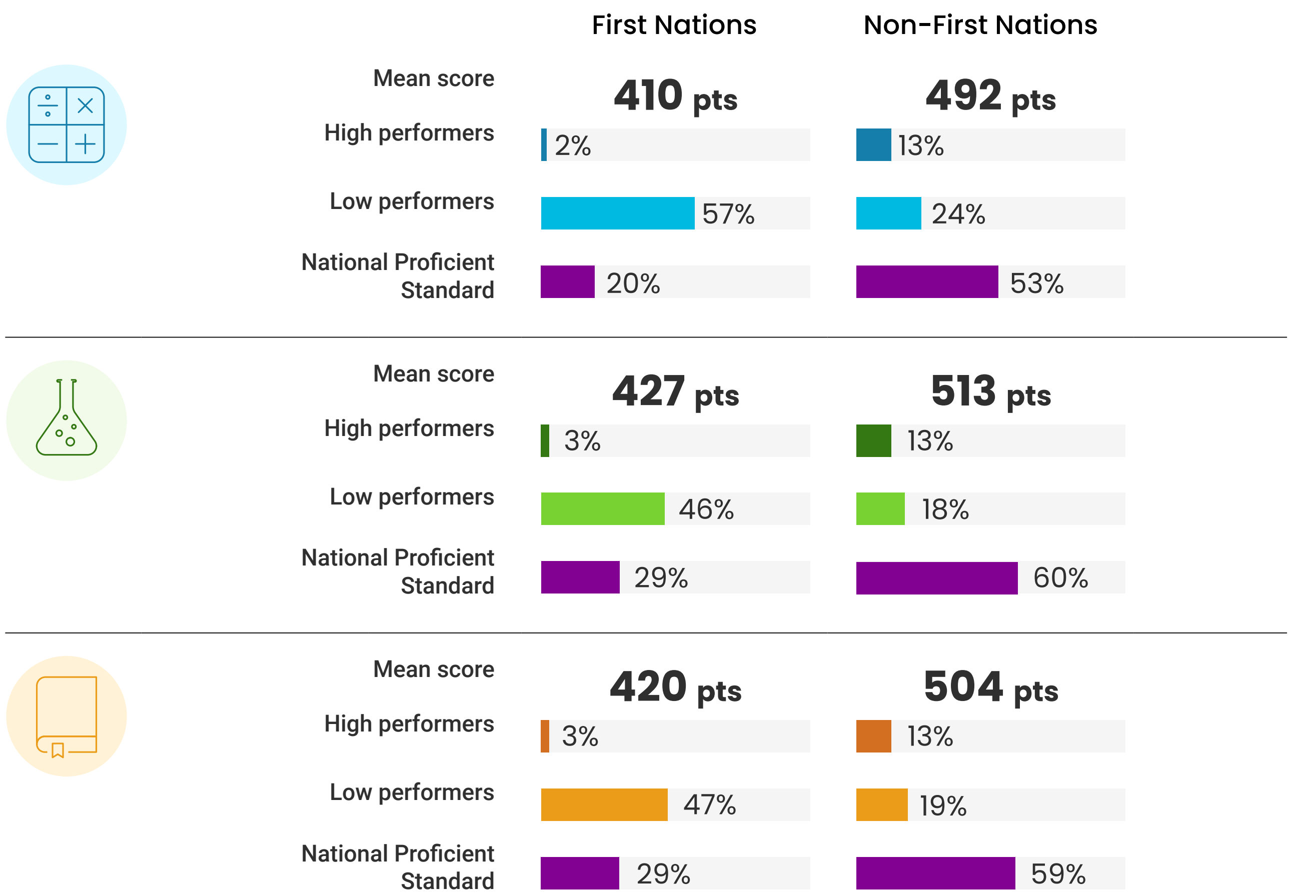
4 For more information about socioeconomic background, please refer to the Reader's guide.

Results for First Nations students

Australian students were asked whether they were of Aboriginal or Torres Strait Islander origin in the Student Questionnaire. Five per cent of the PISA 2022 student population self-identified as being a First Nations student.

Performance and proficiency in PISA 2022

- In all assessment domains, First Nations students performed at a lower level than non-First Nations students.
- In all assessment domains, there were more low-performing and fewer high-performing First Nations students than non-First Nations students.
- There were fewer First Nations students who attained the National Proficient Standard than non-First Nations students.



Performance over time

- Between PISA 2003 and 2022, the mean mathematical literacy performance decreased by 30 points for First Nations students and by 34 points for non-First Nations students.
- Between PISA 2006 and 2022, the mean scientific literacy performance was not different for First Nations students but decreased by 16 points for non-First Nations students.
- Between PISA 2000 and 2022, the mean reading literacy performance decreased by 28 points for First Nations students and by 27 points for non-First Nations students.

Results for immigrant background

- In PISA, immigrant background is divided into 3 categories: Australian-born, first-generation and foreign-born.[5] Almost 50% of the PISA 2022 student population were Australian-born, 33% were first-generation students and just over 10% were foreign-born students.

Performance and proficiency in PISA 2022

- Australian-born students performed at a lower level than first-generation students in all assessment domains. Australian-born students also performed at a lower level than foreign-born students in reading and mathematical literacy, however, Australian-born students performed at a similar level to foreign-born students in scientific literacy.
- In all assessment domains, there were fewer high-performing Australian-born students than first-generation students, while there were more low-performing Australian-born students than first-generation students in mathematical and reading literacy.
- In all assessment domains, fewer Australian-born than first-generation students attained the National Proficient Standard.
- In mathematical literacy and reading literacy, there were fewer Australian-born than foreign-born students who attained the National Proficient Standard.

		Australian-born	First-generation	Foreign-born
	Mean score	481 pts	499 pts	505 pts
	High performers	10%	15%	17%
	Low performers	27%	23%	22%
	National Proficient Standard	48%	55%	58%
	Mean score	505 pts	517 pts	512 pts
	High performers	12%	15%	14%
	Low performers	19%	17%	18%
	National Proficient Standard	57%	62%	61%
	Mean score	495 pts	509 pts	507 pts
	High performers	12%	14%	15%
	Low performers	22%	18%	20%
	National Proficient Standard	56%	62%	61%

5 For more information about immigrant background, please refer to the Reader's guide.

Performance over time

- Between PISA 2003 and 2022, the mean mathematical literacy performance decreased by 46 points for Australian-born students, by 23 points for first-generation students, and by 20 points for foreign-born students.
- Between PISA 2006 and 2022, the mean scientific literacy performance decreased by 23 points for Australian-born students and by 14 points for first-generation students. There was no difference in performance for foreign-born students over this time.
- Between PISA 2000 and 2022, the mean reading literacy performance decreased by 34 points for Australian-born students and by 28 points for first-generation students. There was no difference in performance for foreign-born students over this time.

Results for language background

- In PISA 2022, students were asked whether they spoke English or another language at home most of the time: 86% of students indicated they spoke English at home and 14% of students indicated they spoke a language other than English at home.

Performance and proficiency in PISA 2022

- In all assessment domains, students who spoke English at home performed at a similar level to students who spoke a language other than English at home.
- In mathematical literacy, there were fewer high performers who spoke English at home than high performers who spoke a language other than English at home.
- In scientific literacy and reading literacy, there were fewer low performers who spoke English at home than low performers who spoke a language other than English spoken at home.
- Irrespective of language spoken at home, the proportion of students who attained the National Proficient Standard did not differ.

	English at home	Language other than English
Mean score	488 pts	493 pts
High performers	12%	17%
Low performers	26%	28%
National Proficient Standard	51%	53%

	English at home	Language other than English
Mean score	510 pts	499 pts
High performers	13%	13%
Low performers	18%	24%
National Proficient Standard	59%	55%

	English at home	Language other than English
Mean score	501 pts	491 pts
High performers	13%	13%
Low performers	20%	25%
National Proficient Standard	58%	55%

Performance over time

- Between PISA 2003 and 2022, the mean mathematical literacy performance decreased by 39 points for students who spoke English at home and by 22 points for students who spoke a language other than English at home.
- Between PISA 2006 and 2022, the mean scientific literacy performance decreased by 21 points for students who spoke English at home and by 8 points for students who spoke a language other than English at home.
- Between PISA 2000 and 2022, the mean reading literacy performance decreased by 28 points for students who spoke English at home but was not different for students who spoke a language other than English at home.

Equity in learning opportunities and outcomes

- In PISA 2022, as mathematical literacy was the major assessment domain, the analysis of equity in learning opportunities and outcomes only focuses on mathematical literacy.
- The key proxy for equity in PISA is the strength of the relationship between socioeconomic background and performance – that is the degree to which variance in mathematical literacy performance scores is explained by students' socioeconomic background, as measured by the index of economic, social and cultural status (ESCS).[6] Using the ESCS measure, the strength of the relationship in Australia is not different than the average across the OECD countries.
- The socioeconomic gradient for Australia is such that each increment of the ESCS index is associated with an increase in performance of 45 score points in mathematical literacy.
- The slope of the socioeconomic gradient in Australia is similar to the OECD average.
- In Australia, the effect of socioeconomic background on performance in mathematical literacy is the same as the average across the OECD countries.
- Tasmania has the flattest slope across the Australian jurisdictions, indicating there was less of a relationship between ESCS and performance in Tasmania than in other jurisdictions on average across Australia. Each increment on the ESCS scale was associated with an increase of 37 score points in Tasmania. The Australian Capital Territory had the steepest slope, with a unit increase in ESCS reflected in a 48 point increase in the mathematical literacy score.
- The strength of the relationship between socioeconomic background and performance was not significantly different to the OECD average in any of the states and territories.
- The proportion of disadvantaged students (students placed in the lowest quartile of the ESCS index) varied widely by state. Schools in Tasmania and the Northern Territory enrolled the highest proportions of disadvantaged students, while schools in the Australian Capital Territory were skewed in the opposite direction.
- The proportion of disadvantaged students also varied widely across sectors. Government schools enrolled a substantially higher proportion of disadvantaged students than Catholic or independent schools, while independent schools enrolled a substantially higher proportion of advantaged students.
- 10% of disadvantaged students in Australia were classed as academically resilient; that is, they scored in the top quarter of achievement.

6 For more information about the ESCS index, please refer to the Reader's guide.

Reader's guide

Target population for PISA

This report uses '15-year-olds' as shorthand for the PISA target population. In practice, the target population was students aged between 15 years and 3 (complete) months and 16 years and 2 (complete) months at the beginning of the assessment period, and who were enrolled and attending an educational institution full-time or part-time. As the majority of students are 15-year-olds, it has become the default shorthand for the population.

Participating countries and economies

Eighty-one countries and economic regions participated in PISA 2022, including all OECD member countries, except Luxembourg, and 44 non-OECD member countries and economic regions. Economic regions are required to meet the same PISA technical standards as participating countries, although results for an economic region are only representative of the region assessed and not of the country. For convenience, this report refers to these economic regions as countries (see Chapter 1 for further details).

Australia's non-response bias

There are strict criteria on population coverage, response rates and sampling procedures. For initially selected schools, a minimum response rate of 85% (weighted) was required and a minimum rate of 80% (weighted) was required for selected students. Countries that obtained an initial school response rate between 65% and 85% could still obtain an acceptable school response by the use of replacement schools. Schools with a student participation response rate lower than 50% were not regarded as participating schools.

The results for 12 PISA 2022 countries/economies (Australia, Canada, Denmark, Hong Kong (China), Ireland, Jamaica, Latvia, the Netherlands, New Zealand, Panama, the United Kingdom, and the United States) are reported with annotations as they did not meet one or more of the sampling technical standards.

Australia successfully achieved the required school response rate; however, for the first time in the history of Australia's participation in PISA, Australia did not achieve the required student response rate. Australia achieved a 76% student response rate. Other countries who did not meet the required student response rate were Canada (77%), Hong Kong (China) (75%), Ireland (77%), Jamaica, (68%), New Zealand (72%), Panama (77%), and the United Kingdom (75%).[1]

Low response rates may affect the results, in which case they are biased. However, this depends on how many and on which students were absent during testing. When mostly low-performing students are absent, the results are likely to be biased upwards. When absenteeism is not related to achievement, the results are unlikely to be biased.

For PISA, the effect of non-response is partly corrected by adjusting the student weights for non-response. For example, more students in government schools were absent during PISA testing than students in Catholic or independent schools. Without weight adjustments for this selective non-response, it is likely to cause a positive bias in the national means.

1 Countries who did not meet one or more of the sampling technical standards are annotated with asterisks.

Of the full population of PISA-eligible students in 2022, 59% attended government schools, but of the respondents, only 56% attended government schools. Given that performance is on average lower in government schools than in non-government schools, the national mean performance would be overestimated if the student weights were not adjusted for non-response bias. To reduce the risk of a bias caused by the lower participation rate in government schools, sampling weights were increased for the students who did sit the test in government schools so that the weighted percentages are close to the percentages in the population. Figure I shows that the adjusted weights recover the population distribution of students across sectors.

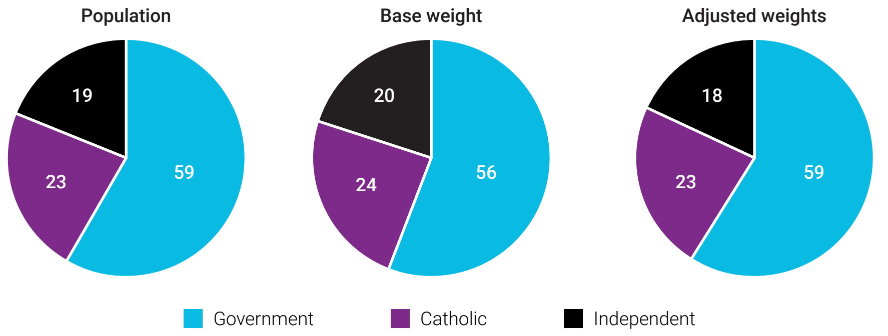


FIGURE I Student sampling weight adjustment for selective non-response by school sector

Adjustment of weights is regarded to correct for non-response bias sufficiently if the participation rates meet the international standards. When the participation rates drop below these standards, countries need to perform a non-response bias analysis to show that the results are not biased. The best way to do this is to compare participants with non-participants on a performance measure other than PISA performance (because PISA scores are not available for the non-participants). This was not possible for Australia because students do not have a universal student ID, making it impossible to match them, for example, to their NAPLAN results. However, the non-response bias analysis Australia undertook was deemed technically sound.

Given that the school response rate standard was met in Australia, the student response rate was close to the international standard and weight adjustments substantially reduced the risk of bias in the results as shown by non-response bias analysis, it is unlikely that the PISA results for Australia are inaccurate. However, it is not possible to exclude the possibility of a small upward bias. Hence, care should be taken when interpreting the results.

Confidence intervals and standard errors

PISA assesses a subset or sample of 15-year-olds so that inferences about the entire population of 15-year-olds can be obtained, but this design introduces a source of uncertainty. The use of confidence intervals based on the standard errors provides a way to account for any uncertainty associated with the sampling design.

International survey assessments often describe student performance by an average score. For PISA, each average score is calculated from the sample of students who undertook PISA 2022 and is referred to as the sample average. The sample average approximates the actual average score (known as the population average) that would have been obtained had all students in a country actually sat the assessment. Since the sample average is just one point along the range of student performance scores, more information is needed to gauge whether the sample average is an underestimation or overestimation of the population average. The calculation of confidence intervals can indicate the precision of a sample average as a population average. Confidence intervals provide a range of scores within which we are confident that the population average actually lies.

In this report, each sample average is presented with an associated standard error. The confidence interval, which can be calculated using the standard error, indicates that there is a 95% chance that the actual population average lies within plus or minus 1.96 standard errors of the sample average.

Statistical significance

Tests for statistical significance indicate whether observed differences between results occur because they are 'real' or if they have occurred because of sampling error, or chance. An 'insignificant' or 'not significant result should be ignored because it may not reflect real differences, while a 'significant' result refers to the statistical nature of the difference and indicates the difference is worth noting.

Significance does not imply any judgement about absolute magnitude or educational relevance. It is not to be confused with the term 'substantial', which is qualitative and based on judgement rather than statistical comparisons. A difference may appear substantial but not be statistically significant (due to factors that affect the size of the standard errors around the estimate, for example) while another difference may seem small but reach statistical significance because the estimate was more accurate.

The term 'significant' is used to describe a difference that meets the requirements of statistical significance at the 0.05 level, indicating that the difference is real, and would be found in at least 95 analyses out of 100 if the comparisons were to be repeated.

In this report, all reported differences and changes are statistically significant, unless specifically stated otherwise. References to 'no difference' or 'not different' mean that the statistical requirement for significance was not met.

Reporting results in PISA

PISA uses mean scores and proficiency levels to provide a summary of student performance and to compare the relative standing between countries and for different groups.

Mean performance and distribution of scores

Each of the assessment domains is reported on a numeric scale. The higher a student scored on the scale, the stronger the student performed in that assessment domain. When the scale was first established (in 2000 for reading literacy; 2003 for mathematical literacy; and 2006 for scientific literacy), the results were scaled to fit approximately normal distributions, with a mean of around 500 score points and standard deviations around 100 score points. This means that a one-point difference on the PISA mathematical literacy scale corresponds to an effect size of 1%, and a 10-point difference to an effect size of 10%.

In addition, the distribution of scores (reported at the 10th, 25th, 75th and 90th percentiles) are reported in graphical format. Figure II shows how to read these graphs.

Each country's results are represented in horizontal bars with various colours. On the left end of the bar is the 10th percentile – this is the score below which 10% of the students have scored. The next line indicates the 25th percentile. The next line at the left of the white band is the lower limit of the confidence interval for the mean – that is, there is 95% confidence that the mean will lie in this white band. The line in the centre of the white band is the mean. The lines to the right of the white band indicate the 75th, and 90th percentiles.

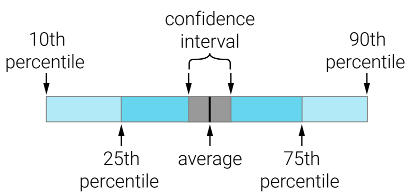


FIGURE II Distribution of scores on the 10th, 25th, 75th and 90th percentiles

OECD average

An OECD average was calculated for each assessment domain and is presented for comparative purposes. The OECD average corresponds to the arithmetical average of the respective OECD country estimates, and can be used to compare a country on a given indicator with a typical OECD country.

Since the inception of PISA in 2000, more countries have joined the OECD. When reporting results over time, more than one OECD average may be reported in the same table to reflect consistent sets of OECD countries. A number in the label indicates the number of countries included in the average:

OECD average:	This is the OECD average for PISA 2022. This is the mean across all OECD member countries, except Luxembourg.
AV00T:	The average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE:	The arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB:	The average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion– and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

Proficiency levels

Proficiency levels in PISA provide a richness to the data, interpreting scores in substantive terms by providing a description of what students can typically do at each proficiency level (see Chapter 2 for more information).

This report uses the following categories to describe student levels of proficiency in PISA.

High performers: Students who scored at the highest two proficiency levels, Level 5 or Level 6, and are considered to demonstrate high levels of skills and knowledge and are highly proficient in the relevant assessment domain.

Low performers: Students who are below Level 2 proficiency are considered to demonstrate low levels of skills and knowledge in the assessment domain. Their proficiency is too low to enable them to participate effectively and productively in life.

PISA proficiency Level 2: is considered the international baseline proficiency level. Level 2 has been identified as the 'minimum level of proficiency' that all individuals should acquire by the end of secondary school (OECD, 2019).

National Proficient Standard in PISA: In Australia, the key performance measure in PISA has been set at the boundary between Level 2 and Level 3 on the PISA proficiency scales (as agreed in the *Measurement framework for schooling in Australia*). This level represents 'a "challenging but reasonable" expectation of student achievement at a year level with students needing to demonstrate more than elementary skills expected at that year level' (Australian Curriculum and Reporting Authority [ACARA], 2020, p.6). As PISA is an age-based sample, the National Proficient Standard refers to 15-year-olds rather than a year level.

Rate of learning

The average Australian PISA student learns at a rate of just over 20 PISA score points per year. Given the typical flattening shape of a learning curve, students at the lower end of the scale are expected to learn more than 20 PISA score points per year and students at the higher end of the distribution are expected to learn less than 20 PISA score points per year.

These estimates are based on National Assessment Program – Literacy and Numeracy data from 2008 to 2022. Growth curves were estimated using the average NAPLAN achievement for Year 3, Year 5, Year 7 and Year 9 in reading and numeracy. These growth curves were then used to estimate average student achievement in reading and numeracy for 15-year-olds with 10.5 years of schooling. The rate of learning in NAPLAN score points for this cohort was converted into a proportion of the NAPLAN standard deviation.

To transform this proportion into PISA score points, it was multiplied by the Australian PISA standard deviation for reading and mathematics. In both cases, the learning rate was estimated to be just over 20 PISA score points per year.

This estimate of just over 20 score points is merely a guideline to facilitate interpretation of differences between PISA mean scores. It is not an exact estimate and the imperfections need to be considered. NAPLAN does not assess science achievement, but because the learning rate estimates were so close for PISA reading and mathematics, it was decided to use the same estimate for science, which may be a big assumption. In addition, NAPLAN students are younger than PISA students, so it needed to be assumed that the learning curve not only holds for somewhat different domains, but also for older students.

Furthermore, research using earlier PISA data sets has examined the average yearly learning gains of students and it is estimated that students learn at a rate equivalent to about 20 score points in PISA. (Avvisati, 2021). However, Avvisati and Givord (2023) have shown that the yearly learning gains can vary significantly across countries.

This report has used 20 PISA score points as an approximation of the average rate of learning over a year of schooling.

Reporting of trends

Each cycle of PISA includes a number of items from previous cycles (referred to as trend items). This allows for comparisons with previous cycles to be made and trends (changes over time) to be measured.

The most reliable way to establish a trend for an assessment domain is to compare results between cycles when that assessment domain was the major domain. The first full assessment of each domain (the major domain) sets the scale and provides a starting point for future comparisons. Reading literacy has been the major assessment domain 3 times: in 2000, 2009 and 2018. Mathematical literacy was the major domain in 2003, 2012 and in 2022, while scientific literacy has been assessed as a major domain in 2006 and in 2015.

When comparing performance over time, there is an introduced source of uncertainty because assessment design and items, the calibration of samples, and sometimes the scaling models change. Link error estimates quantify this uncertainty around the equating of the scales.

PISA provides link error estimates around the scale scores that are independent of the size of the student sample. These estimates can be used when comparing performance over time by country and for subpopulations. In this report, link errors have been used for all calculations when comparing the mean score difference between 2 cycles.

PISA also provides link errors for estimating the proportions of low and high performers. When calculating these link error estimates, the exact shape and density of the performance distribution around the cut-off points needs to be taken into consideration, and it is for this reason that link errors need to be calculated for each country, and for each subpopulation. Link errors for comparing low and high performers between PISA 2022 and previous assessments have been provided for each country, and within each country for female students and male students.

These link errors have been used for calculating the comparison of proficiency for Australia, and for female students and male students nationally, between PISA 2018 and a previous cycle. All other comparisons of proficiency over time do not use link errors as they have not been provided by PISA.

Rounding of figures

Because of rounding, the totals in the text may not exactly correspond to some numbers and percentages in the figures and tables. Totals, differences and averages are always calculated on the basis of exact numbers and are rounded only after calculation. When standard errors have been rounded to one or two decimal places and the value 0.0 or 0.00 is shown, this does not imply that the standard error is zero, but that it is smaller than 0.05 or 0.005 respectively.

Sample surveys

PISA is a sample survey and is designed and conducted so that the sample provides reliable estimates about the population of 15-year-old students. The PISA 2022 sample was a two-stage stratified sample. The first stage involved the sampling of schools in which 15-year-old students could be enrolled. The second stage of the selection process involved randomly sampling students within the sampled schools.

The following variables were used in the stratification of the school sample: jurisdiction; school sector; geographic location; sex of students at the school; and a socioeconomic background variable (based on the ABS *Socio-economic indexes for areas*, which consists of 4 indexes that rank geographic areas across Australia in terms of their relative socioeconomic advantage and disadvantage (Australian Bureau of Statistics, 2021)).

Definition of background characteristics

A number of definitions used in this report are particular to the Australian context, as well as many that are relevant to the international context. This section provides an explanation for those that are not self-evident.

Jurisdictions

Collectively, Australian states and territories are also generally referred to as jurisdictions.

First Nations background

First Nations background data were derived from the Student Questionnaire, which asked students whether they identified as being of Aboriginal and/or Torres Strait Islander descent. For the purpose of this report, data for the 2 groups are presented together under the term 'First Nations students'.

Socioeconomic background

Two measures are used by the OECD to represent elements of socioeconomic background.

The first is the highest level of the father's and mother's occupations and is known as the highest international social and economic index (HISEI), which is coded in accordance with the International Labour Organization's International Standard Classification of Occupations.

The second measure is the index of economic, social and cultural status (ESCS), which was created to capture the wider aspects of a student's family and home background. The ESCS is based on 3 indices:

- the highest occupational status of parents (HISEI)
- the highest educational level of parents in years of education (PARED)
- home possessions (HOMEPOS).

The HOMEPOS index comprises all items on the indices of family wealth (WEALTH); cultural resources (CULTPOSS); and, access to home educational and cultural resources and books in the home (HEDRES).

There have been some adjustments to the computation of ESCS over the PISA cycles.

Geographic location

Participating schools were coded using the ABS *Australian statistical geography standard* (ASGS) (ABS, 2011). The following categories are used to report geographic location using the ASGS:

- major cities, which includes all major cities of Australia
- regional areas, which includes all inner regional and outer regional areas in Australia
- remote areas, which includes all remote and very remote areas in Australia.

Prior to PISA 2022, participating schools were coded using the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) Schools Geographic Location Classification.

Immigrant background

Immigrant background is derived from students' self-report of the country in which they and their parents were born. For the analysis in this report, immigrant background is defined by the following categories:

- Australian-born students – students born in Australia with both parents born in Australia
- first-generation students – students born in Australia with at least one parent born overseas
- foreign-born students – students born overseas with both parents also born overseas.

Language background

Language background is derived from students' self-report of the language they speak at home most of the time. For the analysis in this report, language background has been defined as:

- students who speak English at home
- students who speak a language other than English at home.

Reporting of country results

This report does not include results for countries that achieved at a mean score lower than Costa Rica's, the lowest performing OECD country. This report does not include:

- mathematical literacy results for Albania, Argentina, Brazil, Cambodia, the Dominican Republic, El Salvador, Guatemala, Indonesia, Jamaica, Jordan, Kosovo, Morocco, Palestinian Authority, Panama, Paraguay, Philippines, and Uzbekistan
- scientific literacy results for Albania, Argentina, Baku (Azerbaijan), Brazil, Cambodia, Cyprus, Dominican Republic, El Salvador, Georgia, Guatemala, Indonesia, Jamaica, Jordan, Kosovo, Mexico, Montenegro, Morocco, North Macedonia, Palestinian Authority, Panama, Paraguay, Peru, Philippines, Saudi Arabia, Thailand, and Uzbekistan
- reading literacy results for Albania, Argentina, Baku (Azerbaijan), Brazil, Bulgaria, Cambodia, Colombia, Cyprus, Dominican Republic, El Salvador, Georgia, Guatemala, Indonesia, Jamaica, Jordan. Kazakhstan, Kosovo, Malaysia, Moldova, Mongolia, Montenegro, Morocco, North Macedonia, Palestinian Authority, Panama, Paraguay, Peru, Philippines, Saudi Arabia, Thailand, and Uzbekistan.

1

Introduction

1.1 What is PISA?

The Programme for International Student Assessment (PISA) is an international assessment that measures the knowledge and skills of 15-year-old students (the age at which they have nearly completed compulsory schooling in most participating education systems) and how prepared they are to use these skills to meet real-world opportunities and challenges.[1] This approach contrasts with assessments that are devised to measure the extent to which students have mastered a specific curriculum. PISA's orientation reflects a change in the goals and objectives of curricula, which now increasingly address how well students can apply what they learn at school.

1.2 What are the main goals of PISA?

From the mathematical, scientific and reading literacy data obtained in each cycle of PISA, education systems have access to a breadth and depth of information about the outcomes of their educational approach. This data helps to answer several important questions related to education:

- How well prepared are young adults to meet the challenges of the future?
- What skills do young adults have that will help them adapt to change in their lives? Are they able to analyse, reason and communicate their ideas effectively?
- Are some ways of organising schools and school learning more effective than others?
- What influence does the quality of school resources have on student outcomes?

1 For more information about the target population for PISA, please refer to the Reader's guide.

- What educational structures and practices maximise the opportunities of students from disadvantaged backgrounds?
- To what extent does a student's performance depend on their background? How equitable is education for students from all backgrounds?

1.3 What does PISA assess?

PISA measures 3 core assessment domains of reading literacy, mathematical literacy and scientific literacy.

Mathematical literacy is a student's 'capacity to reason mathematically and to formulate, employ and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to know the role of mathematics play in the world and to make well-founded judgements and decisions needed by constructive, engaged and reflective 21st-century citizens' (OECD, 2019, p. 14).

Reading literacy is a student's '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' (OECD, 2019, p. 14).

Scientific literacy is a student's '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 enquiry, and interpret data and evidence scientifically' (OECD, 2019, p. 15).

1.4 How often is PISA administered?

PISA commenced in 2000 and for the first 7 cycles (2000 to 2018), was conducted every 3 years. The eighth cycle, originally planned for 2021, was postponed to 2022 to accommodate the difficulties and constraints that many education systems experienced because of COVID-19 pandemic. Thus, there was an unprecedented 4-year gap between PISA 2018 and 2022 assessments.

In each cycle, the 3 assessment domains are rotated so that one domain is the major focus (the major domain) and is allocated more assessment time than the other 2 assessment domains (the minor domains). This allows for an in-depth analysis of student performance for each assessment domain every 9 years and trend analysis every 3 years.

Mathematical literacy was the major domain in PISA 2003, 2012 and 2022. Reading literacy was the major domain in PISA 2000, 2009 and 2018, and scientific literacy in PISA 2006 and 2015 (Table 1.1).

Changes in performance are reported over a 22-year period for reading literacy, a 19-year period for mathematical literacy, and a 16-year period for scientific literacy.

TABLE 1.1 Summary of the assessment areas in PISA

PISA 2000	PISA 2003	PISA 2006	PISA 2009	PISA 2012	PISA 2015	PISA 2018	PISA 2022
Reading literacy	Reading literacy	Reading literacy	**Reading literacy**	Reading literacy	Reading literacy	**Reading literacy**	Reading literacy
Mathematical literacy	**Mathematical literacy**	Mathematical literacy	Mathematical literacy	**Mathematical literacy**	Mathematical literacy	Mathematical literacy	**Mathematical literacy**
Scientific literacy	Scientific literacy	**Scientific literacy**	Scientific literacy	Scientific literacy	**Scientific literacy**	Scientific literacy	Scientific literacy

Major assessment domain　Minor assessment domain

PISA also assesses additional domains in each cycle. In PISA 2022, creative thinking and financial literacy were assessed. Australia participated in the assessment of creative thinking but not financial literacy. Australian student performance in creative thinking will be reported in a forthcoming report.

1.5 How are results reported in PISA?

International comparative studies allow the similarities and differences between educational policies and practices to be observed. Policymakers, researchers and others can see what is possible for students to achieve and what environments are most likely to facilitate student learning. PISA provides regular information on educational outcomes, both within and across countries. PISA provides insights into the range of skills and competencies, in different assessment domains, that are considered to be essential to an individual's ability to participate in and contribute to society.

PISA results are reported on a set of scales. Each scale was developed when an assessment domain was first administered as a major domain. Each scale was initially set to have a mean of 500 and a standard deviation of 100 across OECD countries.

Mean scores and standard errors

Similar to other international assessments, PISA results are reported as mean (average) scores, which provide a summary of student performance and allow for comparisons of the relative standing between different countries and different subgroups. The OECD average is the mean of the data values across all OECD countries, and can be used to compare a country on a given indicator with a typical OECD country.[2]

Proficiency levels

PISA also provides a profile of student reading, mathematical and scientific literacy performance using proficiency levels – categories that summarise the skills and knowledge that students are able to display. The performance scale is divided into levels of difficulty, referred to as proficiency levels. Students at a particular level not only typically demonstrate the knowledge and skills associated with that level, but also the proficiencies required at the levels beneath it. Reading literacy has 8 levels of proficiency, mathematical literacy has 8 levels and scientific literacy has 7.

High performers are students who attain a proficiency of Level 5 or 6. They can consistently apply their advanced knowledge and skills in a variety of real-life situations.

Low performers are students who attain a proficiency level below Level 2. This level has been defined internationally as the baseline proficiency level and defines the level of performance on the PISA scale at which students begin to demonstrate the competencies that will enable them to engage effectively and productively across a wider range of situations. Students who fail to reach Level 2 (placed at Level 1a or below) have not acquired the skills and knowledge to allow them to adequately participate in the 21st-century workforce and contribute as productive citizens. These students have low levels of cognitive ability in that assessment domain.

In Australia, students who reach the National Proficient Standard have attained a proficiency of Level 3, as agreed in the *Measurement framework for schooling in Australia* (ACARA, 2020). This level represents 'a "challenging but reasonable" expectation of student achievement at a year level with students needing to demonstrate more than elementary skills expected at that year level' (p. 6).

Further details on the proficiency levels for each literacy domain are in Chapter 2.

2 Although the OECD average is comparable between cycles, changes in the average not only reflect the change in the performance of OECD countries over time, but may also reflect the addition of new member countries to the OECD.

1.6 What did participants do?

Students

Students completed a 2-hour computer-based assessment of mathematical literacy, scientific literacy, reading literacy and creative thinking units and a 45-minute Student Questionnaire. The questionnaire asked students about their family background, attitudes towards learning (interest, motivation and engagement), and the availability and use of information and communications technology (ICT) activities and attitudes towards ICT.

In the test, students were asked to construct a response to a stimulus and a series of questions (or 'items'). Context was provided as stimulus material, which was typically a brief text or text accompanying a table, graph, photograph or diagram.

There was a range of item-response formats to cover the full range of cognitive abilities and knowledge identified in the Assessment Framework.[3] Item-response formats included:

- multiple-choice items, in which students had to choose an answer among several possibilities
- closed constructed-response items, in which students had to provide an unambiguous single word, a number or diagrammatic answer
- open constructed-response items, in which students provided a written response and showed the methods and thought processes they had used.

In addition, students used interactive features to respond to questions, such as a slide bar or running simulations.

School principals

Principals (or the principal's designate) from participating schools completed a 45-minute online School Questionnaire that collected descriptive information about school characteristics, the quality of the school's teaching and educational resources, decision-making processes, instructional practices and school and classroom climate.

Teachers

Teachers from participating schools completed a 40-minute online Teacher Questionnaire. There were 2 questionnaire versions: one for science teachers and the other for non-science teachers. The questionnaires asked teachers about their training, professional development, and their teaching practices.

Administration of PISA

Students completed the test and questionnaires using computers. PISA software and the capture of student responses was managed primarily through USB drives.

School principals and teachers completed their questionnaires on a secure website using unique login credentials.

PISA 2022 was conducted between March and December 2022. Seventy-five per cent of countries had completed their data collection by May 2022. In Australia, PISA 2022 took place during a 6-week period from late July to early September 2022. Together with appropriate application of the student-age definition, this timing allowed Australian students to be tested at a comparable age and a comparable stage in the school year to those in the Northern Hemisphere who had been tested earlier in 2022.[4]

3 The Assessment Framework explains the guiding principles behind the PISA 2018 assessment (OECD, 2019a).

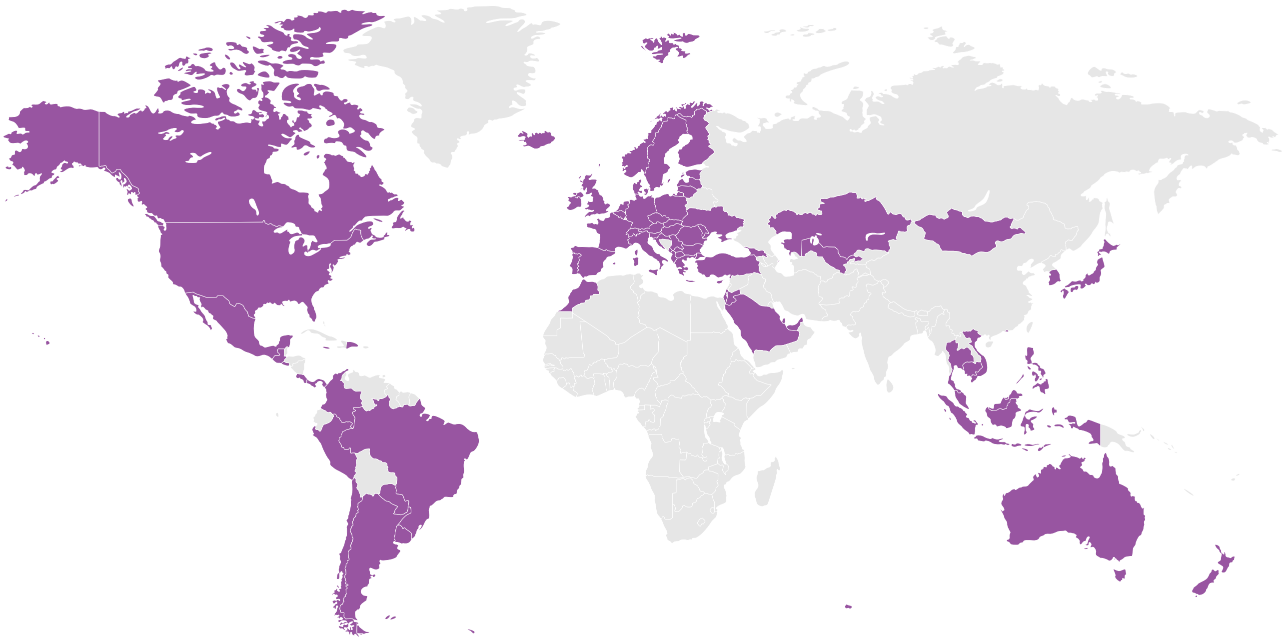
4 For more information on the PISA procedures, please refer to Appendix A.

1.7 Who participates in PISA?

PISA aims to be as inclusive as possible of the population of 15-year-old students in each country and strict guidelines are enforced with regard to the percentage of schools and of students that could be excluded (which could not exceed 5% of the nationally desired target population).[5]

Countries

Although PISA was originally an OECD assessment created by the governments of OECD countries, it has become a major assessment in many regions and countries around the world. Eighty-one countries and partner economies participated in PISA 2022, including 37 OECD countries[6] and 44 partner countries or economies (Figure 1.1).[7]



OECD countries		
Australia	Greece	Norway
Austria	Hungary	Poland
Belgium	Iceland	Portugal
Canada	Ireland	Slovak Republic
Chile	Israel	Slovenia
Colombia	Italy	Spain
Costa Rica	Japan	Sweden
Czech Republic	Korea	Switzerland
Denmark	Latvia	Türkiye
Estonia	Lithuania	United Kingdom
Finland	Mexico	United States
France	Netherlands	
Germany	New Zealand	

Partner countries/economies		
Albania	Indonesia	Paraguay
Argentina	Jamaica	Peru
Baku (Azerbaijan)	Jordan	Philippines
Brazil	Kazakhstan	Qatar
Brunei Darussalam	Kosovo	Romania
Bulgaria	Macao (China)	Saudi Arabia
Cambodia	Malaysia	Serbia
Chinese Taipei	Malta	Singapore
Croatia	Moldova	Thailand
Cyprus	Mongolia	Ukrainian regions*
Dominican Republic	Montenegro	United Arab Emirates
El Salvador	Morocco	Uruguay
Georgia	North Macedonia	Uzbekistan
Guatemala	Palestinian Authority	Viet Nam
Hong Kong (China)	Panama	

* 18 of 27 regions in Ukraine participated in PISA.

Notes: The economic regions (economies) of Chinese Taipei, Hong Kong (China) and Macao (China) participated in PISA 2022. Economic regions are required to meet the same PISA technical standards as other participating countries.

Although 81 countries and economies participated in PISA 2022, only those countries with a mean score higher than the lowest scoring OECD country, Costa Rica, have been reported in this publication. Further details are provided in the Reader's Guide.

The majority of countries administered PISA as a computer-based assessment; however 4 countries (Cambodia, Guatemala, Paraguay, and Viet Nam) administered PISA as a paper-based assessment.

FIGURE 1.1 PISA 2022 participating countries and economies

5 For more information on sampling, please refer to Appendix B.

6 Luxembourg was the only OECD country who did not participate in PISA 2022.

7 For convenience, this report refers to economies as countries.

There are strict criteria on population coverage, response rates and sampling procedures. For initially selected schools, a minimum response rate of 85% (weighted) was required, as well as a minimum rate of 80% (weighted) of selected students. Countries that obtained an initial school response rate between 65% and 85% could still obtain an acceptable school response by the use of replacement schools. Schools with a student participation response rate lower than 50% were not regarded as participating schools.

Twelve PISA 2022 countries/economies (Australia, Canada, Denmark, Hong Kong (China), Ireland, Jamaica, Latvia, the Netherlands, New Zealand, Panama, the United Kingdom, and the United States) have been reported with annotations as they did not meet one or more of the sampling Technical Standards.

Australia successfully achieved the required school response rate, however for the first time in Australia's participation in PISA, Australia did not achieve the required student response rate. Australia achieved a 76% student response rate. Other countries who did not meet the required student response rate were Canada (77%), Hong Kong (China) (75%), Ireland (77%), Jamaica, (68%), New Zealand (72%), Panama (77%), and the United Kingdom (75%). For more information about countries who did not meet the sampling standards, please refer to the Reader's guide.

Given that the school response rate standard was met in Australia, the student response rate was close to the international standard and weight adjustments substantially reduced the risk of bias in the results as shown by non-response bias analysis, it is unlikely that the PISA results for Australia are inaccurate. However, it is not possible to exclude the possibility of a small upward bias. Hence, care should be taken when interpreting the results.

Students

The target population for PISA is students who are aged between 15 years and 3 months, and 16 years and 2 months, at the beginning of the testing period and are enrolled in an educational institution, either full-time or part-time. Since the largest proportion (but not all) of the PISA target population is made up of 15-year-olds, the target population is often referred to as 15-year-olds.

In each country, a random sample of 42 students was selected with equal probability from each of the randomly selected schools using a list of all 15-year-old students submitted by the schools.

Approximately 690,000 students took part in PISA 2022, representing about 29 million 15-year-old students.

1.8 PISA 2022 in Australia

In Australia, a larger sample of schools and students participated in PISA to produce reliable estimates that would be representative of each of the Australian states and territories. In order for comparisons to be made between the states and territories, it was necessary to oversample the smaller states and territories. This is because a random sample proportionate to state and territory populations would not yield sufficient students in the smaller states and territories to give a result that would be sufficiently precise.

In Australia, 743 schools participated in PISA 2022. The sample was designed so that schools were selected with a probability proportional to the enrolment of 15-year-olds in each school. Stratification of the sample ensured that the PISA sample was representative of the Australian population of 15-year-olds. Several variables were used in the stratification including state and territory, school sector, geographic location, gender of students at the school and a socioeconomic background variable (Table 1.2) (ABS, 2021).[8]

8 Based on the ABS Socio-economic indexes for areas (SEIFA).

TABLE 1.2 Number of Australian PISA 2022 schools, by state and territory and school sector

	School sector			
State/Territory	**Government**	**Catholic**	**Independent**	**Total**
ACT	27	9	11	47
NSW	101	44	29	174
VIC	68	30	26	124
QLD	79	24	26	129
SA	58	19	22	99
WA	57	20	26	103
TAS	28	10	11	49
NT	8	4	6	18
Australia	426	160	157	743

Note: numbers are based on unweighted data.

Of the Australian PISA schools, 85% were coeducational, 8% were all-female, and 7% were all-male.

In PISA 2022, 2% of the schools (16 schools) were single-sex schools from the government school sector, 8% (60 schools) were from the Catholic school sector, and 4% (33 schools) were from the independent school sector.

PISA 2022 students across the states and territories

In most Australian jurisdictions, 26 students were sampled per school, while in the Australian Capital Territory, 36 students were sampled per school, and in the Northern Territory, 48 students were sampled per school. The Australian PISA 2022 sample of 13,437 students, whose results feature in the national and international reports, was drawn from all jurisdictions and school sectors according to the distributions shown in Table 1.3.

TABLE 1.3 Number of Australian PISA 2022 students, by state and territory and school sector

		State/Territory								
School sector		**ACT**	**NSW**	**VIC**	**QLD**	**SA**	**WA**	**TAS**	**NT**	**Total**
Government	**N students**	516	1,686	1,155	1,258	890	998	385	164	7,052
	Weighted N	2,759	46,554	36,787	34,533	10,400	15,944	3,520	1,442	151,939
Catholic	**N students**	240	924	571	456	357	395	193	118	3,254
	Weighted N	1,528	20,541	16,000	9,772	3,401	5,515	1,240	302	58,299
Independent	**N students**	253	590	500	536	439	493	196	124	3,131
	Weighted N	876	16,002	14,481	11,348	4,099	6,731	936	485	54,958
Total	**N students**	1,009	3,200	2,226	2,250	1,686	1,886	774	406	13,437
	Weighted N	5,163	83,097	67,268	55,653	17,900	28,190	5,696	2,229	265,196

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

As the sample is age-based in PISA, students come from various year levels. The majority of students were from Year 10, with the remaining students from Years 9 or 11. As shown in Table 1.4, there were some variations to the year-level composition of the sample in the different states and territories because of differing school starting ages.

TABLE 1.4 Percentage of Australian PISA 2022 students, by state and territory and year level

	Year level					
State/Territory	**7**	**8**	**9**	**10**	**11**	**12**
ACT			13	82	5	^
NSW		^	11	84	5	
VIC		^	19	79	1	^
QLD			4	86	10	
SA		^	8	89	3	
WA			1	87	12	
TAS			32	68	^	
NT			8	84	8	
Australia		^	11	83	6	^

^ denotes percentages < 1

Note: percentages are based on the achieved (unweighted) sample; the state and territory totals are reported as whole numbers without rounding off decimal places.

Table 1.5 shows the number of Australian female and male students who participated in PISA 2022 by state and territory. There were equal proportions of female and male students in 2 states (Queensland and the Northern Territory), while there were more male students than female students in the Australian Capital Territory and Tasmania (48% female; 52% male) and in Victoria, South Australia, and Western Australia (49% female, 51% male). There were more female students than male students in New South Wales (51% female; 49% male).

TABLE 1.5 Number and percentage of Australian PISA 2022 students, by state and territory and gender

		State/Territory								
Gender		**ACT**	**NSW**	**VIC**	**QLD**	**SA**	**WA**	**TAS**	**NT**	**Total**
Females	**N students**	480	1,639	1,068	1,128	766	906	371	199	6,557
	Weighted N	2,465	42,557	32,675	27,856	8,691	13,924	2,750	1,125	132,043
	Weighted (%)	48	51	49	50	49	49	48	50	50
Males	**N students**	522	1,559	1,154	1,119	920	977	400	207	6,858
	Weighted N	2,676	40,498	34,466	27,711	9,209	14,225	2,929	1,104	132,818
	Weighted (%)	52	49	51	50	51	51	52	50	50

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

PISA 2022 students and geographic location

The geographic location of schools in PISA 2022 were classified using the *Australian statistical geography standard* (ABS, 2011).[9] Table 1.6 shows 75% of the PISA 2022 students attended schools in major cities, 24% attended schools in regional areas and the remaining 1% of students attended schools in remote areas.

TABLE 1.6 Number and percentage of Australian PISA 2022 students, by geographic location

	Geographic location		
	Major cities	Regional areas	Remote areas
N students	9,730	3,492	215
Weighted N	198,537	64,808	1,851
Weighted (%)	75	24	1

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

PISA 2022 students and First Nations students

Australian students were asked about their Aboriginal and Torres Strait Islander origin in the Student Questionnaire. Five per cent of the assessed PISA 2022 students identified as being a First Nations student (Table 1.7).

TABLE 1.7 Number and percentage of Australian PISA 2022 students, by First Nations background

	First Nations background	
	First Nations	Non-First Nations
N students	701	12,383
Weighted N	13,654	245,111
Weighted (%)	5	95

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

Table 1.8 shows there was a similar proportion of First Nations students who attended schools in major cities and in regional areas (each almost 50%), while only 3% of students attended schools in remote areas. The distribution of non-First Nations students across the geographic locations were similar to the data reported in Table 1.6.

TABLE 1.8 Number and percentages of Australian PISA 2022 students, by geographic location and First Nations background

First Nations background		Geographic location		
		Major cities	Regional areas	Remote areas
First Nations	**N students**	305	352	44
	Weighted N	6,499	6,689	466
	Weighted (%)	48	49	3
Non-First Nations	**N students**	9,181	3,034	168
	Weighted N	187,309	56,455	1,347
	Weighted (%)	75	24	1

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

9 For more information about the *Australian Statistical Geography Standard (ASGS) Remoteness Structure*, please refer to the Reader's guide.

PISA 2022 students and socioeconomic background

Information about students' socioeconomic background was collected in the Student Questionnaire. Students were asked several questions about their family and home background. This information was used to construct a measure of socioeconomic background: the Economic, Social and Cultural Status index. Using this index, participating students were distributed into quartiles of socioeconomic background.

Table 1.9 shows there were higher proportions of students from lower socioeconomic backgrounds who attended government schools (33%) compared to the proportions who attended Catholic schools (17%) or independent schools (12%). Conversely, there were lower proportions of students from higher socioeconomic backgrounds who attended government schools (18%) compared to the proportions who attended Catholic schools (29%) or independent schools (40%).

TABLE 1.9 Number and percentage of Australian PISA 2022 students, by socioeconomic background quartiles and school sector

Socioeconomic background		School sector			Total weighted PISA population (%)
		Government	Catholic	Independent	
Lowest quartile	N students	2,261	565	355	
	Weighted N	47,727	9,961	6,478	
	Weighted (%)	33	17	12	25
Second quartile	N students	1,807	789	611	
	Weighted N	39,386	14,057	10,660	
	Weighted (%)	27	25	20	25
Third quartile	N students	1,483	887	851	
	Weighted N	32,731	16,473	14,844	
	Weighted (%)	22	29	28	25
Highest quartile	N students	1,198	929	1,235	
	Weighted N	26,356	16,387	21,523	
	Weighted (%)	18	29	40	25

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

Three-quarters of the First Nations students who participated in PISA 2022 were classified in the lower 2 socioeconomic quartiles, with half of these students classified in the lower quartile. Only 10% of First Nations students were in the highest quartile. On the other hand, approximately 25% of non-First Nations students were classified in each socioeconomic quartile (Table 1.10).

TABLE 1.10 Number and percentage of Australian PISA 2022 students, by socioeconomic background quartiles and First Nations background

Socioeconomic background		First Nations background		Total weighted PISA population (%)
		First Nations	Non-First Nations	
Lowest quartile	N students	342	2,832	
	Weighted N	6,821	57,221	
	Weighted (%)	51	24	25
Second quartile	N students	168	3,034	
	Weighted N	3,354	60,684	
	Weighted (%)	25	25	25
Third quartile	N students	107	3,111	
	Weighted N	2,058	61,902	
	Weighted (%)	15	25	25
Highest quartile	N students	70	3,290	
	Weighted N	1,175	63,047	
	Weighted (%)	9	26	25

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

Table 1.11 shows that schools in the major cities, which had the bulk of enrolments, had roughly similar proportions of students across the socioeconomic background quartiles—less than half the students in the 2 lowest quartiles (46%) and nearly one-third (28%) in the highest quartile. In contrast, for schools in regional areas, 62% of students were in the 2 lowest quartiles and 16% of students were in the highest quartile.

The distribution of students across the socioeconomic background quartiles were even more skewed towards the lower quartiles for schools in remote areas, with 76% of students in the lower 2 quartiles and just 7% of students in the highest socioeconomic quartile.

TABLE 1.11 Number and percentage of Australian PISA 2022 students, by socioeconomic background quartiles and geographic location

Socioeconomic background		Geographic location			Total weighted PISA population (%)
		Major cities	Regional	Remote	
Lowest quartile	N students	1,994	1,102	85	
	Weighted N	42,644	20,673	849	
	Weighted (%)	22	33	47	25
Second quartile	N students	2,195	947	65	
	Weighted N	45,424	18,157	521	
	Weighted (%)	24	29	29	25
Third quartile	N students	2,459	722	40	
	Weighted N	50,164	13,579	306	
	Weighted (%)	26	22	17	25
Highest quartile	N students	2,753	589	20	
	Weighted N	53,827	10,318	121	
	Weighted (%)	28	16	7	25

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

PISA 2022 students and immigrant background

The Student Questionnaire collected information about where students and their parents were born. These data were used to create a measure of immigrant status with 3 categories: Australian-born, first-generation and foreign-born.[10]

Table 1.12 shows that 52% of the students who participated in PISA 2022 were Australian-born, 34% were first-generation students and over 14%were foreign-born students.

TABLE 1.12 Number and percentage of Australian PISA 2022 students, by immigrant background

	Immigrant background		
	Australian-born	First-generation	Foreign-born
N students	6,758	4,138	1,731
Weighted N	128,931	85,901	34,962
Weighted (%)	52	34	14

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

10 For more information about immigrant background, please refer to the Reader's guide.

PISA 2022 students and language spoken at home

The Student Questionnaire asked students which language was spoken in their homes most of the time. A measure of language spoken at home was derived to identify students who spoke English at home and students who spoke a language other than English at home.

In PISA 2022, 86% of students indicated that English was spoken at home most of the time, while 14% of students indicated they spoke a language other than English at home most of the time (Table 1.13).

TABLE 1.13 Number and percentage of Australian PISA 2022 students, by language background

	Language background	
	English	Other language
N students	11,352	1,695
Weighted N	222,419	35,599
Weighted (%)	86	14

Note: N students is based on the achieved (unweighted) sample; weighted N is based on the number of students in the target population represented by the sample.

1.9 PISA's part in the National Assessment Program

PISA is a key part of Australia's National Assessment Program (NAP). Components of the NAP include:

- the National Assessment Program – Literacy and Numeracy (NAPLAN) conducted annually for every student in Years 3, 5, 7 and 9
- the national sample assessments of Civics and Citizenship, and Information and Communication Technology (ICT) literacy, and Science Literacy
- the international assessments (in addition to PISA) that comprise the International Association for the Evaluation of Educational Achievement (IEA)'s Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS).

Unlike NAPLAN, PISA is not a curriculum-based assessment. It assesses a nationally representative sample of 15-year-olds (rather than a year-level based sample) and provides national and group estimates, rather than reporting individual student results.

The results collected from these assessments allow for nationally comparable reporting of progress towards the *Alice Springs (Mparntwe) education declaration*, which sets out the national vision for education. The Declarations goals are 'for the Australian education system to promote excellence and equity and to enable all young Australians to become confident and creative individuals, successful lifelong learners, and active and informed community members' (Education Council, 2019, p. 4).

The Australian Curriculum, Assessment and Reporting Authority (ACARA) reports on these assessments annually in its National Report on Schooling in Australia, which is the main vehicle for reporting against nationally agreed key performance measures defined in the Measurement Framework for Schooling in Australia (ACARA, 2020).

1.10 Organisation of the report

The Australian results for PISA 2022 are provided in 2 volumes.

This report, Volume I, focuses on Australian student performance and equity in education opportunities in PISA 2022. Chapter 2 provides an overview of the frameworks for assessing the 3 core assessment domains of reading, mathematical and scientific literacy. It outlines the content knowledge that students need to acquire in each domain, the processes that students need to be able to perform, and the contexts in which this knowledge and these skills are applied, and how each domain is assessed. Chapter 3 presents results on Australian student performance in mathematical literacy, Chapters 4 and 5 present the results for scientific and reading literacy, respectively. Results are compared to other participating countries, across the states and territories and for different demographic groups of interest. Chapter 6 provides a discussion on equity, focusing on socioeconomic background.

The second report, Volume II, to be released in May 2024, will examine the student and school background characteristics, and how these are related to student performance.

1.11 Further information

Further information about PISA Australia is available from the national PISA website.

2

The PISA 2022 assessment framework

The PISA assessment framework is the conceptual foundation of the assessment. It defines what it means to be proficient in the assessment domain, describes the constructs to be assessed, the types of questions and response styles to be developed, and the forms of measurement to report proficiency in the assessment domain.

The rotation of the assessment domains in each cycle allows for one domain to be assessed in greater detail every 9 years. In PISA 2022, mathematical literacy was assessed as the major domain for the third time. This provided an opportunity for the assessment domain to be updated, to integrate new developments in theory and practice, and recognise the changes in the world in which students learn and live. Reading and scientific literacy were assessed as minor assessment domains, which means their definitions and constructs for PISA 2022 are the same as for the PISA 2018.

This chapter provides a summary for each of the assessment domains, including how they are defined, organised and measured in PISA. It also focuses on the assessment structure of PISA.

2.1 The PISA mathematical literacy assessment framework

The return of mathematical literacy as the major assessment domain in PISA 2022 has enabled the framework to be revisited and updated to reflect current instructional polices and practices.

The PISA 2022 mathematical literacy framework[1] continues to describe the stages individuals go through in solving contextualised problems and helps to define the mathematical processes in which students engage and solve problems. However, it has been updated to identify mathematical reasoning as a core part of being mathematically literate and to recognise the increasing use of computing tools in everyday life and in

1 Details about the PISA 2022 mathematical literacy assessment framework, proficiency scales and structure of the assessment have been taken from the *PISA 2022 assessment and analytical framework* (OECD, 2023).

mathematical literacy problem-solving contexts. For PISA 2022, the mathematical literacy proficiency scale was expanded from 6 to 8 proficiency levels. Level 1 has been renamed to Level 1a and extended to include Levels 1b and 1c to provide details of what students can typically do at the lower end of the proficiency scale.

The revised framework leverages the use of the digital environment (for example, spreadsheets, simulators, data generators, drag-and-drop, etc.) and has adopted multistage adaptive testing to further improve measurement accuracy and efficiency, especially at the extremes of the proficiency scale.

How is mathematical literacy defined and assessed in PISA?

Mathematical literacy in PISA 2022 is defined as:

> [a] student's' capacity to reason mathematically and to formulate, employ and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to know the role of mathematics play in the world and to make well-founded judgements and decisions needed by constructive, engaged and reflective 21st century citizens. (OECD, 2023, p.14).

The focus of the language in the definition of mathematical literacy is on active engagement with mathematics to solve real-world problems in a variety of contexts. It is intended to encompass mathematical reasoning (both deductive and inductive) and problem-solving using mathematical concepts, procedures, facts, and tools to describe, explain and predict phenomena.

The definition of mathematical literacy not only focuses on the use of mathematics to solve real-world problems, but also identifies mathematical reasoning as a core aspect of being mathematically literate.

In order for students to be mathematically literate they must be able, first, to use their mathematics content knowledge to recognise the mathematical nature of a situation (problem) especially those situations encountered in the real world and second, to formulate it in mathematical terms. The use of mathematical concepts, algorithms and procedures taught in schools then enables the problem to be solved.

The mathematical literacy framework encompasses 3 interrelated concepts:

1. **Cognitive processes** – mathematical reasoning and the problem-solving model
2. **Content knowledge** – how the domain is organised into categories
3. **Contexts** – the real-world "setting" in which items are presented, including select 21st-century skills that are supported and developed as part of being mathematically literate.

Figure 2.1 shows the mathematical reasoning and mathematical processes, the way the mathematical content knowledge is organised in the PISA 2022 framework, the contexts in which students will face mathematical challenge, and the relationship between mathematical literacy and 21st-century skills.

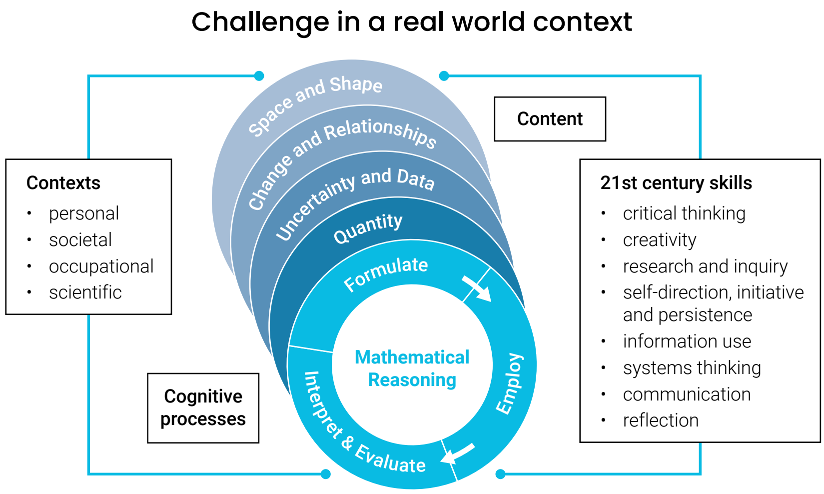


FIGURE 2.1 Main features of the mathematical literacy framework

Mathematical content knowledge

An understanding of mathematical content is important for individuals in the modern world. These concepts are typically found in national mathematics curricula. The mathematical literacy framework identifies 4 mathematics content categories.

1. **Quantity** – number sense and estimation; quantification of attributes, objects, relationships, situations and entities in the world; understanding various representations of those quantifications, and judging interpretations and arguments based on quantity.
2. **Change and relationships** – understanding fundamental types of change and recognising when they occur in order to use suitable mathematical models to describe and predict change. Includes appropriate functions and equations/inequalities as well as creating, interpreting and translating among symbolic and graphical representations of relationships.
3. **Uncertainty and data** – recognising the place of variation in the real world, including having a sense of the quantification of that variation, and acknowledging its uncertainty and error in related inferences. It also includes forming, interpreting and evaluating conclusions drawn in situations where uncertainty is present. The presentation and interpretation of data are also included in this category, as well as basic topics in probability.
4. **Space and shape** – patterns; properties of objects; spatial visualisations; positions and orientations; representations of objects; decoding and encoding of visual information; navigation and dynamic interaction with real shapes as well as representations, movement, displacement, and the ability to anticipate actions in space.

Mathematical cognitive processes

The PISA 2022 mathematical literacy domain describes 4 cognitive processes:

1. **Reasoning mathematically** (both deductively and inductively) involves evaluating situations, selecting strategies, drawing logical conclusions, developing and describing solutions, and recognising how those solutions can be applied.
2. **Formulating situations mathematically** refers to being able to recognise and identify opportunities to use mathematics and then providing mathematical structure to a problem presented in a contextualised form.
3. **Employing mathematical concepts, facts and procedures** refers to being able to apply mathematical concepts, facts, procedures, and reasoning to solve mathematically formulated problems to obtain mathematical conclusions.
4. **Interpreting, applying and evaluating mathematical outcomes** refers to being able to reflect upon mathematical solutions, results or conclusions and interpret them in the context of the real-world problem that initiated the process.

Contexts

An important aspect of mathematical literacy is the ability to use and do mathematics in a variety of real-world situations with which a student could be faced. PISA defines 4 contexts:

- **Personal** – relates to individuals, families and peers. Personal contexts include food preparation, shopping, games, personal health, personal transportation, sports, travel, personal scheduling, and personal finance.
- **Societal** – relates to the community (local, national or global). Societal contexts include voting systems, public transport, government, public policies, demographics, advertising, national statistics and economics.
- **Occupational** – relates to the world of work. Occupational contexts include measuring, costing and ordering materials for building, payroll/accounting, quality control, scheduling/inventory, design/architecture and job-related decision-making.
- **Scientific** – relates to the application of mathematics to the natural world and issues and topics related to science and technology. Scientific contexts include weather or climate, ecology, medicine, space science, genetics, measurement, and the world of mathematics itself.

21st-century skills

There is increased global interest in what are called 21st-century skills and their possible inclusion in educational systems. PISA 2022 identifies eight 21st-century skills in the PISA 2022 assessment framework. These skills are:

- critical thinking
- creativity
- research and inquiry
- self-direction, initiative and persistence
- information use
- systems thinking
- communication
- reflection.

How is mathematical literacy proficiency reported in PISA?

The PISA 2022 mathematical literacy proficiency scale is divided into 8 proficiency levels and 62 points represents one proficiency level. The mathematical literacy proficiency scale spans from Level 1c (the lowest proficiency level) to Level 6 (the highest). Students who placed at Level 5 or 6 (scoring 607 points or higher) are considered high performers, while students who placed below Level 2 (scoring 420 points or lower) are considered low performers. Figure 2.2 describes the skills and knowledge that are required at each of the mathematical literacy proficiency levels.

	Proficiency level	What students can typically do at each level
High performers	6	Students can work through abstract problems and demonstrate creativity and flexible thinking to develop solutions. For example, they can recognise when a procedure that is not specified in a task can be applied in a non-standard context or when demonstrating a deeper understanding of a mathematical concept is necessary as part of a justification. They can link different information sources and representations, including effectively using simulations or spreadsheets as part of their solution. Students at this level are capable of critical thinking and have a mastery of symbolic and formal mathematical operations and relationships that they use to clearly communicate their reasoning. They can reflect on the appropriateness of their actions with respect to their solution and the original situation.
		669 score points
	5	Students can develop and work with models for complex situations, identifying or imposing constraints, and specifying assumptions. They can apply systematic, well-planned problem-solving strategies for dealing with more challenging tasks, such as deciding how to develop an experiment, designing an optimal procedure, or working with more complex visualisations that are not given in the task. Students demonstrate an increased ability to solve problems whose solutions often require incorporating mathematical knowledge that is not explicitly stated in the task. Students at this level reflect on their work and consider mathematical results with respect to the real-world context.
		607 score points
Middle performers	4	Students can work effectively with explicit models for complex concrete situations, sometimes involving two variables, as well as demonstrate an ability to work with undefined models that they derive using a more sophisticated computational-thinking approach. Students at this level begin to engage with aspects of critical thinking, such as evaluating the reasonableness of a result by making qualitative judgements when computations are not possible from the given information. They can select and integrate different representations of information, including symbolic or graphical, linking them directly to aspects of real-world situations. At this level, students can also construct and communicate explanations and arguments based on their interpretations, reasoning, and methodology.
		545 score points
	3	Students can devise solution strategies, including strategies that require sequential decision making or flexibility in understanding of familiar concepts. At this level, students begin using computational-thinking skills to develop their solution strategy. They are able to solve tasks that require performing several different but routine calculations that are not all clearly defined in the problem statement. They can use spatial visualisation as part of a solution strategy or determine how to use a simulation to gather data appropriate for the task. Students at this level can interpret and use representations based on different information sources and reason directly from them, including conditional decision-making using a two-way table. They typically show some ability to handle percentages, fractions and decimal numbers, and to work with proportional relationships.
		482 score points
Low performers	2	Students can recognise situations where they need to design simple strategies to solve problems, including running straightforward simulations involving one variable as part of their solution strategy. They can extract relevant information from one or more sources that use slightly more complex modes of representation, such as two-way tables, charts, or two-dimensional representations of three-dimensional objects. Students at this level demonstrate a basic understanding of functional relationships and can solve problems involving simple ratios. They are capable of making literal interpretations of results.
		420 score points
	1a	Students can answer questions involving simple contexts where all information needed is present, and the questions are clearly defined. Information may be presented in a variety of simple formats and students may need to work with two sources simultaneously to extract relevant information. They are able to carry out simple, routine procedures according to direct instructions in explicit situations, which may sometimes require multiple iterations of a routine procedure to solve a problem. They can perform actions that are obvious or that require very minimal synthesis of information, but in all instances the actions follow clearly from the given stimuli. Students at this level can employ basic algorithms, formulae, procedures, or conventions to solve problems that most often involve whole numbers.
		358 score points
	1b	Students can respond to questions involving easy to understand contexts where all information needed is clearly given in a simple representation (i.e., tabular or graphic) and, as necessary, recognise when some information is extraneous and can be ignored with respect to the specific question being asked. They are able to perform simple calculations with whole numbers, which follow from clearly prescribed instructions, defined in short, syntactically simple text.
		295 score points
	1c	Students can respond to questions involving easy to understand contexts where all relevant information is clearly given in a simple, familiar format (for example, a small table or picture) and defined in a very short, syntactically simple text. They are able to follow a clear instruction describing a single step or operation.
		233 score points

FIGURE 2.2 Summaries of the 8 proficiency levels and cut-off points on the mathematical literacy scale

2.2 The PISA scientific literacy assessment framework

Scientific literacy has been assessed twice as a major assessment domain since PISA began in 2000, in 2006 and 2015. In PISA 2022, scientific literacy was assessed as a minor domain and the current framework describes the definition and constructs of scientific literacy that was used in PISA 2018.[2]

How is scientific literacy defined and assessed in PISA?

Scientific literacy in PISA 2022 is defined as:

> [a] student's' 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 enquiry, and interpret data and evidence scientifically. (OECD, 2023, p.14).

Figure 2.3 shows the scientific literacy assessment framework consists of 3 interrelated aspects. The central aspect comprises 3 competencies that students need to apply in specific contexts, with the application of these competencies influenced by their knowledge of science.

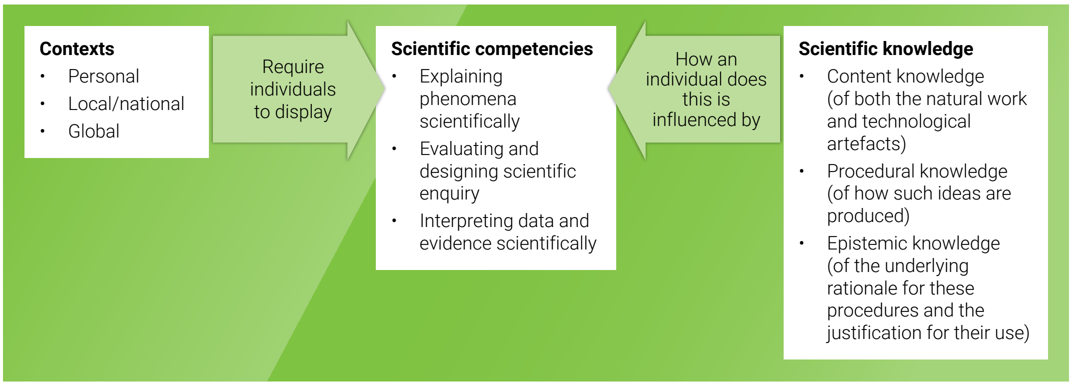


FIGURE 2.3 Main features of the scientific literacy assessment framework

Scientific contexts

The PISA scientific literacy assessment is set within real-world contexts that are not limited to life in the classroom and school. Items in the assessment focus on:

- personal situations – self (family and peer groups)
- local/national situations – community
- global situations – life across the world.

Some of the items may also be framed within a range of applications (health and disease, natural resources, environmental quality, hazards, and frontiers of science and technology) in order to assess an understanding of the processes and practices in advances in scientific knowledge.

2 Details about the scientific literacy assessment framework, proficiency scales and structure of the assessment have been assembled from the *PISA 2018 assessment and analytical framework* (OECD, 2023).

Scientific competencies

The scientific literacy assessment framework defines 3 competencies that are considered essential for the scientifically literate person.

1. **Explaining phenomena scientifically** – recognising, offering and evaluating explanations for a range of natural and technological phenomena through demonstrating the ability to:
   - recall and apply appropriate scientific knowledge
   - identify, use and generate explanatory models and representations
   - make and justify appropriate predictions
   - offer explanatory hypotheses
   - explain the potential implications of scientific knowledge for society.
2. **Evaluating and designing scientific enquiry** – describing and appraising scientific investigations and proposing ways of addressing questions scientifically through demonstrating the ability to:
   - identify the question explored in a given scientific study
   - distinguish questions that could be investigated scientifically
   - propose a way of exploring a given question scientifically
   - evaluate ways of exploring a given question scientifically
   - describe and evaluate how scientists ensure the reliability of data, and the objectivity and generalisability of explanations.
3. **Interpreting data and evidence scientifically** – analysing and evaluating scientific data, claims and arguments in a variety of representations and drawing appropriate conclusions, through demonstrating the ability to:
   - transform data from one representation to another
   - analyse and interpret data and draw appropriate conclusions
   - identify the assumptions, evidence and reasoning in science-related texts
   - distinguish between arguments that are based on scientific evidence and theory and those based on other considerations
   - evaluate scientific arguments and evidence from different sources (for example, newspapers, the internet, journals).

Scientific knowledge

All 3 scientific competencies require an understanding of the major facts, concepts and explanatory theories that form the basis of scientific knowledge. There are 3 forms of scientific knowledge.

1. **Content knowledge** – refers to an understanding of the major facts, ideas and theories from the disciplines of biology, chemistry, physics, earth and space sciences.
2. **Procedural knowledge** – refers to an understanding of the standard concepts and procedures essential to scientific enquiry that underpin the collection, analysis and interpretation of scientific data.
3. **Epistemic knowledge** – refers to an understanding of specific constructs and defining features essential to the process of building scientific knowledge (for example, hypotheses, theories and observations) and their role in justifying the knowledge produced by science.

Cognitive demand

Cognitive demand refers to the type of mental processes required to complete an item and is a key feature of the scientific literacy framework. The scientific literacy assessment tests student ability at 3 different levels of cognitive demand.

- **Low cognitive demand** – carrying out a one-step procedure, such as recalling a fact or locating a single point of information from a table or graph.

- **Medium cognitive demand** – using and applying conceptual knowledge to describe or explain phenomena, selecting appropriate procedures involving 2 or more steps, organising or displaying data, interpreting or using simple data sets or graphs.
- **High cognitive demand** – analysing complex information or data, synthesising or evaluating evidence or justifying, reasoning given various sources, or developing a plan or sequence of steps to approach a problem.

How is scientific literacy proficiency reported in PISA?

The PISA scientific literacy scale is divided into 7 levels of proficiency, with 75 points representing one proficiency level.[3] The scientific literacy proficiency scale spans from Level 1b (the lowest proficiency level) to Level 6 (the highest). Students who placed at Level 5 or 6 (scoring 633 points or higher) are considered high performers, while students who placed below Level 2 (scoring 410 points or lower) are considered low performers. Figure 2.4 describes the skills and knowledge required at each of the scientific literacy proficiency levels.

	Proficiency level	What students can typically do at each level
High performers	6	Students can draw on a range of interrelated scientific ideas and concepts from the physical, life and earth and space sciences and use content, procedural and epistemic knowledge in order to offer explanatory hypotheses of novel scientific phenomena, events and processes or to make predictions. In interpreting data and evidence, they are able to discriminate between relevant and irrelevant information and can draw on knowledge external to the normal school curriculum. They can distinguish between arguments that are based on scientific evidence and theory and those based on other considerations. Students at this level can evaluate competing designs of complex experiments, field studies or simulations and justify their choices.
		708 score points
	5	Students can use abstract scientific ideas or concepts to explain unfamiliar and more complex phenomena, events and processes involving multiple causal links. They are able to apply more sophisticated epistemic knowledge to evaluate alternative experimental designs and justify their choices and use theoretical knowledge to interpret information or make predictions. Students at this level can evaluate ways of exploring a given question scientifically and identify limitations in interpretations of data sets including sources and the effects of uncertainty in scientific data.
		633 score points
Middle performers	4	Students can use more complex or more abstract content knowledge, which is either provided or recalled, to construct explanations of more complex or less familiar events and processes. They can conduct experiments involving two or more independent variables in a constrained context. They are able to justify an experimental design, drawing on elements of procedural and epistemic knowledge. Students at this level can interpret data drawn from a moderately complex data set or less familiar context, draw appropriate conclusions that go beyond the data and provide justifications for their choices.
		559 score points
	3	Students can draw upon moderately complex content knowledge to identify or construct explanations of familiar phenomena. In less familiar or more complex situations, they can construct explanations with relevant cueing or support. They can draw on elements of procedural or epistemic knowledge to carry out a simple experiment in a constrained context. Students at this level are able to distinguish between scientific and non-scientific issues and identify the evidence supporting a scientific claim.
		484 score points
	2	Students are able to draw on everyday content knowledge and basic procedural knowledge to identify an appropriate scientific explanation, interpret data, and identify the question being addressed in a simple experimental design. They can use basic or everyday scientific knowledge to identify a valid conclusion from a simple data set. Students at this level can demonstrate basic epistemic knowledge by being able to identify questions that can be investigated scientifically.
		410 score points
Low performers	1a	Students are able to use basic or everyday content and procedural knowledge to recognise or identify explanations of simple scientific phenomenon. With support, they can undertake structured scientific enquiries with no more than two variables. They are able to identify simple causal or correlational relationships and interpret graphical and visual data that require a low level of cognitive demand. Students at this level can select the best scientific explanation for given data in familiar personal, local and global contexts.
		335 score points
	1b	Students can use basic or everyday scientific knowledge to recognise aspects of familiar or simple phenomenon. They are able to identify simple patterns in data, recognise basic scientific terms and follow explicit instructions to carry out a scientific procedure.
		261 score points

FIGURE 2.4 Summaries of the 7 proficiency levels and cut-off points on the scientific literacy scale

3 This proficiency scale continues the descriptions as set out in the overall PISA 2015 scientific literacy proficiency scale, when scientific literacy was last updated for use as a major assessment domain.

2.3 The PISA reading literacy assessment framework

The reading literacy framework was revised in PISA 2018,[4] when reading literacy was last assessed as a major assessment. The framework integrated the new forms of reading since the emergence of digital texts, and incorporated constructs involved in basic reading processes, such as fluent reading. It also revised the organisation of reading processes so that they reflected the global importance of the different constructs.

How is reading literacy defined and assessed in PISA?

Reading literacy in PISA 2022 is defined as:

> [a] 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. (OECD, 2023, p.14).

Figure 2.5 summarises the features of the reading literacy assessment framework whereby reading is a multifaceted process that involves the reader interacting with the text and accomplishing a task during or after reading the text.

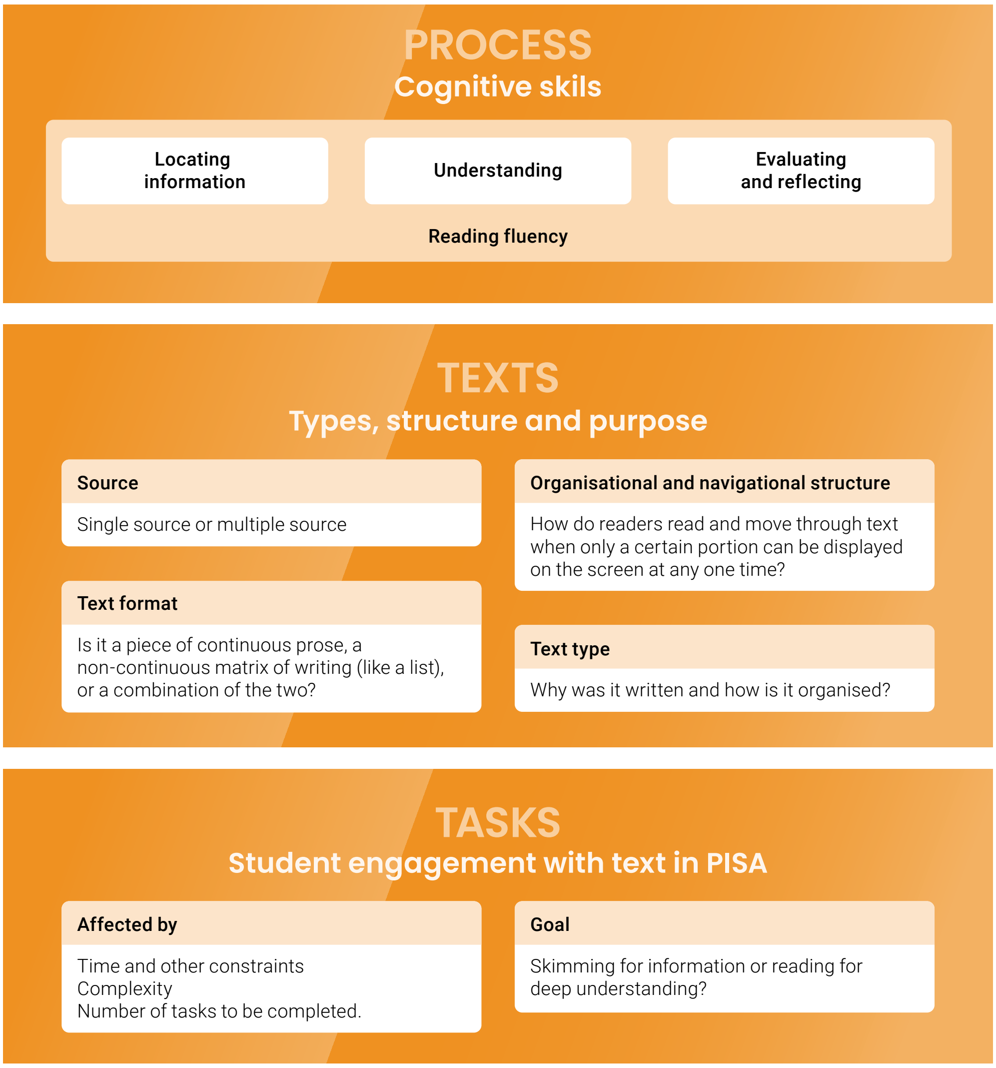


FIGURE 2.5 Main features of the reading literacy framework

4 Details about the reading literacy assessment framework, proficiency scales and structure of the assessment have been assembled from the *PISA 2018 assessment and analytical framework* (OECD, 2019a).

Texts

Texts refer to the type of material that is read by the reader. In the assessment framework, texts are classified using 4 features.

1. **Source** (describes how the text has been composed)
   - A *single unit/single-source text* – has a definite author (or group of authors), time of writing or publication date, and reference title or number
   - *Several units/a multiple-source text* – has different authors, different times of being published, and different titles or reference numbers.
2. **Organisational and navigational structure** (describes how the reader reads and moves through the text)
   - *Static texts* – have a simple, often linear organisational structure and a low density of navigational tools such as scroll bar, tabs and a search function (for example, PDF document)
   - *Dynamic texts* – have a complex non-linear organisational structure and a high density of navigational tools (table of contents, hyperlinks to switch between segments of text, or interactive tools that allow the reader to communicate with others (as in social networks)) that increase the possibilities for the reader to interact with the material.
3. **Text format**
   - Continuous texts – can be either static or dynamic texts, and are composed of sentences that are, in turn, organised into paragraphs (for example, newspaper, reports, novels and reviews).
   - Non-continuous texts – can be either static or dynamic texts, and are organised into a matrix format, based on combinations of lists and require a different kind of reading approach than for reading continuous texts (for example, lists, tables, diagrams, advertisements, catalogues, indexes and forms).
   - Mixed texts – consist of both continuous and non-continuous text formats, where the author has used a variety of presentations to communicate information (for example, a website with paragraphs along with embedded graphics and diagrams, online forums).
4. **Text type** (purpose of the text and its organisation)
   - *Descriptions* – identify a tangible object and where it is located in space (for example, diary, catalogue, flight schedule)
   - *Narrations* – detail when and in what sequence events occurred (for example, novel, play, comic strip)
   - *Expositions* – explain or summarise an object or concept, and describe how objects and concepts relate to one another (for example, scholarly journal article, graph of population trends)
   - *Argumentations* – try to persuade the reader of the writer's viewpoint (for example, letter to the editor, book or film review, online discussion forum post)
   - *Instructions* – provide directions as to what to do (for example, recipes, guidelines for operating an appliance)
   - *Transactions* – refer to the exchange of information in an interaction with a reader (for example, personal letter to share family news, emails to plan an event, text messages to arrange a meeting)

Reading cognitive processes

The reading literacy assessment framework identifies 4 cognitive processes that readers use in order to locate and extract information and construct meaning when they interact with a piece of text to achieve a task.

1. **Reading fluency** relates to the ease and efficiency with which the reader can read and understand a piece of text, and relies on the reader's ability to decode texts accurately and to process them to comprehend the overall meaning of the text. Reading fluency is the central cognitive process and underpins the other 3 processes.

2. **Locating information** requires the reader to judge the relevance, accuracy and credibility of passages in order to locate information as quickly and efficiently as possible. Locating information makes use of 2 specific cognitive processes, depending on the number of texts involved:
   - *Scanning and locating*, where the reader scans a single piece of text to retrieve a few words, phrases or numerical values, without the need to comprehend the overall text as the required information appears essentially verbatim in the text.
   - *Searching for and selecting relevant text*, where the reader needs to deal with multiple texts, and has to identify which piece of each text is the most important.
3. **Understanding** involves the reader's comprehension of the meaning conveyed in the text. Two specific cognitive processes, distinguished by the length of the text to be understood, support the process of understanding.
   - *Representing literal meaning*, where the reader must paraphrase sentences or short passages so that they match the target information desired by the task.
   - *Integrating and generating references*, where the reader works with longer passages to establish their overall meaning. This involves connecting information across various passages or texts, and inferring how they are connected to each other (for example, spatially, temporally or causally) and potentially also to the statement in the question.
4. **Evaluating and reflecting** requires the reader to assess the quality and validity of the text or a set of texts. Three specific cognitive processes support the processes of evaluating and reflecting.
   - *Assessing quality and credibility*, where judgement is made on whether the content is valid, accurate and/or unbiased, and may involve identifying the source of the information and thereby identifying the author's intentions.
   - *Reflecting on content and form*, where readers evaluate the quality and the style of the text, which involves assessing whether the content and form adequately express the author's purpose and point of view. The reader may need to draw from their real-world knowledge and experience in order to be able to compare different perspectives.
   - *Detecting and handling conflict*, where readers need to compare information across multiple pieces of text, recognise contradictions between pieces of text and then decide how best to manage such contradictions. The reader does this by evaluating the credibility of the sources and the logic and soundness of their claims.

Tasks

In PISA, the reader engages with the texts to respond to questions so they can provide evidence about their level of reading literacy. Tasks are arranged in units, which are based on a single or several pieces of texts, and are often arranged in order of difficulty.

Typically, each task has been designed to assess one or more of the processes identified in the assessment framework. However PISA 2018 incorporated the use of scenarios, which have an overarching purpose and are supported by a collection of thematically related texts that may come from a variety of sources.

How is reading literacy proficiency reported in PISA?

The reading literacy scale is divided into 8 levels of proficiency, with 73 points representing one proficiency level.[5] The reading literacy proficiency scale spans from Level 1c (the lowest proficiency level) to Level 6 (the highest). Students who placed at Level 5 or 6 (scoring 626 points or higher) are considered high performers, while students who placed below Level 2 (scoring 408 points or lower) are considered low performers. Figure 2.6 describes the skills and knowledge required at each of the reading literacy proficiency levels.[6]

5 This proficiency scale continues the descriptions as set out in the overall PISA 2018 reading literacy proficiency scale, when reading literacy was last updated for use as a major assessment domain.

6 For more information about the scaling of cognitive items, please refer to Appendix C.

	Proficiency level	What students can typically do at each level
High performers	6	Students can comprehend lengthy and abstract texts in which the information of interest is deeply embedded and only indirectly related to the task. They can compare, contrast and integrate information representing multiple and potentially conflicting perspectives, using multiple criteria and generating inferences across distant pieces of information to determine how the information may be used. Students can reflect deeply on the text's source in relation to its content, using criteria external to the text. They can compare and contrast information across texts, identifying and resolving inter-textual discrepancies and conflicts through inferences about the sources of information, their explicit or vested interests, and other cues as to the validity of the information. Tasks at Level 6 typically require the reader to set up elaborate plans, combining multiple criteria and generating inferences to relate the task and the text(s). Materials at this level include one or several complex and abstract text(s), involving multiple and possibly discrepant perspectives. Target information may take the form of details that are deeply embedded within or across texts and potentially obscured by competing information.
		698 score points
	5	Students can comprehend lengthy texts, inferring which information in the text is relevant even though the information of interest may be easily overlooked. They can perform causal or other forms of reasoning based on a deep understanding of extended pieces of text. They can also answer indirect questions by inferring the relationship between the question and one or several pieces of information distributed within or across multiple texts and sources. Reflective tasks require the production or critical evaluation of hypotheses, drawing on specific information. Students can establish distinctions between content and purpose, and between fact and opinion as applied to complex or abstract statements. They can assess neutrality and bias based on explicit or implicit cues pertaining to both the content and/or source of the information. They can also draw conclusions regarding the reliability of the claims or conclusions offered in a piece of text. Tasks at Level 5 typically involve dealing with concepts that are abstract or counterintuitive, and going through several steps until the goal is reached. In addition, tasks at this level may require the reader to handle several long texts, switching back and forth across texts in order to compare and contrast information.
		626 score points
Middle performers	4	Students can comprehend extended passages in single or multiple-text settings. They interpret the meaning of nuances of language in a section of text by taking into account the text as a whole. In other interpretative tasks, students demonstrate understanding and application of ad hoc categories. They can compare perspectives and draw inferences based on multiple sources. Students can search, locate and integrate several pieces of embedded information in the presence of plausible distractors. They are able to generate inferences based on the task statement in order to assess the relevance of target information. They can handle tasks that require them to memorise prior task context. In addition, students at this level can evaluate the relationship between specific statements and a person's overall stance or conclusion about a topic. They can reflect on the strategies that authors use to convey their points, based on salient features of texts such as titles and illustrations. They can compare and contrast claims explicitly made in several texts and assess the reliability of a source based on salient criteria. Texts at Level 4 are often long or complex, and their content or form may not be standard. Many of the tasks are situated in multiple-text settings. The texts and the tasks contain indirect or implicit cues.
		553 score points
	3	Students at Level 3 can represent the literal meaning of single or multiple texts in the absence of explicit content or organisational clues. They can integrate content and generate both basic and more advanced inferences. They can also integrate several parts of a piece of text in order to identify the main idea, understand a relationship or construe the meaning of a word or phrase when the required information is featured on a single page. They can search for information based on indirect prompts, and locate target information that is not in a prominent position and/or is in the presence of distractors. In some cases, readers at this level recognise the relationship between several pieces of information based on multiple criteria. Students can reflect on a piece of text or a small set of texts, and compare and contrast several authors' viewpoints based on explicit information. Reflective tasks at this level may require the reader to perform comparisons, generate explanations or evaluate a feature of the text. Some reflective tasks require readers to demonstrate a detailed understanding of a piece of text dealing with a familiar topic, whereas others require a basic understanding of less-familiar content. Tasks at Level 3 require the reader to take many features into account when comparing, contrasting or categorising information. The required information is often not prominent or there might be a fair amount of competing information. Texts typical of this level may include other obstacles, such as ideas that are contrary to expectation or negatively worded.
		480 score points
	2	Students can identify the main idea in a piece of text of moderate length. They can understand relationships or construe meaning within a limited part of the text when the information is not prominent by producing basic inferences, and/or when the information is in the presence of some distracting information. They can select and access a page in a set based on explicit though sometimes complex prompts, and locate one or more pieces of information based on multiple, partly implicit criteria. Students can, when explicitly cued, reflect on the overall purpose, or on the purpose of specific details, in texts of moderate length. They can reflect on simple visual or typographical features. They can compare claims and evaluate the reasons supporting them based on short, explicit statements. Tasks at Level 2 may involve comparisons or contrasts based on a single feature in the text. Typical reflective tasks at this level require a comparison or several connections to be made between the text and outside knowledge by drawing on personal experience and attitudes.
		408 score points

continued over

	Proficiency level	What students can typically do at each level
Low performers	1a	Students can understand the literal meaning of sentences or short passages. They can also recognise the main theme or the author's purpose in a piece of text about a familiar topic, and make a simple connection between several adjacent pieces of information, or between the given information and their own prior knowledge. They can select a relevant page from a small set based on simple prompts, and locate one or more independent pieces of information within short texts. Students can reflect on the overall purpose, gist and adjunct information in simple texts containing explicit cues. Most tasks at this level point to relevant factors in the task and in the text.
		335 score points
	1b	Students can evaluate the literal meaning of simple sentences. They can also interpret the literal meaning of texts by making simple connections between adjacent pieces of information in the question and/or the text. Students can scan for and locate a single piece of prominently placed, explicitly stated information in a single sentence, a short text or a simple list. They can access a relevant page from a small set based on simple prompts when explicit cues are present. Tasks at Level 1b explicitly direct readers to consider relevant factors in the task and in the text. Texts at this level are short and typically provide support to the reader, such as through repetition of information, pictures or familiar symbols. There is minimal competing information.
		262 score points
	1c	Students can understand and affirm the meaning of short, syntactically simple sentences on a literal level, and read for a clear and simple purpose within a limited amount of time. Tasks at this level involve simple vocabulary and syntactic structures.
		185 score points

FIGURE 2.6 Summaries of the 8 proficiency levels and cut-off points on the reading literacy scale

The PISA 2022 assessment structure

The assessment framework serves as the conceptual basis for assessing student proficiency across the 3 assessment domains. The items presented to students reflect the concepts outlined in the framework, as well as taking into consideration the difficulty of the items and the different types of item formats. Although students were only presented with a subset of items, the test design ensured there was an overlap of items across the different test forms that facilitated the construction of the proficiency scales that were common to all students.

Construct coverage

In PISA 2022, there were 234 mathematical literacy items, of which 32% were trend items, allowing for comparisons of student performance to be reported over time, and 68% were newly developed items for the PISA 2022 cycle. There were 115 scientific literacy items and 197 reading literacy items.

The PISA 2022 assessment also included a measure of reading fluency in the reading literacy assessment, which was first used in PISA 2018 to collect additional information about the reading skills of students at the lower end of the proficiency scale. The items covered the full range of cognitive abilities and knowledge identified in the assessment framework.[7]

7 Appendix D shows the distribution of the items to the construct coverage as outlined in the *PISA 2022 main survey item pool – cognitive assessment*.

Item-response formats

The assessment domains were assessed through a range of item-response formats to cover the full range of cognitive abilities and knowledge identified in the PISA 2022 assessment framework. These included:

- **Selected-response items** – students were provided with multiple possible responses and were asked to select one or more. These were coded automatically. Selected-response items consisted of:
  - *multiple-choice items* – students were asked to select one correct response from among 4 or 5 possible response options, or where students had to select an answer from a selectable element within a graphic or text.
  - *complex multiple-choice items* – students were asked to select the correct response to each of a number of statements or questions, select more than one response from a list, select choices from a drop-down menu to fill multiple blanks, or select and move elements to complete a task of matching, ordering or categorising.
- **Closed constructed-response items** – students were asked to provide a response with a limited range of acceptable answers, typically numbers. Responses were easily judged to be either correct or incorrect and were coded automatically.
- **Open constructed-response items** – students were asked to provide an extended response that ranged from writing a short explanation to showing the method and thought processes they used in reaching their response. These items were coded by trained experts who selected the code that best captured the response provided by a student to an item. Each code was then converted to a score for that item.

The range of the response formats was considered when selecting items for the PISA 2022 assessment. Particular attention was paid to maintaining at least 30% of constructed-response items. This goal was met for mathematical literacy (31%) and reading literacy (32%), and was exceeded for scientific literacy (36%).

Released items

As PISA is a recurring assessment, the majority of items remain secure in order for trend data to be reported over time. For PISA 2022, a small number of example items for reading literacy were made public after the assessment; however, no new scientific and reading literacy items were released, given they were all trend items. Appendix E provides a few examples of sample items for illustrative purposes. A selection of items is also available through the OECD website.

3

Australian student performance in mathematical literacy

This chapter provides results on Australian student performance in mathematical literacy. The results focus on performance by country, across states and territories, by gender and for different demographic groups of interest. Results are reported for PISA 2022 and over cycles.

This report focuses on differences that are statistically significant (are unlikely to have occurred by chance). Where the commentary states that there was a difference between sets of numbers, whether these were mean scores, percentages, or percentage point differences, it means that the difference satisfied this condition. When it states that there was no difference, or where no comment is made regarding a possible comparison, it indicates that the difference was not statistically significant. For more information about statistical significance, please refer to the Reader's guide.

Because of rounding, the totals in the text may not add up exactly to the corresponding individual country numbers or percentages as reported in the related figure or table. For more information about rounding of figures, please refer to the Reader's guide.

Countries who did not meet one or more of the sampling technical standards are annotated with asterisks in Figures 3.1 to 3.6.

Key findings

- Australian students achieved an average of 487 score points in mathematical literacy in PISA 2022, which was higher than the OECD average of 472 score points.
- Australia was outperformed by students in 9 countries or economies. Singapore was the highest scoring country, with an average achievement of 575 score points. This was 103 points and more than one full standard deviation higher than the OECD average, 88 score points higher than Australia.
- 12% of Australian students were classed as high performers, which was higher than the OECD average of 9% but lower than the 41% of students in Singapore. The percentage of high performers in Australia has declined by 8 percentage points between PISA 2003 and 2022.
- 26% of Australian students were low performers, again lower than the OECD average of 31% but higher than Singapore's 8% low performers. Australia's proportion of low performers has increased by 12 percentage points over the PISA period 2003 to 2022.
- In Australia, Level 3 is the National Proficient Standard in mathematical literacy. 51% of Australian students attained this standard, which was 16 percentage points lower than in 2003.
- Since 2003, when mathematical literacy was first assessed as a major domain, Australia's average score has declined by 37 points.
- While Australia's score has declined in absolute terms, it has improved relative to other participating countries. Five countries consistently outperformed Australia: Singapore, Hong Kong (China), Chinese Taipei, Korea and Canada. However, 11 countries that outperformed Australia in 2018 were on a par with Australia in 2022, and 6 countries that were on par with Australia in 2018 performed at a lower level in 2022.
- Students in the Australian Capital Territory (498 points), Western Australia (497 points), New South Wales (491 points) and Victoria (488 points) all achieved similar scores, and outperformed students in the other jurisdictions.
- Only 4 jurisdictions had more than half the students attain the National Proficient Standard: the Australian Capital Territory (57%), Western Australia (56%), New South Wales (52%), and Victoria (51%). In Tasmania, 42% of students attained this level.
- Between PISA 2003 and 2022, all jurisdictions declined in performance. Victoria had the smallest decline (by 23 points) and South Australia had the largest decline (by 60 points).
- Independent schools outperformed Catholic schools who in turn outperformed government schools. After adjusting for the socioeconomic background at both the student level and school level, there were differences between students in government and Catholic schools, with students in governments schools performing at a higher level, and then between students in independent and Catholic schools, with students in independent schools performing at a higher level. This means that given similar socioeconomic backgrounds, there was no performance advantage for students who attended an independent school over government schools, but both government and independent schools achieved higher results than Catholic schools.
- Australia is one of 42 countries in which there was a gender difference in mathematical literacy; male students outperformed female students in 34 countries and female students outperformed male students in 8 countries. In Australia, males outperformed females by 12 points.
- Between PISA 2003 and 2022 in Australia, the mean mathematical literacy performance for female students declined by 41 points and for male students by 34 points.

3.1 Australia's mathematical literacy results in an international context

Performance

Australian students achieved an average of 487 points in mathematical literacy. This was higher than the OECD average of 472 points.

Singapore was the highest scoring country with a mean score of 575 points. This score was 103 points or more than one full standard deviation higher than the OECD average, and 88 score points higher than Australia. Macao (China) was the next highest performer, with an average achievement of 552 score points, 80 score points higher than the OECD average and 65 score points higher than Australia.

The performance of Australian students:

- was below students in 9 countries or economies (Singapore, Macao (China), Chinese Taipei, Hong Kong (China), Japan, Korea, Estonia, Switzerland, and Canada)
- was not different to students in 12 countries (Netherlands, Ireland, Belgium, Denmark, United Kingdom, Poland, Austria, Czech Republic, Slovenia, Finland, Latvia, and Sweden)
- was higher than students in 59 other countries – notably New Zealand (479 points), and the United States, whose score of 465 points was 22 points, lower than Australia.

This chapter only provides a commentary on those countries/economies who performed higher than the lowest performing OECD country (Costa Rica). The countries omitted from this chapter are:

Albania	Dominican Republic	Jordan	Paraguay
Argentina	El Salvador	Kosovo	Philippines
Brazil	Guatemala	Morocco	Uzbekistan
Cambodia	Indonesia	Palestinian Authority	
Colombia	Jamaica	Panama	

Figure 3.1 provides the mean mathematical literacy scores, along with the distribution of student performance for all countries reported in this chapter. Eighty-one countries participated in PISA 2022; however, countries that attained a mean score lower than Costa Rica (the lowest performing OECD country) were not included.

The measure of the range of performance (between the 10th and 90th percentiles) within each country varied considerably. A smaller range between the lowest and highest performing students indicates that there is greater similarity in performance. Countries with the smallest range of performance included the lowest performing OECD country, Costa Rica (168 points), and other low-performing countries such as Saudi Arabia (166 points) and Mexico (178 points). A larger range between the lowest and highest performing students indicates there is greater diversity in performance. Countries with the largest range of performance included Chinese Taipei (294 points), the Netherlands (282 points), and Israel (280 points) and the high performers Hong Kong (China) (274 points), Korea (272 points), and Singapore (268 points).

In Australia, the difference between the lowest and highest performing students was 261 points. The difference in mathematical literacy performance between the highest and lowest performing students across the OECD countries was 235 points.

	Country	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Significantly higher than Australia	Singapore	575	1.2	572–577	268
	Macao (China)	552	1.1	549–554	241
	Chinese Taipei	547	3.8	539–554	294
	Hong Kong (China)*	540	3.0	534–546	274
	Japan	536	2.9	529–541	243
	Korea	527	3.9	519–534	272
	Estonia	510	2.0	506–513	219
	Switzerland	508	2.1	503–512	253
	Canada*	497	1.6	493–500	244
Not significantly different from Australia	Netherlands*	493	3.8	485–500	282
	Ireland*	492	2.0	487–495	207
	Belgium	489	2.2	485–493	254
	Denmark*	489	1.9	485–493	213
	United Kingdom*	489	2.2	484–493	251
	Poland	489	2.3	484–493	234
	Austria	487	2.3	482–491	246
	Australia*	487	1.8	483–490	261
	Czech Republic	487	2.1	482–491	245
	Slovenia	485	1.2	482–486	234
	Finland	484	1.9	480–487	234
	Latvia*	483	2.0	479–487	207
	Sweden	482	2.1	477–485	251
Significantly lower than Australia	New Zealand*	479	2.0	475–482	258
	Lithuania	475	1.8	471–478	227
	Germany	475	3.1	468–480	248
	France	474	2.5	469–478	239
	Spain	473	1.5	470–476	225
	Hungary	473	2.5	467–477	247
	OECD average	472	0.4	471–473	235
	Portugal	472	2.4	467–476	233
	Italy	471	3.1	465–477	232
	Viet Nam	469	3.9	461–477	220
	Norway	468	2.1	464–472	244
	Malta	466	1.6	462–469	259
	United States*	465	4.0	457–472	246
	Slovak Republic	464	2.9	458–469	263
	Croatia	463	2.4	458–467	230
	Iceland	459	1.6	455–461	230
	Israel	458	3.3	451–464	280
	Türkiye	453	1.6	450–456	236
	Brunei Darussalam	442	0.9	440–443	219
	Ukrainian regions	441	4.1	432–448	228
	Serbia	440	3.0	434–445	229
	United Arab Emirates	431	0.9	429–432	264
	Greece	430	2.3	425–434	216
	Romania	428	4.0	419–435	257
	Kazakhstan	425	1.7	422–428	201
	Mongolia	425	2.6	419–429	214
	Cyprus	418	1.2	415–420	262
	Bulgaria	417	3.3	410–423	251
	Moldova	414	2.3	409–418	205
	Qatar	414	1.1	411–416	229
	Chile	412	2.1	407–415	198
	Uruguay	409	2.0	404–412	217
	Malaysia	409	2.4	403–413	193
	Montenegro	406	1.1	403–407	211
	Baku (Azerbaijan)	397	2.4	392–401	221
	Mexico	395	2.3	390–399	178
	Thailand	394	2.7	388–399	189
	Peru	391	2.3	386–395	201
	Georgia	390	2.4	385–394	214
	Saudi Arabia	389	1.8	385–392	166
	North Macedonia	389	0.9	386–390	213
	Costa Rica	385	1.9	380–388	168

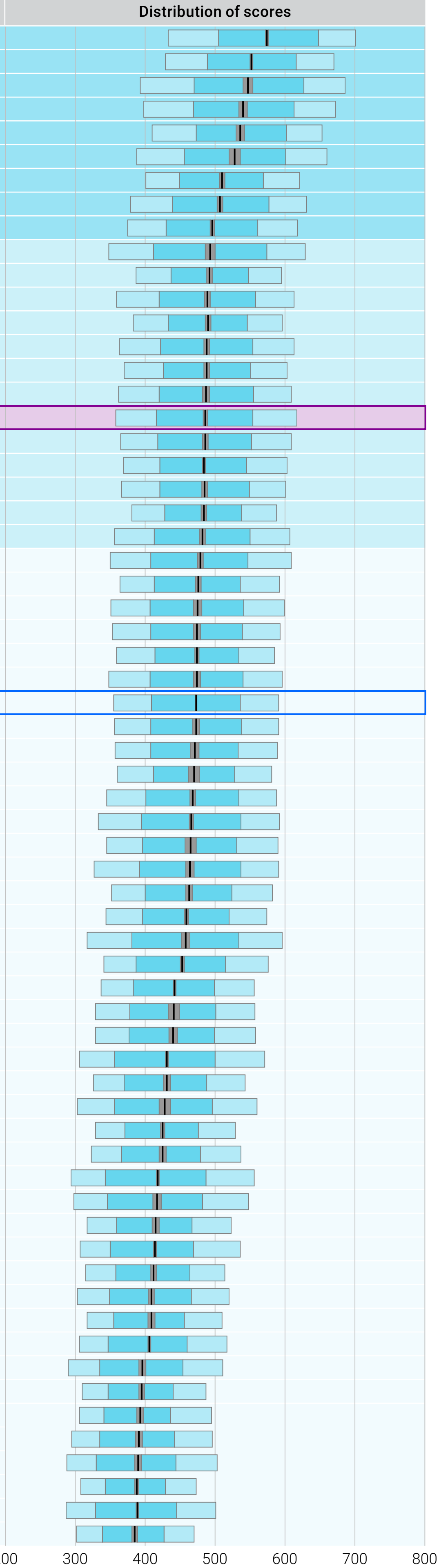


FIGURE 3.1 Mean scores and distribution of student performance on the mathematical literacy scale, by country

Proficiency

The mathematical literacy scale is divided into 8 levels of proficiency, with Level 6 as the highest and Level 1c as the lowest. One proficiency level in mathematical literacy represents 62 score points.

Figure 3.2 shows the percentage of students at each mathematical literacy proficiency level.

Countries are ordered by the percentage of students who performed below Level 2, which is the internationally assigned baseline benchmark. Countries with the lowest percentage of students below Level 2 are placed at the top of the figure and those with the highest portion are placed at the bottom.

High performers

Students who scored at Level 5 (607 points) or above are considered high performers in mathematical literacy. High performers demonstrate high levels of skills and knowledge and can successfully complete most mathematical literacy tasks in PISA.

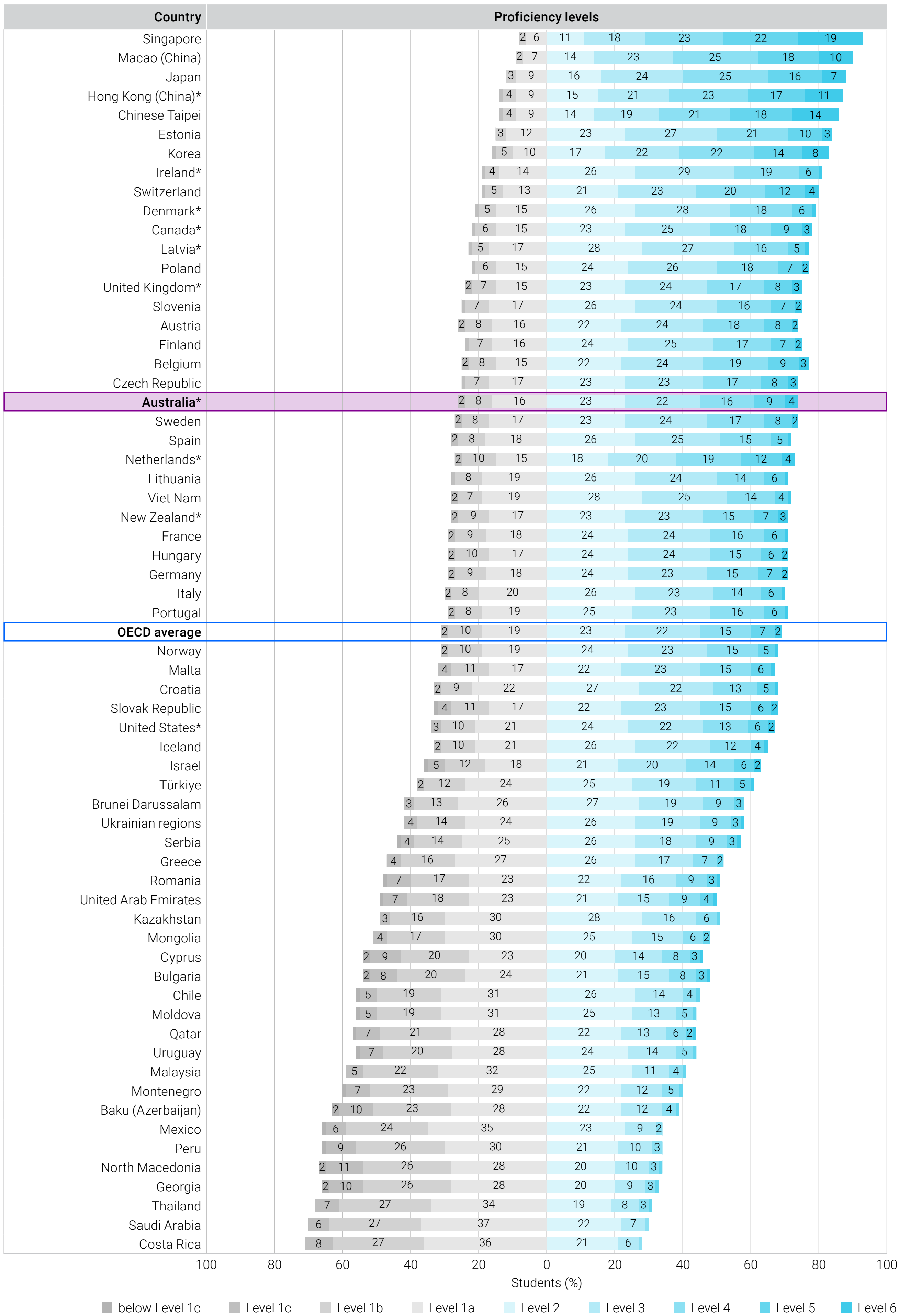
Not surprisingly, the high-performing countries also had the largest percentage of high performers: 41% of students in Singapore, 32% in Chinese Taipei and 29% in Macao (China). On average across OECD countries, 9% of students were high performers. In Australia, 12% of students were high performers; this was similar to Canada (12%), the United Kingdom (11%), and Estonia (13%), and higher than the OECD average.

In 47 countries, fewer than 10% of students were high performers. This includes Ireland and the United States, which each had 7% of high performers.

Low performers

Students who scored below Level 2 in mathematical literacy (lower than 482 points) are considered low performers. Students who do not achieve this level are unable to demonstrate the capacity to use their mathematical literacy skills to solve a wide range of practical problems.

On average, 31% of students across OECD countries were low performers in mathematical literacy, which was higher than the 26% of low performers in Australia. In general, the countries with the highest mean scores were also the countries with the smallest percentage of low performers. Singapore and Macao (China) had 8% of low performers, and Japan (12%). In Australia, the proportion of low performers was similar to the proportions in the United Kingdom (24%), and a little lower than New Zealand (29%).



Note: if the proportion of students in a proficiency level is 1% or lower, the level is shown but without the numeric label '1'. This convention has been used for all figures about proficiency levels in this chapter.

FIGURE 3.2 Percentages of students across the mathematical literacy proficiency scale, by country

Performance over time

PISA compares results between cycles and monitors the knowledge and skills of 15-year- old students over time. Mathematical literacy has been assessed as a major domain in 3 cycles, in 2003, 2012, and now in 2022. Figure 3.3 provides the mean mathematical literacy score differences for these 3 comparison periods when mathematical literacy was the major domain: between PISA 2018 and 2022; between PISA 2012 and 2022; and, between PISA 2003 and 2022.

Between 2018 and 2022

- 3 countries (Brunei Darussalam, Chinese Taipei, and Saudi Arabia) improved their mathematical literacy performance.
- 38 countries had a decline in their performance. The largest declines were in Iceland (36 points) and Norway (33 points). In New Zealand the decline was 15 points, in Ireland 8 points, and the United Kingdom and the United States 13 points. This decline was also seen the top performing countries Macao (China) (6 points), Hong Kong (China) (11 points), Estonia (13 points), and Canada (15 points).
- Australia's mean performance in PISA 2022 (487 points) remained unchanged from 2018 (491 points).
- The OECD average (AV00T) was 496 in PISA 2018, and declined by 16 points in PISA 2022 to 480 points.[1]

Between 2012 and 2022

- 3 countries (Macao (China), Peru and Qatar) improved their mathematical literacy performance.
- 35 countries declined in their performance. The largest declines were in Germany (39 points), Finland (35 points), and Iceland (34 points). The decline was also seen in New Zealand (21 points), United States (16 points), Chinese Taipei (13 points), and Ireland (10 points).
- Australia's mean performance in PISA 2012 was 504 points and had declined by 17 points in 2022.

Between 2003 and 2022

- Only 2 countries improved their mathematical literacy performance: Macao (China) by 25 points and Türkiye by 30 points.
- 22 countries declined in mathematical literacy performance, including Canada (by 36 points), New Zealand (by 44 points), and the United States (18 points). The declines ranged from 60 points in Finland to 13 points in Uruguay.
- Australia's mean performance in PISA 2022 was 487 points, a 37-point decline from 524 points in 2003.
- The OECD average (AV00T) was 502 points in PISA 2000, and declined by 22 points in PISA 2022.[1]

1 Based on the average across OECD countries that compare performance across all assessments, from PISA 2000 through to PISA 2022 (AV00T).

AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 3.3 Mean differences in student performance on the mathematical literacy scale, between PISA 2018 and 2022, 2012 and 2022 and 2003 and 2022, by country

Relative trends over time

Table 3.1 shows the position of a participating country relative to Australia in mathematical literacy performance from PISA 2003 to 2022. Countries are shown in order of highest to lowest performing for PISA 2022.

- Across the PISA cycles, 31 countries consistently performed at lower levels than Australia, including the United States.
- Singapore, Hong Kong (China), Chinese Taipei, Korea and Canada all consistently performed at higher levels than Australia. Australia was outperformed by Japan in all cycles other than 2006, by Macao (China) and Switzerland in all cycles other than 2003, and by the Netherlands in all cycles prior to 2022.

There were a number of countries whose relative performance to Australia's has changed over time.

- Eleven countries performed at a higher level than Australia in 2018, but at a similar level in 2022 (Netherlands, Ireland, Belgium, Denmark, United Kingdom, Poland, Austria, Czech Republic, Slovenia, Finland and Sweden).
- Six countries (New Zealand, France, Portugal, Italy, Slovak Republic, and Iceland) scored at a similar level to Australia in 2018 but at a lower level in 2022.
- Germany and Norway performed at a higher level than Australia in 2018 but at a lower level in 2022.

TABLE 3.1 Relative trends in mathematical literacy performance, by country

	Position relative to Australia in other PISA cycles						
Country	**2022**	**2018**	**2015**	**2012**	**2009**	**2006**	**2003**
Singapore	▲	▲	▲	▲	▲	–	–
Macao (China)	▲	▲	▲	▲	▲	▲	●
Chinese Taipei	▲	▲	▲	▲	▲	▲	–
Hong Kong (China)	▲	▲	▲	▲	▲	▲	▲
Japan	▲	▲	▲	▲	▲	●	▲
Korea	▲	▲	▲	▲	▲	▲	▲
Estonia	▲	▲	▲	▲	●	●	–
Switzerland	▲	▲	▲	▲	▲	▲	●
Canada	▲	▲	▲	▲	▲	▲	▲
Netherlands	●	▲	▲	▲	▲	▲	▲
Ireland	●	▲	▲	●	▼	▼	▼
Belgium	●	▲	▲	▲	●	●	●
Denmark	●	▲	▲	●	▼	▼	▼
United Kingdom	●	▲	●	▼	▼	▼	–
Poland	●	▲	▲	▲	▼	▼	▼
Austria	●	▲	●	●	–	▼	▼
Australia							
Czech Republic	●	▲	●	●	▼	▼	●
Slovenia	●	▲	▲	●	▼	▼	–
Finland	●	▲	▲	▲	▲	▲	▲
Latvia	●	●	▼	▼	▼	▼	▼
Sweden	●	▲	●	▼	▼	▼	▼
New Zealand	▼	●	●	●	●	●	●
Lithuania	▼	▼	▼	▼	▼	▼	–
Germany	▼	▲	▲	▲	●	▼	▼
France	▼	●	●	▼	▼	▼	▼
Spain	▼	▼	▼	▼	▼	▼	▼
Hungary	▼	▼	▼	▼	▼	▼	▼
Portugal	▼	●	●	▼	▼	▼	▼
Italy	▼	●	●	▼	▼	▼	▼
Viet Nam	▼	▼	–	●	–	–	–
Norway	▼	▲	▲	▼	▼	▼	▼
Malta	▼	▼	▼	–	–	–	–
United States	▼	▼	▼	▼	▼	▼	▼
Slovak Republic	▼	●	▼	▼	▼	▼	▼
Croatia	▼	▼	▼	▼	▼	▼	–
Iceland	▼	●	▼	▼	▼	▼	▼
Israel	▼	▼	▼	▼	▼	▼	–
Türkiye	▼	▼	▼	▼	▼	▼	▼
Brunei Darussalam	▼	▼	–	–	–	–	–
Ukrainian regions	▼	▼	–	–	–	–	–
Serbia	▼	▼	–	▼	▼	▼	–
United Arab Emirates	▼	▼	▼	▼	▼	–	–
Greece	▼	▼	▼	▼	▼	▼	▼
Romania	▼	▼	▼	▼	–	▼	–
Kazakhstan	▼	▼	–	▼	▼	–	–
Mongolia	▼	–	–	–	–	–	–
Cyprus	▼	▼	▼	▼	–	–	–
Bulgaria	▼	▼	▼	▼	▼	▼	–
Moldova	▼	▼	–	–	–	–	–
Qatar	▼	▼	▼	▼	▼	▼	–
Chile	▼	▼	▼	▼	▼	▼	–
Uruguay	▼	▼	▼	▼	▼	▼	▼
Malaysia	▼	▼	–	▼	▼	–	–
Montenegro	▼	▼	▼	▼	▼	▼	–
Baku (Azerbaijan)	▼	▼	–	–	–	–	–
Mexico	▼	▼	▼	▼	▼	▼	▼
Thailand	▼	▼	▼	▼	▼	▼	▼
Peru	▼	▼	▼	▼	▼	–	–
Georgia	▼	▼	▼	–	▼	–	–
Saudi Arabia	▼	▼	–	–	–	–	–
North Macedonia	▼	▼	▼	–	–	–	–
Costa Rica	▼	▼	▼	▼	▼	–	–

Note: ▲ Score signficantly higher than Australia's
● Score not significantly different to Australia's
▼ Score signficantly lower than Australia's
– Did not participate in this cycle or comparisons cannot be made

Proficiency over time

Figure 3.4 shows the percentage of low and high performers on the mathematical literacy proficiency scale for PISA 2003, 2012, 2018 and 2022 by country, and the differences in performance between 2 cycles, by country. There were a number of countries whose proportions of high and low performers have changed over time.

Between PISA 2018 and 2022

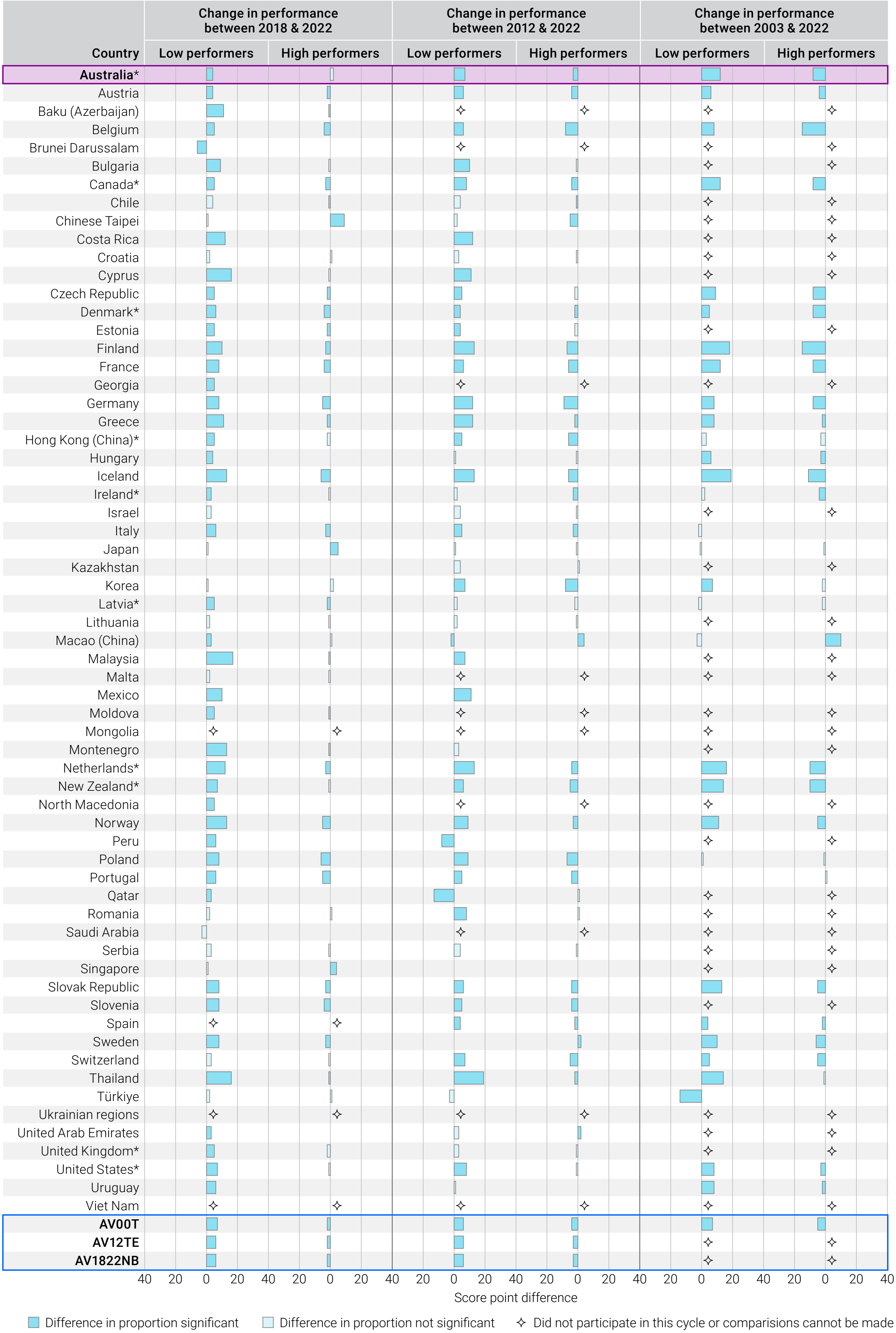
- The proportion of low performers in Australia increased by 4 percentage points, and the proportion of high performers remained unchanged.
- The percentage of low performers across the OECD countries increased by 7 percentage points. The percentage of high performers across the OECD countries (AV00T) decreased by 2 percentage points (see Footnote 1).
- The percentage of high performers increased in just 3 countries: Chinese Taipei (9 percentage points), Japan (5 percentage points), and Singapore (4 percentage points).
- The percentage of high performers declined in 29 countries. The largest declines were in Iceland and Poland (by 6 percentage points), and in Germany, Norway, and Portugal (by 5 percentage points), while many of the others were in the region of 1 or 2 percentage points.
- Only Brunei Darussalam had a decrease in the proportion of low performers (6 percentage points).
- The percentage of low performers increased in 43 countries, ranging from 17 percentage points in Malaysia, 16 percentage points each in Cyprus and Thailand, to 3 percentage points in Ireland, Macao (China), Qatar and the United Arab Emirates.

Between 2012 and 2022

- The proportion of low performers in Australia increased by 7 percentage points, and the proportion of high performers decreased by 3 percentage points.
- The percentage of low performers across the OECD countries increased by 7 percentage points, while the percentage of high performers across the OECD countries (AV00T) decreased by 4 percentage points (see Footnote 1).
- The percentage of low performers increased in 32 countries. ranging from 19 percentage points in Thailand, 13 percentage points in Finland, Iceland, and the Netherlands to 4 percentage points in Denmark, Estonia, and Spain.
- The decrease in the proportion of high performers was highest in Germany (9 percentage points), Belgium and Korea (8 percentage points), and Finland and Poland (7 percentage points).

Between PISA 2003 and 2022

- The percentage of Australian low performers increased by 12 percentage points, while the percentage of high performers decreased by 8 percentage points.
- The percentage of low performers across the OECD countries increased by 7 percentage points, while the percentage of high performers across the OECD countries (AV00T) decreased by 5 percentage points (see Footnote 1).
- There were 21 countries in which the percentage of low performers increased and the percentage of high performers decreased, that is, there were more low performers and fewer high performers.
- The increase in the percentage of low performers was highest in Iceland (19 percentage points), and Finland (18 percentage points), while the decrease in high performers was largest in Finland (by 14 percentage points).
- Macao (China) was the only country in which the proportion of high performers increased (by 10 percentage points).
- Türkiye was the only country in which the percentage of low performers decreased (by 14 percentage points).



AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 3.4 Change in proportions of low and high performers on the mathematical literacy proficiency scale between PISA 2003 and 2022, and 2018 and 2022, by country

Countries by gender

Performance

Figure 3.5 provides the mean scores and standard errors for female and male students on the mathematical literacy scale, graphs the difference by gender and indicates whether the difference was significant. Across the OECD countries, the mean score for female students was 468 points and for male students was 477 points, a difference of 9 points.

- In 34 countries, males scored higher than females. Italy had the largest score difference of 21 points.
- In 8 countries, females scored higher than males. Cyprus had the largest score difference of 16 points.
- In Australia, female students scored 481 points on average, which was lower than male students, who scored 493 points.

Country	Females		Males	
	Mean score	SE	Mean score	SE
Italy	461	2.8	482	4.0
Austria	478	2.7	497	2.9
Chile	403	2.2	420	2.6
Macao (China)	544	1.8	559	1.5
Peru	384	2.5	399	2.8
Costa Rica	377	2.1	392	2.3
Hungary	465	2.9	480	3.1
United Kingdom*	482	2.9	496	3.0
United States*	458	3.9	471	4.7
Ireland*	485	2.7	498	2.7
Canada*	491	1.7	503	1.9
Singapore	568	1.7	581	1.7
Mexico	389	2.5	401	2.6
Denmark*	483	2.1	495	2.6
Germany	469	3.0	480	3.7
Australia*	481	2.1	493	2.5
Israel	452	2.9	463	5.2
Serbia	434	2.8	445	3.9
Uruguay	403	2.2	414	2.5
Switzerland	502	2.5	513	2.6
Netherlands*	487	4.2	498	3.9
Portugal	467	2.5	477	2.6
New Zealand*	474	2.6	484	2.9
Viet Nam	464	3.7	475	4.6
Spain	468	1.6	478	1.9
Ukrainian regions	436	4.1	446	5.3
France	469	2.5	479	3.4
Latvia*	478	2.3	488	2.3
OECD average	468	0.4	477	0.5
Japan	531	2.9	540	4.2
Hong Kong (China)*	536	3.4	544	3.4
Belgium	486	2.8	493	3.2
Czech Republic	483	2.3	491	3.3
Croatia	460	3.0	466	3.0
Estonia	507	2.5	513	2.2
Greece	427	2.2	433	3.3
Türkiye	450	2.7	456	2.6
Chinese Taipei	544	4.7	550	4.7
Poland	486	2.9	492	2.7
Lithuania	473	2.0	478	2.3
Korea	525	3.7	530	5.6
Romania	425	4.1	430	4.5
Moldova	412	2.3	416	2.8
Iceland	457	2.2	461	2.4
Sweden	481	2.1	483	2.7
Saudi Arabia	388	2.5	390	2.6
Malta	465	2.4	467	2.2
Slovak Republic	463	3.3	465	3.4
Kazakhstan	426	1.8	425	2.1
Montenegro	406	1.4	405	1.5
Norway	469	2.4	468	2.5
Slovenia	485	1.9	484	1.7
Finland	487	2.1	482	2.3
Georgia	393	2.3	387	3.2
Mongolia	427	2.8	422	2.9
Bulgaria	420	3.5	415	4.1
Thailand	397	3.5	391	3.3
North Macedonia	392	1.2	386	1.3
Baku (Azerbaijan)	401	2.4	394	2.9
United Arab Emirates	435	0.9	428	1.5
Qatar	418	1.5	410	1.7
Malaysia	414	2.4	403	2.8
Brunei Darussalam	448	1.3	437	1.2
Cyprus	426	1.8	411	1.7

Differences in mean score

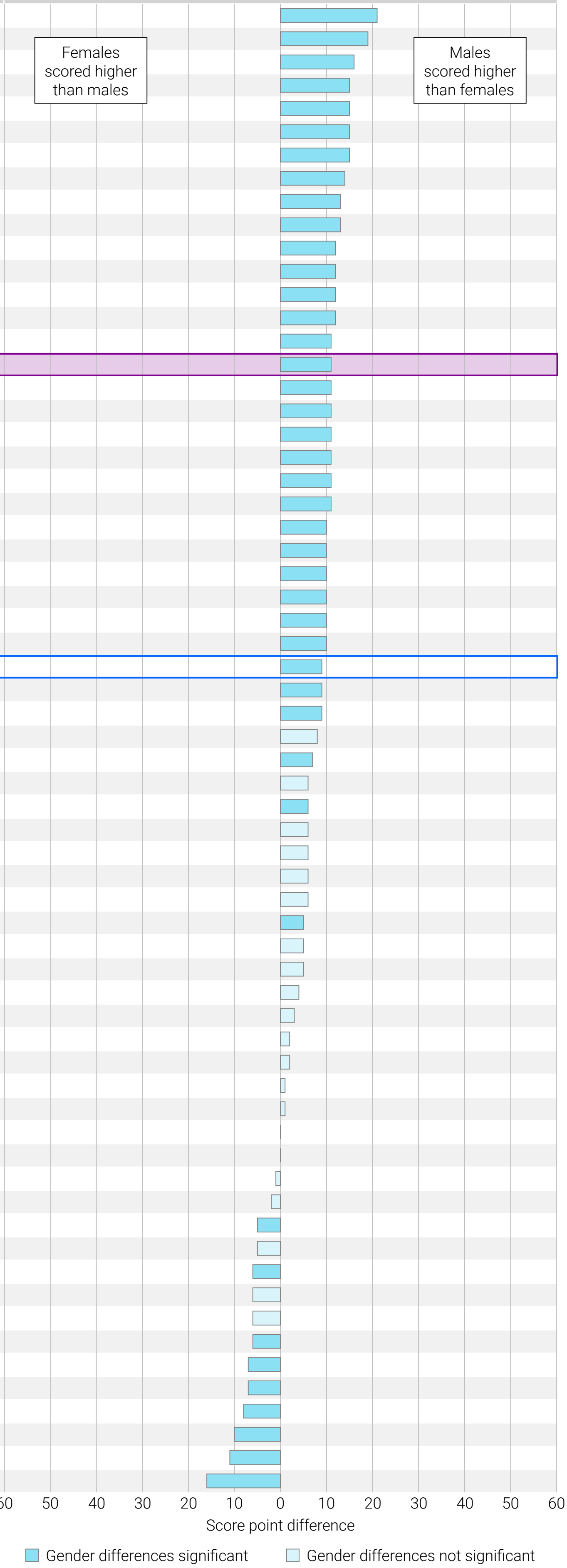


FIGURE 3.5 Mean scores and differences in student performance on the mathematical literacy scale, by country and gender

Proficiency

Figure 3.6 shows the proportions of high performers and low performers by gender internationally.

- In Australia, there was no gender difference in the proportion of low performers, but a 5 percentage point difference in favour of male students in the proportion of high performers.
- In 22 countries, there were differences in the proportions of low performers. In 14 countries there was a higher proportion of male low performers; in 8 countries there was a higher proportion of female low performers. Across the OECD, the difference was significant, but very small, with 32% of female low performers and 31% of male low performers.
- The largest gender differences were in Cyprus, where there was 49% of female low performers and 57% of male low performers; and, in Costa Rica, where there was 76% of female low performers and 67% of male low performers.
- In almost every participating country or economy (55 of the 63), there was a gender difference with more male high performers. Across the OECD, there was 7% of female high performers and 11% of male high performers.
- The largest difference was in Macao (China), where the difference was 8 percentage points.

FIGURE 3.6 Proportions of low and high performers in mathematical literacy, by country and gender

3.2 Australia's mathematical literacy results in a national context

Australia

Performance

As mentioned in Section 3.1, Australian students scored an average of 487 points in mathematical literacy on the PISA 2022 assessment. This was higher than the OECD average of 472 points, but 88 points lower than Singapore, the highest performing country (Figure 3.7).

	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Australia	487	1.8	483–490	261
OECD average	472	0.4	471–473	235
Singapore	575	1.2	572–577	268

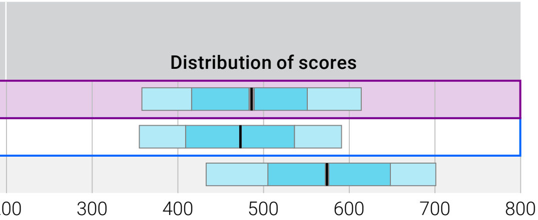


FIGURE 3.7 Mean scores and distribution of student performance on the mathematical literacy scale, for Australia

Proficiency

Figure 3.8 shows the percentages of students at each mathematical reading literacy proficiency level for Australia and the OECD average.

In Australia, 4% of students achieved the highest proficiency level, Level 6, and a further 9% achieved Level 5. These students were the highest performers in PISA 2022.

At the other end of the scale, 26% of Australian students were low performers, and scored below Level 2 in mathematical literacy. Around 10% scored below Level 1a.

Around half (51%) of the students in Australia attained the National Proficient Standard (Level 3 or above), compared to 46% across the OECD countries.

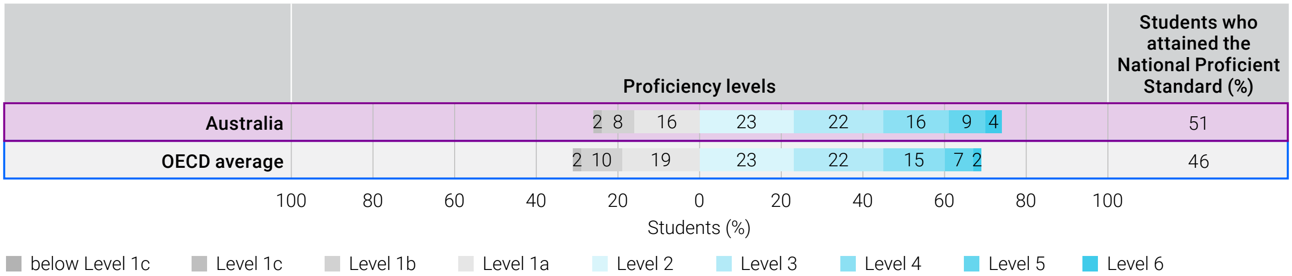


FIGURE 3.8 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, for Australia

Performance over time

Figure 3.9 shows the mean mathematical literacy performance for Australia for the PISA cycles since 2003, along with details about the changes in performance between the cycles.

In 2003, when mathematical literacy was first a major domain, Australia's mean score was 524 points. In 2012, when it was again a major domain, Australia's performance declined by 20 points to 504 points, and in 2022 it declined by another 17 points to 487 points.

Examining achievement at the percentiles helps understand where the decline in Australia's mathematical literacy performance has occurred. Figure 3.10 shows the distribution of mathematical literacy performance from PISA 2003 to 2022, the mean scores, and the scores at the 10th, 25th, 75th and 90th percentiles.

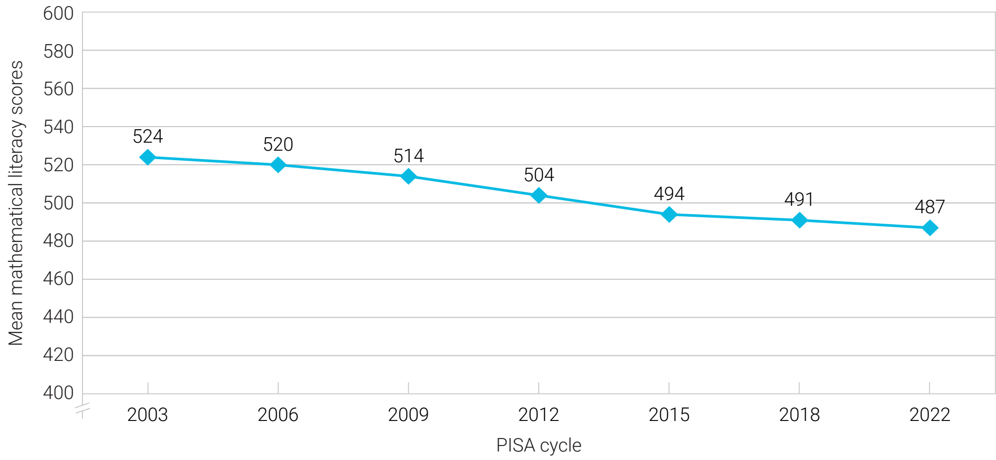
Between PISA 2012 and 2022, there were declines at all the percentiles, mostly at the lower end:

- the 10th percentile by 23 points
- the 25th percentile by 21 points
- the 75th percentile by 15 points
- the 90th percentile by 11 points.

Between PISA 2003 and 2022, the declines at all percentiles were larger, again more so at the lower end:

- the 10th percentile by 40 points
- the 25th percentile by 44 points
- the 75th percentile by 36 points
- the 90th percentile by 26 points.

Since PISA 2003, the range of performance between the 10th and 90th percentiles has widened slightly. In 2003, the difference between the lowest and highest performing students was 246 points, and in PISA 2022 it was 261 points.



	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-4		-7		-17	▼	-27	▼	-33	▼	-37	▼
2018			-3		-13	▼	-23	▼	-29	▼	-33	▼
2015					-10	▼	-20	▼	-26	▼	-30	▼
2012							-10	▼	-16	▼	-20	▼
2009									-6		-10	▼
2006											-4	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.9 Mean mathematical literacy performance and differences from PISA 2003 to 2022, for Australia

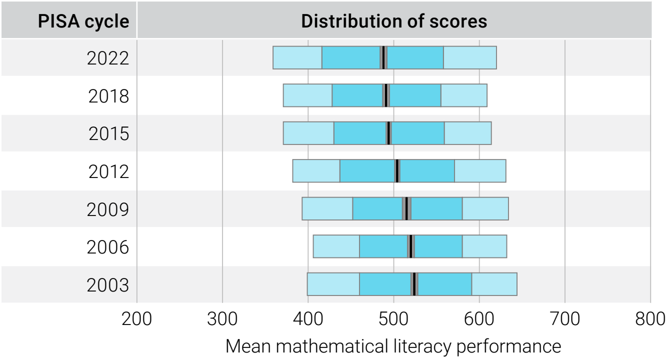


FIGURE 3.10 Distribution of student performance on the mathematical literacy scale from PISA 2003 to 2022, for Australia

Proficiency over time

Figure 3.11 shows the percentage of students who performed at each mathematical literacy proficiency level and the proportions of students who attained the National Proficient Standard from PISA 2003 to 2022. These results are another way to view the downward shift over time, with fewer high performers and more low performers.

High performers

There were the following percentage point changes in high performers:

- between PISA 2018 and 2022, there was a 2 percentage points increase in high performers
- between PISA 2012 and 2022, there was a 3 percentage points decrease in high performers
- between PISA 2003 and 2022, there was an 8 percentage points decrease in high performers.

Low performers

There were the following percentage point changes in low performers:

- between PISA 2018 and 2022, there was a 4 percentage points increase in low performers
- between PISA 2012 and 2022, there was a 7 percentage points increase in low performers
- between PISA 2003 and 2022, there was a 12 percentage points increase in low performers.

National Proficient Standard

In PISA 2022, 51% of Australian students attained the National Proficient Standard. This was not different from 2018 but 8 percentage points lower than in 2012 (with 58%), and 16 percentage points lower than in 2003 (with 67%).

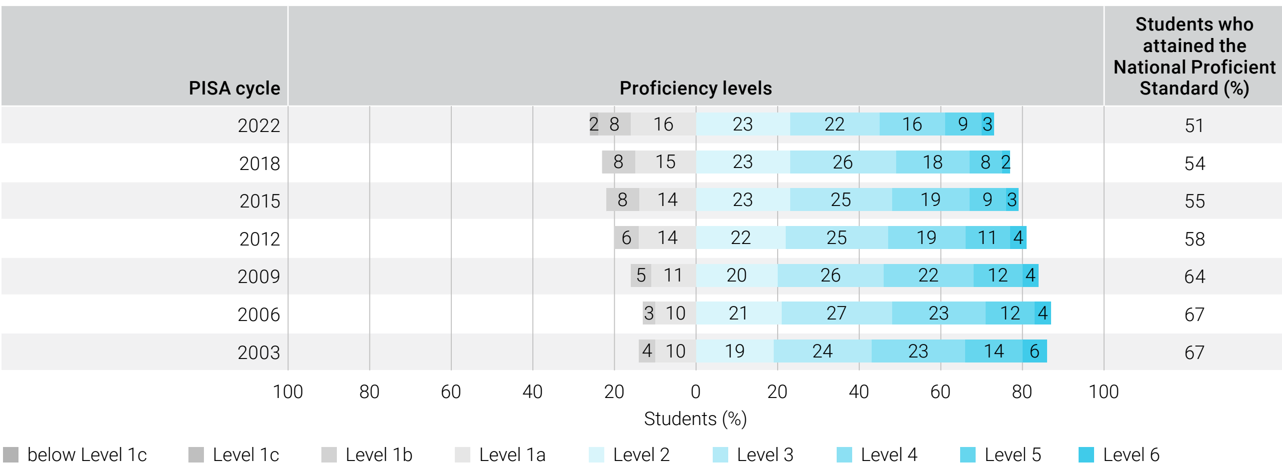


FIGURE 3.11 Percentages of students across the mathematical literacy proficiency scales and proportions of students who attained the National Proficient Standard from PISA 2003 to 2022, for Australia

Australia by gender

Performance

Figure 3.12 shows the mathematical literacy performance for Australian female and male students and the OECD average. Australian male students had an average score of 493 points and outperformed female students, whose average score was 481 points. Both male and female students scored at a higher level than the average for their gender across the OECD countries.

	Gender	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Australia	Females	481	2.1	477–485	244	
	Males	493	2.5	487–497	275	
OECD average	Females	468	0.4	466–468	222	
	Males	477	0.5	475–477	281	

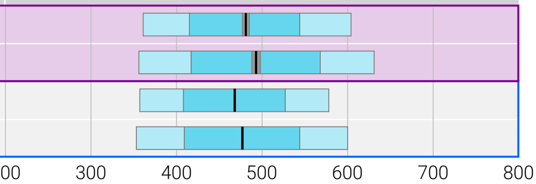


FIGURE 3.12 Mean scores and distribution of Australian student performance on the mathematical literacy scale, by gender

Proficiency

Figure 3.13 shows the percentages of Australian female and male students and the OECD average at each mathematical literacy proficiency scale level, and the proportion of students who attained the National Proficient Standard.

High performers

- The percentage of Australian female high performers (10%) was lower than of Australian male high performers (15%).
- The percentage of Australian female high performers (10%) was higher than the percentage across OECD countries (7%).
- The percentage of Australian male high performers (15%) was higher than the percentage across OECD countries (11%).

Low performers

- The percentage of Australian female low performers (27%) was not different to Australian male low performers (26%).
- The percentage of Australian female low performers (27%) was lower than the percentage across OECD countries (32%).
- The percentage of Australian male low performers (26%) was lower than the percentage across OECD countries (31%).

National Proficient Standard

- 48% of Australian female students and 53% of Australian male students attained the National Proficient Standard.

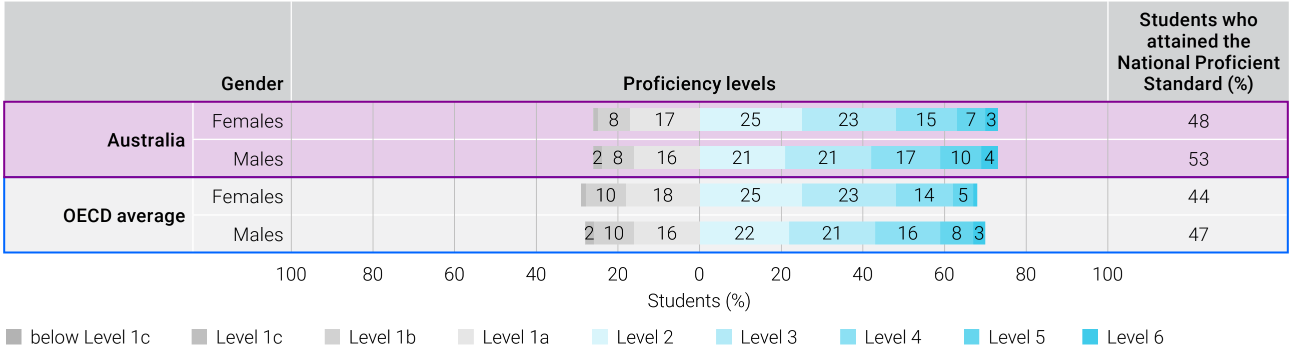


FIGURE 3.13 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard by gender, for Australia and the OECD average

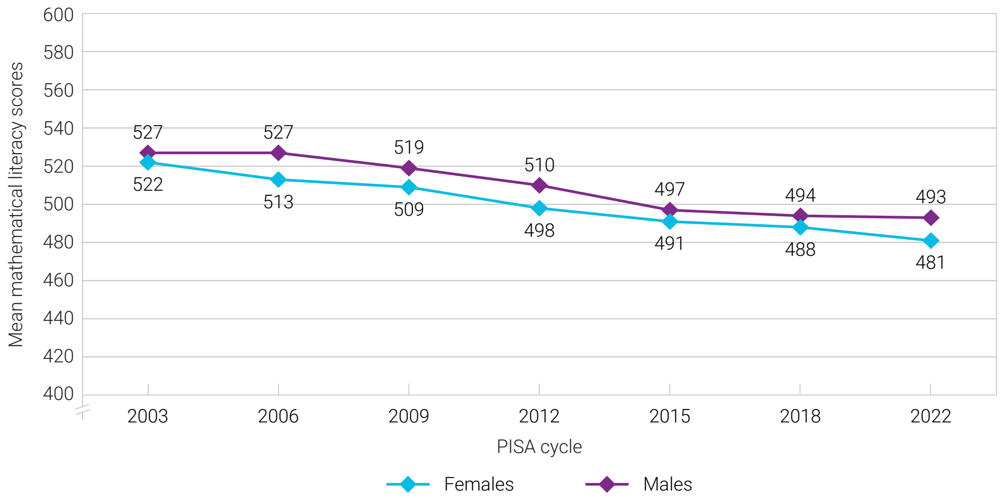
Performance over time

Figure 3.14 shows the mean mathematical literacy performance for Australian female and male students from PISA 2003 to 2022 and illustrates the overall decline in performance over this time for both males and females.

Between PISA 2018 and 2022, the mean mathematical literacy performance did not change for either female or male students.

Between PISA 2012 and 2022, the mean performance declined for female students by 17 points and for male students by 17 points.

Between PISA 2003 and 2022, the mean performance for females declined by 41 points and for male students by 34 points.



Females												
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-7		-10	▼	-17	▼	-28	▼	-32	▼	-41	▼
2018			-3		-10	▼	-21	▼	-25	▼	-34	▼
2015					-7		-18	▼	-22	▼	-31	▼
2012							-11	▼	-15	▼	-24	▼
2009									-4		-13	▼
2006											-9	▼

Males												
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-1		-4		-17	▼	-26	▼	-34	▼	-34	▼
2018			-3		-16	▼	-25	▼	-33	▼	-33	▼
2015					-13	▼	-22	▼	-30	▼	-30	▼
2012							-9	▼	-17	▼	-17	▼
2009									-8		-8	
2006											0	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.14 Mean mathematical literacy performance and differences from PISA 2003 to 2022, for Australia by gender

Proficiency over time

Figure 3.15 shows the proportions of low and high performers and proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale for female and male students. Generally, across the cycles of PISA (from 2003 when mathematical literacy was first a major domain), there has been an increase in low-performing female and male students, and a decrease in high-performing female and male students.

High performers

Between PISA 2018 and 2022, the proportion of female high performers was not different, but there was a 3 percentage point increase in the proportion of male high performers.

Between PISA 2012 and 2022, there was a 3 percentage point decrease in female high performers but the proportion of male high performers was not different.

Between PISA 2003 and 2022, there was a 7 percentage point decrease in female and male high performers.

Low performers

There were the percentage point increases over the following cycles:

- between PISA 2018 and 2022, there was a 4 percentage point increase in female and male low performers.
- between PISA 2012 and 2022, female low performers increased by 6 percentage points, and male low performers by 8 percentage points.
- between PISA 2003 and 2022, female low performers increased by 13 percentage points and male low performers by 11 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of female students who attained the National Proficient Standard decreased by 4 percentage points, while the proportion of male students was not different.

Between PISA 2012 and 2022, the proportion of female and male students who attained the National Proficient Standard decreased by 8 and 7 percentage points, respectively.

Between PISA 2003 and 2022, the proportion of students who attained the National Proficient Standard decreased by 18 percentage points for female students and 14 percentage points for male students.

Females

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	27	10	49
2018	23	9	53
2015	22	10	54
2012	21	12	56
2009	16	14	62
2006	14	13	64
2003	14	18	67

Males

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	15	53
2018	22	12	55
2015	22	13	56
2012	18	17	60
2009	15	19	66
2006	12	19	69
2003	15	22	67

Students (%)

FIGURE 3.15 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, for Australia by gender

States and territories

Performance

Figure 3.16 presents the mathematical literacy performance for students in each of the Australian states and territories. For comparison, the mean scores and distributions of performance for Australia, the OECD average and Singapore are included.

The mean scores for mathematical literacy in 2022 ranged from 498 points in the Australian Capital Territory to 466 points in Tasmania. The difference in mean scores between the highest and lowest performing jurisdictions was 32 points.

Students in the Australian Capital Territory, Western Australia, New South Wales, Victoria, and Queensland, all performed at a higher level than students across the OECD, on average, while students in South Australia, Tasmania and the Northern Territory performed at a similar level to the OECD average.

Singapore performed 76 points higher on average than the Australian Capital Territory, 108 points higher on average than Tasmania.

The largest range of student performance was seen in New South Wales, with 269 points between the 10th and 90th percentiles. South Australia had the narrowest range of mathematical literacy, at 244 points.

Table 3.2 presents the pairwise comparisons of mean mathematical literacy performance between any 2 states and territories.

- Students in the Australian Capital Territory performed at a similar level to students in Western Australia, New South Wales, and Victoria and at a higher level than students in all other jurisdictions.
- Students in New South Wales, Western Australia and Victoria performed at similar levels.
- Students in Queensland, South Australia, and the Northern Territory performed at similar levels. This was due to the large standard error associated with the mean score for the Northern Territory.

Comparisons between the performance of each jurisdiction and the performance of each country are provided in Appendix G.

State/Territory	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
ACT	498	3.3	491–504	248
NSW	491	4.0	483–498	269
VIC	488	4.4	479–496	258
QLD	480	3.5	473–486	256
SA	475	3.1	469–481	244
WA	497	3.8	489–504	255
TAS	466	4.6	457–475	252
NT	469	9.0	451–486	257
Australia	487	1.8	483–490	261
OECD average	472	0.4	471–473	235
Singapore	575	1.2	572–577	268

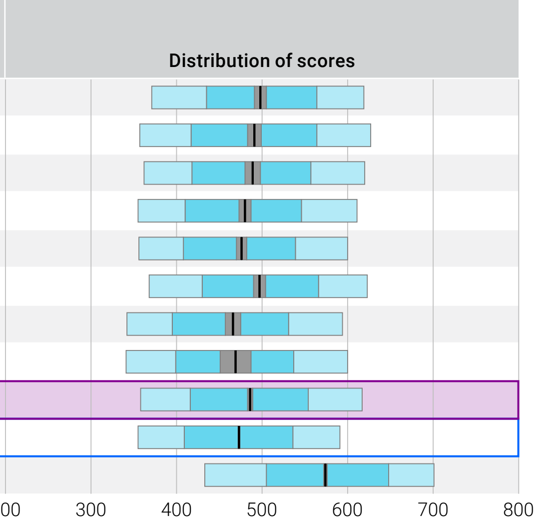


FIGURE 3.16 Mean scores and distribution of student performance on the mathematical literacy scale, by state and territory

TABLE 3.2 Multiple comparisons of mean mathematical literacy performance, by state and territory

State/Territory	Mean score	SE	ACT	WA	NSW	VIC	QLD	SA	NT	TAS	OECD average
ACT	498	3.3		●	●	●	▲	▲	▲	▲	▲
WA	497	3.8	●		●	●	▲	▲	▲	▲	▲
NSW	491	4.0	●	●		●	▲	▲	▲	▲	▲
VIC	488	4.4	●	●	●		●	▲	▲	▲	▲
QLD	480	3.5	▼	▼	▼	●		●	●	▲	▲
SA	475	3.1	▼	▼	▼	▼	●		●	●	●
NT	469	9.0	▼	▼	▼	▼	●	●		●	●
TAS	466	4.6	▼	▼	▼	▼	▼	●	●		●
OECD average	472	0.4	▼	▼	▼	▼	▼	●	●	●	

Note: read across the row to compare a state's/territory's performance with the performance of each state or territory listed in the column heading.
▲ Mean performance statistically significantly higher than in comparison state/territory
● No statistically significant difference from comparison state/territory
▼ Mean performance statistically significantly lower than in comparison state/territory

Proficiency

Figure 3.17 shows the percentages of students on the mathematical literacy proficiency scale in PISA 2022 for each state and territory, together with the percentages for Australia, Singapore, and the OECD average.

High performers

Overall, 12% of Australian students were high performers. This was higher than the OECD average of 9% but not near the 41% of students in Singapore who achieved this level. Students in the states and territories had the following percentages of high performers:

- 14% in both New South Wales and Western Australia were high performers; these 2 states had the highest proportions of high performers
- 13% in the Australian Capital Territory
- 12% in Victoria were high performers (the same average as for the whole of Australia)
- 11% in Queensland
- 9% in South Australia
- 8% in Tasmania and the Northern Territory.

Low performers

In Australia, 26% of students were low performers. This proportion was higher than Singapore's (8%) but lower than the average across the OECD countries (31%). Students in the states and territories had the following proportions of low performers:

- 34% in Tasmania
- 33% in the Northern Territory
- 29% in South Australia
- 28% in Queensland
- 26% in New South Wales and Victoria
- 22% in Western Australia
- 20% in the Australian Capital Territory (the lowest proportion of any jurisdiction).

National Proficient Standard

Only in 4 jurisdictions did more than half of the students attain the National Proficient Standard. The Australian Capital Territory had the highest percentage of students (57%) followed by 56% of students in Western Australia, 52% in New South Wales, and 51% in Victoria. Fewer than half of the students in Queensland (48%), South Australia (46%), the Northern Territory (44%), and Tasmania (42%) attained this level.

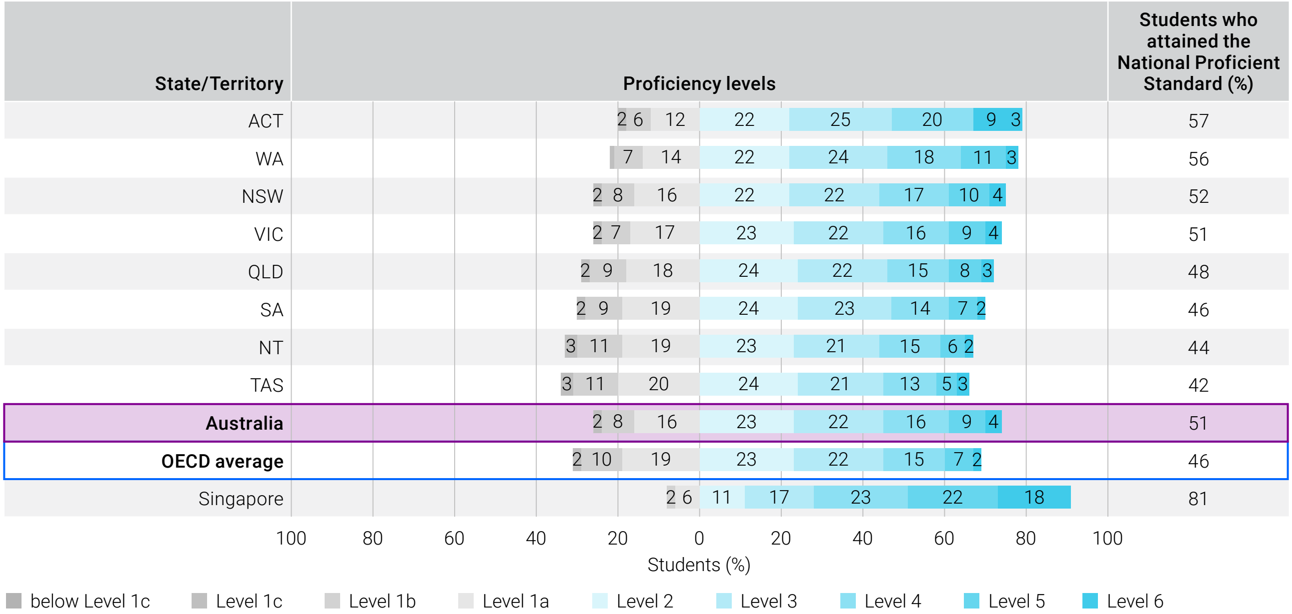


FIGURE 3.17 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory

Performance over time

Figure 3.18 shows the mean performance in mathematical literacy for all PISA cycles by state and territory. In addition, it shows the change in scores between the cycles.

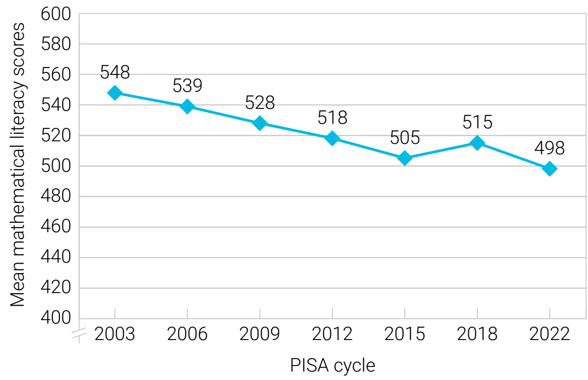
Between PISA 2018 and 2022, the Australian Capital Territory recorded a 17-point decline in performance. The scores for other states were not different to 2018.

Between PISA 2012 and 2022, 5 states recorded declines in their performance. The largest was in Queensland with a decline of 23 points, followed by the Australian Capital Territory by 20 points, Western Australia by 19 points, New South Wales by 18 points, and South Australia by 14 points.

Between PISA 2003 and 2022, all jurisdictions recorded declines in performance:

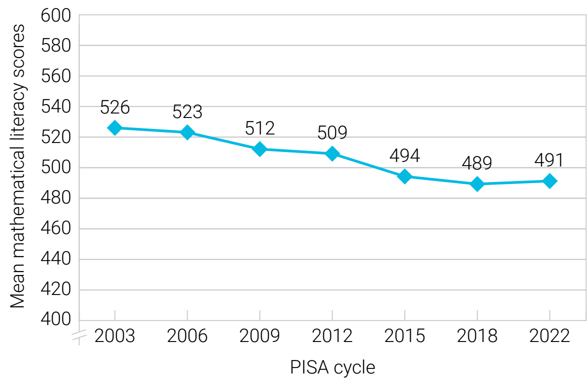
- South Australia by 60 points
- Western Australia by 51 points
- the Australian Capital Territory by 50 points
- Tasmania by 41 points
- Queensland by 40 points
- New South Wales by 35 points
- the Northern Territory by 27 points
- Victoria by 23 points.

Australian Capital Territory



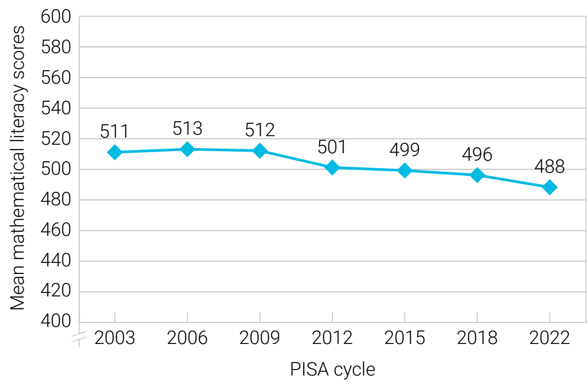
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-17 ▼	-7	-20 ▼	-30 ▼	-41 ▼	-50 ▼
2018		10	-3	-13	-24 ▼	-33 ▼
2015			-13	-23 ▼	-34 ▼	-43 ▼
2012				-10	-21 ▼	-30 ▼
2009					-11	-20 ▼
2006						-9

New South Wales



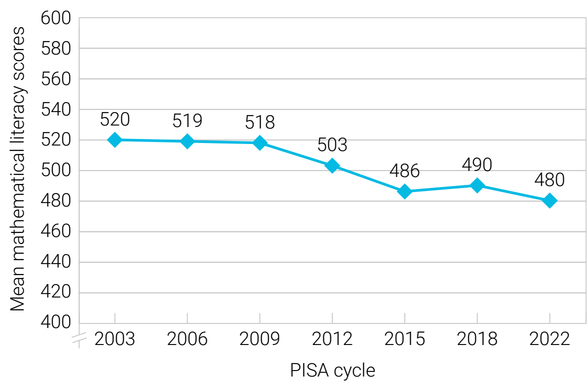
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	2	-3	-18 ▼	-21 ▼	-32 ▼	-35 ▼
2018		-5	-20 ▼	-23 ▼	-34 ▼	-37 ▼
2015			-15 ▼	-18 ▼	-29 ▼	-32 ▼
2012				-3	-14 ▼	-17 ▼
2009					-11	-14 ▼
2006						-3

Victoria



	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-8	-11	-13	-24 ▼	-25 ▼	-23 ▼
2018		-3	-5	-16 ▼	-17 ▼	-15 ▼
2015			-2	-13	-14 ▼	-12
2012				-11	-12 ▼	-10
2009					-1	1
2006						2

Queensland

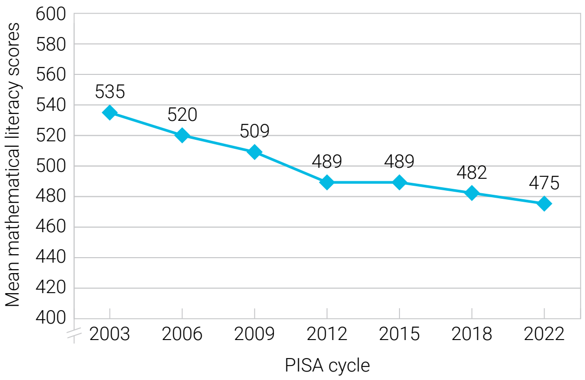


	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-10	-6	-23 ▼	-38 ▼	-39 ▼	-40 ▼
2018		4	-13 ▼	-28 ▼	-29 ▼	-30 ▼
2015			-17 ▼	-32 ▼	-33 ▼	-34 ▼
2012				-15	-16 ▼	-17 ▼
2009					-1	-2
2006						0

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

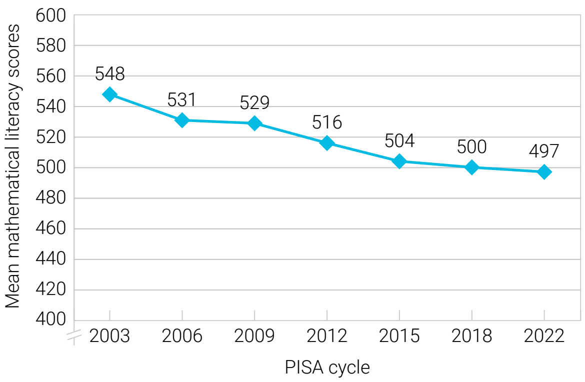
FIGURE 3.18 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory

South Australia



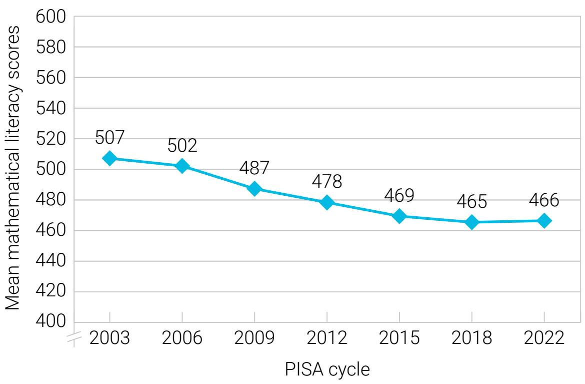
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-7	-14	-14 ▼	-34 ▼	-45 ▼	-60 ▼
2018		-7	-7	-27 ▼	-38 ▼	-53 ▼
2015			0	-20 ▼	-31 ▼	-46 ▼
2012				-20 ▼	-31 ▼	-46 ▼
2009					-11	-26 ▼
2006						-15 ▼

Western Australia



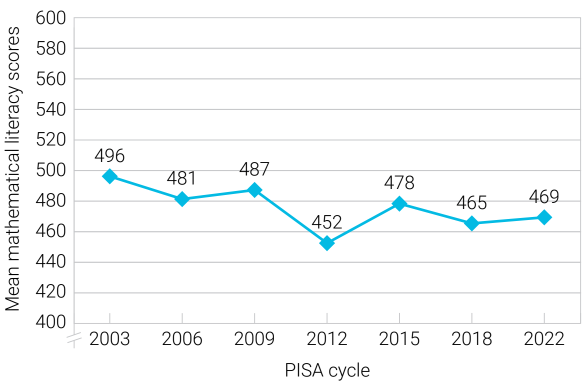
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-3	-7	-19 ▼	-32 ▼	-34 ▼	-51 ▼
2018		-4	-16 ▼	-29 ▼	-31 ▼	-48 ▼
2015			-12 ▼	-25 ▼	-27 ▼	-44 ▼
2012				-13	-15 ▼	-32 ▼
2009					-2	-19 ▼
2006						-17 ▼

Tasmania



	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-1	-3	-12	-21 ▼	-36 ▼	-41 ▼
2018		-4	-13 ▼	-22 ▼	-37 ▼	-42 ▼
2015			-9	-18 ▼	-33 ▼	-38 ▼
2012				-9	-24 ▼	-29 ▼
2009					-15 ▼	-20
2006						-5

Northern Territory



	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	4	-9	-17	-18	-12 ▼	-27 ▼
2018		-13	13	-22 ▼	-16	-31 ▼
2015			26 ▲	-9	-3	-18
2012				-35 ▼	-29 ▼	-44 ▼
2009					6	-9
2006						-15

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.18 (continued) Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory

Proficiency over time

Figure 3.19 shows the proportions of high and low performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy scale from PISA 2003 to 2022 for each state and territory.

High performers

Between PISA 2018 and 2022, there were no differences in the proportions of high performers across the states and territories.

Between PISA 2012 and 2022, 4 jurisdictions recorded decreases in the proportions of high performers:

- the Australian Capital Territory by 6 percentage points
- New South Wales, Queensland, and Western Australia by 4 percentage points.

Between PISA 2003 and 2022, all jurisdictions except Victoria and the Northern Territory recorded percentage point decreases in high performers:

- the Australian Capital Territory by 15 percentage points
- South Australia and Western Australia by 14 percentage points
- Queensland by 8 percentage points
- New South Wales by 7 percentage points
- Tasmania by 6 percentage points.

Low performers

There were more low performers over the following cycles:

- between PISA 2018 and 2022, the Australian Capital Territory and Victoria increased each by 5 percentage points, and Queensland and South Australia each by 6 percentage points
- between PISA 2012 and 2022, Queensland by 9 percentage points, Tasmania by 7 percentage points, New South Wales, Victoria, South Australia, and Western Australia each by 6 percentage points
- between PISA 2003 and 2022, South Australia increased by 18 points, Tasmania by 16 percentage points, Western Australia by 13 percentage points, New South Wales and Queensland by 12 percentage points each, the Northern Territory by 11 percentage points, and the Australian Capital Territory and Victoria each by 9 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, there were decreases in the proportions of students who attained the National Proficient Standard in the Australian Capital Territory (by 9 percentage points), and in Victoria and Queensland (by 6 percentage points).

Between PISA 2012 and 2022, except for the Northern Territory, there were decreases in the proportion of students who attained the National Proficient Standard in all jurisdictions. The largest decline was in Queensland (by 11 percentage points), followed by the Australian Capital Territory, New South Wales, Victoria, South Australia and Western Australia (all declined by 7 percentage points), and Tasmania (by 6 percentage points).

Between PISA 2003 and 2022, there were fewer students who attained the National Proficient Standard in all jurisdictions:

- South Australia by 27 percentage points
- Western Australia by 20 percentage points
- the Australian Capital Territory and Tasmania by 19 percentage points
- Queensland by 18 percentage points
- New South Wales by 14 percentage points
- the Northern Territory by 13 percentage points
- Victoria decreased by 12 percentage points.

Australian Capital Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	20	13	57
2018	15	15	66
2015	19	14	61
2012	16	19	65
2009	14	21	69
2006	10	23	74
2003	11	27	76

Students (%)

New South Wales

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	14	52
2018	24	11	52
2015	23	13	55
2012	20	18	59
2009	17	16	63
2006	13	18	67
2003	14	20	67

Students (%)

Victoria

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	12	51
2018	21	11	56
2015	19	11	58
2012	19	12	58
2009	16	15	63
2006	14	14	64
2003	17	15	63

Students (%)

Queensland

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	28	11	48
2018	23	10	54
2015	24	9	53
2012	20	15	58
2009	15	18	65
2006	13	16	67
2003	16	18	66

Students (%)

South Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	29	9	46
2018	24	7	50
2015	23	10	54
2012	23	10	53
2009	16	14	63
2006	12	15	67
2003	11	23	73

Students (%)

Western Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	14	56
2018	20	12	58
2015	18	12	60
2012	16	17	63
2009	13	22	69
2006	11	21	72
2003	8	28	76

Students (%)

Tasmania

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	34	8	42
2018	32	6	42
2015	32	8	44
2012	27	9	48
2009	24	10	52
2006	18	12	58
2003	18	14	61

Students (%)

Northern Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	33	8	44
2018	33	8	43
2015	28	11	47
2012	36	7	41
2009	24	10	54
2006	25	11	52
2003	21	14	57

Students (%)

FIGURE 3.19 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by state and territory

States and territories by gender

Performance

Figure 3.20 shows that there were 2 significant gender differences in mathematical literacy in PISA 2022. Male students outperformed female students in Western Australia by 22 points, and in Queensland by 18 points. These differences are not only significant but substantial.

Female students in the Australian Capital Territory, New South Wales, Victoria and Western Australia performed higher than the OECD female student average; female students in Queensland, South Australia, Tasmania and the Northern Territory performed at the same level as female students across OECD countries.

Male students in the Australian Capital Territory, New South Wales, Victoria, Queensland, and Western Australia performed higher than the OECD male student average; male students in the Northern Territory and South Australia performed at a similar level to the OECD average for male students. Male student performance in Tasmania was lower than the OECD male student average.

	Females		Males	
State/Territory	Mean score	SE	Mean score	SE
WA	486	5.0	508	4.4
QLD	471	4.4	489	4.3
NT	462	10.2	476	11.1
SA	471	3.7	480	4.2
NSW	487	4.0	496	5.9
VIC	484	5.8	492	5.3
ACT	498	4.6	499	5.1
TAS	471	7.8	463	5.0
OECD average	468	0.4	477	0.5

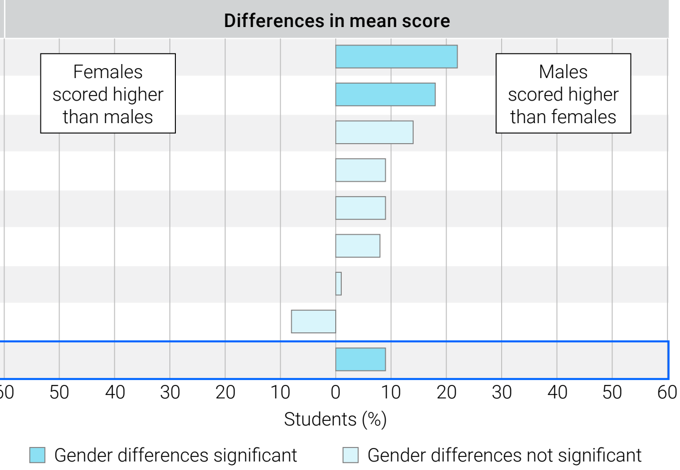


FIGURE 3.20 Mean scores and differences in student performance on the mathematical literacy scale, by state and territory and gender

Proficiency

Figure 3.21 shows the proportions of students in each mathematical literacy proficiency level for the states and territories by gender. The OECD averages for female and male students have been included in the figure for comparison.

Female high performers

Except for the Australian Capital Territory and New South Wales, the percentage of female high performers was not different to the OECD average. The percentages of female high performers in all states and territories were as follows:

- 11% in New South Wales and Victoria
- 10% in the Australian Capital Territory and Western Australia
- 7% in Queensland and South Australia
- 9% in Tasmania
- 4% in the Northern Territory.

Male high performers

The proportions of male high performers in the Australian Capital Territory, New South Wales, Western Australia, and Queensland were higher than the OECD average for males. The proportion of male high performers in Tasmania was lower than the OECD average.

The percentages of male high performers in all states and territories were:

- 17% in New South Wales and Western Australia
- 14% in the Australian Capital Territory, Victoria, and Queensland
- 13% in the Northern Territory
- 11% in South Australia
- 7% in Tasmania.

Female low performers

The proportions of female low performers in the Australian Capital Territory, New South Wales, Victoria and Western Australia were lower than the OECD average. The percentages in all states and territories were:

- 19% in the Australian Capital Territory
- 24% in Western Australia
- 25% in New South Wales
- 26% in Victoria
- 29% in South Australia
- 30% in Queensland
- 32% in Tasmania
- 33% in the Northern Territory.

Male low performers

The proportions of male low performers in the Australian Capital Territory, New South Wales, Victoria and Western Australia were lower than the OECD average. The percentages in all states and territories were:

- 20% in Western Australia
- 21% in the Australian Capital Territory
- 25% in Victoria
- 27% in New South Wales and Queensland
- 30% in South Australia
- 33% in the Northern Territory
- 35% in Tasmania.

National Proficient Standard

The proportions of female students who attained the National Proficient Standard in mathematical literacy ranged from 40% in the Northern Territory to 56% in the Australian Capital Territory, while the proportions of male students ranged from 42% in Tasmania to 59% in Western Australia.

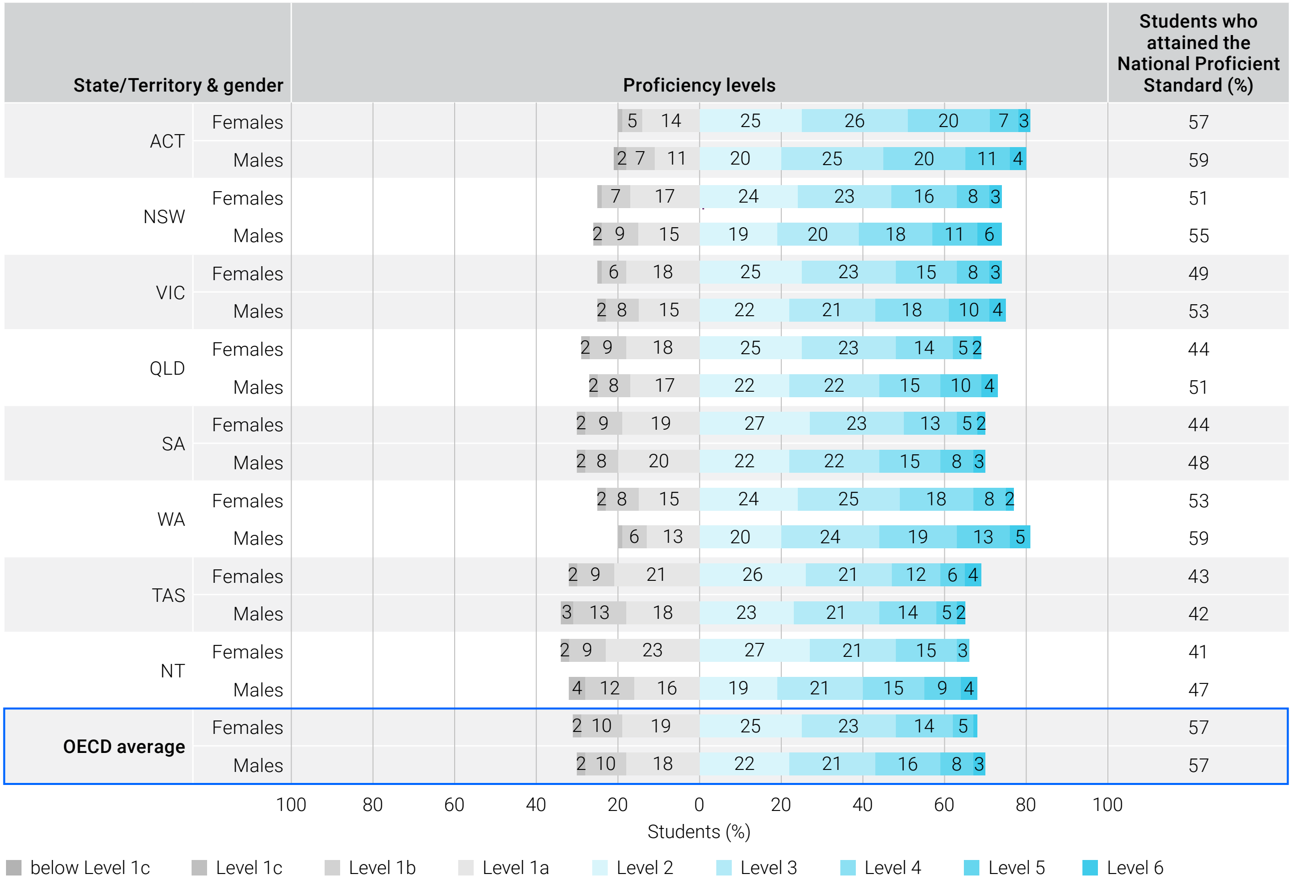


FIGURE 3.21 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory and gender

Performance over time

Figure 3.22 shows the mean mathematical literacy performance from PISA 2003 to 2022, along with the change in performance between cycles for the states and territories, by gender.

Between PISA 2018 and 2022, the mean score for female students declined in Queensland (by 16 points) and for male and female students in the Australian Capital Territory (by 18 points and 15 points, respectively).

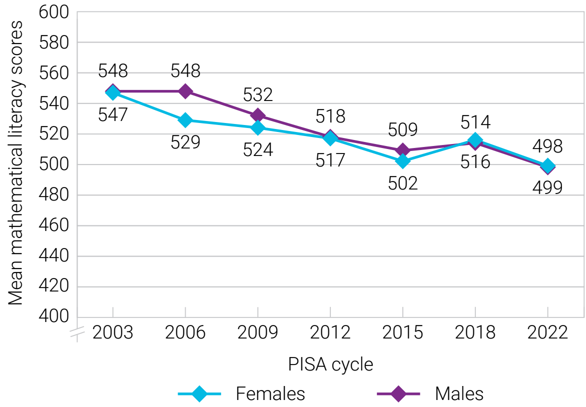
Between PISA 2012 and 2022, all states and territories recorded declines for most students in mean mathematical literacy performance:

- the Australian Capital Territory (females by 18 points; males by 19 points)
- New South Wales (males by 19 points)
- Victoria (males by 18 points)
- Queensland (females by 29 points; males by 18 points)
- South Australia (males by 16 points)
- Western Australia (females by 17 points; males by 20 points)
- Tasmania (males by 20 points).

Between PISA 2003 and 2022, all jurisdictions recorded declines in the mean mathematical literacy performance for most students:

- the Australian Capital Territory (females and males each by 49 points)
- New South Wales (females by 37 points; males by 33 points)
- Victoria (males by 26 points)
- Queensland (females by 50 points; males by 29 points)
- South Australia (females by 59 points; males each by 60 points)
- Western Australia (females by 60 points; males by 43 points)
- Tasmania (females by 37 points; males by 44 points)
- the Northern Territory (female students by 39 points)

Australian Capital Territory



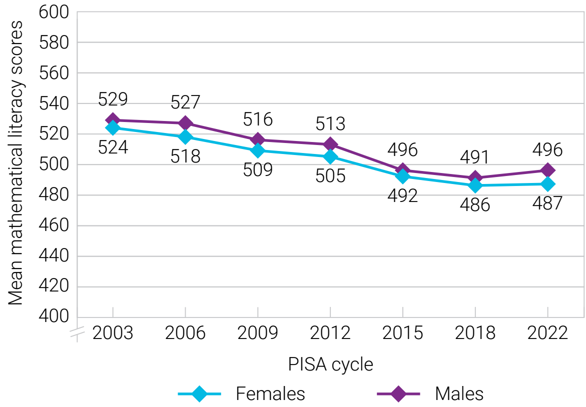
Females – Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	-18 ▼	-4 ▼	-19 ▼	-26 ▼	-31 ▼	-49 ▼
2018		14	-1	-8	-13	-31 ▼
2015			-15	-22 ▼	-27 ▼	-45 ▼
2012				-7	-12	-30 ▼
2009					-5	-23
2006						-18

Males – Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	-15 ▼	-10	-19 ▼	-33 ▼	-49 ▼	-49 ▼
2018		5	-4	-18	-34 ▼	-34 ▼
2015			-9	-23	-39 ▼	-39 ▼
2012				-14	-30 ▼	-30 ▼
2009					-16	-16
2006						-1

New South Wales



Females – Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	1	-5	-18 ▼	-22 ▼	-31 ▼	-37 ▼
2018		-6	-19 ▼	-23 ▼	-32 ▼	-38 ▼
2015			-13	-17 ▼	-26 ▼	-32 ▼
2012				-4	-13 ▼	-19 ▼
2009					-9	-15 ▼
2006						-6

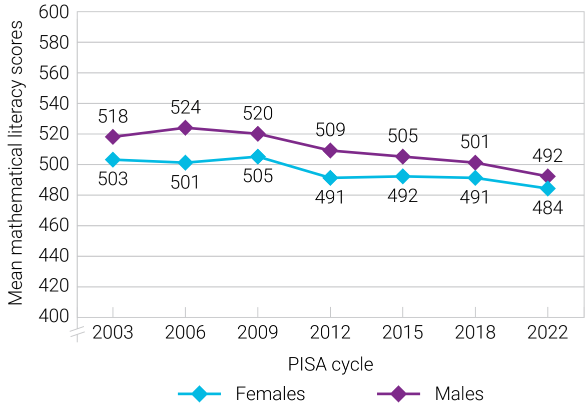
Males – Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	5	0	-17	-20 ▼	-31 ▼	-33 ▼
2018		-5	-22 ▼	-25 ▼	-36 ▼	-38 ▼
2015			-17 ▼	-20 ▼	-31 ▼	-33 ▼
2012				-3	-14	-16
2009					-11	-13
2006						-2

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.22 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory and gender

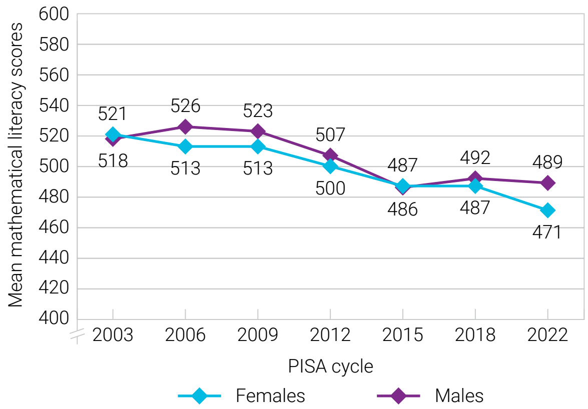
Victoria



Females						
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-7	-8	-7	-21 ▼	-17	-19
2018		-1	0	-14	-10	-12
2015			1	-13	-9	-11
2012				-14	-10	-12
2009					4	2
2006						-2

Males						
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-9	-13	-17 ▼	-28 ▼	-32 ▼	-26 ▼
2018		-4	-8	-19 ▼	-23 ▼	-17
2015			-4	-15	-19 ▼	-13
2012				-11	-15	-9
2009					-4	2
2006						6

Queensland



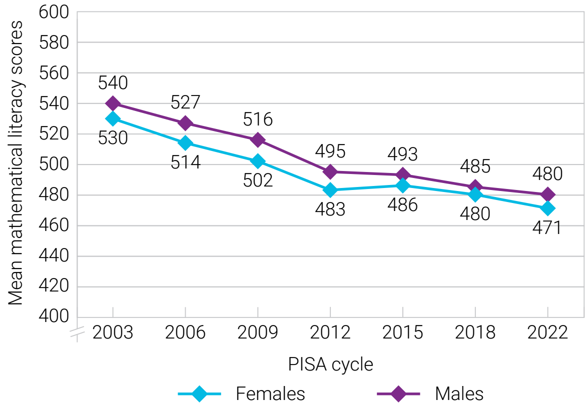
Females						
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-16 ▼	-16 ▼	-29 ▼	-42 ▼	-42 ▼	-50 ▼
2018		0	-13	-26 ▼	-26 ▼	-34 ▼
2015			-13	-26 ▼	-26 ▼	-34 ▼
2012				-13	-13	-21 ▼
2009					0	-8
2006						-8

Males						
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-3	3	-18 ▼	-34 ▼	-37 ▼	-29 ▼
2018		6	-15 ▼	-31 ▼	-34 ▼	-26 ▼
2015			-21 ▼	-37 ▼	-40 ▼	-32 ▼
2012				-16	-19 ▼	-11
2009					-3	5
2006						8

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.22 (continued) Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory and gender

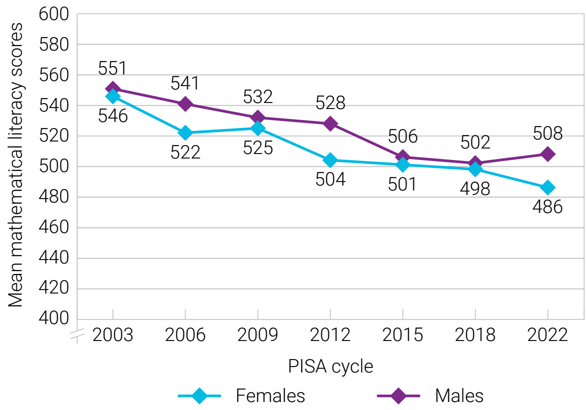
South Australia



	Females					
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-9	-15 ▼	-12	-31 ▼	-43 ▼	-59 ▼
2018		-6	-3	-22 ▼	-34 ▼	-50 ▼
2015			3	-16 ▼	-28 ▼	-44 ▼
2012				-19 ▼	-31 ▼	-47 ▼
2009					-12	-28 ▼
2006						-16

	Males					
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-5	-13	-15 ▼	-36 ▼	-47 ▼	-60 ▼
2018		-8	-10	-31 ▼	-42 ▼	-55 ▼
2015			-2	-23 ▼	-34 ▼	-45 ▼
2012				-21 ▼	-32 ▼	-47 ▼
2009					-11	-28 ▼
2006						-13

Western Australia



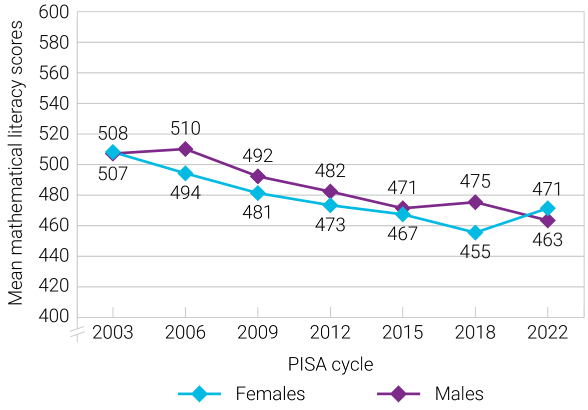
	Females					
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	-12	-15 ▼	-18 ▼	-39 ▼	-36 ▼	-60 ▼
2018		-3	-6	-27 ▼	-24 ▼	-48 ▼
2015			-2	-24 ▼	-21 ▼	-45 ▼
2012				-21 ▼	-18 ▼	-42 ▼
2009					3	-21 ▼
2006						-24 ▼

	Males					
	Difference between PISA cycles					
	2018	2015	2012	2009	2006	2003
2022	6	2	-20 ▼	-24 ▼	-33 ▼	-43 ▼
2018		-4	-26 ▼	-30 ▼	-39 ▼	-49 ▼
2015			-22 ▼	-26 ▼	-35 ▼	-45 ▼
2012				-4	-13	-23 ▼
2009					-9	-19
2006						-10

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.22 (continued) Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory and gender

Tasmania



Females

Difference between PISA cycles

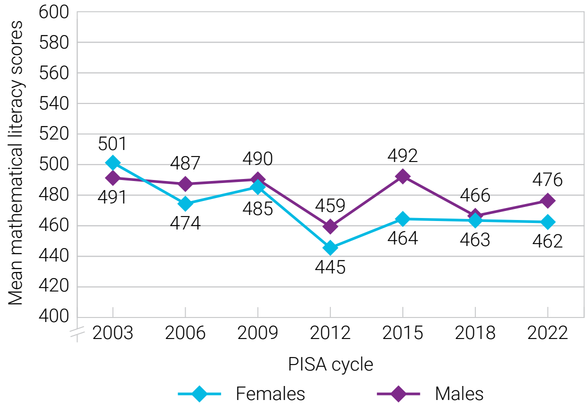
	2018	2015	2012	2009	2006	2003
2022	16	4	-2	-10	-23 ▼	-37 ▼
2018		-12	-18 ▼	-26 ▼	-39 ▼	-53 ▼
2015			-6	-14	-27 ▼	-41 ▼
2012				-8	-21 ▼	-35 ▼
2009					-13	-27 ▼
2006						-14

Males

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	-12	-8	-19 ▼	-29 ▼	-47 ▼	-44 ▼
2018		4	-7	-17	-35 ▼	-32 ▼
2015			-11	-21 ▼	-39 ▼	-36 ▼
2012				-10	-28 ▼	-25 ▼
2009					-18 ▼	-15
2006						3

Northern Territory



Females

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	1	-1	17	-23	-12	-39 ▼
2018		-1	18	-22	-11	-38 ▼
2015			19	-21	-10	-37 ▼
2012				-40 ▼	-29	-56 ▼
2009					11	-16
2006						-27 ▼

Males

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003
2022	10	-16	17	-14	-11	-15
2018		-26	7	-24 ▼	-21	-25 ▼
2015			33 ▲	2	5	1
2012				-31 ▼	-28 ▼	-32 ▼
2009					3	-1
2006						-4

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.22 (continued) Mean mathematical literacy performance and differences from PISA 2003 to 2022, by state and territory and gender

Proficiency over time

Figure 3.23 shows the proportions of low and high-performing female and male students and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022 by state and territory and gender.

High performers

Between PISA 2018 and 2022, the proportion of male high performers increased in New South Wales by 5 percentage points.

Between PISA 2012 and 2022, the jurisdictions recorded the following percentage point declines in high performers:

- the Australian Capital Territory (females by 6 percentage points)
- New South Wales (females by 4 percentage points)
- Queensland (females by 6 percentage points).

Between PISA 2003 and 2022, there was no difference in the proportion of female and male high performers in Victoria, or male high performers in New South Wales, Queensland or the Northern Territory. All other jurisdictions recorded the following percentage point declines:

- the Australian Capital Territory (females by 17 percentage points; males by 13 percentage points)
- New South Wales (females by 7 percentage points)
- Queensland (females by 11 percentage points)
- South Australia (females by 13 percentage points; males by 15 percentage points)
- Western Australia (females by 16 percentage points, males by 12 percentage points)
- Tasmania (females by 3 percentage points, males by 9 percentage points)
- the Northern Territory (females by 13 percentage points).

Low performers

Between PISA 2018 and 2022, there were percentage point declines in low performers in the following jurisdictions:

- Victoria (males by 6 percentage points)
- Queensland (females by 8 percentage points)
- South Australia (females by 6 percentage points).

Between PISA 2012 and 2022, there were percentage point increases in low performers in the following jurisdictions:

- New South Wales (females by 5 percentage points; males by 7 percentage points)
- Victoria (males by 8 percentage points)
- Queensland (females by 9 percentage points; males by 8 percentage points)
- South Australia (males by 8 points)
- Western Australia (males by 7 percentage points)
- Tasmania (males by 11 percentage points)

Between PISA 2003 and 2022, there were percentage point increases in low performers in all jurisdictions:

- the Australian Capital Territory (females and males both 9 percentage points)
- New South Wales (females by 13 percentage points; males by 12 percentage points)
- Victoria (female and males both by 9 percentage points)
- Queensland (females by 14 points; males by 10 percentage points)
- South Australia (female and males both by 18 percentage points)
- Western Australia (females by 16 percentage points; males by 10 percentage points)
- Tasmania (females by 15 percentage points; males by 16 percentage points)
- the Northern Territory (females by 13 percentage points).

National Proficient Standard

Between PISA 2018 and 2022, there were the following percentage point declines in the proportions of female and male students who attained the National Proficient Standard in 5 jurisdictions:

- the Australian Capital Territory (females by 10 percentage points; males by 7 percentage points)
- Victoria (females by 6 percentage points; males by 5 percentage points)
- Queensland (females by 9 percentage points)
- South Australia and Western Australia (females by 5 percentage points).

Between PISA 2012 and 2022, there were percentage point declines in the proportions of female and male students who attained the National Proficient Standard:

- the Australian Capital Territory and New South Wales (females by 9 percentage points)
- Victoria (males by 8 percentage points)
- Queensland (females by 13 percentage points; males by 9 percentage points)
- South Australia and Western Australia (males by 7 percentage points)
- Tasmania (males by 8 percentage points).

Between PISA 2003 and 2022, the proportions of students who attained the National Proficient Standard did not change for males in the Northern Territory, but other the jurisdictions had the following percentage point declines:

- the Australian Capital Territory (females by 21 percentage points for females; males by 16 percentage points)
- New South Wales (females by 16 percentage points; males by 12 percentage points)
- Victoria (females by 11 percentage points; males by 12 percentage points)
- Queensland (females by 23 percentage points; males by 14 percentage points)
- South Australia (females by 28 percentage points; males by 25 percentage points)
- Western Australia (females by 23 percentage points; males by 16 percentage points)
- Tasmania (females by 20 percentage points; males by 18 percentage points)
- the Northern Territory (females by 19 percentage points).

Australian Capital Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	19	10	56	21	14	59
2018	13	14	66	17	15	66
2015	18	11	61	19	16	61
2012	15	17	65	16	20	65
2009	13	17	70	14	25	68
2006	9	18	71	10	29	77
2003	11	27	77	11	27	75

Students (%)

New South Wales

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	25	11	51	27	17	54
2018	24	10	51	24	12	54
2015	23	12	54	23	14	56
2012	20	15	59	19	20	60
2009	17	14	62	17	17	64
2006	12	15	67	13	20	67
2003	13	18	67	15	23	66

Students (%)

Victoria

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	26	11	49	26	14	53
2018	22	10	54	20	13	58
2015	20	8	55	19	14	60
2012	22	9	54	17	15	61
2009	16	12	60	15	18	66
2006	16	10	60	13	18	68
2003	17	12	60	17	18	65

Students (%)

Queensland

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	30	7	45	27	14	51
2018	22	8	53	23	11	55
2015	23	9	53	25	10	52
2012	21	14	57	19	16	60
2009	16	16	64	15	20	66
2006	14	13	64	12	18	69
2003	16	18	67	17	19	65

Students (%)

FIGURE 3.23 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by state and territory and gender

South Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	29	7	44	30	11	48
2018	24	7	49	24	8	51
2015	23	8	51	22	11	56
2012	26	8	50	21	12	55
2009	18	11	60	14	16	65
2006	12	12	65	11	17	70
2003	11	20	72	12	26	73

Western Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	24	10	52	20	17	60
2018	19	10	58	20	13	58
2015	17	11	59	18	14	61
2012	19	14	58	13	21	67
2009	14	21	68	13	23	71
2006	12	17	68	11	25	75
2003	8	26	76	9	29	76

Tasmania

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	32	9	42	35	7	42
2018	36	4	38	28	8	46
2015	33	7	42	31	8	46
2012	30	8	46	24	10	50
2009	26	9	50	23	11	55
2006	19	9	55	17	15	62
2003	17	12	62	19	16	60

Northen Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	33	4	40	33	13	48
2018	34	8	44	32	8	41
2015	32	6	43	24	16	51
2012	38	5	36	34	8	47
2009	24	9	54	24	11	55
2006	26	10	50	24	12	53
2003	20	17	58	23	12	56

Students (%)

FIGURE 3.23 (continued) Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by state and territory and gender

School sector

Performance

PISA has consistently found differences in reporting student performance before and after accounting for socioeconomic background. For this reason, school sector results are also reported after adjustment for student- and for school-level socioeconomic background.[2]

Figure 3.24 shows the mean scores for mathematical literacy by school sector.

The performance of students in independent schools was 29 points higher than students in Catholic schools and 44 points higher than students in government schools.

The performance of students in Catholic schools was 15 points higher than students in government schools.

Students in government schools had the largest range of scores; there were 265 points between students in the 10th and 90th percentiles, whereas the differences in the spread of scores for Catholic schools and independent schools were smaller, at between 233 and 252 points respectively.

Table 3.3 shows the mean difference in mathematical literacy scores and the mean score difference after student-level socioeconomic background, and student- and school-level socioeconomic background, were accounted for.

When student-level socioeconomic background was accounted for, students in independent schools still performed at a higher level than students in government and Catholic schools, although the differences were smaller. However, the difference between students in government schools and students in Catholic schools was no longer significant.

When school-level socioeconomic background was also accounted for, the differences between students in independent schools and students in government schools were not significant. Interestingly though, once school- and student-level socioeconomic background were accounted for, there was a difference between government and Catholic schools; students who attended government schools achieved at a higher level. The difference between students in independent schools and students in Catholic schools also remained, with students who attended an independent school achieving at a higher level.

This means there was no performance advantage over students who attended an independent school over a government school, but, given similar socioeconomic backgrounds, students in government schools and independent schools achieved higher results than those in Catholic schools.

School sector	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Government	475	2.7	469–479	265	
Catholic	490	2.8	484–495	233	
Independent	519	4.6	509–527	252	

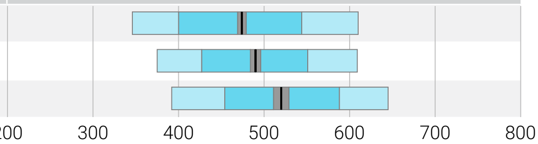


FIGURE 3.24 Mean scores and distribution of student performance on the mathematical literacy scale, by school sector

2 For more information about the reporting of school sector, please refer to the Reader's guide.

TABLE 3.3 Differences in mean mathematical literacy scores after adjusting for student- and school-level socioeconomic background

School sector comparison	Difference in score points	Difference in scores after accounting for student-level socioeconomic background	Difference in scores after accounting for student- and school-level socioeconomic background
Catholic–Government	**15**	0	**-17**
Independent–Government	**44**	**20**	-7
Independent–Catholic	**29**	**22**	**14**

Note: statistically significant values are shown in bold.

Proficiency

Figure 3.25 shows the percentages of students at each proficiency level on the mathematical literacy proficiency scale by school sector.

High performers

The percentage of high performers in independent schools (19%) was higher than in government schools (11%) and in Catholic schools (10%). The percentage of high performers in Catholic schools was not different to government schools.

Low performers

The percentage of low performers in independent schools (16%) was lower than in government schools (32%) and Catholic schools (22%).

National Proficient Standard

Just under half the students in government schools (45%) attained the National Proficient Standard in mathematical literacy compared to 52% of students in Catholic schools and 65% of students in independent schools.

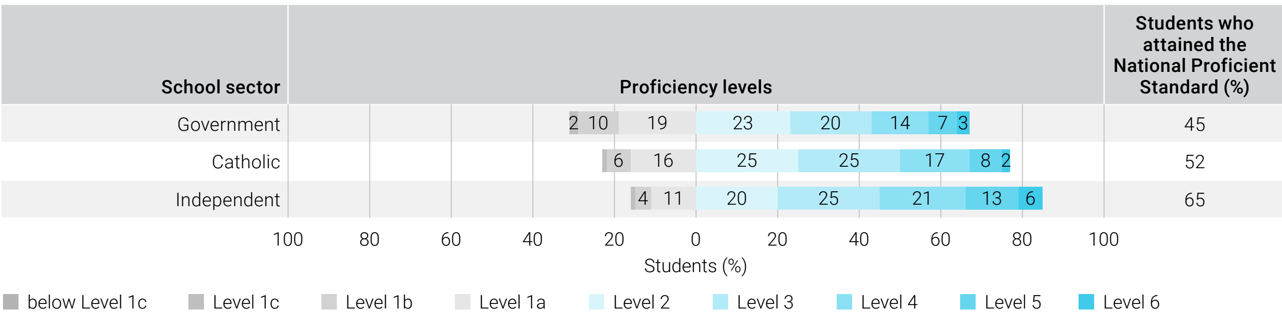


FIGURE 3.25 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector

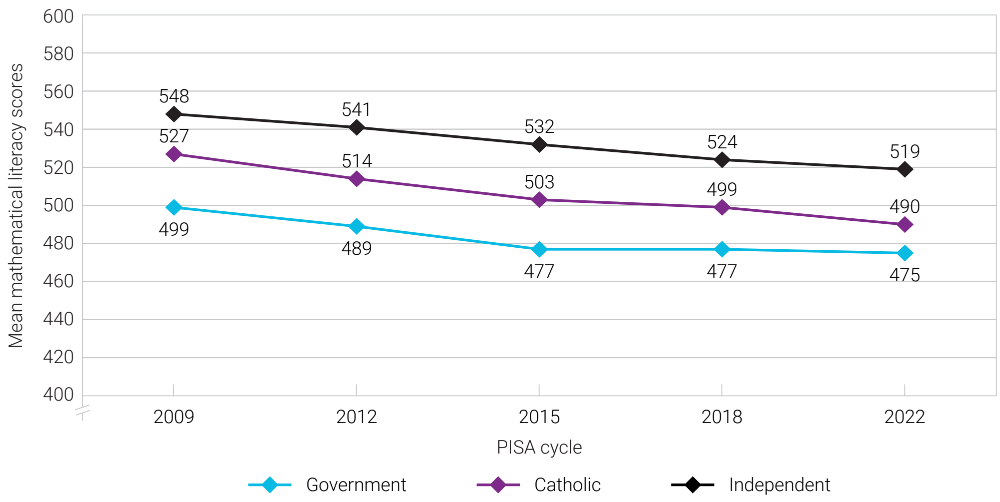
Performance over time

Figure 3.26 shows the mean mathematical literacy performance from PISA 2009, when results for school sector were first reported, to this current cycle of PISA, along with the change in performance between cycles.

Between PISA 2018 and 2022, there were no differences in the mean mathematical literacy performance in each of the school sectors.

Between PISA 2012 and 2022, the mean mathematical literacy performance for students in all sectors declined. The largest decline was in Catholic schools, in which the average declined by 24 points. Independent schools declined by an average of 22 points and government schools by 14 points.

Between PISA 2009 and 2022, the mean mathematical literacy performance for students in each sector declined. The largest decline was in Catholic schools (37 points), followed by independent schools (29 points) and government schools (24 points).



Government								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-2		-2		-14	▼	-24	▼
2018			0		-12	▼	-22	▼
2015					-12	▼	-22	▼
2012							-10	▼

Catholic								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-9		-13	▼	-24	▼	-37	▼
2018			-4		-15	▼	-28	▼
2015					-11		-24	▼
2012							-13	▼

Independent								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-5		-13	▼	-22	▼	-29	▼
2018			-8		-17	▼	-24	▼
2015					-9		-17	▼
2012							-7	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.26 Mean mathematical literacy performance and differences from PISA 2009 to 2022, by school sector

Proficiency over time

Figure 3.27 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard from PISA 2009 to 2022 by school sector.

High and low performers

Between PISA 2018 and 2022, the proportion of low performers increased in all sectors by 4 percentage points. The proportion of high performers remained about the same in all school sectors.

Between PISA 2012 and 2022, the proportion of low performers increased across all school sectors by 6 percentage points in government schools, 8 percentage points in Catholic schools and 7 percentage points in independent schools. At the same time, the proportion of high performers decreased by 4 percentage points in Catholic schools.

Between PISA 2009 and 2022, the proportion of low performers increased in government schools by 11 percentage points, in Catholic schools by 13 percentage points and in independent schools by 8 percentage points.

National Proficient Standard

Between PISA 2018 and 2022 there were no differences in the proportions of students who attained the National Proficient Standard in independent or government schools, but the proportion of students in Catholic schools decreased by 6 percentage points.

Between PISA 2012 and 2022, the percentage of students who attained the National Proficient Standard decreased by 6 percentage points for students in government schools, by 13 percentage points for students in Catholic schools, and 10 percentage points for students in independent schools.

Between 2009 and 2022 the proportions of students who attained the National Proficient Standard declined in Catholic schools by 19 percentage points, by 14 percentage points in independent schools and by 11 percentage points in government schools.

Government

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	32	11	45
2018	28	8	47
2015	28	9	48
2012	25	12	51
2009	21	13	57

Catholic

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	10	52
2018	18	10	59
2015	17	12	60
2012	14	14	65
2009	10	16	72

Independent

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	16	19	65
2018	11	17	69
2015	10	19	73
2012	9	23	74
2009	8	26	78

Students (%)

FIGURE 3.27 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2009 to 2022, by school sector

School sector by gender

Performance

Figure 3.28 shows that there were gender differences in all of the 3 schooling sectors; male students outperformed female students in each sector. The difference was largest in independent schools, where males outperformed females by 16 points.

	Females		Males	
School sector	Mean score	SE	Mean score	SE
Government	469	3.0	480	3.7
Catholic	484	3.0	496	4.3
Independent	511	5.4	527	5.1

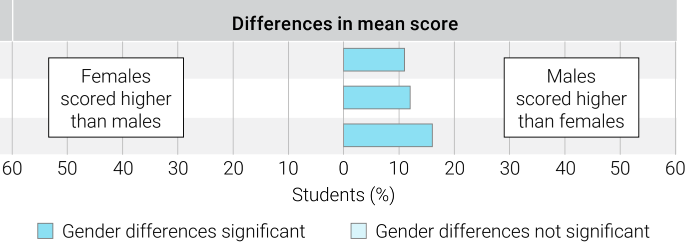


FIGURE 3.28 Mean scores and differences in student performance on the mathematical literacy scale, by school sector and gender

Proficiency

Figure 3.29 shows the percentage of students at each proficiency level on the mathematical literacy scale by school sector and gender.

High performers

The proportion of female high performers in independent schools (17%) was higher than in Catholic schools (7%) and government schools (8%).

The proportion of male high performers in independent schools (21%) was higher than in Catholic schools (14%) and government schools (13%).

Low performers

The proportion of female low performers in independent schools (17%) was lower than in Catholic schools (22%) and government schools (32%).

The proportion of male low performers in independent schools (14%) was lower than in Catholic schools (23%) and government schools (31%).

National Proficient Standard

Independent schools (61%) had the highest proportion of female students who attained the National Proficient Standard in mathematical literacy, compared to Catholic schools (50%) and government schools (43%). This pattern was replicated for male students with 69% attaining the National Proficient Standard in independent schools, 55% in Catholic schools and 47% in government schools.

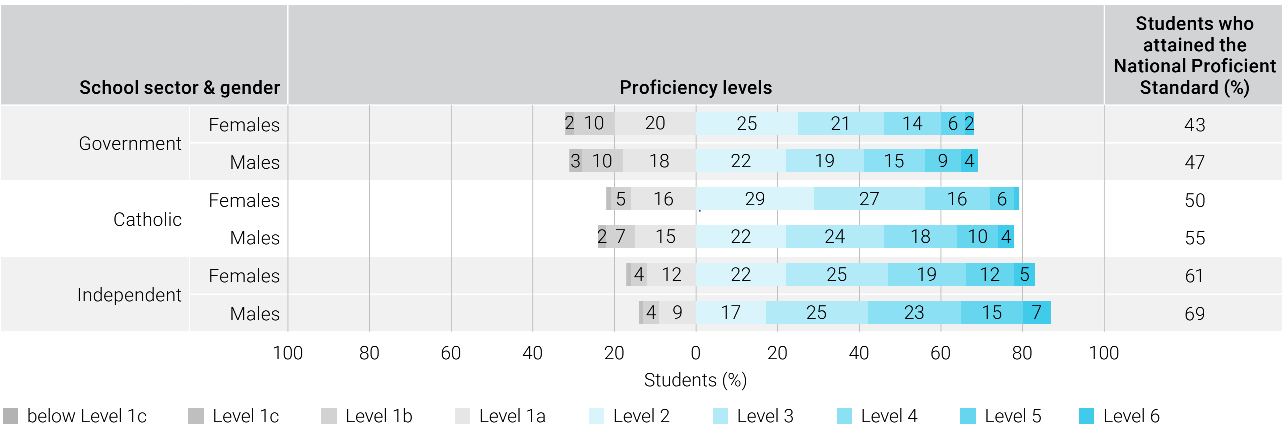


FIGURE 3.29 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector and gender

Performance over time

Figure 3.30 shows the mean mathematical literacy performance from PISA 2009 to 2022, along with the change in performance between cycles for female and male students by school sector.

Between PISA 2018 and 2022, there were no differences in mathematical literacy performance for either female or male students across the school sectors.

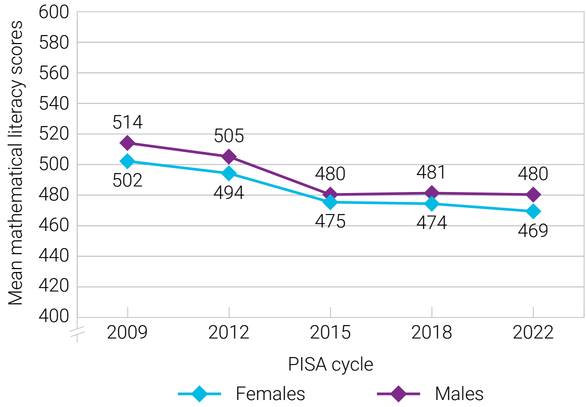
Between PISA 2012 and 2022, there were the following declines in mean mathematical literacy performance:

- government schools (females and males each by 25 percentage points)
- Catholic schools (females by 36 points; males by 38 percentage points)
- independent schools (females by 33 points; males by 26 percentage points).

Between PISA 2009 and 2022, there were the following declines in mean mathematical performance:

- government schools (females by 33 percentage points; males by 34 percentage points)
- Catholic schools (females by 30 percentage points; males by 43 percentage points)
- independent schools (females by 41 percentage points; males by 42 percentage points).

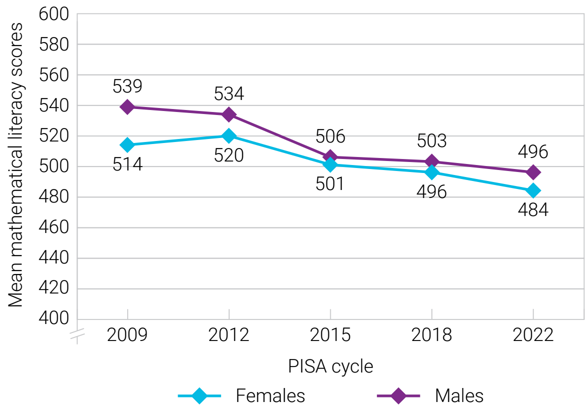
Government



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-5		-6		-25	▼	-33	▼
2018			-1		-20	▼	-28	▼
2015					-19	▼	-27	▼
2012							-8	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-1		0		-25	▼	-34	▼
2018			1		-24	▼	-33	▼
2015					-25	▼	-34	▼
2012							-9	

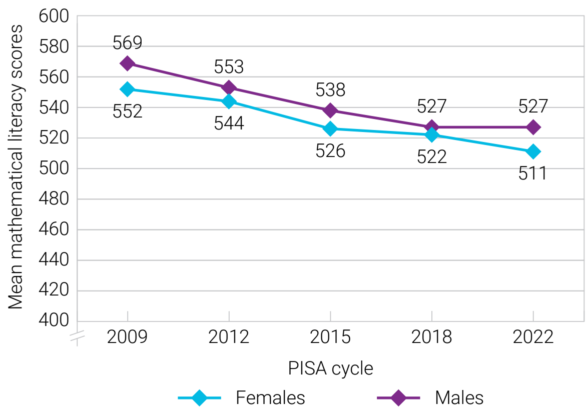
Catholic



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-12		-17	▼	-36	▼	-30	▼
2018			-5		-24	▼	-18	▼
2015					-19	▼	-13	
2012							6	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-7		-10		-38	▼	-43	▼
2018			-3		-31	▼	-36	▼
2015					-28	▼	-33	▼
2012							-5	

Independent



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-11		-15	▼	-33	▼	-41	▼
2018			-4		-23	▼	-30	▼
2015					-18	▼	-26	▼
2012							-8	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	0		-11		-26	▼	-42	▼
2018			-11		-26	▼	-42	▼
2015					-15	▼	-31	▼
2012							-16	▼

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.30 Mean mathematical literacy performance and differences from PISA 2009 to 2022, by school sector and gender

Proficiency over time

Figure 3.31 shows the proportions of female and male low- and high performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2009 to 2022 by school sector.

High performers

Between PISA 2018 and 2022, there was a 3 percentage point increase in male high performers in government schools.

Between PISA 2009 and 2022, there were the following decreases in high performers:

- in Catholic schools (females by 7 percentage points; males by 6 percentage points)
- in independent schools (females by 8 percentage points; males by 6 percentage points).

Low performers

Between PISA 2018 and 2022, there were the following percentage point increases in low performers in:

- government schools (female and males both by 4 percentage points)
- Catholic schools (males by 5 percentage points)
- independent schools (females by 6 percentage points).

Between PISA 2012 and 2022, there were again percentage point increases in low performers in:

- government schools (females by 5 percentage points; males by 8 percentage points)
- Catholic schools (females by 7 percentage points; males by 10 percentage points)
- independent schools (females by 9 percentage points; males by 6 percentage points).

Over this 10-year period, the proportion of female and male high performers remained the same across all school sectors.

Between PISA 2009 and 2022, there were the following percentage point increases in

- Government schools (females and males each by 11 percentage points)
- Catholic schools (females by 12 percentage points; males by 14 percentage points)
- independent schools (females by 9 percentage points; males by 6 percentage points).

National Proficient Standard

Between PISA 2018 and 2022, the proportion of female students in both Catholic and independent schools who attained the National Proficient Standard declined, in both sectors by 8 percentage points.

Between PISA 2012 and 2022, the proportion of female students who attained the National Proficient Standard decreased by 5 percentage points in government schools 14 percentage points in Catholic schools and by 13 percentage points independent schools.

Between PISA 2009 and 2022, the proportion of female and male students who attained the National Proficient Standard decreased by 11 percentage points in government schools; and, in Catholic schools by 20 percentage points for females and 19 percentage points for males. In independent schools, female students declined by 17 percentage points and male students by 11 percentage points.

The proportion of male students who attained the National Proficient Standard over this period decreased by 6 percentage points in government schools, and by 11 percentage points in Catholic schools. The proportion of male students who attained the National Proficient Standard over this period was not different in independent schools.

Government

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	32	8	43	32	13	47
2018	28	7	46	27	10	49
2015	28	7	47	28	10	49
2012	28	10	48	23	14	53
2009	21	11	55	20	16	59

Students (%)

Catholic

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	22	7	50	23	14	55
2018	18	9	58	18	12	60
2015	17	10	59	18	13	61
2012	15	11	63	14	17	67
2009	10	14	69	9	20	74

Students (%)

Independent

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	17	17	61	14	21	69
2018	11	15	69	12	18	70
2015	11	16	71	9	22	74
2012	9	21	74	9	25	75
2009	8	25	77	7	27	80

Students (%)

FIGURE 3.31 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2009 to 2022, by school sector and gender

3.3 Australia's mathematical literacy results for different demographic groups in a national context

Geographic location

Performance

Figure 3.32 shows the mathematical literacy performance of students from schools classified using the Australian Statistical Geography Standard (ASGS), which categorises schools into 3 regions: major cities, regional areas and remote areas.

In previous cycles of PISA, the MCEETYA Schools Geographic Location Classification was used to examine geographic location. Since PISA 2018, the ASGS has been used to measure geographical location as it provides more accurate information for the regional classification of students than the MCEETYA classification and is more widely used in research. This means that performance can only be reported over a 4-year period.

Students in major city schools outperformed students in regional schools and remote schools, and students in regional schools outperformed students in remote schools.

On average, students from major city schools scored 33 points higher in mathematical literacy than students in regional schools. Students in major city schools scored 70 points higher than students in remote schools and those regional schools scored 37 points higher than students in remote schools.

The ranges of scores from the 10th and 90th percentiles were largest for students in major city schools (264 points), with smaller spreads of performance in regional schools (241 points) and in remote schools (230 points).

Geographic location	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Major cities	496	2.3	491–500	264
Regional areas	463	2.6	457–467	241
Remote areas	426	11.7	403–448	230

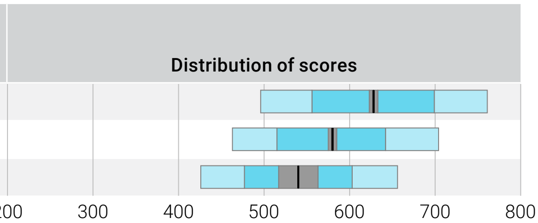


FIGURE 3.32 Mean scores and distribution of student performance on the mathematical literacy scale, by geographic location

Proficiency

Figure 3.33 shows the percentages of students on the mathematical literacy proficiency scale for schools classified with the ASGS.[3]

The proportion of high performers in major city schools (14%) was higher than in regional schools (7%), and remote schools (2%).

Around 24% of students in major city schools were poor performers, compared to 34% of students in regional areas and, disturbingly, almost half (48%) of students in remote areas.

National Proficient Standard

Around 55% of students in major city schools attained the National Proficient Standard in mathematical literacy compared to 40% of students in regional schools and 27% in remote schools.

3 For more information about geographic location, please refer to the Reader's guide.

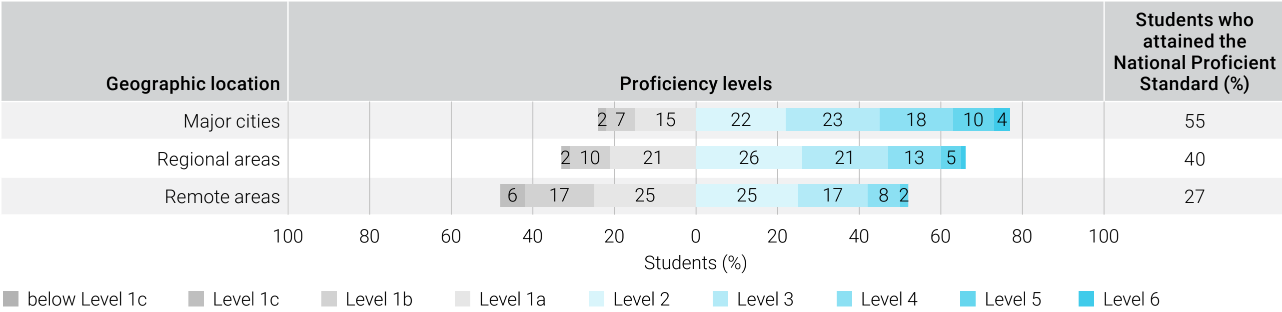
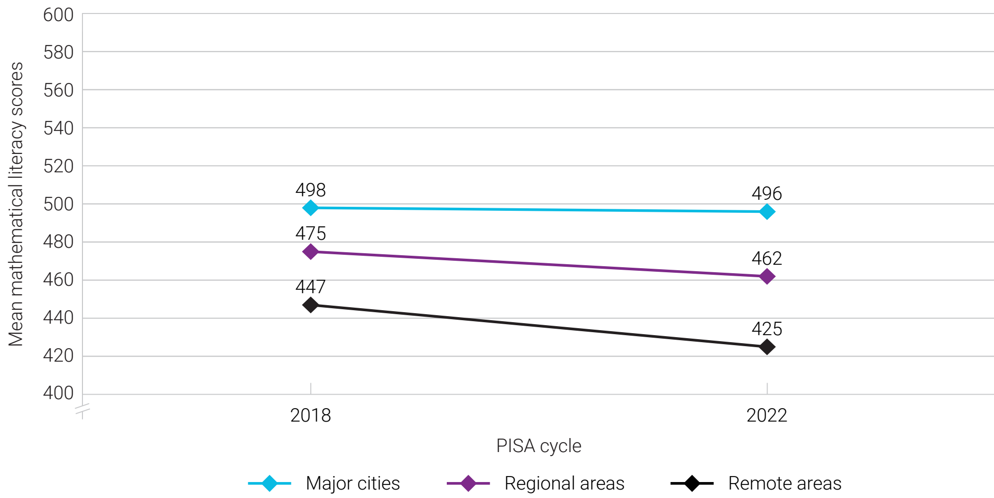


FIGURE 3.33 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by geographic location

Performance over time

Figure 3.34 shows the mean mathematical literacy performance and change in performance between PISA 2018 and 2022. The only difference between these 2 cycles was in regional schools, where the average score declined by 13 points.



Major cities		
	Difference between PISA cycles	
	2018	
2022	-2	

Regional areas		
	Difference between PISA cycles	
	2018	
2022	-13	▼

Remote areas		
	Difference between PISA cycles	
	2018	
2022	-22	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.34 Mean mathematical literacy performance and differences from PISA 2018 to 2022, by geographic location

Proficiency over time

Figure 3.35 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale for PISA 2018 to 2022 by geographic location.

High and low performers

Between PISA 2018 and 2022, in major city schools there was a 3 percentage point increase in low performers and a 2 percentage point increase in high performers. In regional schools, there was a 7 percentage point increase in low performers.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of students in major city schools who attained the National Proficient Standard decreased by 2 percentage points in major city schools, 7 percentage points in regional schools and 13 percentage points in remote schools.

Major cities

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	14	55
2018	20	12	57

Students (%)

Regional areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	34	7	40
2018	27	7	48

Students (%)

Remote areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	48	2	27
2018	41	5	38

Students (%)

FIGURE 3.35 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2018 to 2022, by geographic location

Socioeconomic background

Performance

Figure 3.36 shows the performance of students in mathematical literacy at each socioeconomic background (ESCS)[4] quartile and illustrates that, on average, students from higher socioeconomic backgrounds performed at a higher level than students from lower socioeconomic backgrounds.

On average, students from the highest socioeconomic quartile scored 101 points higher in mathematical literacy than students in the lowest quartile. The score difference between one quartile and the next was between 32 and 35 points on average.

The spread of scores between the lowest and highest performing students within each quartile was very similar and ranged from 225 to 250 points.

Socioecnomic background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Lowest quartile	439	2.0	435–443	225
Second quartile	471	2.3	466–475	232
Third quartile	505	2.4	500–510	243
Highest quartile	540	2.8	534–544	250

Distribution of scores

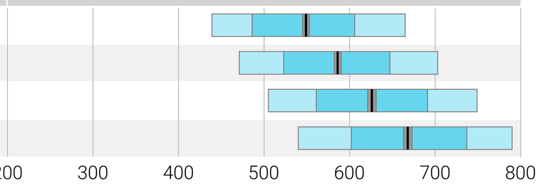


FIGURE 3.36 Mean scores and distribution of student performance on the mathematical literacy scale, by socioeconomic background

4 For more information about socioeconomic background and the ESCS index, please refer to the Reader's guide.

Proficiency

Figure 3.37 shows the percentages of students on the mathematical literacy proficiency scales and the proportions of the students who attained the National Proficient Standard across the socioeconomic quartiles. Students in the lowest socioeconomic quartile were under-represented at the higher end of the scale and over-represented at the lower end of the scale.

High performers

The proportion of high performers increased with each increase in socioeconomic quartile: 3% of students in the lowest, 7% in the second, 14% in the third, and 26% in the highest quartile.

Low performers

The proportion of low performers decreased with each increase in socioeconomic quartile: 43% of students in the lowest, 30% in the second, 19% in the third, and 11% in the highest quartile.

National Proficient Standard

The percentage of students who attained the National Proficient Standard increased with each increase in socioeconomic quartile: 30% of students in the lowest, 44% in the second, 59% in the third, and 72% in the highest quartile.

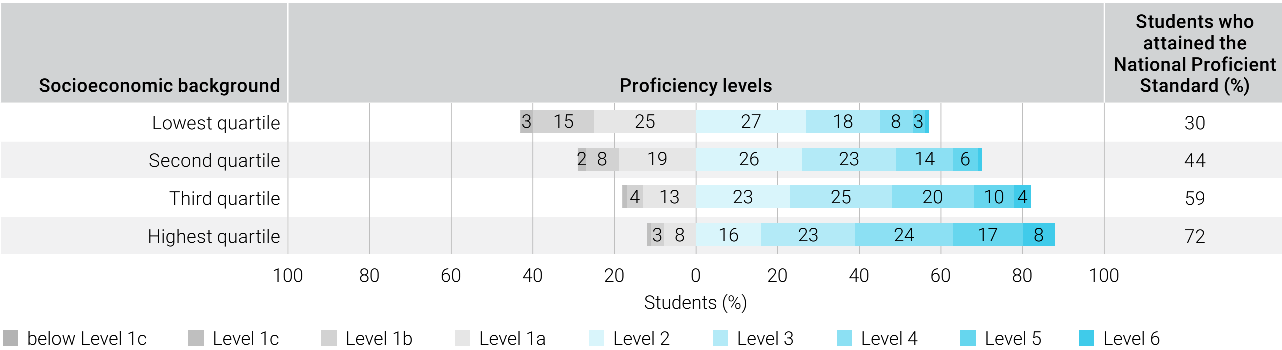


FIGURE 3.37 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by socioeconomic background

Performance over time

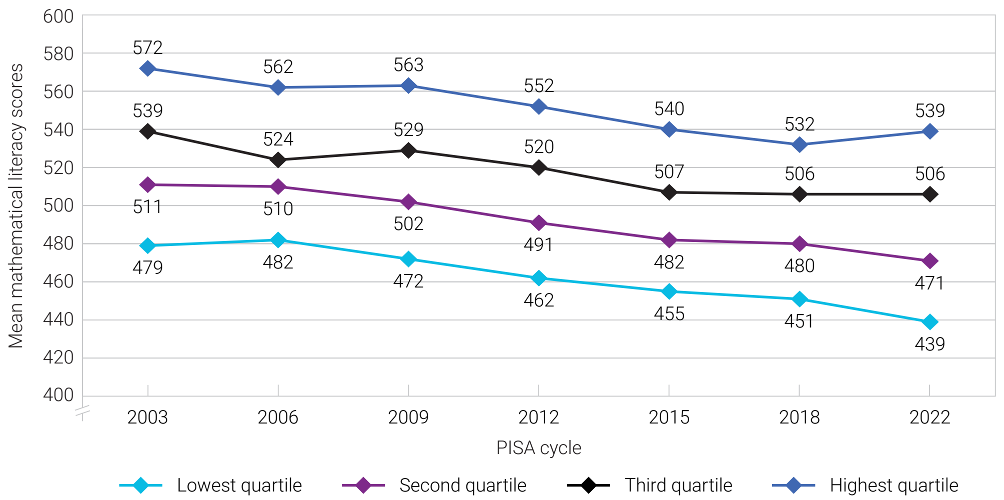
Figure 3.38 shows the mean mathematical literacy performance for each quartile of socioeconomic background since PISA 2003, along with details about the change in performance between cycles.

Between PISA 2018 and 2022, the average score for students in the lowest 2 ESCS quartiles declined: by 12 points in the lowest quartile and by 9 points in the second quartile.

Between PISA 2012 and 2022, there were the following declines in performance for all socioeconomic quartiles:

- 23 points in the lowest quartile
- 20 points in the second quartile
- 14 points in the third quartile
- 13 points in the highest quartile.

Between PISA 2003 and 2022, the mean mathematical literacy performance declined by 40 points for students in the lowest and second quartiles, and by 33 points in the third and highest quartiles.



	Lowest quartile											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-12	▼	-16	▼	-23	▼	-33	▼	-43	▼	-40	▼
2018			-4		-11	▼	-21	▼	-31	▼	-28	▼
2015					-7		-17	▼	-27	▼	-24	▼
2012							-10	▼	-20	▼	-17	▼
2009									-10	▼	-7	
2006											3	

	Second quartile											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-9	▼	-11	▼	-20	▼	-31	▼	-39	▼	-40	▼
2018			-2		-11	▼	-22	▼	-30	▼	-31	▼
2015					-9		-20	▼	-28	▼	-29	▼
2012							-11	▼	-19	▼	-20	▼
2009									-8	▼	-9	▼
2006											-1	

	Third quartile											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	0		-1		-14	▼	-23	▼	-18	▼	-33	▼
2018			-1		-14	▼	-23	▼	-18	▼	-33	▼
2015					-13	▼	-22	▼	-17	▼	-32	▼
2012							-9	▼	-4		-19	▼
2009									5		-10	▼
2006											-15	▼

	Highest quartile											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	7		-1		-13	▼	-24	▼	-23	▼	-33	▼
2018			-8		-20	▼	-31	▼	-30	▼	-40	▼
2015					-12	▼	-23	▼	-22	▼	-32	▼
2012							-11	▼	-10	▼	-20	▼
2009									1		-9	
2006											-10	▼

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.38 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by socioeconomic background

Proficiency over time

Figure 3.39 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale by socioeconomic background. Over time there were more low performers and fewer high performers in each of the quartiles.

High and low performers

Between PISA 2018 and 2022, the proportion of low performers increased for the groups at the lowest levels of socioeconomic background: by 6 percentage points for students in the lowest quartile and by 5 percentage points for students in the second quartile, while the proportion of high performers increased by 5 percentage points for students in the highest quartile.

Between PISA 2012 and 2022, the proportion of low performers increased in each socioeconomic quartile, but the proportion of high performers decreased in the lowest 2 quartiles. The following percentage point changes were noted:

- in the lowest quartile, there was 10 percentage point increase in low performers and a 2 percentage point decrease in high performers
- in the second quartile, there was an 8 percentage point increase in low performers and a 3 percentage point decrease in high performers
- in the third quartile there was a 6 percentage point increase in low performers
- in the highest quartile, there was a 4 percentage point increase in low performers.

Between PISA 2003 and 2022, the same pattern could be seen: there were more low performers and fewer high performers. The following percentage point changes were recorded:

- in the lowest quartile, there was a 17 percentage point increase low performers and a 5 percentage point decrease in high performers
- in the second quartile, there was a 14 percentage point increase in low performers and 7 percentage point decrease in high performers
- in the third quartile, there was a 9 percentage point increase in low performers and an 8 percentage point decrease in high performers
- in the highest quartile, there was a 7 percentage point increase in low performers and a 9 percentage point decrease in high performers.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of students who attained the National Proficient Standard decreased by 6 percentage points for students in the lowest quartile and by 5 percentage points for students in the second quartile.

Between PISA 2012 and 2022, in all quartiles there were percentage point declines in the proportions of students who attained the National Proficient Standard:

- by 10 percentage points in the lowest quartile
- by 9 percentage points in the second quartile
- by 7 percentage points in the third quartile
- by 5 percentage points in the highest quartile.

Between PISA 2003 and 2022, there were percentage point declines in students who attained the National Proficient Standard in all quartiles:

- by 18 percentage points in the lowest quartile and second quartiles
- by 15 percentage points in the third quartile
- by 13 percentage points in the highest quartile.

Lowest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	43	3	30
2018	37	4	36
2015	35	4	37
2012	33	6	40
2009	27	6	45
2006	23	6	49
2003	26	8	48

Students (%)

Second quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	30	7	44
2018	25	7	49
2015	24	7	50
2012	22	10	53
2009	17	11	59
2006	14	13	62
2003	16	14	62

Students (%)

Third quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	19	15	59
2018	17	13	61
2015	16	12	63
2012	13	17	66
2009	11	19	71
2006	10	16	70
2003	10	23	74

Students (%)

Highest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	11	26	73
2018	11	20	72
2015	9	23	76
2012	8	28	78
2009	5	31	84
2006	4	30	83
2003	5	35	85

Students (%)

FIGURE 3.39 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by socioeconomic background

First Nations background

Performance

Figure 3.40 shows First Nations and non-First Nations student performance in mathematical literacy. First Nations students achieved a mean score of 410 points, which was 82 points lower than the mean score of 492 points for non-First Nations students.[5]

First Nations student performance was similar to the performance of students in the lower-performing countries (for example, Malaysia, Montenegro, Kazakhstan and Baku (Azerbaijan)).

The spread of scores between the 10th and 90th percentiles was 221 points for First Nations students and 258 for non-First Nations students. This is to be expected given the much smaller population of First Nations people.

First Nations background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
First Nations	410	4.1	401–417	221	
Non-First Nations	492	1.9	488–495	258	

200 300 400 500 600 700 800

FIGURE 3.40 Mean scores and distribution of student performance on the mathematical literacy scale, by First Nations background

5 For more information about First Nations background, please refer to the Reader's guide.

Proficiency

Figure 3.41 shows the under-representation of First Nations students at the higher end of the mathematical literacy proficiency scale and the similarly over-representation of First Nations students at the lower end of the proficiency scale.

Just 2% of First Nations students were high performers. This was substantially lower than the proportion of high-performing non-First Nations students (13%).

The proportion of low-performing First Nations students (57%) was higher, and more than twice the proportion of low-performing non-First Nations students (24%).

Just 20% of First Nations students attained the National Proficient Standard in mathematical literacy compared to just over half (53%) of non-First Nations students.

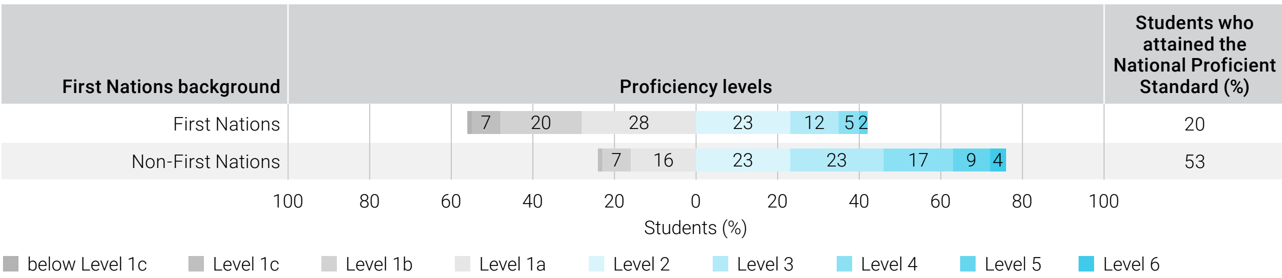


FIGURE 3.41 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by First Nations background

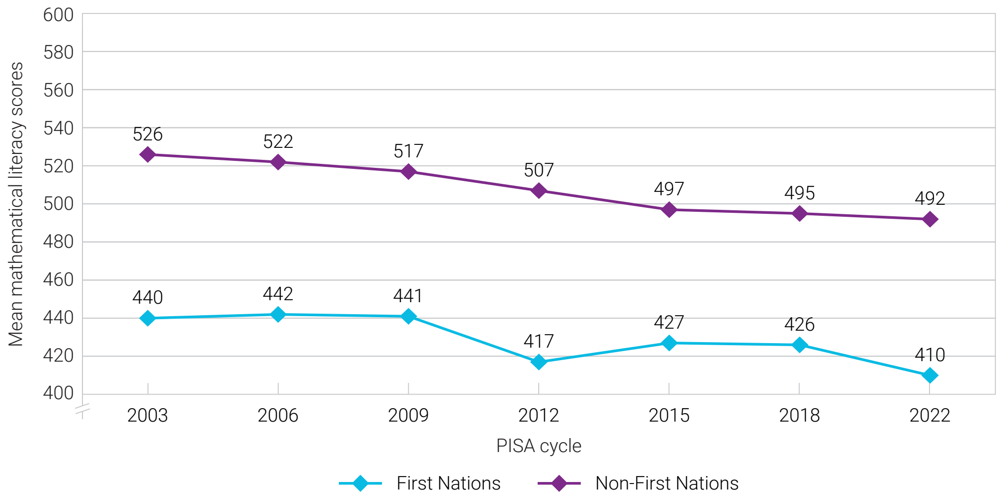
Performance over time

Figure 3.42 shows the mean mathematical literacy performance and change in performance across the PISA cycles for First Nations and non-First Nations students.

Between PISA 2018 and 2022, there was a decline of 16 points in the mathematical literacy performance of First Nations students, but no difference for non-First Nations students.

Between PISA 2012 and 2022, the mean mathematical literacy performance for non-First Nations students declined by 15 points, but the mean performance for First Nations students did not change.

Between PISA 2003 and 2022, the mean mathematical literacy performance declined by 30 points for First Nations students, and by 34 points for non-First Nations students.



	First Nations											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-16	▼	-17	▼	-7		-31	▼	-32	▼	-30	▼
2018			-1		9		-15		-16		-14	
2015					-10		-14	▼	-15		-13	
2012							-24	▼	-25	▼	-23	▼
2009									-1		1	
2006											2	

	Non-First Nations											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-3		-5		-15	▼	-24	▼	-30	▼	-34	▼
2018			-2		-12	▼	-22	▼	-27	▼	-31	▼
2015					-10	▼	-20	▼	-25	▼	-29	▼
2012							-10	▼	-15	▼	-19	▼
2009									-5		-9	▼
2006											-4	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.42 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by First Nations background

Proficiency over time

Figure 3.43 shows the proportions of low and high performers and the proportion of students who attained the National Proficient Standard on the mathematical literacy proficiency scale by First Nations background.

High and low performers

Between PISA 2018 and 2022, the proportion of low-performing First Nations students increased by 9 percentage points, while the proportion of low-performing non-First Nations students increased by 3 percentage points, and the proportion of high performers increased by 2 percentage points.

Between PISA 2012 and 2022, there was a 7 percentage point increase in the proportion of low-performing First Nations students. Among non-First Nations students, there was an increase in low performers by 6 percentage points and a decrease in high performers by 2 percentage points.

Between PISA 2003 and 2022, there was a 14 percentage point increase in low-performing First Nations students and a 2 percentage point decrease in high-performing First Nations students. Over this period, low-performing non-First Nations students increased by 11 percentage points and high-performing non-First Nations students decreased by 7 percentage points.

National Proficient Standard

The proportion of First Nations students who attained the National Proficient Standard declined by 8 percentage points between PISA 2018 and 2022, compared to a 3 percentage point decline for non-First Nations students. Between PISA 2012 and 2022, there was no difference for First Nations students but non-First Nations students decreased by 7 percentage points. And between PISA 2003 and 2022, there was a 10 percentage point decline for First Nations students compared to 15 percentage points for non-First Nations students.

First Nations			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	57	2	20
2018	48	3	27
2015	49	3	25
2012	50	2	23
2009	40	3	34
2006	39	3	32
2003	43	5	30

Non-First Nations			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	13	53
2018	21	11	55
2015	21	12	57
2012	19	15	60
2009	15	17	65
2006	12	17	68
2003	14	20	68

Students (%)

FIGURE 3.43 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by First Nations background

Immigrant background

Performance

Figure 3.44 shows that the achievement levels of first-generation students and foreign-born students were similar, and that both groups outperformed Australian-born students.[6] On average, first-generation students scored 18 points higher, and foreign-born students scored 24 points higher than Australian-born students. The difference between foreign-born and first-generation students was negligible.

The spread of scores for Australian-born students (248 points) was smaller than the spread of scores for either first-generation students (267 points), or for foreign-born students (275 points).

Immigrant background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Australian-born	481	1.7	477– 483	248	
First-generation	499	2.6	493–503	267	
Foreign-born	505	4.5	495–513	275	

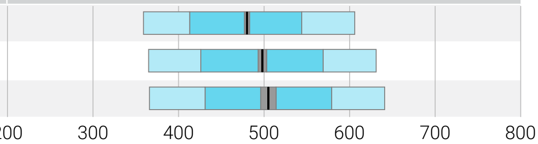


FIGURE 3.44 Mean scores and distribution of student performance on the mathematical literacy scale, by immigrant background

6 For more information about immigrant background, please refer to the Reader's guide.

Proficiency

Figure 3.45 shows the percentage of students by immigrant background on the mathematical literacy proficiency scale.

There were more high-performing foreign-born students (17%) than of first-generation students (15%) and Australian-born students (10%). There was no difference between the proportions of high-performing first-generation students and foreign-born students.

There were more low-performing Australian-born students (27%) than of either first-generation students (23%) or foreign-born students (22%). The difference between first-generation and foreign-born students was not different.

Foreign-born students (58%) had the highest attainment of the National Proficient Standard in mathematical literacy compared to first-generation students (55%) and Australian-born students (48%).

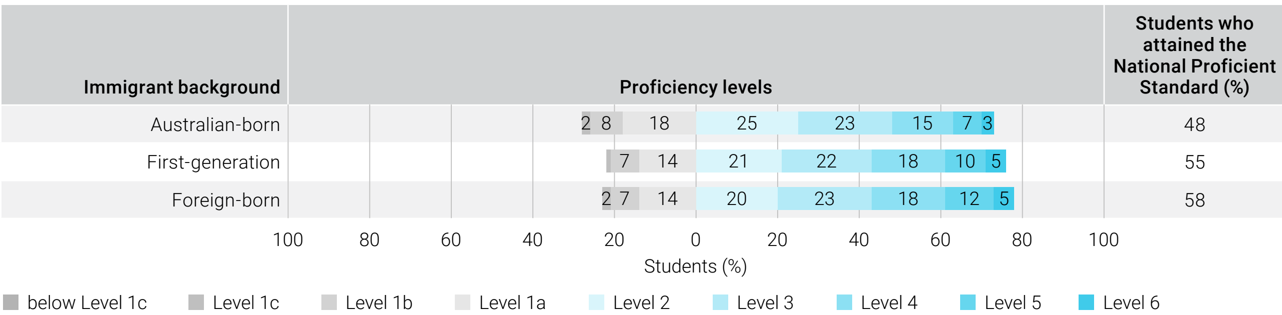


FIGURE 3.45 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by immigrant background

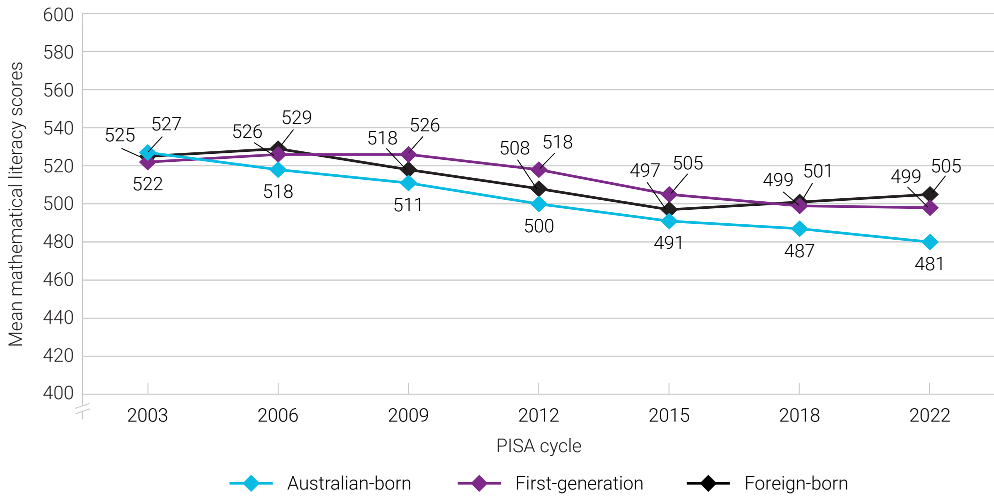
Performance over time

Figure 3.46 shows the mathematical literacy performance for students from different immigrant backgrounds, and changes in performance over time.

Between PISA 2018 and 2022, there were no differences in mathematical literacy performance for any of the immigrant background groups.

Between PISA 2012 and 2022, performance declined by 19 points for both Australian-born and first-generation students.

Between PISA 2003 and 2022, the performance declined for all 3 groups: Australian-born students by 46 points, first-generation students by 23 points, and foreign-born students by 20 points.



	Australian-born											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-6		-10	▼	19	▼	-30	▼	-37	▼	-46	▼
2018			-4		-13	▼	-24	▼	-31	▼	-40	▼
2015					-9	▼	-20	▼	-27	▼	-36	▼
2012							-11	▼	-18	▼	-27	▼
2009									-7	▼	-16	▼
2006											-9	▼

	First-generation											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	0		-6		-19	▼	-27	▼	-28	▼	-23	▼
2018			-6		-19	▼	-27	▼	-27	▼	-22	▼
2015					-13	▼	-21	▼	-21	▼	-17	▼
2012							-8		-8		-4	
2009									0		4	
2006											4	

	Foreign-born											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	4		8		-3		-13		-24	▼	-20	▼
2018			4		-7		-17	▼	-28	▼	-24	▼
2015					-11		-21	▼	-32	▼	-28	▼
2012							-10		-21	▼	-17	▼
2009									-11		-7	
2006											4	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.46 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by immigrant background

Proficiency over time

Figure 3.47 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale for PISA 2003 to 2022 by immigrant background.

High and low performers

Between PISA 2018 and 2022, the only change among the 3 groups of students was a 4 percentage point increase in low performers among Australian-born students.

Between PISA 2012 and 2022, the proportion of low performers increased for both Australian-born and first-generation students, by 8 percentage points and 6 percentage points, respectively. Over the same period, high performers decreased by 2 percentage points for Australian-born students and 4 percentage points for first-generation students. There were no differences for foreign-born students.

Between PISA 2003 and 2022, there were percentage point changes for all groups:

- Australian-born students showed a 14 percentage point increase in low performers and a 10 point decrease in high performers
- first-generation students showed a 10 percentage point increase in low performers and a 6 point decrease in high performers
- foreign-born students showed a 7 percentage point increase in low performers.

National Proficient Standard

Between PISA 2018 and 2022, there was a 5 percentage point decrease in the proportion of Australian-born students who attained the National Proficient Standard.

Between PISA 2012 and 2022, Australian-born students who attained the National Proficient Standard decreased by 10 percentage points, as did first-generation students by 7 percentage points. There was no difference in the proportion of foreign-born students who attained this standard.

Between PISA 2003 and 2022, Australian-born students who attained the National Proficient Standard decreased by 20 percentage points, first-generation students by 10 percentage points and foreign-born students by 8 percentage points.

Australian-born

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	27	10	48
2018	23	9	53
2015	22	10	55
2012	19	12	58
2009	16	15	63
2006	13	15	66
2003	14	20	68

First-generation

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	23	15	55
2018	21	13	57
2015	18	14	60
2012	17	19	63
2009	13	19	68
2006	11	18	69
2003	13	21	65

Foreign-born

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	17	58
2018	21	14	58
2015	22	14	56
2012	20	17	59
2009	17	20	64
2006	13	23	68
2003	15	21	67

Students (%)

FIGURE 3.47 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by immigrant background

Language background

Performance

Figure 3.48 shows that there was no difference in mathematical literacy performance between students who spoke English at home and students who spoke a language other than English at home.[7]

The spread of scores between the 10th and 90th percentiles was larger for students who spoke a language other than English at home, with a range of 297 points, compared to 255 points for students who spoke English at home.

Main language spoken at home	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
English	488	1.5	484–490	255	
Other language	493	5.2	482–503	297	

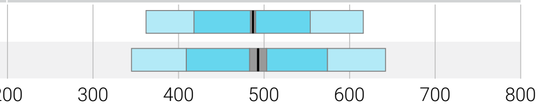


FIGURE 3.48 Mean scores and distribution of student performance on the mathematical literacy scale, by language background

Proficiency

Figure 3.49 shows the percentages of students by language background at each proficiency level for mathematical literacy.

There were more high performers who spoke English at home (12%) than those who spoke a language other than English at home (17%).

The proportions of low performers who spoke English at home (26%) and who spoke a language other than English at home (28%) were the same.

The proportion of students who attained the National Proficient Standard was not different between the 2 language groups.

Main language spoken at home	Proficiency levels	Students who attained the National Proficient Standard (%)
English		51
Other language		53

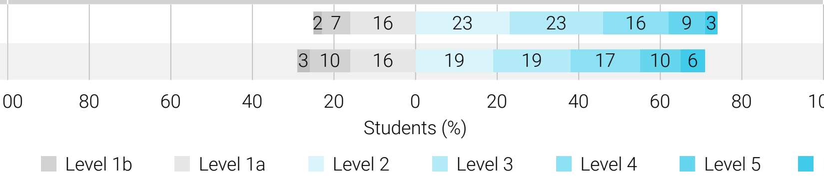


FIGURE 3.49 Percentages of students across the mathematical literacy proficiency scale and proportions of students who attained the National Proficient Standard, by language background

Performance over time

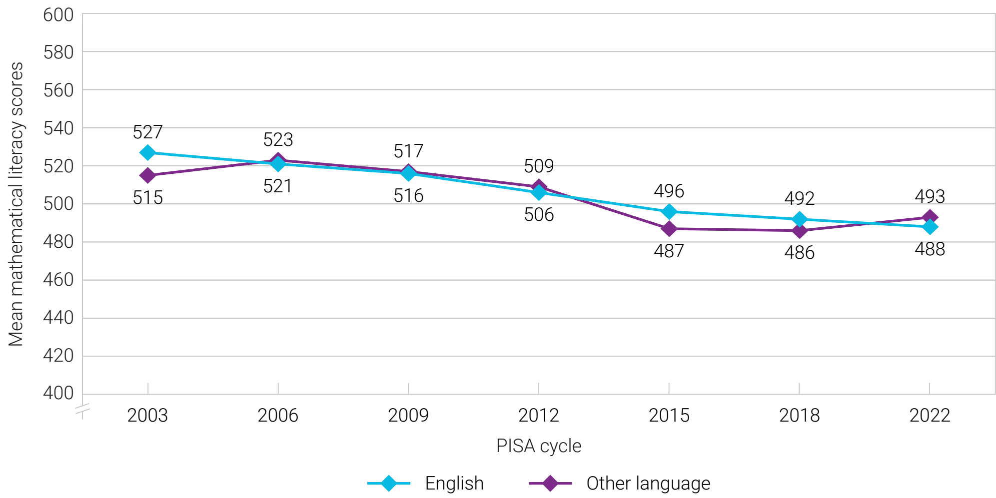
Figure 3.50 shows the mean mathematical literacy performance for students by language background, and their changes in performance over time.

Between PISA 2018 and 2022, the mean mathematical literacy performance did not change for students from the 2 language background groups.

Between PISA 2012 and 2022, the mean mathematical literacy performance declined for students who spoke English at home by 18 points, and for students who spoke a language other than English at home by 16 points.

Between PISA 2003 and 2018, the mean mathematical literacy performance declined by 39 points for students who spoke English at home, and by 22 points for students who spoke a language other than English.

7 For more information about immigrant background, please refer to the Reader's guide.



English

Difference between PISA cycles

	2018		2015		2012		2009		2006		2003	
2022	-4		-8	▼	-18	▼	-28	▼	-33	▼	-39	▼
2018			-4		-14	▼	-24	▼	-29	▼	-35	▼
2015					-10	▼	-20	▼	-25	▼	-31	▼
2012							-10	▼	-15	▼	-21	▼
2009									-5		-11	▼
2006											-6	

Other language

Difference between PISA cycles

	2018		2015		2012		2009		2006		2003	
2022	7		6		-16	▼	-24	▼	-30	▼	-22	▼
2018			-1		-23	▼	-31	▼	-37	▼	-29	▼
2015					-22	▼	-30	▼	-36	▼	-28	▼
2012							-8		-14		-6	
2009									-6		2	
2006											8	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 3.50 Mean mathematical literacy performance and differences from PISA 2003 to 2022, by language background

Proficiency over time

Figure 3.51 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the mathematical literacy proficiency scale by language background. For both groups of students, across the 7 cycles of PISA there has been a general increase in low performers and a decrease in high performers.

High and low performers

Between PISA 2018 and 2022, the proportion of low-performing English-speaking students increased by 4 percentage points.

Between PISA 2012 and 2022, low performers increased by 7 percentage points for English-speaking students, but the proportion of high performers decreased by 3 percentage points. For students who spoke a language other than English at home, the proportion of low performers increased by 5 percentage points, but high performers decreased by 4 percentage points.

Between PISA 2003 and 2022, low performers increased by 12 percentage points for English-speaking students, while high performers declined by 8 percentage points. There was a 9 percentage point increase in low performers who spoke a language other than English at home, while the proportion of high performers did not change.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of English-speaking students who attained the National Proficient Standard decreased by 4 percentage points.

Between PISA 2012 and 2022, the proportions of students who attained the National Proficient Standard decreased by 8 percentage points for students who spoke English at home and by 6 percentage points for students who spoke a language other than English at home.

Between PISA 2003 and 2022, the proportion of students who attained the National Proficient Standard decreased by 17 percentage points for students who spoke English at home and 9 percentage points for students who spoke a language other than English at home.

English			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	12	68
2018	22	10	67
2015	21	11	65
2012	19	14	59
2009	15	16	57
2006	12	16	55
2003	13	20	51

Other language			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	28	17	62
2018	28	14	65
2015	27	13	62
2012	23	20	59
2009	20	21	52
2006	15	21	51
2003	19	19	53

60 40 20 0 20 40 60
Students (%)

FIGURE 3.51 Proportions of low and high performers and students who attained the National Proficient Standard on the mathematical literacy proficiency scale from PISA 2003 to 2022, by language background

4

Australian student performance in scientific literacy

This chapter provides results on Australian student performance in scientific literacy. The results focus on performance by country, across states and territories, by gender and for different demographic groups of interest. Results are reported for PISA 2022 and over cycles.

This report focuses on differences that are statistically significant (are unlikely to have occurred by chance). Where the commentary states that there was a difference between sets of numbers (whether these were mean scores or percentages), it means that the difference satisfied this condition. Where it states that there was no difference, or where no comment is made regarding a possible comparison, it indicates that the difference was not statistically significant. For more information about statistical significance, please refer to the Reader's guide.

Because of rounding, the totals in the text may not add up exactly to the corresponding individual country numbers or percentages as reported in the related figure or table. For more information about rounding of figures, please refer to the Reader's guide.

Countries who did not meet one or more of the sampling technical standards are annotated with asterisks in Figures 4.1 to 4.6.

Key findings

- Australian students achieved an average of 507 score points in scientific literacy in PISA 2022, which was higher than the OECD average of 485 score points.
- Australia was outperformed by students in 8 OECD countries or economies. The highest performing economy in PISA 2022 was Singapore, with an average achievement of 561 score points. This was 77 score points and more than 1 full standard deviation higher than the OECD average, 54 score points higher than Australia.
- Since 2006, when scientific literacy was first assessed as a major domain, Australia's average score has declined by 20 points. The OECD average has declined by 12 points. Singapore, Macao (China), Chinese Taipei, Korea, Hong Kong (China) and Canada, all consistently performed at higher levels than Australian in PISA. Japan outperformed Australia in all cycles other than 2006. Only Ireland, which performed at a lower level than Australia in previous cycles, showed a performance similar to Australia's in 2022. While Finland and Switzerland performed at a higher level than Australia in 2006, their 2022 performance was not different to Australia's, and the Netherlands performed at a higher level than Australia in previous cycles but performed at a lower level than Australia in 2022.
- 13% of Australian students were classified as high performers. This was higher than the OECD average of 7% but contrasted with 24% of students in Singapore. The percentage of high performers in Australia has remained unchanged between 2006 and 2022.
- 20% of Australian students were low performers. This was lower than the OECD average of 24% but contrasted with Macao (China), which had 7% low performers. The proportion of low performers in Australia has increased by 7 percentage points between 2006 and 2022.
- In Australia, Level 3 has been identified as the National Proficient Standard in scientific literacy. 58% of Australian students attained this standard, which was 9 percentage points lower than in 2006.
- The performance of students in the Australian Capital Territory (523 points) was higher than students in all jurisdictions, except for Western Australia (518 points). Sixty six per cent of students in the Australian Capital Territory attained the National Proficient Standard, while 62% of students in Western Australia attained the National Proficient Standard.
- Between PISA 2006 and 2022, with the exception of the Northern Territory and Victoria, all remaining jurisdictions declined in performance ranging from 15 points in Tasmania to 48 points in South Australia.
- Independent schools outperformed Catholic schools, which in turn outperformed government schools. After adjusting for the socioeconomic background at both the student level and school level, there were differences between students in government and Catholic schools, with students in governments schools performing at a higher level, and differences between students in independent and Catholic schools, with students in independent schools performing at a higher level. This means that given similar socioeconomic backgrounds, government schools achieved a higher performance in scientific literacy than Catholic schools, and independent schools achieved a higher performance than Catholic schools.
- In 2022, there was no gender difference in scientific literacy mean performance, there was no gender difference between the percentages of low performers; however, there was a 2 percentage point difference for both male and female high performers.

4.1 Australia's scientific literacy results in an international context

Performance

Australian students achieved an average of 507 points in scientific literacy. This was higher than the OECD average of 485 points.

Singapore was the highest scoring economy with a mean score of 561 points. This score was 77 points higher than the OECD average, and 54 score points higher than Australia. Japan was the next highest performer, with an average achievement of 547 score points, 62 score points higher than the OECD average and 40 score points higher than Australia.

The performance of Australian students was:

- below students in 8 countries or economies (Singapore, Japan, Macao (China), Chinese Taipei, Korea, Estonia, Hong Kong (China) and Canada).
- not different to students in 4 countries (Finland, New Zealand, Ireland and Switzerland).
- higher than students in 69 other countries – notably Germany, whose score was 15 points lower.

This chapter only provides a commentary on those countries/economies who performed higher than the lowest performing OECD country (Costa Rica). The countries omitted from this chapter are:

Albania	El Salvador	Mexico	Peru
Argentina	Georgia	Montenegro	Philippines
Baku (Azerbaijan)	Guatemala	Morocco	Saudi Arabia
Brazil	Indonesia	North Macedonia	Thailand
Cambodia	Jamaica	Palestinian Authority	Uzbekistan
Cyprus	Jordan	Panama	
Dominican Republic	Kosova	Paraguay	

Figure 4.1 provides the mean scientific literacy scores, along with the distribution of student performance for all countries reported in this chapter. Eighty-one countries participated in PISA 2022; however, countries that attained a mean score lower than Costa Rica's (the lowest performing OECD country) are not included.

The measure of the range of performance (between the 10th and 90th percentiles) within each country varied considerably and seemed to be unrelated to the achieved mean score for that country. A smaller range between the lowest and highest performing students indicated that there was greater similarity in performance. Countries with the smallest range of performance included Kazakhstan (195 points), Costa Rica (206 points), the relatively high-performing Macao China (225 points), Estonia (232 points) and the very high-performing Singapore (258 points). A larger range between the lowest and highest performing students indicated there was greater diversity in performance. Countries with the largest range of performance included the Netherlands (296 points), the United Arab Emirates (287 points), and Israel (285 points), and the high-performing Korea (270 points) and Chinese Taipei (267 points).

In Australia, the difference between the lowest and highest performing students was 283 points. This was similar to Sweden (284 points), the United States (282 points), New Zealand (281 points), Germany (279 points) and Finland (278 points). The difference in scientific literacy performance between the highest and lowest performing students across the OECD countries was 254 points.

The difference in scientific literacy performance between the highest and lowest performing students across the partner economies was the greatest in the United Arab Emirates (287 points) and smallest in Mongolia (197 points).

	Country	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Significantly higher than Australia	Singapore	561	1.3	558–564	258
	Japan	547	2.8	541–552	241
	Macao (China)	543	1.1	540–545	225
	Chinese Taipei	537	3.3	530–543	267
	Korea	528	3.6	520–534	270
	Estonia	526	2.1	521–529	232
	Hong Kong (China)*	520	2.8	514–525	242
	Canada*	515	1.9	511–518	260
Not significantly different than Australia	Finland	511	2.5	506–515	278
	Australia*	507	1.9	503–510	283
	New Zealand*	504	2.2	499–508	281
	Ireland*	504	2.3	499–508	237
	Switzerland	503	2.2	498–506	261
Significantly lower than Australia	Slovenia	500	1.4	497–502	246
	United Kingdom*	500	2.4	495–504	271
	United States*	499	4.3	490–507	282
	Poland	499	2.5	494–504	253
	Czech Republic	498	2.3	493–502	260
	Latvia*	494	2.3	489–498	219
	Denmark*	494	2.5	488–498	246
	Sweden	494	2.4	488–498	284
	Germany	492	3.5	485–499	279
	Austria	491	2.7	486–496	266
	Belgium	491	2.5	485–495	266
	Netherlands*	488	4.1	480–496	296
	France	487	2.7	481–492	270
	Hungary	486	2.7	480–491	254
	OECD average	485	0.4	483–485	254
	Spain	485	1.6	481–487	238
	Lithuania	484	2.3	479–489	241
	Portugal	484	2.6	479–489	239
	Croatia	483	2.4	477–487	243
	Norway	478	2.4	473–482	276
	Italy	477	3.2	471–483	241
	Türkiye	476	1.9	472–479	234
	Viet Nam	472	3.6	465–479	199
	Malta	466	1.7	462–468	269
	Israel	465	3.4	458–471	285
	Slovak Republic	462	3.0	456–468	269
	Ukrainian regions	450	3.8	442–457	234
	Serbia	447	2.9	441–453	235
	Iceland	447	1.8	443–450	248
	Brunei Darussalam	446	1.3	443–448	245
	Chile	444	2.5	438–448	238
	Greece	441	2.8	435–446	236
	Uruguay	435	2.5	430–440	239
	Qatar	432	1.5	429–435	250
	United Arab Emirates	432	1.3	429–434	287
	Romania	428	3.9	419–435	252
	Kazakhstan	423	1.7	419–426	195
	Bulgaria	421	3.2	414–427	247
	Moldova	417	2.4	412–421	214
	Malaysia	416	2.3	411–420	202
	Mongolia	412	2.4	407–417	197
	Colombia	411	3.3	404–417	225
	Costa Rica	411	2.4	406–415	206

Distribution of scores

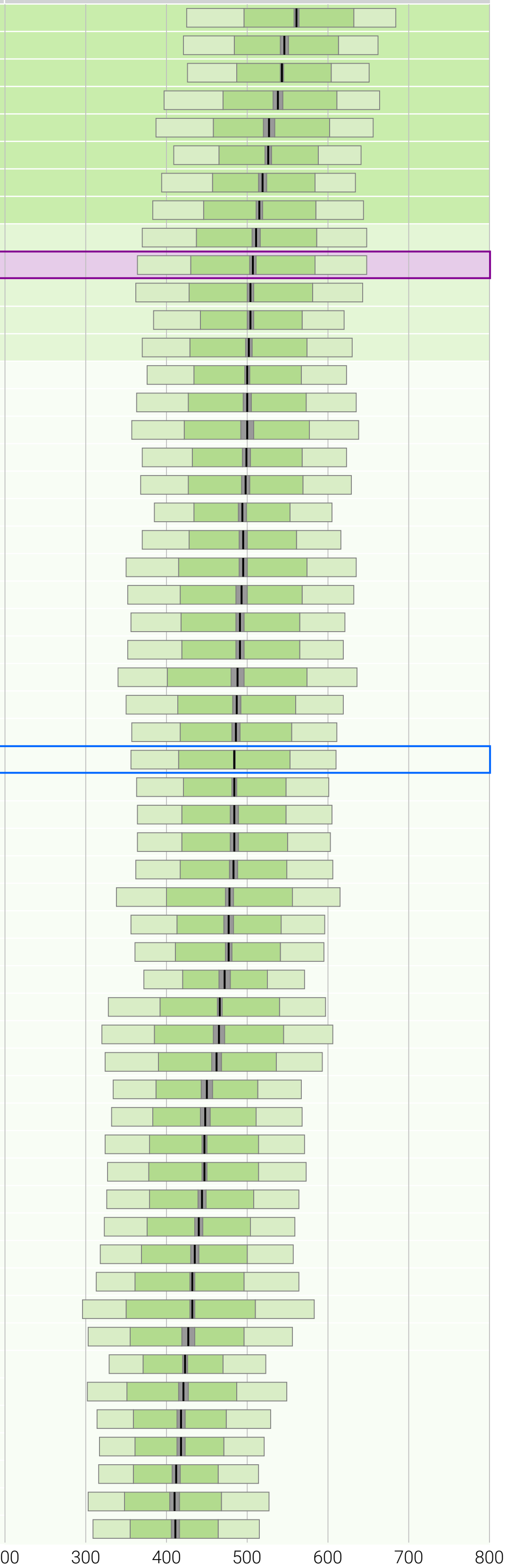


FIGURE 4.1 Mean scores and distribution of student performance on the scientific literacy scale, by country

Proficiency

The scientific literacy scale is divided into 7 levels of proficiency, with Level 6 as the highest and Level 1b as the lowest. One proficiency level in scientific literacy represents 75 score points. Figure 4.2 shows the percentage of students at each scientific literacy proficiency level from below Level 1b to Level 6, by country. Countries have been ordered by the percentage of students who performed below Level 2, which is the internationally assigned baseline benchmark. Countries with the lowest percentage of students below Level 2 are placed at the top of the figure and those with the highest portion are placed at the bottom.

High performers

Students who scored at Level 5 (633 points) or above are considered high performers in scientific literacy. High performers demonstrate high levels of skills and knowledge and can successfully complete most scientific literacy tasks in PISA.

On average, 7% of the students across the OECD countries were high performers.

Five of the very highest performing countries also had the largest percentage of high performers: 24% in Singapore, 18% in Japan and Chinese Taipei, 16% in Korea and 15% in Macao (China).

Two of the other highest performing countries had lower percentages of high performers: Canada had 12%, Estonia and Hong Kong (China) each had 11%.

Nine other countries had between 10% and 13% high performers (Australia and Finland 13%, New Zealand 12%, the Netherlands and the United States (11%), and Germany, Sweden, Switzerland and the United Kingdom had 10% high performers).

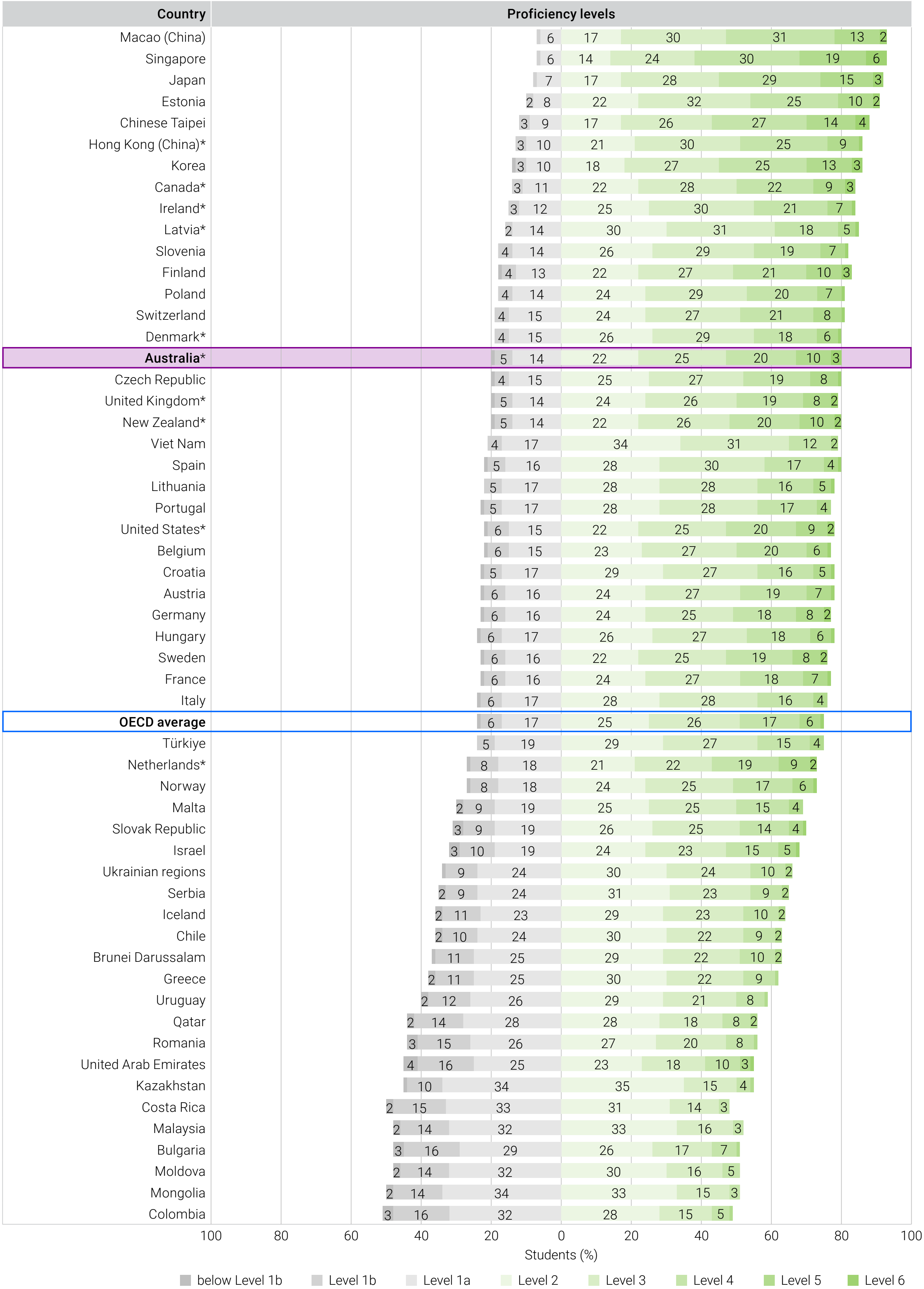
Low performers

Students who scored below Level 2 in scientific literacy (lower than 410 points) are considered low performers. Students who do not achieve this level are unable to demonstrate the capacity to use their scientific literacy skills to solve a wide range of practical problems.

On average, 24% of students across the OECD countries were low performers in scientific literacy.

The countries with the highest mean scores were also the countries with the smallest percentage of low performers. Macao (China) had 7% of low performers; Japan 8%, Singapore 8%, Estonia 10%, Chinese Taipei 12%, Hong Kong (China) 13%, Korea 14%, and Canada 15%.

Australia, New Zealand, the Czech Republic, and the United Kingdom had 20% of low performers.



Note: if the proportion of students in a proficiency level is 1% or lower, the level is shown but without the numeric label '1'. This convention has been used for all figures about proficiency levels in this chapter.

FIGURE 4.2 Percentages of students across the scientific literacy proficiency scale, by country

Performance over time

PISA compares results between cycles and monitors the knowledge and skills of 15-year-old students over time. Scientific literacy has been assessed as a major domain twice: in 2006 and 2015. Figure 4.3 provides the mean scientific literacy score differences for the previous cycle and when scientific literacy was the major domain:

- between PISA 2018 and 2022
- between PISA 2015 and 2022
- between PISA 2006 and 2022.

Between 2018 and 2022

- 13 countries improved their performance in scientific literacy. Kazakhstan had the largest improvement with a 26-point increase; Chinese Taipei increased by 22 points; Japan by 17 points; Brunei Darussalam by 15 points; Qatar by 13 points; Singapore, Croatia, and Uruguay 10 points; Italy and Malta 9 points; Ireland and Türkiye 8 points; and, Latvia 7 points.
- 11 countries (Belgium, Germany, Greece, Finland, Iceland, Malaysia, Moldova, the Netherlands, Norway, Poland and Slovenia) declined in their performance. Iceland had the largest average decline of 28 points.
- Australia's mean performance in PISA 2022 (507 points) remained unchanged from its performance in PISA 2018 (503 points).

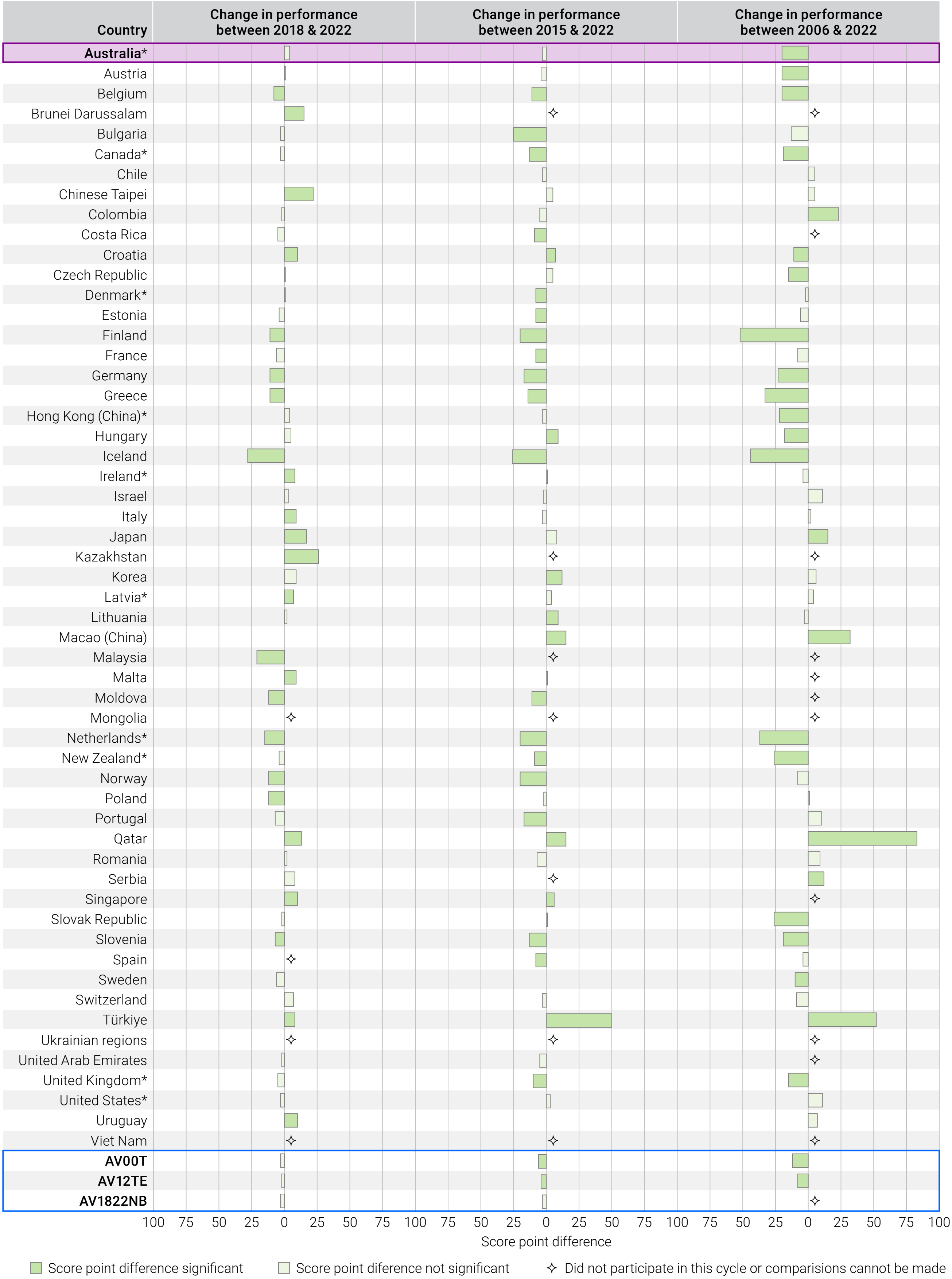
Between 2015 and 2022

- 8 countries improved their performance in scientific literacy. Türkiye had the largest improvement with a 50-point increase; Qatar and Macao (China) both increased by 15 points; Korea by 12 points; Hungary and Lithuania by 9 points; Croatia by 7 points; and Singapore by 6 points.
- 19 countries declined in their performance (France, Denmark, Spain, Estonia, Costa Rica, New Zealand, the United Kingdom, Moldova, Belgium, Canada, Slovenia, Greece, Germany, Portugal, Finland, Norway, the Netherlands, Bulgaria, and Iceland). Iceland had the largest average decline of 26 points, while Denmark, Estonia, France and Spain equally had the smallest decline of 8 points.
- Australia's mean performance in PISA 2022 (507 points) remained unchanged from 2015 (510 points).
- The OECD average (AV00T) was 497 in PISA 2015, and declined by 6 points in PISA 2022 to 491 points.[1]

Between 2006 and 2022

- 6 countries (Qatar, Türkiye, Macao (China), Colombia, Japan, and Serbia) improved their scientific literacy performance. The increase in performance ranged from 12 points in Serbia to 83 points in Qatar.
- 18 countries (Finland, Iceland, the Netherlands, Greece, New Zealand, Slovak Republic, Germany, Hong Kong (China), Australia, Belgium, Canada, Slovenia, Hungary, the Czech Republic, the United Kingdom, Croatia and Sweden) declined in their scientific literacy performance. The decline ranged from 10 points in Sweden to 52 points in Finland.
- Australia's mean performance in PISA 2006 was 527 points, which declined by 20 points to a mean score of 507 points in 2022.
- The OECD average (AV00T) was 503 in PISA 2006, and declined by 12 points in PISA 2022 to 491 points.[1]

1 Based on the average across OECD countries that compare performance across all assessments, from PISA 2006 through to PISA 2022 (AV00T).



AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 4.3 Mean differences in student performance on the scientific literacy scale, between PISA 2018 and 2022, 2015 and 2022 and 2006 and 2022, by country

Relative trends over time

Table 4.1 shows the position of a participating country relative to Australia in scientific literacy performance from PISA 2006 to 2022. Countries are shown in order of highest to lowest performing for PISA 2022.

- Across the PISA cycles, 25 countries consistently performed at lower levels than Australia (Brunei Darussalam, Bulgaria, Chile, Colombia, Costa Rica, Croatia, Greece, Hungary, Israel, Kazakhstan, Lithuania, Malaysia, Malta, Moldova, Mongolia, Qatar, Romania, Serbia, Spain, Türkiye, Ukraine regions, United Arab Emirates, the United States, Uruguay and Viet Nam).
- Singapore, Macao (China), Chinese Taipei, Korea, Hong Kong (China) and Canada all consistently performed at higher levels than Australia. Japan outperformed Australia in all cycles other than 2006.

From 2006 to 2022, New Zealand's performance has not been different to Australia's.

The performance of a number of countries relative to Australia has changed over time.

- Ireland performed at a lower level than Australia in 2006 and 2009; but in 2022 their performance was not different to Australia's.
- Finland and Switzerland performed at a higher level than Australia in 2006; but in 2022 their performance was not different to Australia's.
- Japan and Estonia both performed at a level not different to Australia in 2006; but their performances have been higher than Australia's since 2012.
- The Netherlands performed at a higher level than Australia in 2006; but in 2022 their performance was lower than Australia's.

TABLE 4.1 Relative trends in scientific literacy performance, by country

	Position relative to Australia in other PISA cycles					
Country	**2022**	**2018**	**2015**	**2012**	**2009**	**2006**
Singapore	▲	▲	▲	▲	▲	–
Japan	▲	▲	▲	▲	▲	●
Macao (China)	▲	▲	▲	▲	▲	▲
Chinese Taipei	▲	▲	▲	▲	▲	▲
Korea	▲	▲	▲	▲	▲	▲
Estonia	▲	▲	▲	▲	●	●
Hong Kong (China)	▲	▲	▲	▲	▲	▲
Canada	▲	▲	▲	▲	▲	▲
Finland	●	▲	▲	▲	▲	▲
Australia						
New Zealand	●	●	●	●	●	●
Ireland	●	▲	▲	●	▼	▼
Switzerland	●	▲	▲	▲	▲	▲
Slovenia	▼	▲	▲	●	▼	▼
United Kingdom	▼	▲	●	▼	▼	▼
United States	▼	▼	▼	▼	▼	▼
Poland	▼	▲	▲	▲	▼	▼
Czech Republic	▼	▲	●	●	▼	▼
Latvia	▼	●	▼	▼	▼	▼
Denmark	▼	▲	▲	●	▼	▼
Sweden	▼	▲	●	▼	▼	▼
Germany	▼	▲	▲	▲	●	▼
Austria	▼	▲	●	●	–	▼
Belgium	▼	▲	▲	▲	●	●
Netherlands	▼	▲	▲	▲	▲	▲
France	▼	●	●	▼	▼	▼
Hungary	▼	▼	▼	▼	▼	▼
Spain	▼	▼	▼	▼	▼	▼
Lithuania	▼	▼	▼	▼	▼	▼
Portugal	▼	●	●	▼	▼	▼
Croatia	▼	▼	▼	▼	▼	▼
Norway	▼	▲	▲	▼	▼	▼
Italy	▼	●	●	▼	▼	▼
Türkiye	▼	▼	▼	▼	▼	▼
Viet Nam	▼	–	–	–	–	–
Malta	▼	▼	▼	–	–	–
Israel	▼	▼	▼	▼	▼	▼
Slovak Republic	▼	●	▼	▼	▼	▼
Ukrainian regions	▼	–	–	–	–	–
Serbia	▼	▼	–	▼	▼	▼
Iceland	▼	●	▼	▼	▼	▼
Brunei Darussalam	▼	▼	–	–	–	–
Chile	▼	▼	▼	▼	▼	▼
Greece	▼	▼	▼	▼	▼	▼
Uruguay	▼	▼	▼	▼	▼	▼
Qatar	▼	▼	▼	▼	▼	▼
United Arab Emirates	▼	▼	▼	▼	▼	–
Romania	▼	▼	▼	▼	▼	▼
Kazakhstan	▼	▼	–	▼	▼	–
Bulgaria	▼	▼	▼	▼	▼	▼
Moldova	▼	▼	▼	–	▼	–
Malaysia	▼	▼	–	▼	▼	–
Mongolia	▼	–	–	–	–	–
Colombia	▼	▼	▼	▼	▼	▼
Costa Rica	▼	▼	▼	▼	▼	–

Note: ▲ Score signficantly higher than Australia's
● Score not significantly different to Australia's
▼ Score signficantly lower than Australia's
– Did not participate in this cycle or comparisons cannot be made

Proficiency over time

Figure 4.4 shows the change in proportions of low and high performers on the scientific literacy proficiency scale for PISA 2006 and 2022 by country, and the differences in performance between PISA 2006 and 2022, PISA 2015 and 2022, and 2018 and 2022, by country. A number of countries' proportions of high and low performers have changed over time.

Between PISA 2018 and 2022

- In Australia between 2018 and 2022, the percentage of low performers remained about the same, while the percentage of high performers increased by 3 percentage points.
- There was a 2 percentage point increase in low performers across the OECD countries, while the percentage of high performers across the OECD countries (AV00T) increased by 1 percentage point (see Footnote 1).
- The percentage of high performers increased in 16 countries (Australia, Austria, Chile, Chinese Taipei, Costa Rica, Croatia, Hong Kong (China), Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Singapore, Türkiye and Uruguay). The improvement in the percentages of high performers ranged from 0.3 percentage points in Costa Rica to 6 percentage points in Chinese Taipei.
- The percentage of high performers declined in Iceland by 2 percentage points.
- The percentage of low performers increased in 14 countries (Canada, Finland, France, Germany, Greece, Iceland, Malaysia, Moldova, Norway, the Netherlands, Poland, Slovenia, Sweden and the United Kingdom). These increases ranged from 2 percentage points in Canada to 11 percentage points in Iceland and Malaysia.
- The percentage of low performers declined in 6 countries (Brunei Darussalam, Chinese Taipei, Japan, Kazakhstan, Malta and Qatar). These declines ranged from 3 percentage points in Japan to 15 percentage points in Kazakhstan.

Between PISA 2015 and 2022

- In Australia between 2015 and 2022, the percentage of low performers increased by 2 percentage points, while the percentage of high performers remained about the same.
- There was a 3 percentage point increase in low performers across OECD countries , while the percentage of high performers across the OECD countries (AV00T) remained unchanged (see Footnote 1).
- The percentage of high performers increased in 12 countries (Croatia, the Czech Republic, Hong Kong (China), Hungary, Korea, Latvia, Macao (China), Qatar, Romania, Türkiye, the United Arab Emirates and the United States). These increases ranged from 1 percentage point in Croatia, Latvia, Qatar, Romania and the United Arab Emirates to 6 percentage points in Macao (China).
- The percentage of high performers declined in 6 countries (Belgium, Bulgaria, Iceland, Malta, Portugal and Slovenia). These declines ranged from 1 percentage point in Bulgaria and Iceland to 3 percentage points in Malta, Portugal and Slovenia.
- The percentage of low performers increased in 21 countries (Australia, Belgium, Bulgaria, Canada, Costa Rica, Denmark, Finland, Germany, Greece, Hong Kong (China), Iceland, Moldova, the Netherlands, New Zealand, Norway, Portugal, Romania, Slovenia, Spain, the United Arab Emirates and the United Kingdom). The improvement in the percentages of high performers ranged from 2 percentage points in Australia, to 11 percentage points in Iceland.
- The percentage of low performers declined in 5 countries (Hungary, Lithuania, Qatar, Singapore and Türkiye). These declines ranged from 2 percentage points in Singapore to 20 percentage points in Türkiye.

AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 4.4 Change in proportions of low and high performers on the scientific literacy proficiency scale between PISA 2006 and 2022, 2015 and 2022, and 2018 and 2022, by country

Between PISA 2006 and 2022

- In Australia between 2006 and 2022, the percentage of low performers increased by 7 percentage points, while the percentage of high performers remained about the same.
- There was a 4 percentage point increase of low performers across the OECD countries, while the percentage of high performers across the OECD countries (AV00T) remained unchanged (see Footnote 1).
- The percentage of high performers increased in 9 countries (Macao (China), Korea, Portugal, Qatar, Sweden, Colombia, Romania, Serbia, and Türkiye). The improvement in the percentages of high performers ranged from 1 percentage point in Colombia, Romania and Serbia to 9 percentage points in Macao (China).
- The percentage of high performers declined in 13 countries (Austria, Belgium, Bulgaria, Canada, Czech Republic, Finland, Greece, Hong Kong (China), Iceland, the Netherlands, New Zealand, Slovenia and the United Kingdom). These declines ranged from 2 percentage points in Austria, Bulgaria, Canada and Greece, to 8 percentage points in Finland.
- The percentage of low performers increased in 21 countries (Australia, Austria, Belgium, Canada, Croatia, Czech Republic, Estonia, Finland, Germany, Greece, Hong Kong (China), Hungary, Iceland, the Netherlands, New Zealand, Norway, Slovak Republic, Slovenia, Sweden, Switzerland and the United Kingdom). These increases ranged from 2 percentage points in Estonia to 15 percentage points in Iceland.
- The percentage of low performers declined in 5 countries (Colombia, Japan, Macao (China), Qatar and Türkiye). These declines ranged from 3 percentage points in Macao (China) to 35 percentage points in Türkiye.

Countries by gender

Performance

Figure 4.5 provides the mean scores and standard errors for female and male students on the scientific literacy scale, graphs the difference by gender and indicates whether the difference was significant.

In scientific literacy, the gender gap in performance in 2022 was narrower than in mathematical literacy and reading literacy. Across the OECD countries, the mean score for both female and male students was 485 points. Female students outperformed male students in 17 countries, with the largest differences in Finland (22 points) and Qatar (21 points).

In 9 countries, male students scored higher than female students. Costa Rica had the largest score difference of 15 points between males and females, followed by Chile with 14 points.

In Australia, female students scored at a similar level to male students (506 and 508 points respectively).

Country	Females		Males		Differences in mean score
	Mean score	SE	Mean score	SE	
Costa Rica	404	2.5	418	3.0	
Chile	436	2.8	450	3.0	
Austria	485	3.0	497	3.1	
Uruguay	431	2.8	440	3.1	
United Kingdom*	496	3.1	504	3.1	
Denmark*	490	2.7	497	3.3	
Singapore	558	1.9	565	1.9	
United States*	496	4.3	503	5.2	
Italy	474	3.0	481	4.2	
Colombia	408	3.5	414	3.7	
Viet Nam	470	3.5	475	4.1	
Ireland*	501	3.0	507	3.0	
Spain	482	1.7	487	2.1	
Hungary	484	3.1	488	3.4	
Chinese Taipei	536	4.0	539	4.3	
Australia*	506	2.3	508	2.7	
Netherlands*	487	4.6	489	4.3	
Japan	546	2.9	548	3.8	
Macao (China)	542	1.6	544	1.7	
Latvia*	493	2.6	495	2.5	
Canada*	515	2.1	515	2.4	
Germany	492	3.5	493	4.1	
Switzerland	502	2.6	503	2.8	
Belgium	491	3.1	491	3.5	
Hong Kong (China)*	520	3.2	520	3.2	
OECD average	485	0.5	485	0.6	
Israel	465	3.2	465	5.2	
Ukrainian regions	450	4.1	450	5.0	
New Zealand*	504	2.9	504	3.1	
Romania	428	4.1	427	4.2	
France	488	3.0	487	3.7	
Portugal	485	2.9	484	2.8	
Poland	500	3.1	498	3.1	
Czech Republic	499	2.6	497	3.5	
Korea	530	3.8	526	5.2	
Estonia	528	2.6	524	2.3	
Serbia	449	3.0	446	3.7	
Türkiye	478	2.8	473	2.9	
Kazakhstan	426	2.0	421	2.2	
Lithuania	487	2.4	482	2.9	
Slovak Republic	466	3.7	459	3.3	
Moldova	421	2.5	413	2.9	
Sweden	498	2.6	489	3.1	
Greece	446	2.8	436	3.6	
Croatia	488	3.3	477	2.9	
Malta	472	2.5	460	2.4	
Brunei Darussalam	452	1.9	440	1.7	
Iceland	454	2.6	440	2.5	
Malaysia	423	2.5	410	2.8	
Norway	485	2.8	472	2.9	
Mongolia	420	2.7	405	2.6	
Slovenia	508	1.9	493	2.0	
Bulgaria	430	3.5	413	3.9	
United Arab Emirates	441	1.5	424	1.8	
Qatar	443	1.8	422	2.1	
Finland	522	2.6	500	3.0	

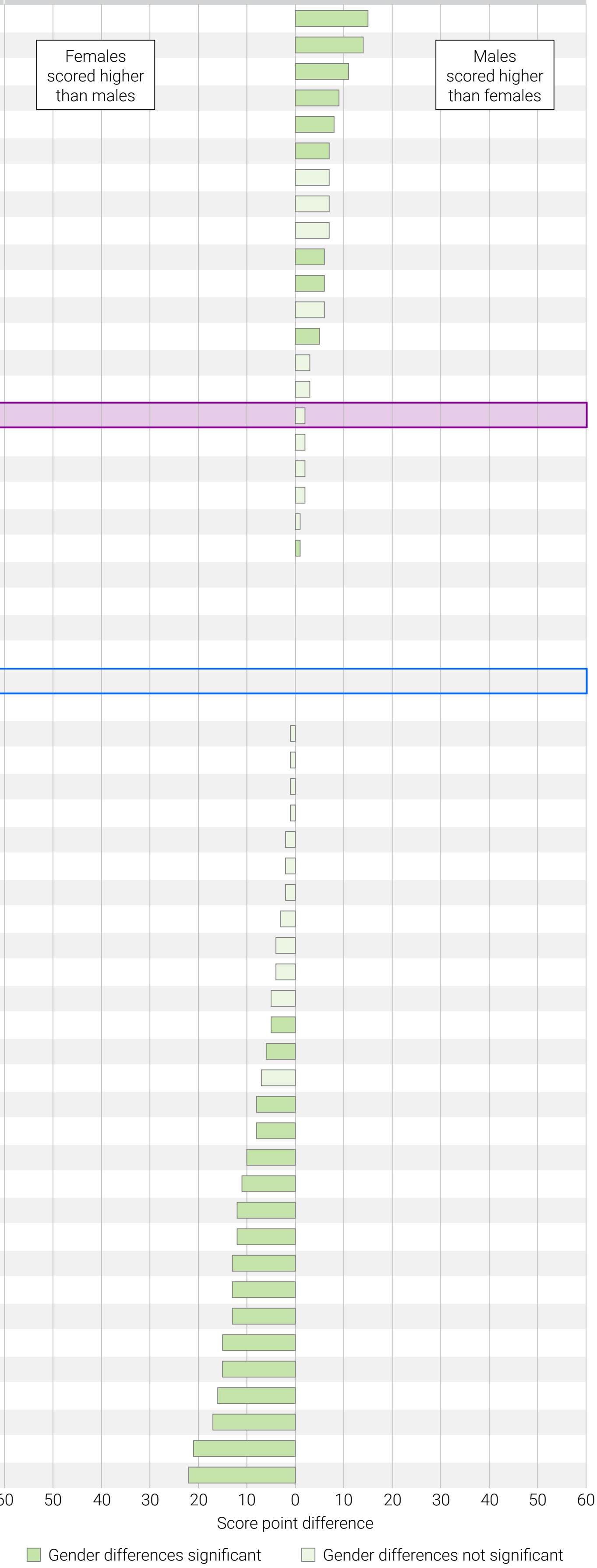


FIGURE 4.5 Mean scores and differences in student performance on the scientific literacy scale, by country and gender

Proficiency

Figure 4.6 shows the proportions of high- and low-performing male and female students in scientific literacy by country and their associated gender gaps. Countries are ordered by their mean score in scientific literacy.

High performers

- In Australia, there were more high performers (females: 11%; males: 14%) than there were across the OECD countries (females: 7%; males: 8%).
- In most of the reported countries in scientific literacy, there were more male high performers than female high performers, except in Finland where there was a higher percentage of female high performers (females: 14%; males: 12%).
- Five of the highest performing countries had the highest proportion of high performers and the largest gender gap: Singapore (females 22%; males 27%), Chinese Taipei (females 16%; males 20%), Macao (China) (females 13%; males 17%) and Japan (females 16%; males 20%).
- The other highest performing countries had smaller gender gaps in their proportions of high performers: Hong Kong (China) (females: 9%; males: 12%), Canada (females: 11%; males: 13%), in Estonia and Korea the gender differences were the same.

Low performers

- The percentage of Australian low performers (females: 19%; males: 21%) was lower than the percentage across the OECD countries (females: 23%; males: 26%).
- In most of the reported countries in scientific literacy, there was a higher proportion of male low performers than of female low performers, except in Costa Rica (females: 54%; males: 47%), and Chile (females 39%; males; 34%). In 21 out of 56 reported countries, however, there were no differences between the genders in percentage of low performers.
- The widest gender gaps in percentages among low performers in which there was a higher proportion of male students was in Qatar (females: 38%; males: 50%), Bulgaria (females: 43%; males: 52%), Malaysia (females: 43%; males: 52%), Mongolia (females: 45%; males 54%), the United Arab Emirates (females: 41%; males: 49%) and Finland (females: 14%; males: 22%).
- Seven of the highest performing countries had the smallest percentage of low performers and smaller gaps between the proportion of female and male low performers. This was observed in Canada (females: 14%; males: 16%), Macao (China) (females: 6%; males: 8%), Japan (females: 7%; males: 9%), Estonia (females: 9%; males: 11%), Hong Kong (China) (females: 11%; males:14%), Chinese Taipei (females: 11%; males: 13%) and Korea (females: 12%; males: 15%).
- In Singapore, the highest performing country, there was no gender difference in the percentages of low performers.

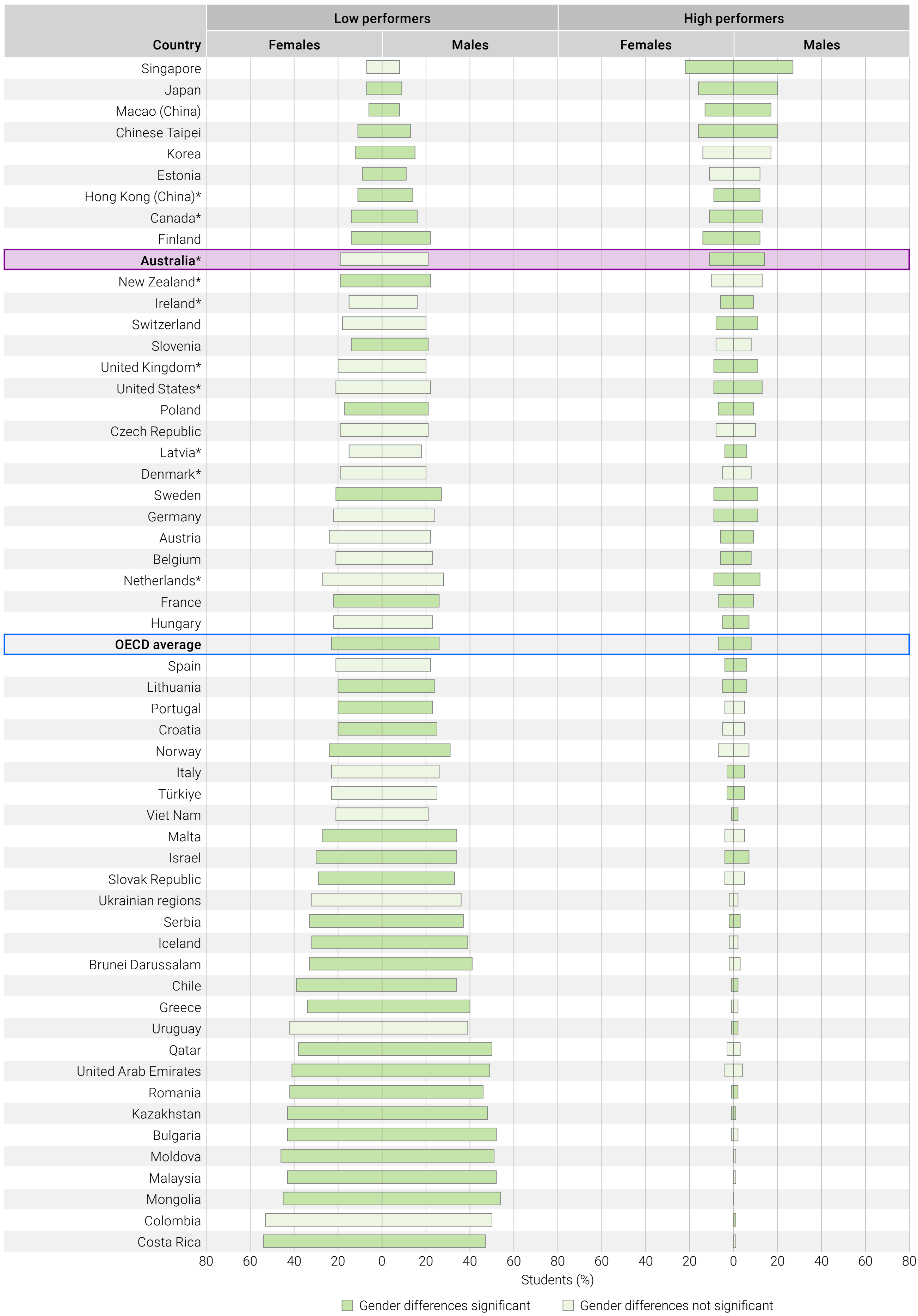


FIGURE 4.6 Proportions of low and high performers in scientific literacy, by country and gender

4.2 Australia’s scientific literacy results in a national context

Australia

Performance

Figure 4.7 shows the mean scientific literacy scores along with the distribution of student performance for Australia, the OECD and as a point of comparison, Singapore, the highest performing country in scientific literacy.

As mentioned in section 4.1, Australian students attained a mean score of 507 points in scientific literacy. This was higher than the OECD average of 485, but a substantial 54 score points lower than Singapore (561 points).

	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Australia	507	1.9	503–510	283
OECD average	485	0.4	483–485	254
Singapore	561	1.3	558–564	258

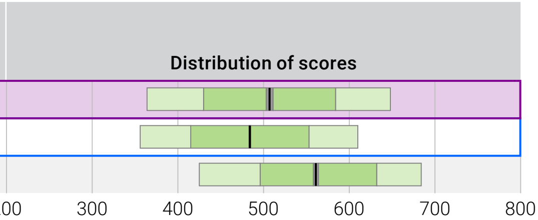


FIGURE 4.7 Mean scores and distribution of student performance on the scientific literacy scale, for Australia

Proficiency

On average across the OECD countries, the percentage of low performers in scientific literacy (that is, those students who did not attain Level 2) was 24% compared to 20% of students in Australia.

Figure 4.8 shows that in scientific literacy across the OECD countries, most students performed at proficiency Levels 2 (25%) and 3 (26%). In Australia, 22% of students performed at Level 2 and 25% performed at Level 3.

Across the OECD countries, 7% of students were high performers (that is, those students who attained the highest proficiency levels, Levels 5 and 6). In Australia, 13% of students attained proficiency Levels 5 and 6.

In PISA 2022, 58% of Australian students attained the National Proficient Standard (Level 3 or above) in scientific literacy. This was higher than the OECD average.

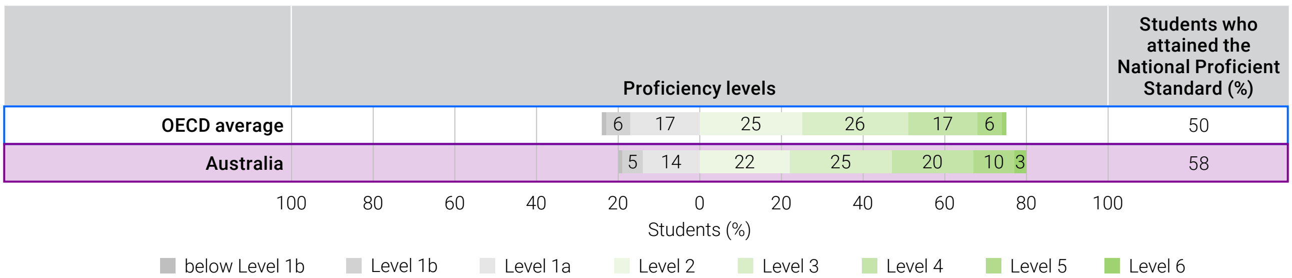


FIGURE 4.8 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, for Australia

Performance over time

Figure 4.9 shows the mean scientific literacy performance for Australia for the 6 PISA cycles since 2006, along with details about the changes in performance between the cycles. In this time, Australia’s mean score declined by 20 points from 527 points in 2006 and 2009, to 507 points in 2022.

There was a 14 point decline in performance between PISA 2012 and 2022.

There was no statistically significant change in scientific literacy performance between PISA 2015 and 2022 and between PISA 2018 and 2022.

Examining achievement at the percentiles provides further detail to help understand where changes in Australia's scientific literacy performance has occurred. Figure 4.10 shows the distribution of scientific literacy performance from PISA 2006 to 2022, the mean scores, and the scores at the 10th, 25th, 75th and 90th percentiles.

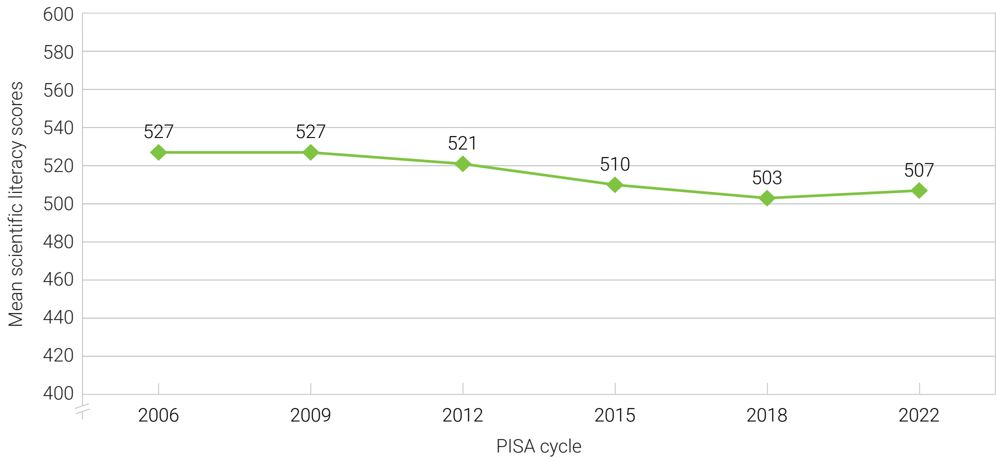
Between PISA 2018 and 2022, performance at the 75th and 90th percentiles increased by 8 and 17 points respectively.

Between PISA 2015 and 2022, performance at the 10th and 25th percentiles declined by 8 points, and at the 90th percentile performance increased by 8 points.

Between PISA 2006 and 2022, the declines in percentiles were larger except at the 90th percentile:

- the 10th percentile by 30 points
- the 25th percentile by 29 points
- the 75th percentile by 14 points.

Between PISA 2006 and 2018 the range of performance between the 10th and the 90th percentiles has remained constant. In PISA 2006, the difference was 259 points, while in 2018 the difference was 262 points. Between PISA 2018 and 2022, the difference between the lowest and highest performing students increased to 283 points. This indicates that there was a broader range of student abilities in 2022 than there was in 2006.



	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	4		-3		-14	▼	-20	▼	-20	▼
2018			-7	▼	-18	▼	-24	▼	-24	▼
2015					-11	▼	-17	▼	-17	▼
2012							-6		-6	
2009									0	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.9 Mean scientific literacy performance and differences from PISA 2006 to 2022, for Australia

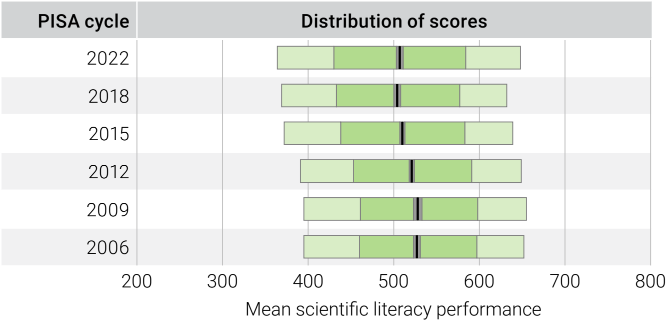


FIGURE 4.10 Distribution of student performance on the scientific literacy scale from PISA 2006 to 2022, for Australia

Proficiency over time

Figure 4.11 shows the percentage of Australian students at each scientific literacy proficiency level and the proportions of students who attained the National Proficient Standard from PISA 2006 to 2022.

High performers

Between PISA 2018 and 2022, there was a 3 percentage point increase in the proportion of high performers.

Between PISA 2015 and 2022, there was no difference in the proportion of high performers.

Between PISA 2006 and 2022, there was a 2 percentage point decrease in the proportion of high performers.

Low performers

Between PISA 2018 and 2022, there was no difference in the proportion of low performers.

Between PISA 2015 and 2022, was a 2 percentage point increase in the proportion of low performers.

Between PISA 2006 and 2022, there was a 7 percentage point increase in the proportion of low performers.

National Proficient Standard

The proportion of students who attained the National Proficient Standard in 2022 (58%) remained the same as in 2018 (58%).

Between PISA 2015 and 2022, this proportion declined by 3 percentage points and again by 9 percentage points between PISA 2006 and 2022. This was not different from 2009 but a 7 percentage point decline since 2012.

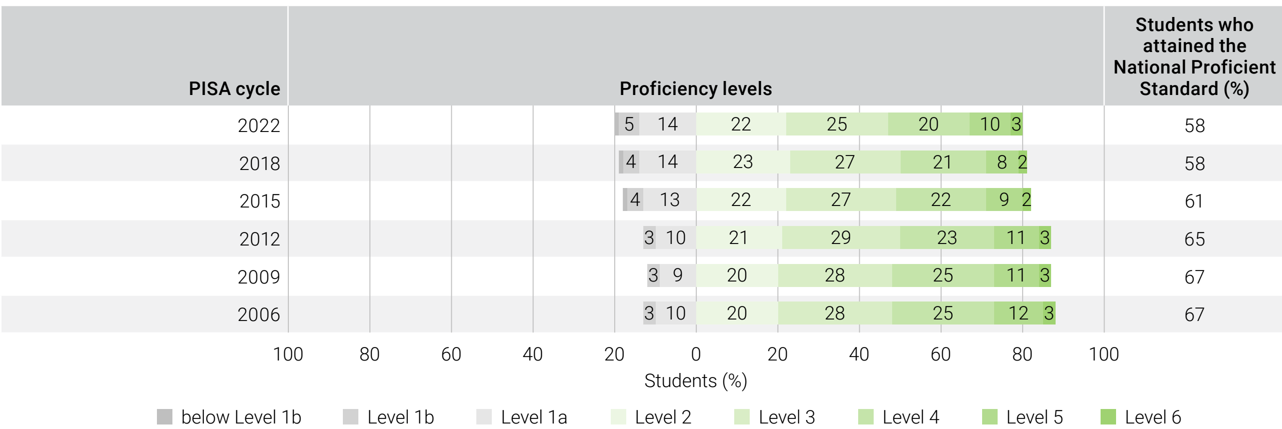


FIGURE 4.11 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard from PISA 2006 to 2022, for Australia

Australia by gender

Performance

As mentioned in section 4.1, a smaller range between the lowest and highest performing students indicates greater similarity in performance. The findings were similar for female and male students as shown in figure 4.12.

- In Australia, female and male students performed similarly in scientific literacy, with a range of 270 points for females and a slightly wider range of 296 for males.
- Across the OECD countries, female and male students also performed similarly in scientific literacy with a range for females of 243 points and, again, slightly wider for males at 265 points.
- In scientific literacy, Australian female students performed 21 points higher than female students across the OECD countries, while Australian male students performed 23 points higher than male students across the OECD countries.

	Gender	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Australia	Females	506	2.3	478–510	270	
	Males	508	2.7	502–513	296	
OECD average	Females	485	0.5	483–485	243	
	Males	485	0.6	483–485	265	

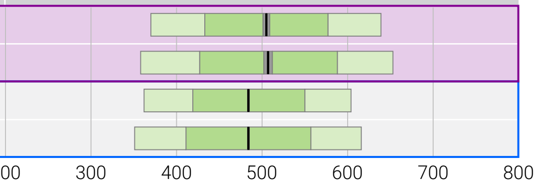


FIGURE 4.12 Mean scores and distribution of student performance on the scientific literacy scale, for Australia by gender

Proficiency

Figure 4.13 shows the percentages of Australian female and male students and the OECD average at each scientific literacy proficiency level, and the proportion of students who attained the National Proficient Standard.

High performers

- There were more Australian female high performers (11%) than on average across the OECD countries (7%).
- There were more Australian male high performers (14%) than the average across the OECD countries (8%).

Low performers

- There were fewer Australian female low performers (19%) than the average across the OECD countries (23%).
- There were fewer Australian male low performers (21%) than the average across OECD countries (26%).

National Proficient Standard

- In 2022, 58% of Australian female and male students attained the National Proficient Standard.

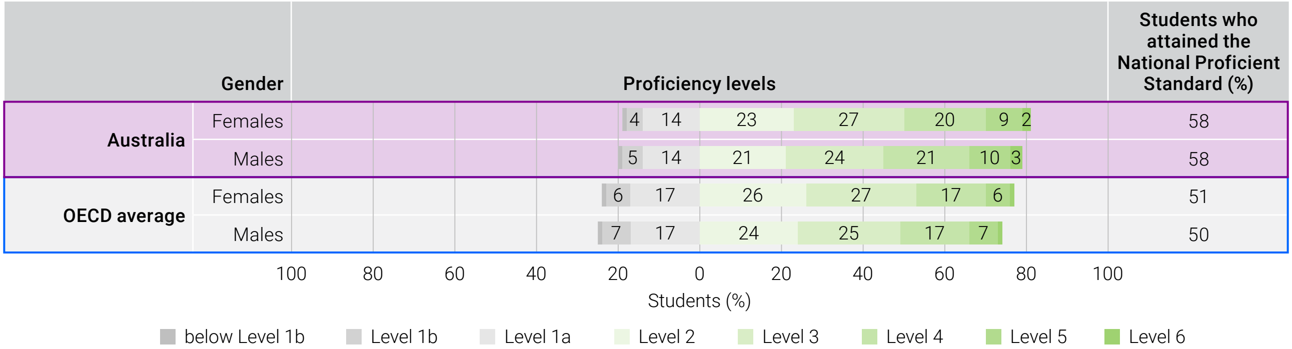


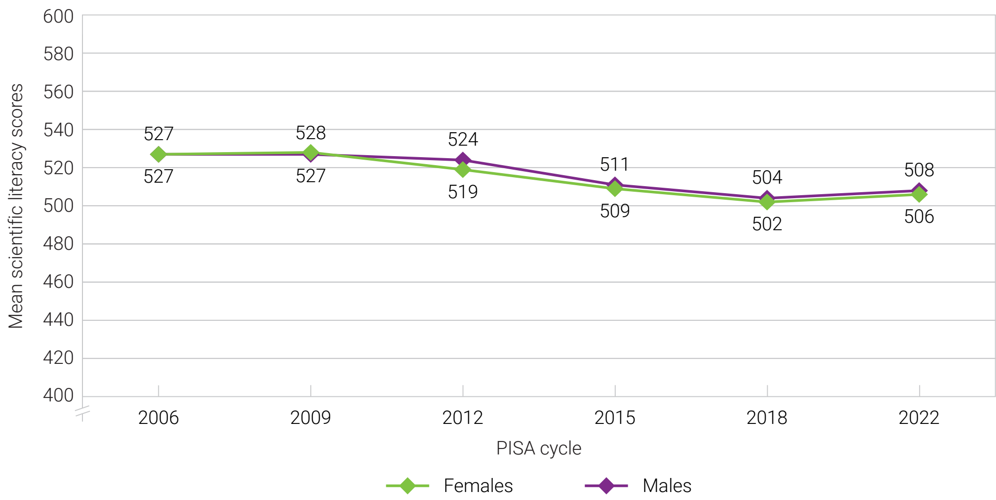
FIGURE 4.13 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard by gender for Australia and the OECD average

Performance over time

Figure 4.14 shows the mean scientific literacy performance for Australian female and male students from 2006 to 2022 and illustrates the similarities in their scientific literacy performance.

Between PISA 2018 and 2022, and between PISA 2015 and 2022, the mean scientific literacy performance did not change for either female or male students.

Between PISA 2006 and 2022, the mean scientific literacy performance declined by 21 points for female students by 19 points for male students.



	Females									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	4		-3		-13	▼	22	▼	-21	▼
2018			-7		-17	▼	-26	▼	-25	▼
2015					-10	▼	-19	▼	-18	▼
2012							-9	▼	-8	
2009									1	

	Males									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	4		-3		-16	▼	19	▼	-19	▼
2018			-7		-20	▼	-23	▼	-23	▼
2015					-13	▼	-16	▼	-16	▼
2012							-3	▼	-3	
2009									0	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.14 Mean scientific literacy performance and differences from PISA 2006 to 2022, by gender for Australia

Proficiency over time

Figure 4.15 shows the proportions of female and male low and high performers and the proportion of students who attained the National Proficient Standard on the scientific literacy proficiency scale by gender.

High performers

Between PISA 2018 and 2022, there was a 3 percentage point increase in both the proportion of female high performers and male high performers.

Between 2015 and 2022, the proportion of female high performers declined by 7 percentage points but remained unchanged for male high performers.

Between PISA 2006 and 2022, there was no difference in the proportion of male high performers, but the proportion of female high performers declined by 2 percentage points.

Low performers

Between 2018 and 2022, there was no difference in the proportions of female and male low performers.

Between PISA 2015 and 2022, the proportion of female low performers remained unchanged, while the proportion of male low performers increased by 11 percentage points.

Between PISA 2006 and 2022, the proportions of female and male low performers each increased by 7 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportions of female and male students who attained the National Proficient Standard remained unchanged.

Between PISA 2015 and 2022, the proportion of both female and male students who attained the National Proficient Standard declined by 3 percentage points.

Between PISA 2006 and 2022, the proportions of female and male students who attained the National Proficient Standard declined by 9 and 8 percentage points respectively.

Females			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	19	11	58
2018	18	8	58
2015	17	19	61
2012	13	14	64
2009	11	14	68
2006	12	14	67

Males			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	21	14	58
2018	20	10	58
2015	10	13	61
2012	12	15	65
2009	13	16	67
2006	14	16	66

Students (%): 60 40 20 0 20 40 60

FIGURE 4.15 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by gender for Australia

States and territories

Performance

Figure 4.16 presents the scientific literacy performance for students in each of the Australian states and territories. For comparison, the mean scores and distributions of performance for Australia, the OECD average and Singapore are included.

The mean scores for scientific literacy in 2022 ranged from 523 points in the Australian Capital Territory to 492 points in Tasmania. The difference in mean scores between the highest and lowest performing jurisdictions was 31 points.

The Northern Territory displayed the widest distribution of scores, with a range of 295 points between the 10th and 90th percentiles. The Australian Capital Territory and South Australia had the narrowest range, with 270 and 271 points respectively, separating the 10th and 90th percentiles.

Singapore performed higher, by 38 points on average, than the Australian Capital Territory, and by 69 points on average than Tasmania.

Table 4.2 presents the pairwise comparisons of mean scientific literacy performance between any 2 states and territories.

- Students in the Australian Capital Territory performed at a higher level than students in all jurisdictions except for Western Australia.
- Western Australia performed at a higher level than Queensland, South Australia and the Northern Territory and Tasmania.
- Students in New South Wales and Victoria performed at similar levels to Queensland, South Australia and the Northern Territory, and both New South Wales and Victoria performed at a higher level than Tasmania.
- Students in Tasmania, Queensland, South Australia and the Northern Territory performed at similar levels.
- Students in 6 jurisdictions (the Australian Capital Territory, Western Australia, New South Wales, Victoria, Queensland and South Australia) performed at a higher level than the OECD average (485 points). The Northern Territory and Tasmania performed at a level not statistically different to the OECD average.

State/Territory	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
ACT	523	3.7	515–530	270	
NSW	508	4.2	499–516	294	
VIC	508	4.2	499–516	275	
QLD	502	3.9	493–509	283	
SA	498	3.7	491–505	271	
WA	518	4.0	510–525	278	
TAS	492	5.3	481–502	276	
NT	497	8.6	480–513	295	
Australia	507	1.9	503–510	283	
OECD average	485	0.4	483–485	254	
Singapore	561	1.3	558–564	258	

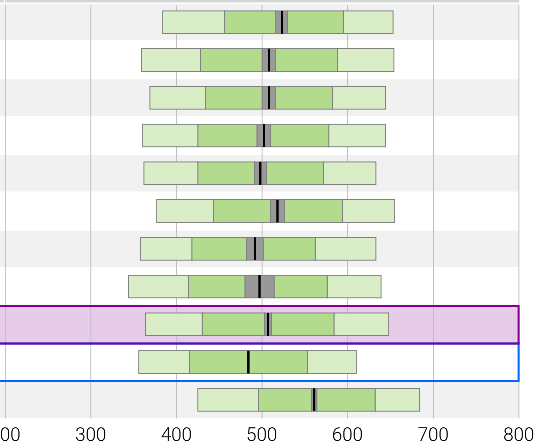


FIGURE 4.16 Mean scores and distribution of student performance on the scientific literacy scale, by state and territory

TABLE 4.2 Multiple comparisons of mean scientific literacy performance, by state and territory

State/Territory	Mean score	SE	ACT	WA	VIC	NSW	QLD	SA	NT	TAS	OECD average
ACT	523	3.7		●	▲	▲	▲	▲	▲	▲	▲
WA	518	4.0	●		●	●	▲	▲	▲	▲	▲
VIC	508	4.2	▼	●		●	●	●	●	▲	▲
NSW	508	4.2	▼	●	●		●	●	●	▲	▲
QLD	502	3.9	▼	▼	●	●		●	●	●	▲
SA	498	3.7	▼	▼	●	●	●		●	●	▲
NT	497	8.6	▼	▼	●	●	●	●		●	●
TAS	492	5.3	▼	▼	▼	▼	●	●	●		●
OECD average	485	0.4	▼	▼	▼	▼	▼	▼	●	●	

Note: read across the row to compare a state's/territory's performance with the performance of each state or territory listed in the column heading.
▲ Mean performance statistically significantly higher than in comparison state/territory
● No statistically significant difference from comparison state/territory
▼ Mean performance statistically significantly lower than in comparison state/territory

Comparisons between the performance of each jurisdiction and the performance of each country are provided in Appendix G.

Proficiency

Figure 4.17 shows the percentages of students at each of the scientific literacy proficiency scale in PISA 2022 for each state and territory, together with the percentages for Australia, Singapore and the OECD average.

High performers

Overall, 13% of Australian students were high performers. This was higher than the OECD average of 7% of students but significantly lower than the 24% of students in Singapore who achieved proficiency Levels 5 and 6. Students in the states and territories had the following percentages of high performers:

- 15% in the Australian Capital Territory; this was the highest percentage of all jurisdictions
- 14% in New South Wales and Western Australia
- 12% in Queensland and Victoria
- 11% in the Northern Territory
- 10% in South Australia and Tasmania.

Low performers

- In Australia, 20% of students were low performers. This proportion was higher than Singapore's (8%) but lower than the average across the OECD countries (24%). Students in the states and territories had the following proportions of low performers:
- 24% in the Northern Territory
- 22% in Tasmania
- 21% in Queensland and South Australia
- 20% in New South Wales (this is also the Australian average)
- 18% in Victoria
- 17% in Western Australia
- 14% in the Australian Capital Territory, the lowest proportion of any jurisdiction.

National Proficient Standard

The Australian Capital Territory had the highest percentage of students who attained the National Proficient Standard in scientific literacy (66%) followed by 62% of students in Western Australia.

In all Australian states and territories, more than half of students attained the National Proficient Standard (Tasmania, 51% South Australia, 56%; Queensland, 56%; the Northern Territory, 56%; New South Wales, 58%; and, Victoria, 59%).

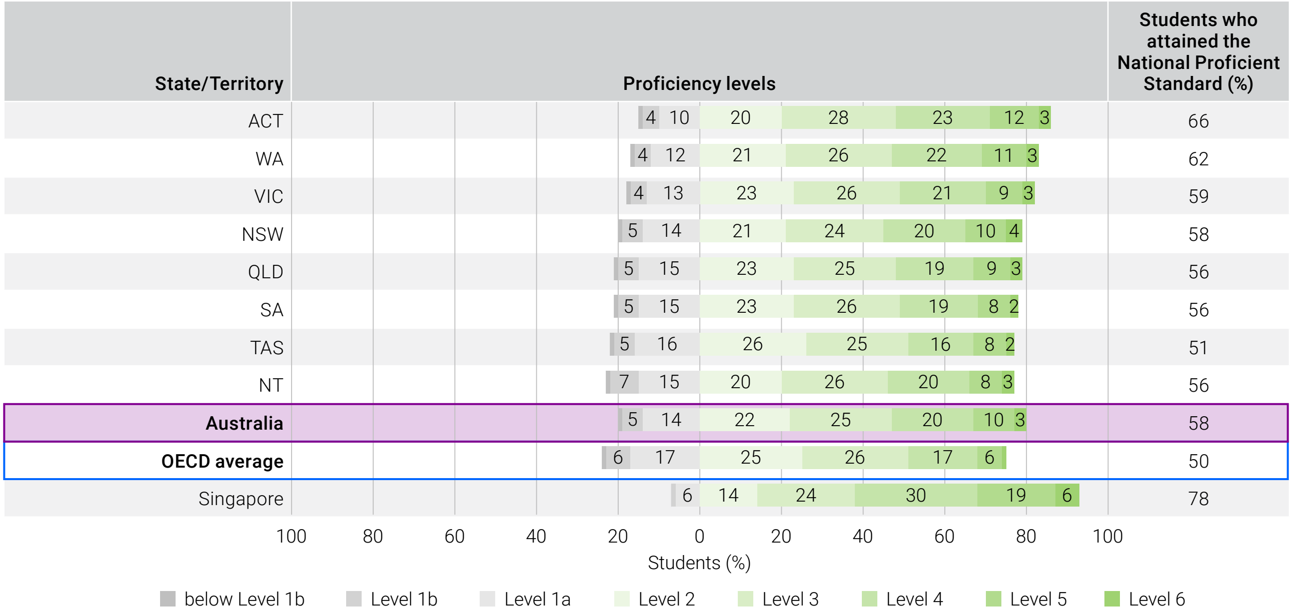


FIGURE 4.17 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory.

Performance over time

Figure 4.18 shows the mean performance in scientific literacy for each cycle of PISA since 2006 by state and territory. In addition, it shows the change in scores over time.

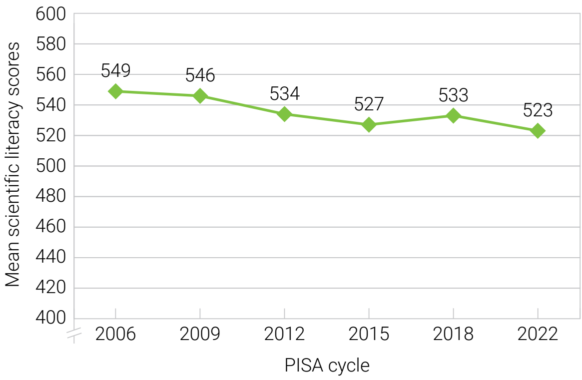
Between PISA 2018 and 2022, New South Wales was the only jurisdiction to report a statistically significant change in performance (an increase of 12 points).

Between PISA 2015 and 2022, there was no difference between jurisdictions.

Between PISA 2006 and 2022, except for Victoria and the Northern Territory, all jurisdictions experienced a decline in performance:

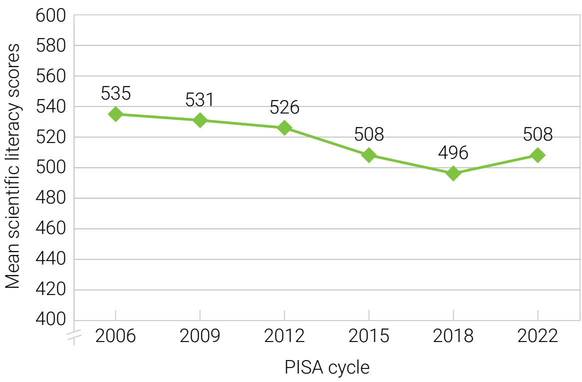
- South Australia by 34 points
- New South Wales by 27 points
- the Australian Capital Territory by 26 points
- Queensland by 20 points
- Western Australia by 25 points
- Tasmania by 15 points.

Australian Capital Territory



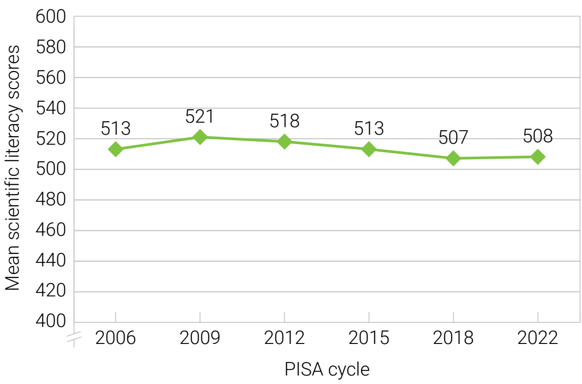
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	-10		-4		-11		-23	▼	-26	▼
2018			6	▲	-1		-13		-16	▼
2015					-7		-19	▼	-22	▼
2012							-12		-15	▼
2009									-3	

New South Wales



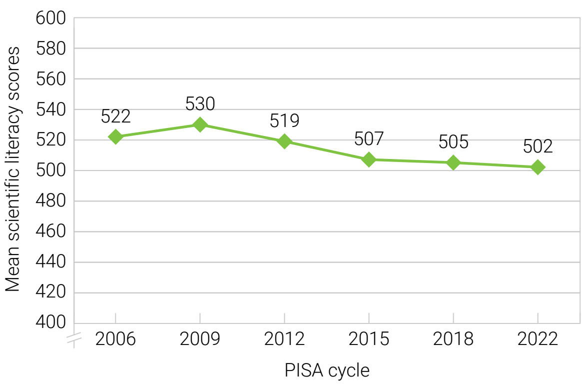
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	12	▲	0		-18	▼	-23	▼	-27	▼
2018			-12	▼	-30	▼	-35	▼	-39	▼
2015					-18	▼	-23	▼	-27	▼
2012							-5		-9	
2009									-4	

Victoria



	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	1		-5		-10		-13		-5	
2018			-6		-11		-14		-6	
2015					-5		-8		0	
2012							-3		5	
2009									8	

Queensland

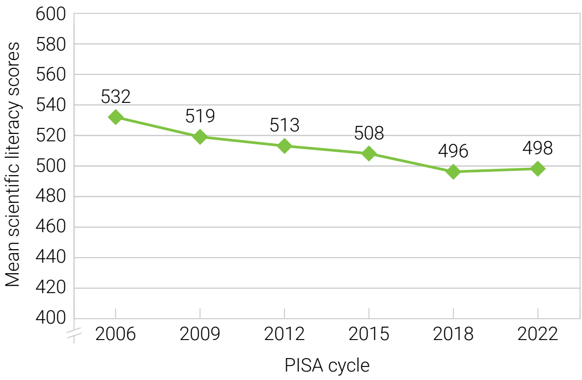


	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	-3		-5		-17	▼	-28	▼	-20	▼
2018			-2		-14	▼	-25	▼	-17	▼
2015					-12	▼	-23	▼	-15	▼
2012							-11		-3	
2009									8	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

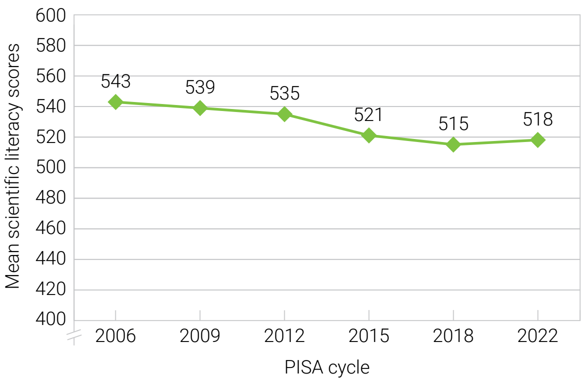
FIGURE 4.18 Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory

South Australia



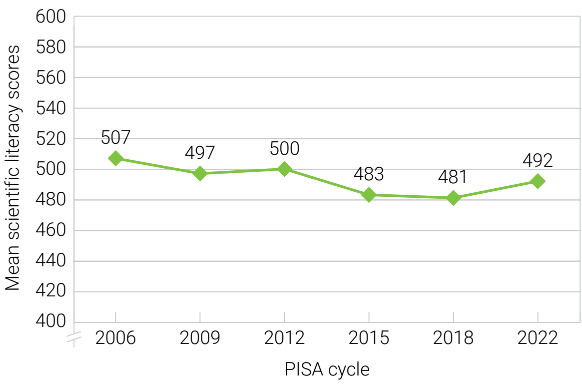
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	2	-10	-15 ▼	-21 ▼	-34 ▼
2018		-12	-17 ▼	-23 ▼	-36 ▼
2015			-5	-11	-24 ▼
2012				-6	-19 ▼
2009					-13

Western Australia



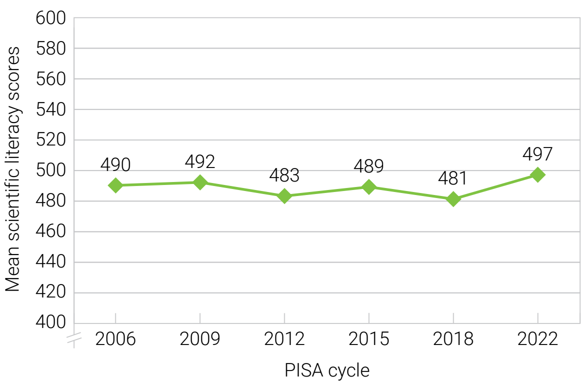
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	3	-3	-17 ▼	-21 ▼	-25 ▼
2018		-6	-20 ▼	-24 ▼	-28 ▼
2015			-14 ▼	-18 ▼	-22 ▼
2012				-4	-8
2009					-4

Tasmania



	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	11	9	-8	-5	-15 ▼
2018		-2	-19 ▼	-16 ▼	-26 ▼
2015			-17 ▼	-14	-24 ▼
2012				3	-7
2009					-10

Northern Territory



	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	16	8	14	5	7
2018		-8	-2	-11	-9
2015			6	-3	-1
2012				-9	-7
2009					2

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.18 (continued) Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory

Proficiency over time

Figure 4.19 shows the proportions of high and low performers on the scientific literacy proficiency scale from PISA 2006 to 2022 for each state and territory.

High performers

Between PISA 2018 and 2022, the proportion of high performers in New South Wales increased by 5 percentage points and in Tasmania by 4 percentage points.

Between PISA 2015 and 2022, there were no differences in the proportions of high performers in any jurisdiction.

Between PISA 2006 and 2022, the proportion of high performers declined in the Australian Capital Territory by 7 percentage points, in South Australia by 5 percentage points, and in Western Australia by 4 percentage points.

Low performers

Between PISA 2018 and 2022, the proportion of low performers in the Australian Capital Territory increased by 4 percentage points.

Between PISA 2015 and 2022, there were no differences in the proportions of low performers across the states and territories.

Between PISA 2006 and 2022, there were no differences in the proportions of low performers in Victoria, Tasmania and the Northern Territory. However, the following states had increases in their proportions of low performers:

- South Australia by 10 percentage points
- New South Wales by 9 percentage points
- Queensland by 7 percentage points
- Western Australia by 7 percentage points
- the Australian Capital Territory by 5 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, and PISA 2015 and 2022, the proportions of students who attained the National Proficient Standard did not change in any state or territory.

Between PISA 2006 and 2022, all states and territories except for Victoria and the Northern Territory had the following declines in the proportions of students who attained the National Proficient Standard:

- South Australia by 14 percentage points
- New South Wales by 11 percentage points
- Queensland and Western Australia by 10 percentage points
- the Australian Capital Territory by 8 percentage points
- Tasmania by 8 percentage points.

Australian Capital Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	14	15	66
2018	11	15	71
2015	14	14	68
2012	12	17	71
2009	11	20	74
2006	10	21	75

New South Wales

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	20	14	58
2018	21	9	55
2015	19	12	59
2012	14	16	66
2009	12	15	69
2006	11	17	69

Victoria

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	18	12	59
2018	18	10	60
2015	16	10	63
2012	13	11	64
2009	13	13	65
2006	16	11	62

Queensland

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	21	12	56
2018	18	9	59
2015	18	10	60
2012	13	12	64
2009	12	15	68
2006	13	13	66

South Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	21	10	56
2018	19	8	55
2015	17	10	60
2012	15	11	61
2009	12	10	66
2006	11	15	69

Western Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	17	14	62
2018	16	12	63
2015	15	12	65
2012	11	16	70
2009	11	18	71
2006	10	19	73

Tasmania

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	10	51
2018	25	6	49
2015	27	9	48
2012	20	10	57
2009	20	8	57
2006	18	11	59

Northern Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	11	56
2018	28	8	48
2015	26	12	51
2012	26	9	55
2009	22	10	57
2006	26	13	53

Students (%)

FIGURE 4.19 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by state and territory

States and territories by gender

Performance

Figure 4.20 shows there were no significant gender differences between female and male students in any jurisdiction except for Western Australia where male students performed significantly higher than their female counterparts.

The OECD average for females and males was 485 points each.

In the Australian Capital Territory, female students scored 527 points, 42 points higher than the female OECD average and 21 points higher than the national female average. Male students in the Australian Capital Territory attained a mean score of 519 points, 34 points higher than the OECD male student average and 11 points higher than the national male student average.

The gender gap in performance was the greatest in Western Australia, where female students scored 511 points, 13 points lower than their male counterparts (524 points). While some gender gaps within states and territories appear wide, there was no difference due to the large standard error associated with the mean score. This is particularly the case in Tasmania.

Female students and male students in all jurisdictions except for the Northern Territory performed at a higher level than female students and male students across the OECD countries. In the case of the Northern Territory, there was no difference due to the large standard error associated with the mean score.

State/Territory	Females		Males	
	Mean score	SE	Mean score	SE
TAS	502	8.1	483	6.8
ACT	527	4.8	519	5.6
NSW	509	4.3	507	6.2
VIC	508	5.7	508	5.1
SA	499	4.3	498	4.8
NT	493	10.2	501	11.9
QLD	496	4.9	507	5.0
WA	511	5.4	524	4.9
OECD average	485	0.5	485	0.6

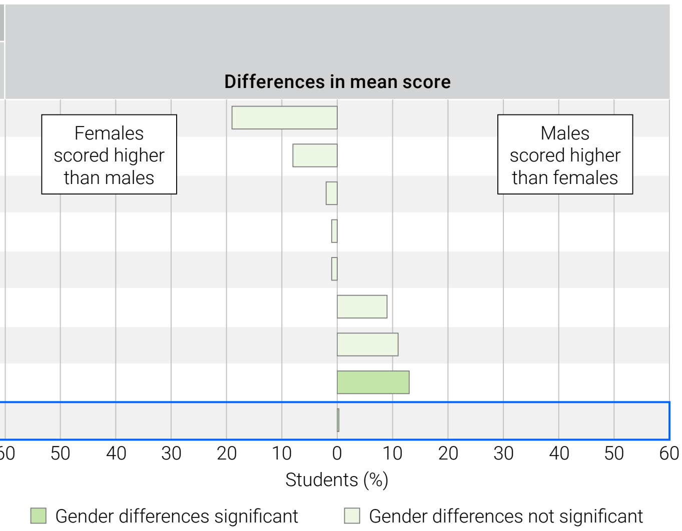


FIGURE 4.20 Mean scores and differences in student performance on the scientific literacy scale, by state and territory and gender

Proficiency

Figure 4.21 shows the proportions of female and male students in each proficiency level on the scientific literacy scale for the states and territories. The OECD averages for female and male students have been included for comparison.

Female high performers

Except for South Australia and the Northern Territory, the percentages of female high performers were significantly higher than the OECD average for female students. There were the following percentages of female high performers:

- 15% in the Australian Capital Territory
- 13% in New South Wales
- 12% in Western Australia and Tasmania
- 11% in Victoria
- 10% in Queensland.

Male high performers

Except for Tasmania and the Northern Territory, the percentages of male high performers were significantly lower than the OECD average for male students. The percentages of male high performers were:

- 16% in Western Australia
- 15% in the Australian Capital Territory and New South Wales
- 14% in Queensland
- 13% in Victoria
- 11% in South Australia.

Female low performers

- The Australian Capital Territory had the lowest proportion of female low performers. The proportions in Tasmania, South Australia, Queensland and the Northern Territory were similar to the OECD average proportion for female students. The proportions in the other states and territories were:
- 19% in New South Wales
- 18% in Western Australia
- 17% in Victoria
- 12% in the Australian Capital Territory.

Male low performers

Western Australia had the lowest proportion of male low performers (16%) of any state or territory. Tasmania, the Northern Territory, New South Wales and South Australia had similar proportions of male low performers to the OECD average. In Victoria and Queensland the proportions were 20% each, and in the Australian Capital Territory and Western Australia were 16% each.

National Proficient Standard

The proportion of female students who attained the National Proficient Standard in scientific literacy ranged from 53% in Tasmania to 67% in the Australian Capital Territory, while the proportion of male students ranged from 50% in Tasmania to 66% in the Australian Capital Territory.

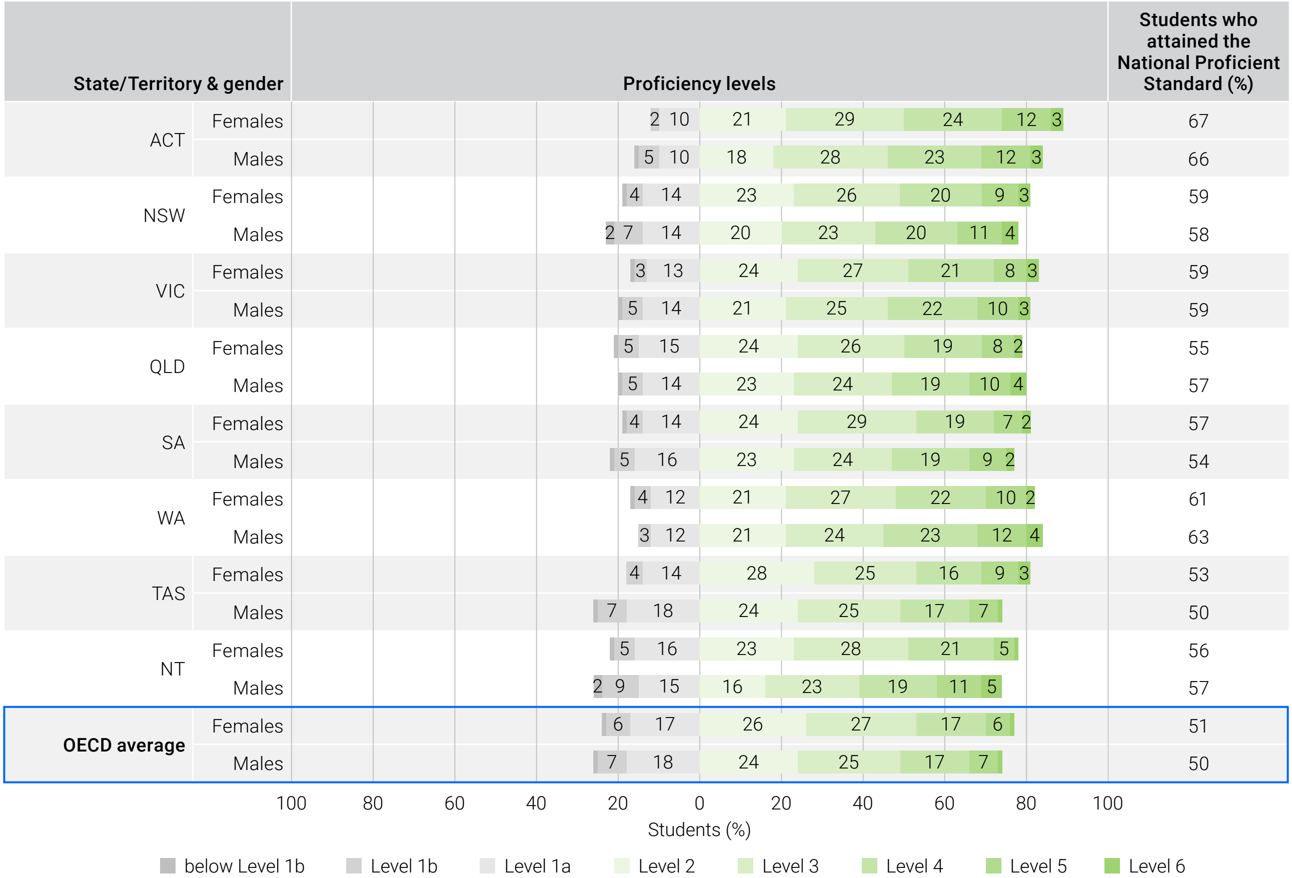


FIGURE 4.21 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory and gender

Performance over time

Figure 4.22 shows the mean scientific literacy performance from PISA 2006 to 2022, along with the change in performance for the states and territories, by gender.

Between PISA 2018 and 2022, the mean scores of female students increased in Tasmania by 28 points and in New South Wales by 12 points. It declined in Queensland by 9 points and in the Australian Capital Territory by 11 points. In this period, the performance of male students increased in New South Wales by 13 points and in the Northern Territory by 23 points. New South Wales was the only jurisdiction in which both female and male students improved their performance.

Between PISA 2015 and 2022, the mean scientific literacy performance for female students in Tasmania increased by 20 points, while it declined in Queensland by 14 points. Male student performance across all jurisdictions remained the same during this time.

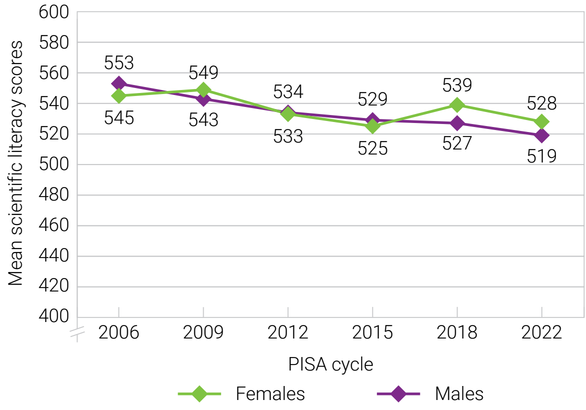
Between PISA 2006 and 2022, performance in scientific literacy for female students in Tasmania, Victoria and the Northern Territory remained the same. In all remaining jurisdictions, there were declines in female student performance:

- South Australia by 32 percentage points
- New South Wales by 31 percentage points
- Western Australia by 28 percentage points
- Queensland by 26 percentage points
- the Australian Capital Territory by 17 percentage points.

Except for Victoria and the Northern Territory where performance remained the same, there were declines for male students during this time:

- South Australia by 35 percentage points
- the Australian Capital Territory by 34 percentage points
- New South Wales declined by 23 percentage points
- Tasmania declined by 23 percentage points
- Western Australia declined by 21 percentage points
- Queensland declined by 16 percentage points.

Australian Capital Territory



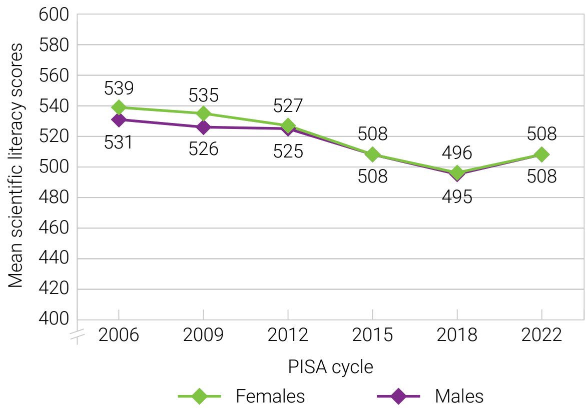
Females

Difference between PISA cycles	2018		2015		2012		2009		2006	
2022	-11	▼	3		-5		-21		-17	▼
2018			14	▲	6		-10		-6	
2015					-9		-24		-20	▼
2012							-16		-12	
2009									4	

Males

Difference between PISA cycles	2018		2015		2012		2009		2006	
2022	-8		-10		-15		-24		-34	▼
2018			-2		-7		-16		-26	▼
2015					-5		-14		-24	▼
2012							-9		-19	
2009									-10	

New South Wales



Females

Difference between PISA cycles	2018		2015		2012		2009		2006	
2022	12	▲	0		-19	▼	-27	▼	-31	▼
2018			-12		-31	▼	-39	▼	-43	▼
2015					-19	▼	-27	▼	-31	▼
2012							-8		12	
2009									-4	

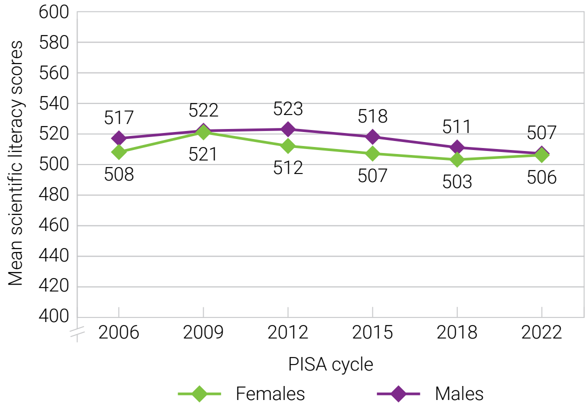
Males

Difference between PISA cycles	2018		2015		2012		2009		2006	
2022	13	▲	0		-17		-18		-23	▼
2018			-13		-30	▼	-31	▼	-36	▼
2015					-17	▼	-18		-23	▼
2012							-1		-6	
2009									-5	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.22 Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory and gender

Victoria



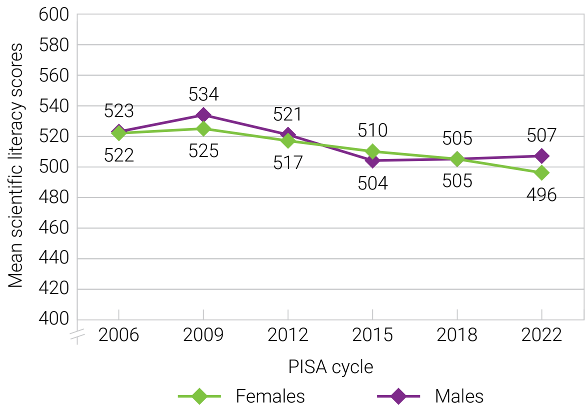
Females

Difference between PISA cycles	2018	2015	2012	2009	2006
2022	3	1	-6	-15	-2
2018		-4	-9	-18	-5
2015			-5	-14	-1
2012				-9	4
2009					13

Males

Difference between PISA cycles	2018	2015	2012	2009	2006
2022	-4	-11	-16	-15	-10
2018		-7	-12	-11	-6
2015			-5	-4	1
2012				1	6
2009					5

Queensland



Females

Difference between PISA cycles	2018	2015	2012	2009	2006
2022	-9 ▼	-14 ▼	-21 ▼	-29 ▼	-26 ▼
2018		-5 ▼	-12	-20 ▼	-17 ▼
2015			-7	-15	-12
2012				-8	-5
2009					3

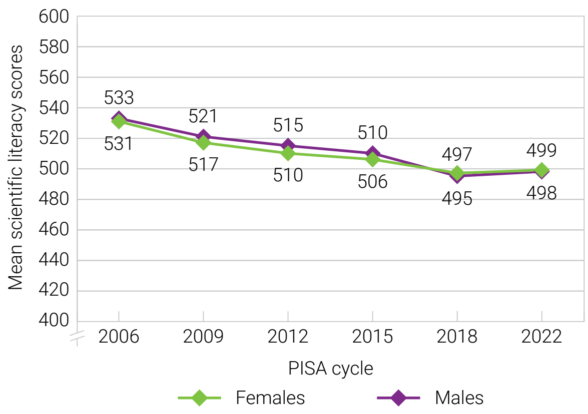
Males

Difference between PISA cycles	2018	2015	2012	2009	2006
2022	2	3	-14	-27 ▼	-16 ▼
2018		1	-16 ▼	-29 ▼	-18 ▼
2015			-17 ▼	-30 ▼	-19 ▼
2012				-13	-2
2009					11

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.22 (continued) Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory and gender

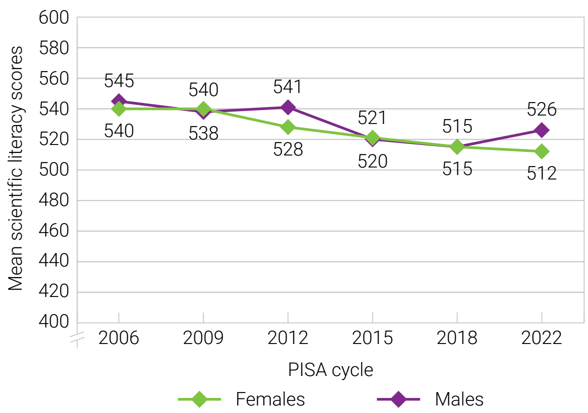
South Australia



Females					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	2	-7	-13	-18 ▼	-32 ▼
2018		-9	-13	-21 ▼	-34 ▼
2015			-4	-11	-25 ▼
2012				-7	-21 ▼
2009					-14

Males					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	3	-12	-17 ▼	-23 ▼	-35 ▼
2018		-15	-20 ▼	-26 ▼	-38 ▼
2015			-5	-11	-23 ▼
2012				-6	-18 ▼
2009					-12

Western Australia



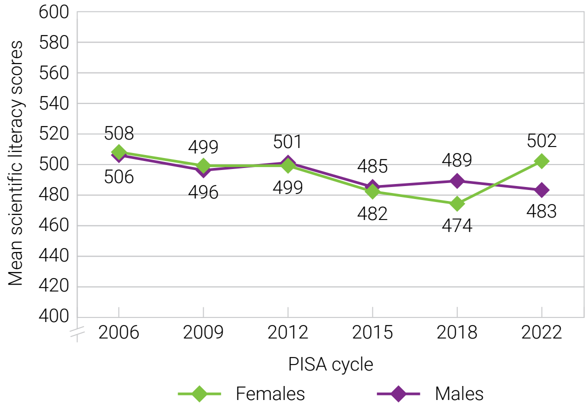
Females					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	-3	-9	-16	-28 ▼	-28 ▼
2018		-6	-13	-25 ▼	-25 ▼
2015			-7	-19 ▼	-19 ▼
2012				-12	-12
2009					0

Males					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	9	4	-17	-14	-21 ▼
2018		-5	-26 ▼	-23 ▼	-30 ▼
2015			-21 ▼	-18	-25 ▼
2012				3	-5
2009					-7

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.22 (continued) Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory and gender

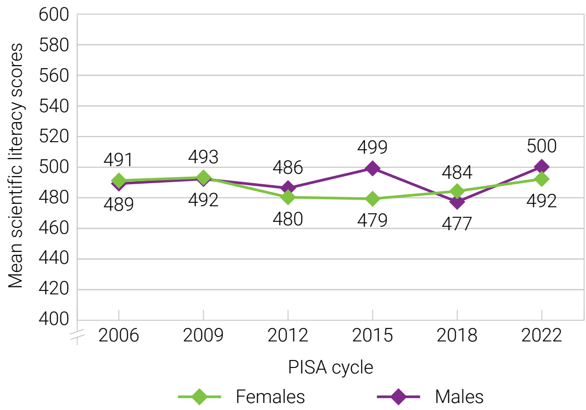
Tasmania



Females					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	28 ▲	20 ▲	3	3	-6
2018		-8	-25 ▼	-24 ▼	-34 ▼
2015			-17	-17	-26 ▼
2012				0	-8
2009					-9

Males					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	-6	-2	-18	-13	-23 ▼
2018		4	-12	-7	-17 ▼
2015			-16	-11	-21 ▼
2012				5	-5
2009					-10

Northern Territory



Females					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	8	13	12	-1	1
2018		5	4	-9	-7
2015			-1	-14	-13
2012				-13	-11
2009					2

Males					
	Difference between PISA cycles				
	2018	2015	2012	2009	2006
2022	23 ▲	1	14	8	11
2018		-22	-9	-15	-12
2015			13	-7	10
2012				-6	-3
2009					3

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.22 (continued) Mean scientific literacy performance and differences from PISA 2006 to 2022, by state and territory and gender

Proficiency over time

Figure 4.23 shows the proportions of low- and high-performing female and male students and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022 by state and territory and gender.

High performers

Between PISA 2018 and 2022, the following jurisdictions had increases in the proportions of high-performing female and male students:

- 9 percentage points for male students in the Northern Territory
- 8 percentage points for female students in Tasmania
- 4 percentage points for male students in Western Australia
- 3 percentage points for male students in Queensland
- 4 percentage points for female students and 6 percentage points for male students in New South Wales.

Between PISA 2015 and 2022, there were no differences in the proportions of high-performing female and male students in all states and territories.

Between PISA 2006 and 2022, the following jurisdictions had decreases in the proportions of high-performing female and male students:

- 9 percentage points for male students in the Australian Capital Territory
- 8 percentage points for female students in the Northern Territory
- 5 percentage points for female students in South Australia.

Low performers

Between PISA 2018 and 2022, there was no difference in the proportion of low-performing male students. There was a 5 percentage point increase in high-performing female students in Queensland and an 8 percentage point decrease in Tasmania.

Between PISA 2015 and 2022, the proportions of male low performers remained unchanged. For female low performers, there were increases in Queensland (5 percentage points) and Western Australia (4 percentage points) and a decrease in Tasmania (8 percentage points).

Between PISA 2006 and 2022, the following jurisdictions had increases in the proportions of low-performing female and male students:

- 9 percentage points each for male and female students in New South Wales
- 8 percentage points for female students and 7 percentage points for male students in Queensland
- 9 percentage points for female students and 11 percentage points for male students in South Australia
- 8 percentage points for female students in Western Australia.

National Proficient Standard

Between PISA 2018 and 2022, there were no differences in the proportions of female and male students who attained the National Proficient Standard in any jurisdiction.

Between PISA 2015 and 2022, the proportion of female students who attained the National Proficient Standard declined only in Queensland (by 6 percentage points), and the proportion of male students declined only in South Australia (by 7 percentage points).

Between PISA 2006 and 2022, there was no change in the proportions of female and male students who attained the National Proficient Standard in Victoria or the Northern Territory, or the proportion of female students in the Australian Capital Territory and Tasmania. However, the following decreases were observed:

- 11 percentage points for male students in the Australian Capital Territory
- 13 percentage points for female students and 8 percentage points for male students in New South Wales
- 11 percentage points for female students and 9 percentage points for male students in Queensland
- 13 percentage points for female students and 14 percentage points for male students in South Australia
- 10 percentage points each for male and female students in Western Australia
- 9 percentage points for male students in Tasmania.

Australian Capital Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	12	15	67	16	15	66
2018	8	15	74	14	15	68
2015	14	12	68	15	17	68
2012	11	15	71	13	19	70
2009	9	19	76	13	22	71
2006	9	19	73	11	23	76

Students (%)

New South Wales

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	19	13	59	22	15	58
2018	20	8	55	22	9	55
2015	18	11	59	20	14	60
2012	13	15	67	15	18	64
2009	10	15	71	15	16	66
2006	9	16	72	14	17	66

Students (%)

Victoria

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	17	11	59	20	13	59
2018	18	9	59	17	11	62
2015	16	7	62	16	13	64
2012	14	9	63	13	13	65
2009	12	12	65	15	14	65
2006	15	9	61	16	13	64

Students (%)

Queensland

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	21	10	55	20	14	57
2018	17	8	59	20	10	58
2015	16	9	61	20	11	58
2012	13	11	63	14	13	64
2009	11	12	68	12	18	68
2006	13	12	66	14	13	66

Students (%)

FIGURE 4.23 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by state and territory and gender

South Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	19	9	57	22	11	54
2018	17	7	56	21	8	55
2015	17	9	59	18	11	61
2012	15	10	61	14	12	62
2009	11	9	66	13	12	67
2006	10	14	70	11	16	69

Students (%)

Western Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	18	12	61	16	16	63
2018	14	10	63	17	13	63
2015	13	11	66	16	14	65
2012	12	14	67	10	17	73
2009	9	18	72	12	19	70
2006	9	17	72	10	21	74

Students (%)

Tasmania

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	18	12	53	26	8	50
2018	27	4	46	23	8	52
2015	27	8	47	27	9	50
2012	21	10	56	19	10	58
2009	18	8	56	21	8	57
2006	17	10	60	20	12	58

Students (%)

Northen Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	21	6	56	26	16	57
2018	27	9	50	28	6	47
2015	29	8	48	23	15	53
2012	24	8	55	27	9	55
2009	20	9	58	24	11	56
2006	26	14	55	26	12	52

Students (%)

FIGURE 4.23 (continued) Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by state and territory and gender

School sector

Performance

PISA has consistently found differences in reporting student performance before and after accounting for socioeconomic background. For this reason, school sector results are also reported after adjustment for student- and for school-level socioeconomic background.[2]

Figure 4.24 shows the mean scores for scientific literacy by school sector.

The performance of students in independent schools was 27 points higher than students in Catholic schools and 44 points higher than students in government schools.

The performance of students in Catholic schools was 17 points higher than students in government schools.

Students in government schools had the largest range of scores with 288 points between students in the 10th and 90th percentiles. The differences in the spread of scores for Catholic schools and independent schools were smaller, at between 260 and 272 points, respectively.

Table 4.3 shows the mean difference in scientific literacy scores and the mean score difference after student-level socioeconomic background, and student- and school-level socioeconomic background, were accounted for.

When student-level socioeconomic background was accounted for, students in independent schools still performed at a higher level than students in government and Catholic schools, although the differences were lower. However, the differences between students in government schools and students in Catholic schools were no longer significant.

When school- and student-level socioeconomic background were accounted for, there was a difference between government and Catholic schools; students who attended government schools achieved at a higher level. There was also a difference between Catholic and independent schools; students who attended independent schools achieved at a higher level. There was no difference between students in independent and government schools.

School sector	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Government	494	2.8	488–499	288	
Catholic	511	3.2	504–516	260	
Independent	538	4.6	528–547	272	

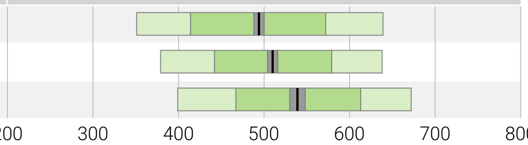


FIGURE 4.24 Mean scores and distribution of student performance on the scientific literacy scale, by school sector

TABLE 4.3 Differences in mean scientific literacy scores after adjusting for student- and school-level socioeconomic background

School sector comparison	Difference in score points	Difference in scores after accounting for student-level socioeconomic background	Difference in scores after accounting for student- and school-level socioeconomic background
Catholic–Government	**16**	0	**-15**
Independent–Government	**44**	**19**	-6
Independent–Catholic	**27**	**19**	**12**

Note: statistically significant values are shown in bold.

2 For more information about the reporting of school sector, please refer to the Reader's guide.

Proficiency

Figure 4.25 shows the percentages of students at each proficiency level on the scientific literacy proficiency scale by school sector.

High performers

There was a higher percentage of high performers in independent schools (19%) than in government schools (11%) and Catholic schools (11%).

Low performers

There were 12% of low performers in independent schools, 16% in Catholic schools and 24% in government schools.

National Proficient Standard

Just over half the students in government schools (53%) attained the National Proficient Standard in scientific literacy compared to 60% of students in Catholic schools and 70% of students in independent schools.

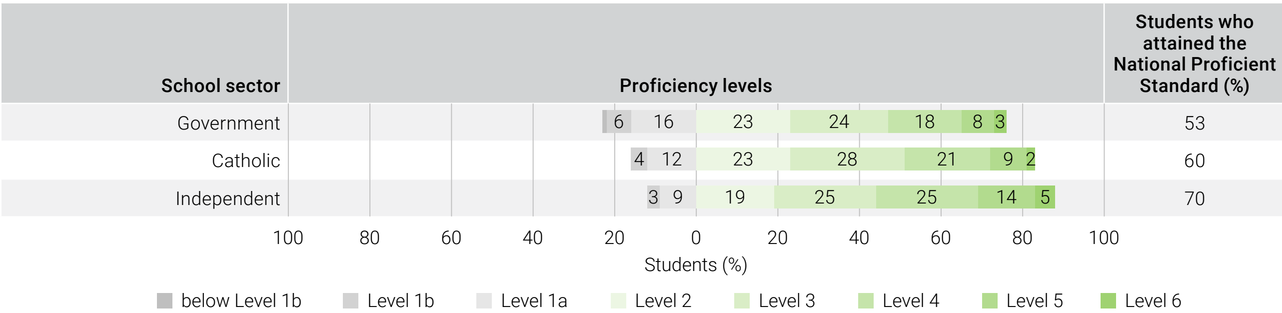


FIGURE 4.25 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector

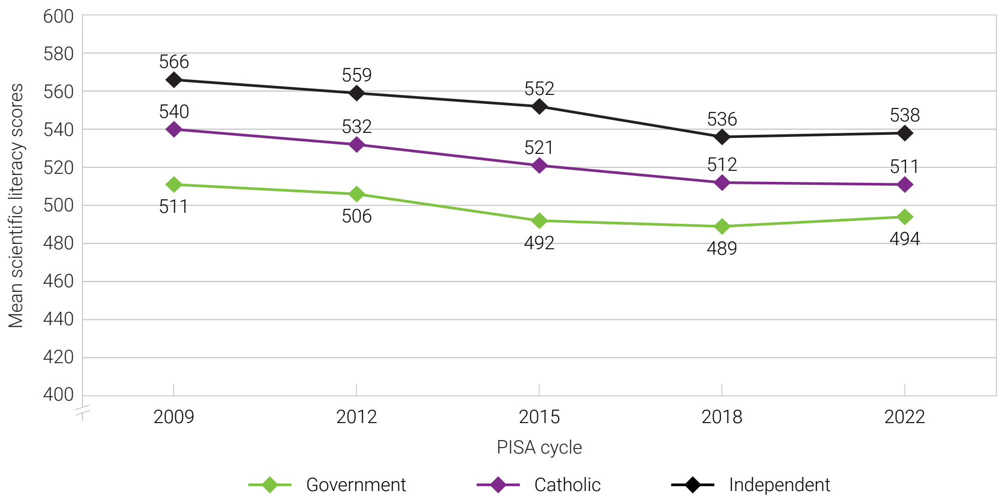
Performance over time

Figure 4.26 shows the mean scientific literacy performance from PISA 2009, when results for school sector were first reported, to PISA 2022, along with the change in performance between cycles.

Between PISA 2018 and 2022, there were no differences in the mean scientific literacy performance for each of the 3 school sectors.

Between PISA 2015 and 2022, there were no differences in the mean scientific literacy performance for government schools. However, the mean scores declined by 10 points for Catholic schools and by 14 points for independent schools.

Between PISA 2009 and 2022, the mean scientific literacy performance for students in all sectors declined. Catholic schools had the largest mean score decline of 29 points, followed by independent schools by 28 points and government schools by 17 points.



	Government			
	Difference between PISA cycles			
	2018	2015	2012	2009
2022	5	2	-12 ▼	-17 ▼
2018		-3	-17 ▼	-22 ▼
2015			-14 ▼	-19 ▼
2012				-5

	Catholic			
	Difference between PISA cycles			
	2018	2015	2012	2009
2022	-1	-10 ▼	-21 ▼	-29 ▼
2018		-9 ▼	-20 ▼	-28 ▼
2015			-11	-19 ▼
2012				-8

	Independent			
	Difference between PISA cycles			
	2018	2015	2012	2009
2022	2	-14 ▼	-21 ▼	-28 ▼
2018		-16 ▼	-23 ▼	-30 ▼
2015			-7	-14 ▼
2012				-7

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.26 Mean scientific literacy performance and differences from PISA 2009 to 2022, by school sector

Proficiency over time

Figure 4.27 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard from PISA 2009 to 2022 by school sector.

High performers

Between PISA 2018 and 2022, the proportions of high performers increased by 3 percentage points in government schools and by 4 percentage points in independent schools.

Between PISA 2015 and 2022, the proportion of high performers in government schools increased by 2 percentage points but remained the same in Catholic and independent schools.

Between PISA 2009 and 2022, the proportion of high performers in government schools remained the same, while the proportion in Catholic schools declined by 3 percentage points, and in independent schools by 6 percentage points.

Low performers

Between PISA 2018 and 2022, the percentage of low performers in all school sectors remained about the same.

Between PISA 2015 and 2022, the proportion of low performers in government schools remained the same, increased in Catholic schools by 4 percentage points and in independent schools by 5 percentage points

Between PISA 2009 and 2022, the percentage of low performers increased by 6 percentage points in government schools, by 9 percentage points in Catholic schools and by 6 percentage points in independent schools.

National Proficient Standard

Between PISA 2018 and 2022, there were no differences in the proportions of students who attained the National Proficient Standard in any school sector.

Between PISA 2015 and 2022, the proportion of students who attained the National Proficient Standard declined by 5 percentage points in Catholic schools and by 9 percentage points in independent schools.

Between PISA 2009 and 2022, the proportion of students who attained the National Proficient Standard declined by 7 percentage points in government schools, by 13 percentage points in independent schools and by 14 percentage points in Catholic schools.

Government

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	11	53
2018	23	8	52
2015	23	9	53
2012	18	11	58
2009	17	12	60

Catholic

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	16	11	60
2018	15	9	62
2015	13	11	66
2012	9	13	71
2009	7	14	75

Independent

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	12	19	70
2018	10	14	72
2015	7	18	78
2012	6	21	80
2009	6	24	82

FIGURE 4.27 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2009 to 2022, by school sector

School sector by gender

Performance

Figure 4.28 shows that there were no gender differences in any of the 3 schooling sectors.

	Females		Males	
School sector	Mean score	SE	Mean score	SE
Government	494	3.1	495	4.0
Catholic	508	3.9	513	4.7
Independent	535	5.5	541	5.1

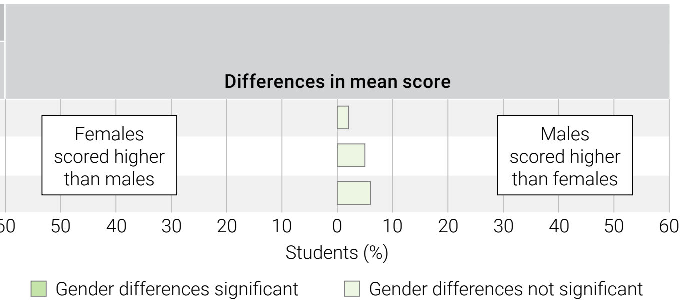


FIGURE 4.28 Mean scores and differences in student performance on the scientific literacy scale, by school sector and gender

Proficiency

Figure 4.29 shows the percentage of students at each proficiency level on the scientific literacy scale by school sector.

Female students

Independent schools had the highest proportion of female high performers (18%), followed equally by Catholic schools and government schools (9%).

There were fewer female low performers in independent schools (12%) than in government schools (23%) and in Catholic schools (15%).

Male students

Independent schools had the highest proportion of male high performers (19%), followed by Catholic schools (14%) and government schools (12%).

There were fewer male low performers in independent schools (12%) than in Catholic schools (18%) and government schools (24%).

National Proficient Standard

Independent schools (68%) had the highest proportion of female students who attained the National Proficient Standard in scientific literacy followed by Catholic schools (61%) and government schools (53%). This pattern was replicated for male students with 71% attaining the National Proficient Standard in independent schools, 60% in Catholic schools and 53% in government schools.

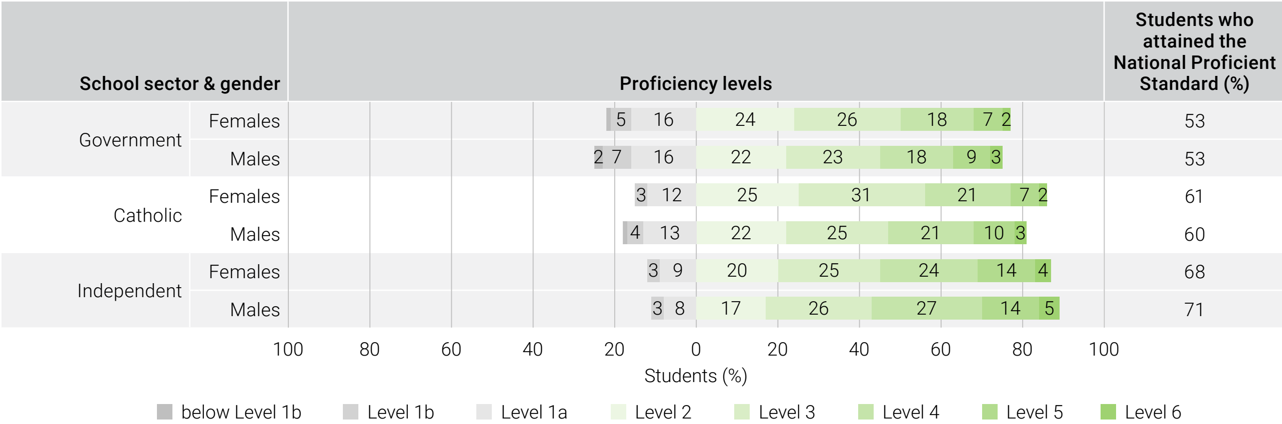


FIGURE 4.29 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector and gender

Performance over time

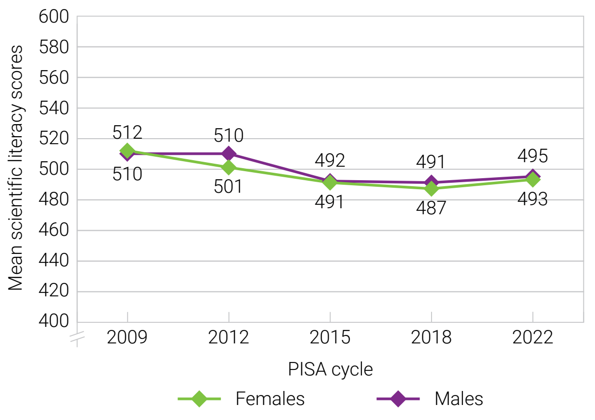
Figure 4.30 shows the mean scientific literacy performance from PISA 2009 to 2022, along with the change in performance between 2 cycles for female and male students by school sector.

Between PISA 2018 and 2022, there were no differences in scientific literacy performance for female and male students across the school sectors.

Between PISA 2015 and 2022, the mean scientific literacy performance for female students declined by 13 points in Catholic schools and by 14 points for male students in independent schools.

Between PISA 2009 and 2022, the mean scientific literacy performance for female students declined in government schools by 18 points, Catholic schools by 30 points and independent schools by 32 points. Over this same period, the mean scientific literacy performance for male students declined in government schools by 15 points, Catholic schools by 31 points and independent schools by 24 points.

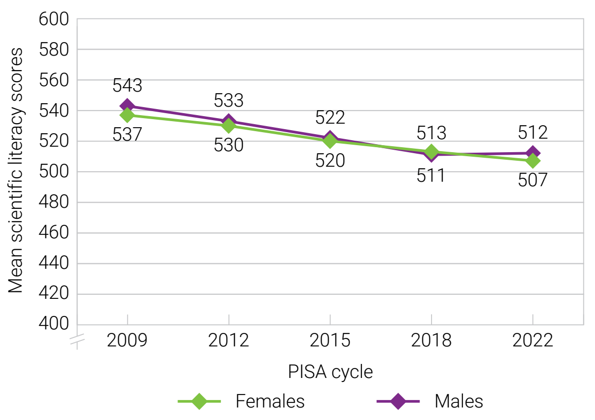
Government



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	6		2		-8		-18	▼
2018			-4	▼	-14	▼	-25	▼
2015					-10		-21	▼
2012							-11	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	4		3		-15	▼	-15	▼
2018			-1		-19	▼	-19	▼
2015					-18	▼	-18	▼
2012							0	

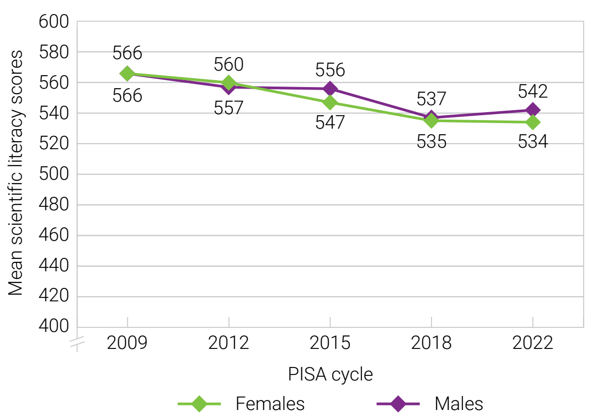
Catholic



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-6		-13	▼	-23	▼	-30	▼
2018			-7		-17	▼	-24	▼
2015					-10		-17	▼
2012							-7	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	1		-10		-21	▼	-31	▼
2018			-11	▼	-22	▼	-32	▼
2015					-11		-21	▼
2012							-10	

Independent



Females								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-1		-13		-26	▼	-32	▼
2018			-13	▼	-25	▼	-31	▼
2015					-13		-19	▼
2012							-6	

Males								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	5		-14	▼	-15		-24	▼
2018			-19	▼	-20	▼	-29	▼
2015					-1		-10	
2012							-9	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.30 Mean scientific literacy performance and differences from PISA 2009 to 2022, by school sector and gender

Proficiency over time

Figure 4.31 shows the proportions of female and male low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale for PISA 2009 to 2022 by school sector.

High performers

Between PISA 2018 and 2022, there was a 3 percentage point increase in female high performers and a 4 percentage point increase in male high performers in government schools. There was a 6 percentage point increase in female high performers in independent schools.

Between PISA 2015 and 2022, there were no differences in the proportions of male or female high performers in any sector.

Between PISA 2009 and 2022, there was a 6 percentage point decrease in male and female high performers in independent schools.

Low performers

Between PISA 2018 and 2022, there were no differences in the proportions of male and female low performers in any sector.

Between PISA 2015 and 2022, the proportions of male and female low performers in independent and Catholic school sectors changed. There was a 4 percentage point increase for female students in Catholic schools and a 5 percentage point increase each for female and male low performers in independent schools.

Between PISA 2009 and 2022, there were percentage point changes for low performers across all school sectors:

- in government schools, an increase for females by 8 percentage points and for males by 7 percentage points
- in Catholic schools, an increase for females by 8 percentage points and for males by 10 percentage points
- in independent schools, a decrease for females by 7 percentage points and for males by 5 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of female students who attained the National Proficient Standard in independent schools decreased by 6 percentage points.

Between PISA 2015 and 2022, in independent schools, the proportion of students who attained the National Proficient Standard decreased by 11 percentage points for females and 7 percentage points for males. In Catholic Schools, the declines were 5 percentage points for females and 7 percentage points for males.

Between PISA 2009 and 2022, there were decreases in the proportions of female and male students who attained the National Proficient Standard across all school sectors:

- in government schools, by 8 percentage points for females and 6 percentage points for males
- in Catholic schools, by 14 percentage points for females and 16 percentage points for males
- in independent schools, by 15 percentage points for females and 9 percentage points for males.

Government

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	23	10	53	24	12	53
2018	23	7	51	24	9	53
2015	22	8	53	24	10	53
2012	15	10	57	19	13	59
2009	15	11	61	19	13	59

Students (%)

Catholic

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	15	9	61	18	14	60
2018	14	8	64	16	11	61
2015	11	9	66	14	13	66
2012	9	12	71	10	15	70
2009	6	12	75	8	16	75

Students (%)

Independent

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	12	18	68	12	19	71
2018	9	13	73	11	16	71
2015	7	15	78	7	21	79
2012	5	21	80	7	22	79
2009	5	24	82	6	25	81

Students (%)

FIGURE 4.31 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2009 to 2022, by school sector and gender

4.3 Australia's scientific literacy results for different demographic groups in a national context

Geographic location

Performance

Figure 4.32 shows the reading literacy performance of students from schools classified using the Australian Statistical Geography Standard (ASGS).

Students in major city schools outperformed students in regional schools and remote schools, and students in regional schools outperformed students in remote schools.

Students in major city schools achieved a mean score of 514 points compared to 466 points for students in remote schools (68 points higher).

Students in remote schools achieved a mean score of 446 points, 41 points lower than students in regional schools.

The range of scores from the 10th and 90th percentiles were similar for students in major city schools and regional schools (284 and 272 points, respectively). The spread for students in remote schools was 274 points.

Geographic location	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Major cities	514	2.5	509–519	284	
Regional areas	487	3.3	480–493	272	
Remote areas	446	14.0	418–473	274	

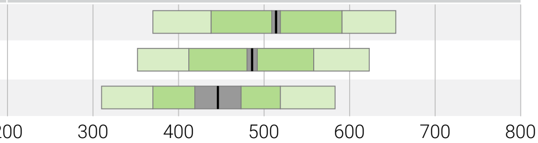


FIGURE 4.32 Mean scores and distribution of student performance on the scientific literacy scale, by geographic location

Proficiency

Figure 4.33 shows the percentages of students on the scientific literacy proficiency scale for schools classified with the ASGS.

The proportion of high performers in major city schools (14%) was higher than in regional schools (9%) and remote schools (4%). The proportion of high performers in regional schools was higher than in remote schools.

The proportion of low performers in major city schools (18%) was lower than in regional schools (24%) and in remote schools (37%). There were no differences between the proportions of low performers in regional schools and remote schools.

Around 61% of students in major city schools attained the National Proficient Standard in scientific literacy compared to 50% of students in regional schools and 38% in remote schools.

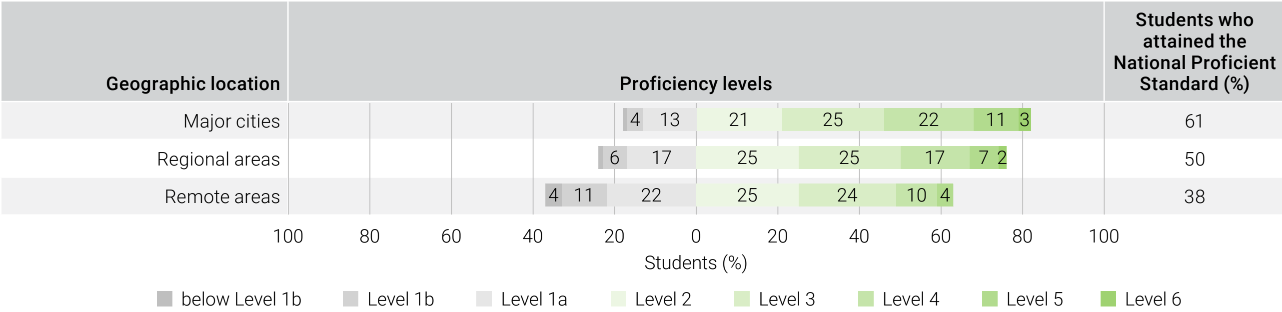
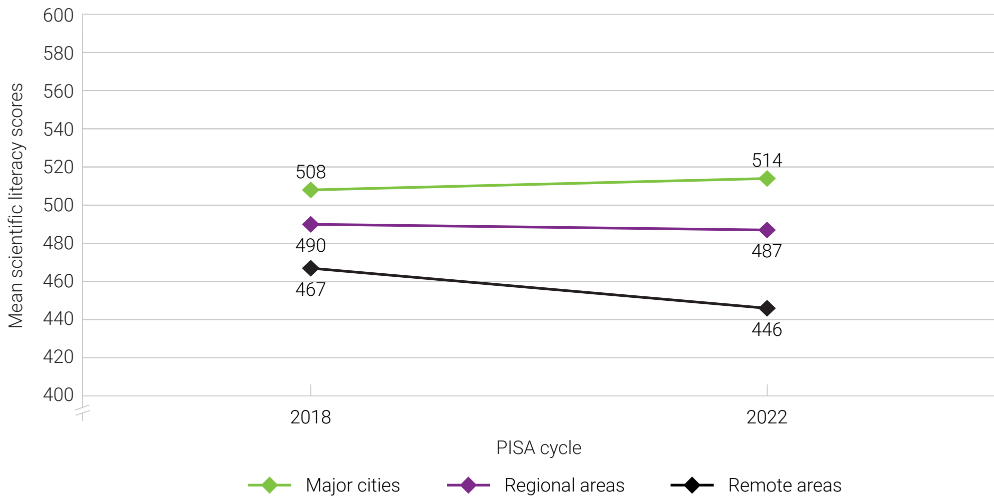


FIGURE 4.33 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by geographic location

Performance over time

Figure 4.34 shows the mean scientific literacy performance, and change in performance from PISA 2018 to 2022, for schools classified using the ASGS.

Between PISA 2018 and 2022, there was no difference in the mean scientific literacy performance for students in major city schools, regional schools or remote schools.



	Major cities	
	Difference between PISA cycles	
	2018	
2022	6	

	Regional areas	
	Difference between PISA cycles	
	2018	
2022	-3	

	Remote areas	
	Difference between PISA cycles	
	2018	
2022	-21	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.34 Mean scientific literacy performance and differences from PISA 2018 to 2022, by geographic location

Proficiency over time

Figure 4.35 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale for PISA 2018 to 2022 by geographic location.

Between PISA 2018 and 2022, there were no differences in the proportions of low- and high-performing students in any regional or remote schools, however there was a 4 percentage point increase in high performers in major city schools.

Between PISA 2018 and 2022, there were no differences in the proportions of students who attained the National Proficient Standard across any geographic location.

Major cities

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	18	14	61
2018	18	10	60

Regional areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	9	50
2018	22	7	53

Remote areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	37	4	38
2018	37	5	41

Students (%)

FIGURE 4.35 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2018 to 2022, by geographic location

Socioeconomic background

Performance

Figure 4.36 shows the performance of students in scientific literacy at each socioeconomic background, (ESCS)[3] quartile and illustrates that, on average, students from higher socioeconomic backgrounds performed at a higher level than students from lower socioeconomic backgrounds.

Students in the highest quartile attained a mean score of 561 points, which was higher than the mean score of 459 points attained by students in the lowest quartile. The score point difference between the lowest and highest quartile is 102 points, and the score difference between one quartile and the next was around 34 points on average.

The spread of scores between the lowest and highest performing students within each quartile was very similar (ranging from 257 to 268 points.)

3 For more information about socioeconomic background and the ESCS index, please refer to the Reader's guide.

Socioecnomic background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Lowest quartile	459	2.7	453–464	257
Second quartile	489	2.8	483–494	263
Third quartile	526	2.5	520–530	261
Highest quartile	561	3.1	555–567	268

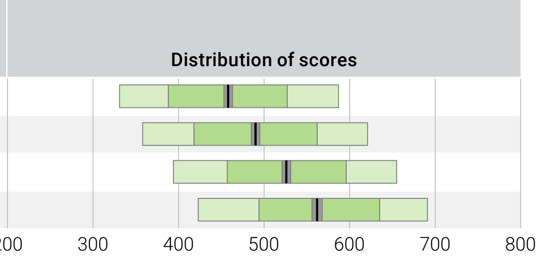


FIGURE 4.36 Mean scores and distribution of student performance on the scientific literacy scale, by socioeconomic background

Proficiency

Figure 4.37 shows the percentage of students on the scientific literacy proficiency scale and the proportions of the students who attained the National Proficient Standard across the socioeconomic quartiles. Students in the lowest socioeconomic quartile were under-represented at the higher end of the scale and over-represented at the lower end of the scale.

The proportion of high performers increased with each increase in socioeconomic quartile: 4% of students in the lowest, 8% in the second, 15% in the third, and 25% in the highest quartile.

The proportion of low performers declined with each increase in socioeconomic quartile: 32% of students in the lowest, 23% in the second, 13% in the third, and 8% in the highest quartile.

The percentage of students who attained the National Proficient Standard increased with each increase in socioeconomic quartile: 40% of students in the lowest, 52% in the second, 66% in the third, and 78% in the highest quartile.

Socioeconomic background	Students who attained the National Proficient Standard (%)
Lowest quartile	40
Second quartile	52
Third quartile	66
Highest quartile	78

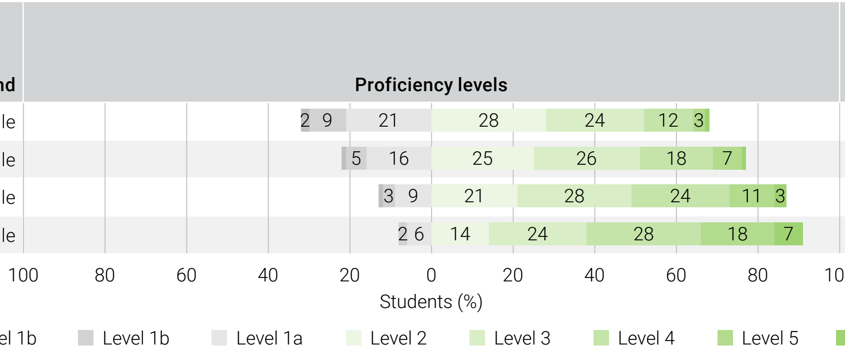


FIGURE 4.37 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by socioeconomic background

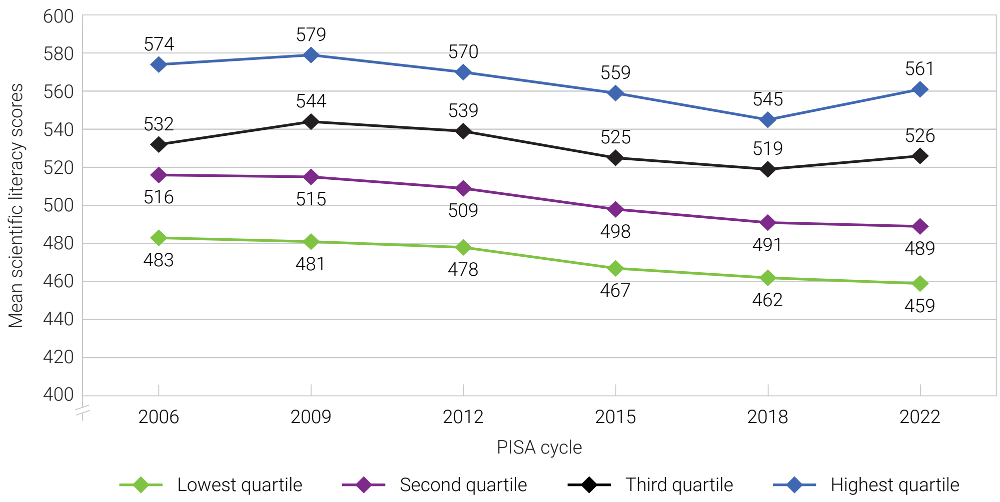
Performance over time

Figure 4.38 shows the mean scientific literacy performance for each quartile of socioeconomic background since PISA 2006, along with details about the change in performance between 3 cycles.

Between PISA 2018 and 2022, there was an increase of 16 points in the highest quartile.

Between PISA 2015 and 2022, there was a decline of 8 points in the lowest quartile and a decline of 9 points in the second quartile.

Between PISA 2006 and 2022, there was a decline of 24 points in the lowest quartile, a decline of 27 points in the second quartile and a decline of 13 points in the highest quartile.



	Lowest quartile									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	-3		-8	▼	-17	▼	-22	▼	-24	▼
2018			-5		-14	▼	-19	▼	-21	▼
2015					-9	▼	-14	▼	-16	▼
2012							-5		-7	
2009									-2	

	Second quartile									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	-2		-9	▼	-20	▼	-26	▼	-27	▼
2018			-7		-18	▼	-24	▼	-25	▼
2015					-11	▼	-17	▼	-18	▼
2012							-6		-7	
2009									-1	

	Third quartile									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	7		1		-13	▼	-18	▼	-6	
2018			-6		-20	▼	-25	▼	-13	▼
2015					-14	▼	-19	▼	-7	
2012							-5		7	
2009									12	▲

	Highest quartile									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	16	▲	2		-9		-18	▼	-13	▼
2018			-14	▼	-25	▼	-34	▼	-29	▼
2015					-11	▼	-20	▼	-15	▼
2012							-9	▼	-5	
2009									5	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.38 Mean scientific literacy performance and differences from PISA 2006 to 2022, by socioeconomic background

Proficiency over time

Figure 4.39 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale by socioeconomic background between PISA 2006 and 2022.

High and low performers

Between PISA 2018 and 2022, the proportions of high performers increased in the third quartile by 3 percentage points and by 8 percentage points in the highest quartile. The proportions of low performers remained unchanged across the quartiles.

Between PISA 2015 and 2022, the proportion of high-performing students in the highest quartile increased by 4 percentage points. In the second quartile, low-performing students declined by 3 percentage points.

Between PISA 2006 and 2022, the proportions of high performers declined in the second quartile by 3 percentage points. For low performers, there were changes across all socioeconomic quartiles. In the lowest and second quartiles, there was a 9 percentage point and 8 percentage point increase respectively in the proportions of low performers. In the third and highest quartiles, there was a 2 percentage point and 4 percentage point increase respectively in the proportions of low performers.

National Proficient Standard

Between PISA 2018 and 2022, and PISA 2015 and 2022, there were no differences in the proportions of students who attained the National Proficient Standard.

Between PISA 2006 and 2022, there were declines in the proportions of students who attained the National Proficient Standard:

- by 10 percentage points in the lowest quartile
- by 11 percentage points in the second quartile
- by 4 percentage points in the third quartile
- by 6 percentage points in the highest quartile.

Lowest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	32	4	50
2018	31	4	49
2015	29	4	47
2012	24	5	43
2009	22	5	41
2006	23	6	40

Students (%)

Second quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	23	8	63
2018	20	7	63
2015	19	8	61
2012	14	9	56
2009	13	10	53
2006	14	11	52

Students (%)

Third quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	13	15	70
2018	14	11	75
2015	12	12	73
2012	8	15	68
2009	8	16	65
2006	10	14	66

Students (%)

Highest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	8	25	84
2018	10	18	86
2015	7	22	82
2012	5	26	80
2009	4	28	75
2006	5	27	78

Students (%)

FIGURE 4.39 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by socioeconomic background

First Nations background

Performance

Figure 4.40 shows the mean scores for scientific literacy performance for First Nations and non-First Nations students. First Nations students achieved a mean score of 427 points, which was 86 points lower than the mean score of 513 points for non-First Nations students.[4]

First Nations student performance was similar to the performance of students in the lower-performing countries such as Bulgaria, Malaysia, Moldova, Romania and the United Arab Emirates.

The spread of scores between the 10th and 90th percentiles for First Nations and non-First Nations students was 280 and 264 points, respectively.

First Nations background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
First Nations	427	5.8	415–438	280
Non-First Nations	513	2.0	508–516	264

Distribution of scores: 200 300 400 500 600 700 800

FIGURE 4.40 Mean scores and distribution of student performance on the scientific literacy scale, by First Nations background

4 For more information about First-Nations background, please refer to the Reader's guide.

Proficiency

Figure 4.41 shows the extent of the under-representation of First Nations students at the higher end of the scientific literacy proficiency scale and, similarly, the substantial over-representation of First Nations students at the lower end of the proficiency scale.

There were fewer high-performing First Nations students (3%) than high-performing non-First Nations students (13%).

The proportion of low-performing First Nations students (46%) was more than twice the proportion of low-performing non-First Nations students (18%).

More First Nations students performed in scientific literacy at proficiency Level 1a (27%) and Level 2 (25%) than non-First Nations students, (13% performed at Level 1a; 22% performed at Level 2).

Just over one-quarter (29%) of First Nations students attained the National Proficient Standard in scientific literacy compared to 60% of non-First Nations students.

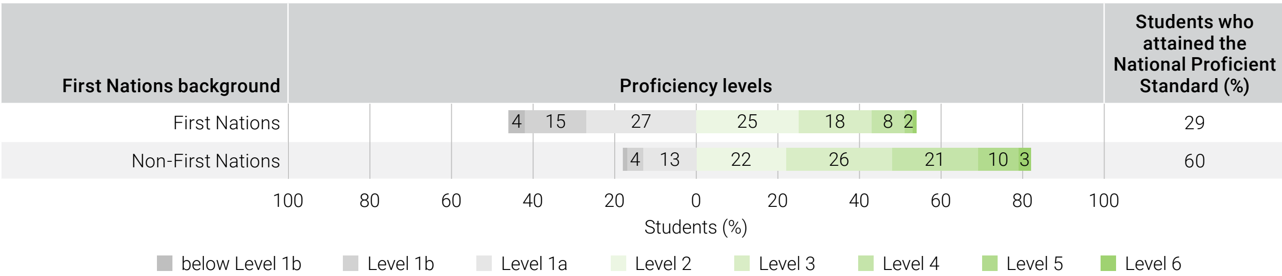


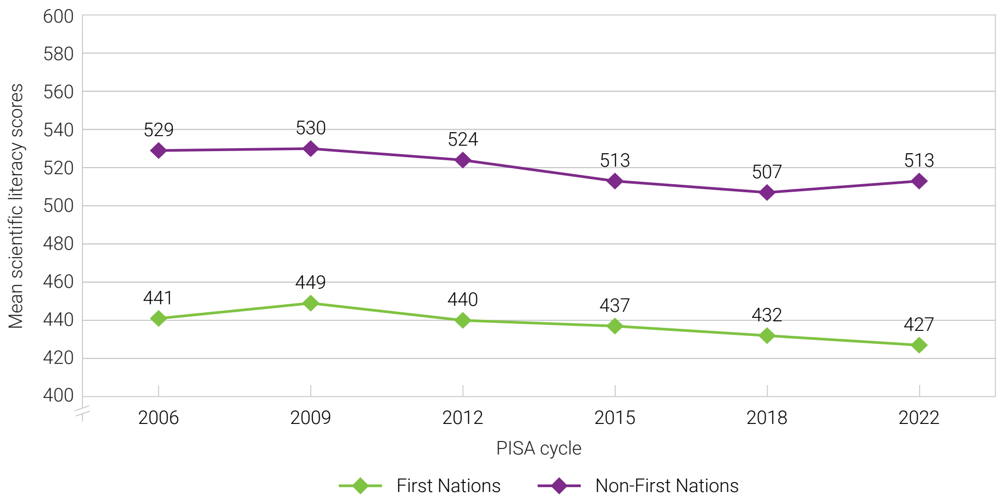
FIGURE 4.41 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by First Nations background

Performance over time

Figure 4.42 shows the mean scientific literacy performance and change in performance across the PISA cycles for First Nations and non-First Nations students.

Between PISA 2018 and 2022, and between PISA 2015 and 2022, there were no differences in the scientific literacy performance for either First Nations or non-First Nations students.

Between PISA 2006 and 2022, the mean scientific literacy performance declined by 16 points for non-First Nations students, but the mean scientific literacy performance for First Nations students did not change during this time.



	First Nations									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	-5		-10		-13		-22	▼	-14	
2018			-5		-8		-17		-9	
2015					-3		-12		-4	
2012							-9		-1	
2009									8	

	Non-First Nations									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	6		0		-11	▼	-17	▼	-16	▼
2018			-6	▼	-17	▼	-23	▼	-22	▼
2015					-11	▼	-17	▼	-16	▼
2012							-6		-5	
2009									1	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.42 Mean scientific literacy performance and differences from PISA 2006 to 2022, by First Nations background

Proficiency over time

Figure 4.43 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale by First Nations background.

High and low performers

Between PISA 2018 and 2022, the proportion of high-performing non-First Nations students increased by 3 percentage points. The proportion of low-performing First Nations and non-First Nations students remained unchanged.

Between PISA 2015 and 2022, the proportion of high-performing non-First Nations students increased by 2 percentage points.

Between PISA 2006 and 2022, the proportion of high-performing First Nations students remained unchanged, while the proportion of low-performing non-First Nations students increased by 6 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, and between PISA 2015 and 2022, there were no differences in the proportions of First Nations and non-First Nations students who attained the National Proficient Standard.

Between PISA 2006 and 2022, the proportion of non-First Nations students who attained the National Proficient Standard declined by 8 percentage points, but the proportion of First Nations students who attained the National Proficient Standard remained unchanged.

First Nations			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	46	3	29
2018	44	3	31
2015	42	3	31
2012	37	2	33
2009	35	3	38
2006	39	4	34

Non-First Nations			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	18	13	60
2018	18	10	60
2015	17	12	62
2012	13	14	66
2009	12	15	68
2006	12	15	68

Students (%)

FIGURE 4.43 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by First Nations background

Immigrant background

Performance

Figure 4.44 shows that the mean scientific literacy performance of students by immigrant background.[5]

The results show that first-generation students attained a mean score of 517 points and scored 12 points higher than Australian-born students (505 points). Foreign-born students attained a mean score of 512 points, their performance was not dissimilar to their Australian-born and first-generation counterparts.

First-generation students and foreign-born students performed at similar levels.

The spread of scores for Australian-born students (277 points) was smaller than the spread of scores for either first-generation students (286 points) or for foreign-born students (292 points).

Immigrant background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Australian-born	505	2.2	500–508	277
First-generation	517	2.8	511–522	286
Foreign-born	512	5.0	502–522	292

Distribution of scores

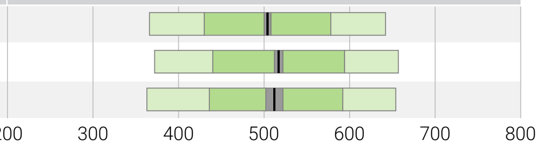


FIGURE 4.44 Mean scores and distribution of student performance on the scientific literacy scale, by immigrant background

5 For more information about immigrant background, please refer to the Reader's guide.

Proficiency

Figure 4.45 shows the percentage of students by immigrant background at each proficiency level on the scientific literacy proficiency scale.

The proportions of high-performing Australian-born students (12%) and foreign-born students (14%) were lower than the proportion of first-generation students (15%).

There was a difference between the proportions of high-performing Australian-born students (12%), and first-generation-born students (15%), while there was no difference in the proportion of high-performing first-generation born students and foreign-born students or high-performing Australian-born students and foreign-born students.

There were no differences between the proportions of low-performing Australian-born students (19%), first-generation students (17%), or foreign-born students (18%).

National Proficient Standard

57% of Australian-born students attained the National Proficient Standard in scientific literacy compared to 62% of first-generation students and 61% of foreign-born students.

In the proportions of students who attained the National Proficient Standard there was:

- no difference between Australian-born and foreign born students
- no difference between first-generation and foreign-born students
- a higher proportion of Australian-born than first-generation students.

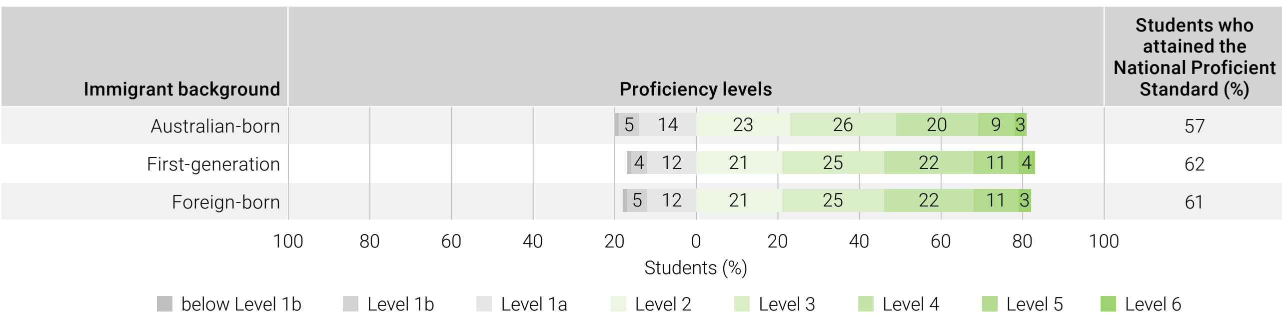
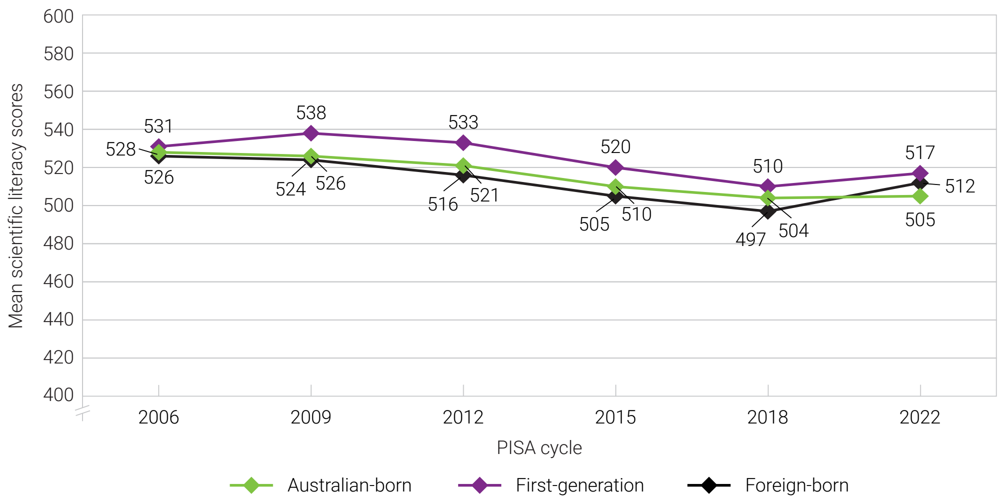


FIGURE 4.45 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by immigrant background

Performance over time

Figure 4.46 shows the scientific literacy performance for students from different immigrant backgrounds since 2006 and changes in performance over time.

- Between PISA 2018 and 2022, foreign-born students' performance increased by 15 points.
- Between PISA 2015 and 2022, there were no differences in scientific literacy performance for any of the immigrant background groups.
- Between PISA 2006 and 2022, the performance of Australian-born students declined by 23 points and first-generation students by 14 points. The performance of foreign-born students remained unchanged.



Australian-born										
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	1		-5		-16	▼	-21	▼	-23	▼
2018			-6	▼	-17	▼	-22	▼	-24	▼
2015					-11	▼	-16	▼	-18	▼
2012							-5		-7	
2009									-2	

First-generation										
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	7		-3		-16	▼	-21	▼	-14	▼
2018			-10	▼	-23	▼	-28	▼	-21	▼
2015					-13	▼	-18	▼	-11	▼
2012							-5		2	
2009									7	

Foreign-born										
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	15	▲	7		-4		-12		-14	
2018			-8		-19	▼	-27	▼	-29	▼
2015					-11		-19	▼	-21	▼
2012							-8		-10	
2009									-2	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.46 Mean scientific literacy performance and differences from PISA 2006 to 2022, by immigrant background

Proficiency over time

Figure 4.47 shows the difference in the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy from PISA 2006 to 2022 for each immigrant background group.

High and low performers

Between PISA 2018 and 2022, the proportion of high performers increased for Australian-born students by 2 percentage points, for first-generation students by 3 percentage points, and for foreign-born students by 5 percentage points. In this period, there were no differences in the proportions of low performers in any of the immigrant groups.

Between PISA 2015 and 2022, there were no differences in the proportions of high performers in any of the immigrant background groups, while the proportions of low performers declined for Australian-born students by 3 percentage points and for first-generation students by 2 percentage points.

Between PISA 2006 and 2022, there were changes for Australian-born students and first-generation students but not for foreign-born students:

- for Australian-born students, there was an 8 percentage point increase in low performers and a 2 percentage point increase in high performers.
- for first-generation students, there was a 6 percentage point increase in low performers but no difference in the proportion of high performers.

National Proficient Standard

Between PISA 2018 and 2022, there were no differences among any of the 3 immigrant background groups.

Between PISA 2015 and 2022, the proportion of Australian-born students who attained the National Proficient Standard declined by 3 percentage points. There was no difference in the proportion of first-generation or foreign-born students.

Between PISA 2006 and 2022, the proportion of Australian-born students who attained the National Proficient Standard declined by 10 percentage points, first-generation students declined by 6 percentage points and the proportion of foreign-born students remained unchanged.

FIGURE 4.47 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency levels from PISA 2006 to 2022, by immigrant background

Language background

Performance

Figure 4.49 shows the performance of students by language background.[6] Students whose main language spoken at home was English attained a mean score of 510 points which was statistically similar to students who spoke a language other than English at home (499 points).

The range of scores between the 10th and 90th percentiles was wider for students who spoke a language other than English at home (306 points) compared to the spread of scores for students who spoke English at home (279 points).

Main language spoken at home	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
English	510	1.8	506–513	279	
Other language	499	5.7	486–509	306	

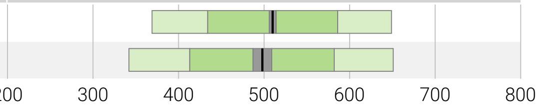


FIGURE 4.48 Mean scores and distribution of student performance on the scientific literacy scale, by language background

Proficiency

Figure 4.49 shows the percentages of students by language background at each proficiency level on the scientific literacy scale.

The proportion of high performers who spoke English at home and high performers who spoke a language other than English at home was the same (13%).

There were fewer low performers who spoke English at home (18%) than low performers who spoke a language other than English at home (24%).

The proportions of students who attained the National Proficient Standard were not different between the students who spoke English at home and students who spoke a language other than English at home.

Main language spoken at home	Proficiency levels	Students who attained the National Proficient Standard (%)
English	4 13 22 26 21 10 3	59
Other language	2 7 15 21 23 19 10 4	55

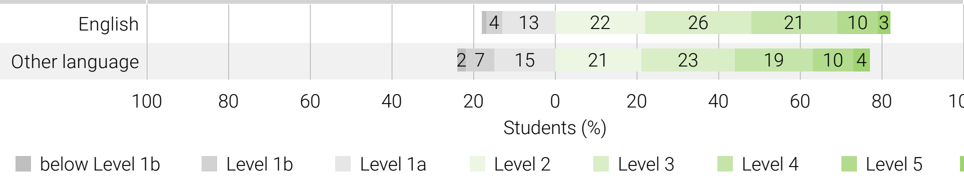


FIGURE 4.49 Percentages of students across the scientific literacy proficiency scale and proportions of students who attained the National Proficient Standard, by language background

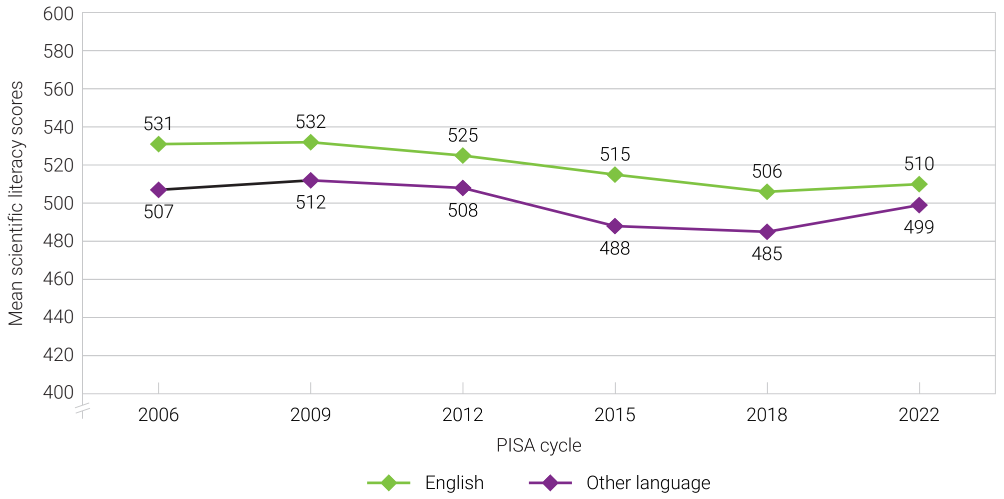
Performance over time

Figure 4.50 shows the mean performance in scientific literacy for students by language background, and their changes in performance over time.

Between PISA 2018 and 2022, and between PISA 2015 and 2022, there was no difference in scientific literacy performance for students from the 2 language background groups.

Between PISA 2006 and 2022, there was a decline in performance of students from both language background groups. For students who spoke English at home there was a 21 point decrease. Students who spoke a language other than English at home had an 8 point decrease.

6 For more information about language background, please refer to the Reader's guide.



	English									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	4		-5		-15	▼	-22	▼	-21	▼
2018			-8	▼	-19	▼	-25	▼	-24	▼
2015					-10	▼	-17	▼	-16	▼
2012							-7	▼	-6	
2009									1	

	Other language									
	Difference between PISA cycles									
	2018		2015		2012		2009		2006	
2022	13		11		-9		-13		-8	▼
2018			-3		-23	▼	-27	▼	-22	▼
2015					-21	▼	-24	▼	-19	
2012							-4		1	
2009									5	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 4.50 Mean scientific literacy performance and differences from PISA 2006 to 2022, by language background

Proficiency over time

Figure 4.51 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the scientific literacy proficiency scale by language background.

Between PISA 2018 and 2022, there was a 3 percentage point increase in the proportion of high performers who spoke English at home and a 5 percentage point increase in the proportion of high performers who spoke a language other than English at home. There were no differences in the proportions of low performers who spoke English at home and who spoke a language other than English at home.

Between PISA 2015 and 2022, there were no differences in the proportions of high performers who spoke English at home and students who spoke a language other than English at home. The proportion of low performers who spoke English at home increased by 2 percentage points, but there was no difference in low performers for students who spoke a language other than English at home.

Between PISA 2006 and 2022, there was a 7 percentage point increase in the proportion of low performers who spoke English at home, and a 2 percentage point decline in high performers. There was no difference in the proportions of high performers and low performers for students who spoke a language other than English at home.

National Proficient Standard

Between PISA 2018 and 2022, there were no differences in the proportions of students who attained the National Proficient Standard, regardless of language background.

Between PISA 2015 and 2022, there was a 3 percentage point decline in the proportion of students who attained the National Proficient Standard for students who spoke English at home. There was no difference for students who spoke a language other than English at home.

Between PISA 2006 and 2022, there was a 9 percentage point decline in the proportion of students who attained the National Proficient Standard and spoke English at home. There was no difference for students who spoke a language other than English at home.

English

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	18	13	59
2018	18	10	59
2015	16	12	63
2012	12	14	66
2009	11	15	69
2006	12	15	69

Other language

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	13	55
2018	27	9	51
2015	27	10	51
2012	20	15	58
2009	19	14	60
2006	20	13	57

Students (%)

FIGURE 4.51 Proportions of low and high performers and students who attained the National Proficient Standard on the scientific literacy proficiency scale from PISA 2006 to 2022, by language background

5

Australian student performance in reading literacy

This chapter provides results on Australian student performance in reading literacy. The results focus on performance by country, across states and territories, by gender and for different demographic groups of interest. Results are reported for PISA 2022 and over cycles.

This report focuses on differences that are statistically significant (are unlikely to have occurred by chance). Where the commentary states that there was a difference between sets of numbers, (whether these were mean scores or percentages), it means that the difference satisfied this condition. Where it states that there was no difference, or where no comment is made regarding a possible comparison, it indicates that the difference was not statistically significant. For more information about statistical significance, please refer to the Reader's guide.

Because of rounding, the totals in the text may not add up exactly to the corresponding individual country numbers or percentages as reported in the related figure or table. For more information about rounding of figures, please refer to the Reader's guide.

Countries who did not meet one or more of the sampling technical standards are asterisked in Figures 5.1 to 5.6.

Key findings

- Australian students achieved an average of 498 score points in reading literacy in PISA 2022, which was higher than the OECD average of 476 score points.
- Australia was outperformed by students in 8 countries. Singapore was the highest scoring country in PISA 2022, with an average achievement of 543 score points. This was 67 score points or two-thirds of a full standard deviation higher than the OECD average.
- Since PISA 2000, when reading literacy was first assessed as a major domain, Australia's average score has declined by 30 points. The OECD average, for those countries who can be compared across all assessments, has declined by 18 points.
- Australia's performance, relative to other countries, has changed over time. Singapore has consistently performed higher than Australia, and Finland has performed higher than Australia in all PISA cycles except in PISA 2022 where their performance is lower than Australia. Four countries (Canada, Ireland, Japan and Korea) that were on a par with Australia in their first PISA cycle, outperformed Australia in 2022, and of 5 countries that performed lower than Australia in their first PISA cycle, 3 of these countries (Estonia, Chinese Taipei and Macao (China)) outperformed Australia in 2022, and 2 of these countries (United Kingdom and the United States) are on par with Australia in 2022.
- 12% of Australian students were classed as high performers, which was higher than the OECD average of 7% but lower than the 23% of students in Singapore. The proportion of high performers in Australia has decreased by 5 percentage points between 2000 and 2022.
- 21% of Australian students were low performers, again lower than the OECD average of 26% but higher than Singapore's 11% low performers. The proportion of low performers in Australia has increased by 9 percentage points between 2000 and 2022.
- In Australia, Level 3 is the National Proficient Standard in reading literacy and 57% of Australian students attained this standard, which was 12 percentage points lower than in 2000.
- The performance of students in the Australian Capital Territory (517 points) was higher than all other jurisdictions, and 66% attained the National Proficient Standard.
- Between PISA 2000 and 2022, all states and territories, except Victoria and the Northern Territory, declined in performance. The largest declines were in South Australia with 45 points, followed by New South Wales with 40 points.
- Independent schools outperformed Catholic schools, which in turn outperformed government schools. After adjusting for the socioeconomic background at both the student level and school level, the only difference found was between government and Catholic schools, with students in government schools performing at a higher level. This means that given similar socioeconomic backgrounds, there was no performance advantage for students who attended an independent school over either a Catholic school or government school, but government schools had higher results than Catholic schools.
- In Australia and in all except one country, female students performed at a higher level than male students in reading literacy. However, over a 22-year period, the performance of Australian female students declined by 37 points and male students by 26 points.

5.1 Australia's reading literacy results in an international context

Performance

Singapore was the highest scoring country (or economy) in reading literacy, with a mean score of 543 points.[1] Ireland, Japan, Korea, China, Chinese Taipei and Estonia performed at similar levels, lower than Singapore but higher than all other countries.

Australian students achieved a mean score of 498 points in reading literacy. This was higher than the OECD average of 476 points. Singapore's score was 67 points or two-thirds of a standard deviation higher than the OECD average, and 45 points higher than Australia's mean performance.

The performance of Australian students was:

- below students in 8 countries (Singapore, Ireland, Japan, Korea, Chinese Taipei, Estonia, Macao (China) and Canada)
- not different to students in 4 countries (the United States, New Zealand, Hong Kong (China) and the United Kingdom)
- higher than students in 68 other countries – notably Finland and Denmark.

This chapter only provides a commentary on those countries/economies who performed higher than the lowest performing OECD country (Costa Rica). The countries omitted from this chapter are:

Albania	Dominican Republic	Kosovo	Panama
Argentina	El Salvador	Malaysia	Paraguay
Baku (Azerbaijan)	Georgia	Moldova	Peru
Brazil	Guatemala	Mongolia	Philippines
Bulgaria	Indonesia	Montenegro	Saudi Arabia
Cambodia	Jamaica	Morocco	Thailand
Colombia	Jordan	North Macedonia	Uzbekistan
Cyprus	Kazakhstan	Palestinian Authority	

Figure 5.1 provides the mean reading literacy scores, together with the standard errors, confidence intervals around the mean, and the difference between the 10th and 90th percentiles. It shows the distribution of reading literacy scores for all countries that attained a mean reading literacy score higher than Costa Rica in PISA 2022.

The measure of the range of performance (between the 10th and 90th percentiles) within each country varied considerably and was unrelated to the achieved mean score for that country. A smaller range between the lowest and highest performing students indicated that there was greater similarity in performance. Countries with the smallest range of performance included Viet Nam (197 points), the relatively low-performing Mexico (218 score points) and Costa Rica (222 score points), the relatively high-performing Ireland (227 score points), Macao (China) (228 score points) and Türkiye (227 score points).

A larger range between the lowest and highest performing students indicated there was greater diversity in performance. Countries with the largest range of performance included the United Arab Emirates (328 score points), Israel (323 points) and the Netherlands (303 score points).

In Australia, the difference between the lowest and highest performing students was 288 points, which was similar to the lowest and highest performing students from Qatar, France, Canada, New Zealand, Sweden, the United States, Malta and Norway. The difference in reading literacy performance between the highest and lowest performing students across the OECD was 262 points.

1 For ease of reading, economies are referred to as countries.

	Country	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Significantly higher than Australia	Singapore	543	1.9	538–546	271
	Ireland*	516	2.3	511–520	227
	Japan	516	3.2	509–522	249
	Korea	515	3.6	508–522	262
	Chinese Taipei	515	3.3	508–521	269
	Estonia	511	2.4	506–515	240
	Macao (China)	510	1.3	507–513	228
	Canada*	507	2.0	503–510	278
Not significantly different than Australia	United States*	504	4.3	495–512	292
	New Zealand*	501	2.1	496–505	287
	Hong Kong (China)*	500	2.8	494–505	255
	Australia*	498	2.0	494–501	288
	United Kingdom*	494	2.4	489–499	269
Significantly lower than Australia	Finland	490	2.3	485–494	270
	Denmark*	489	2.6	483–493	238
	Poland	489	2.7	483–494	272
	Czech Republic	489	2.2	484–493	256
	Sweden	487	2.5	482–491	290
	Switzerland	483	2.3	478–487	273
	Italy	482	2.7	476–486	240
	Austria	480	2.7	475–485	273
	Germany	480	3.6	472–486	276
	Belgium	479	2.5	473–483	274
	Portugal	477	2.7	471–481	243
	Norway	477	2.5	471–481	295
	OECD average	476	0.5	474–476	262
	Croatia	475	2.4	470–480	232
	Latvia*	475	2.5	469–479	233
	Spain	474	1.7	471–477	250
	France	474	3.1	467–479	277
	Israel	474	3.5	466–480	323
	Hungary	473	2.8	467–478	264
	Lithuania	472	2.2	467–476	244
	Slovenia	469	1.6	465–471	252
	Viet Nam	462	3.9	454–469	197
	Netherlands*	459	4.3	450–467	303
	Türkiye	456	1.9	452–459	227
	Chile	448	2.6	442–453	239
	Slovak Republic	447	3.1	440–452	275
	Malta	445	1.9	441–449	295
	Serbia	440	2.8	434–445	236
	Greece	438	2.8	432–443	245
	Iceland	436	2.1	431–439	271
	Uruguay	430	2.4	425–435	260
	Brunei Darussalam	429	1.2	426–431	261
	Romania	428	4.0	420–436	262
	Ukrainian regions	428	3.9	419–435	242
	Qatar	419	1.4	416–422	277
	United Arab Emirates	417	1.3	414–419	328
	Mexico	415	2.9	409–421	218
	Costa Rica	415	2.7	410–420	222

Distribution of scores

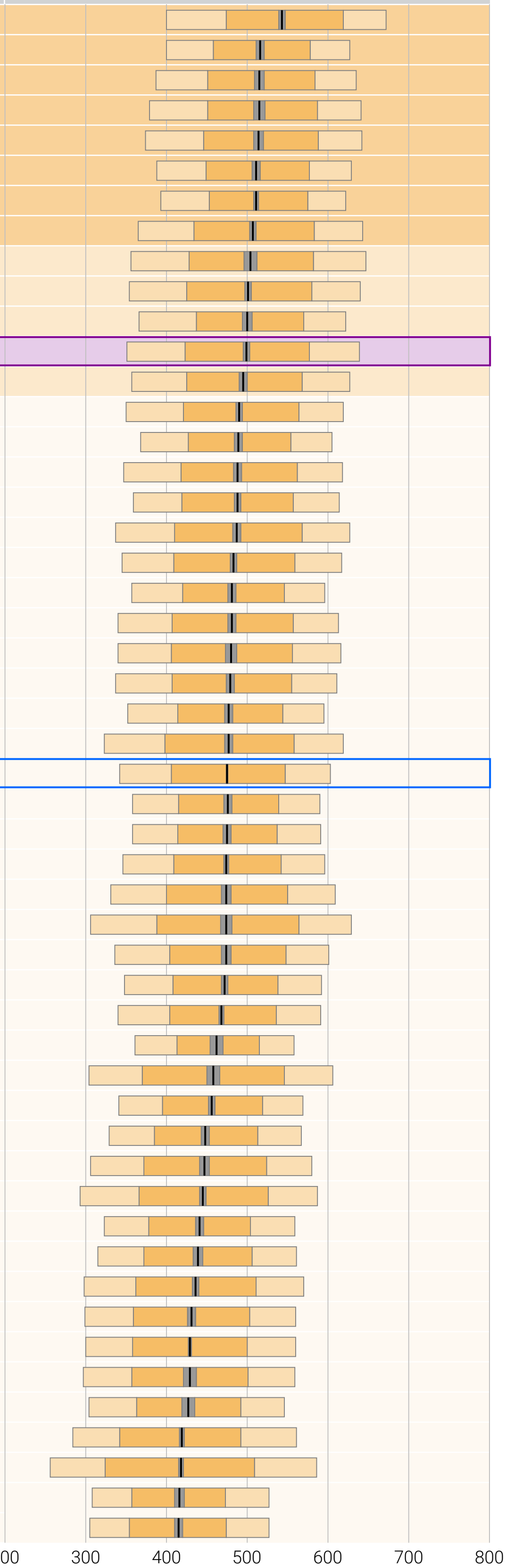


FIGURE 5.1 Mean scores and distribution of student performance on the reading literacy scale, by country

Proficiency

The reading literacy scale is divided into 8 levels of proficiency, with Level 6 as the highest and Level 1c as the lowest. One proficiency level in reading literacy represents 73 score points. Figure 5.2 shows the percentage of students at each reading literacy proficiency level from below Level 1c to Level 6, by country. Countries are ordered by the percentage of students who performed below Level 2, which is the internationally assigned baseline benchmark. Countries with the lowest percentage of students below Level 2 are placed at the top of the figure and those with the highest portion are placed at the bottom.

High performers

Students who scored at Level 5 (626 points) or above are considered high performers in reading literacy. High performers demonstrate high levels of skills and knowledge and can successfully complete most reading literacy tasks in PISA.

Singapore had the largest proportion of high performers with almost one-quarter of their students attaining Level 5 or 6 on the reading literacy proficiency scale.

Australia, with 12% of high performers, was among a handful of countries with the highest proportion of high performers. These were the United States, Chinese Taipei and Canada (14%), Korea and New Zealand (13%) and Japan (12%).[2]

In 38 countries, fewer than 10% of students were high performers. This includes the high-performing Hong Kong (China) and Macao (China) that each had 9% high performers.

On average, 7% of students across the OECD countries were high performers, which was similar to the proportions of high performers in Denmark, Belgium, France and the Netherlands (7%), and Austria, the Czech Republic and Germany (8%).

Low performers

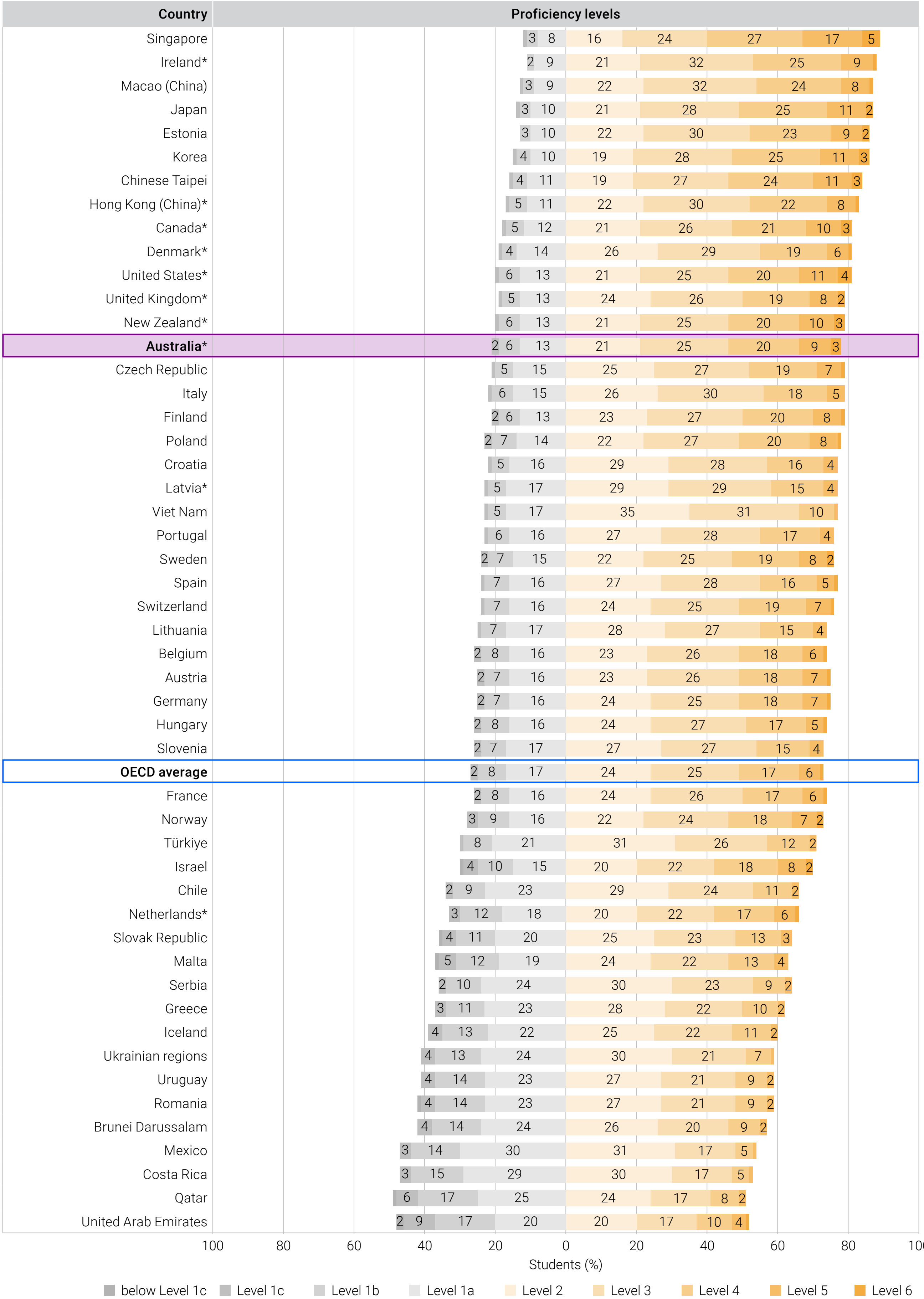
Students who scored below Level 2 in reading literacy (lower than 480 points) are considered low performers. Students who do not achieve this level are unable to demonstrate the capacity to use their reading literacy skills to solve a wide range of practical problems.

The countries with the highest mean scores were also the countries with the smallest percentage of students who performed below Level 2, the low performers. Singapore and Ireland had 11% of low performers, Macao (China) (13%), Japan and Estonia (14%), Korea (15%), Chinese Taipei (16%), Hong Kong (China) (17%) and Canada (18%).

In Australia, 21% of students were low performers. This was similar to the proportions in the Czech Republic, Italy, Finland and New Zealand (21%), the United Kingdom and the United States (20%), Poland (22%) and Croatia, Latvia, Portugal and Viet Nam (23%).

On average, 26% of students across the OECD countries were low performers in reading literacy, which was similar to the proportions of low performers in Switzerland, Lithuania, Belgium, Austria and Germany (25%), Hungary and Slovenia (26%) and France and Norway (27%).

2 As noted in the Reader's guide (see rounding of figures), the totals in the text may not exactly correspond to individual country numbers or percentages as reported in the related figure or table. This applies throughout this report.



Note: if the proportion of students in a proficiency level is 1% or lower, the level is shown but without the numeric label '1'. This convention has been used for all figures about proficiency levels in this chapter.

FIGURE 5.2 Percentages of students across the reading literacy proficiency scale, by country

Performance over time

PISA compares results between cycles and monitors the knowledge and skills of 15-year-old students over time. Reading literacy was the major domain in 3 cycles: in 2000, 2009 and 2018. Figure 5.3 provides the mean reading literacy score differences for these 3 comparison periods when reading literacy was the major domain:

- between PISA 2018 and 2022
- between PISA 2009 and 2022
- between PISA 2000 and 2022.

Between PISA 2018 and 2022

- 4 countries (Japan, Qatar, Chinese Taipei and Brunei Darussalam) improved their reading literacy performance. The increase in performance ranged from 12 points in Japan and Qatar to 21 points in Brunei Darussalam.
- 23 countries, including Canada, Estonia, Finland, Hong Kong (China), Iceland, Macao (China), Singapore and the United Kingdom, declined in their reading literacy performance. The decline ranged from 7 points in Singapore to 38 points in Iceland.
- Australia's mean performance in PISA 2022 remained unchanged from 2018.
- The OECD average (AV00T) was 493 points in PISA 2018, and declined by 11 points in PISA 2022 to 482 points.[3]

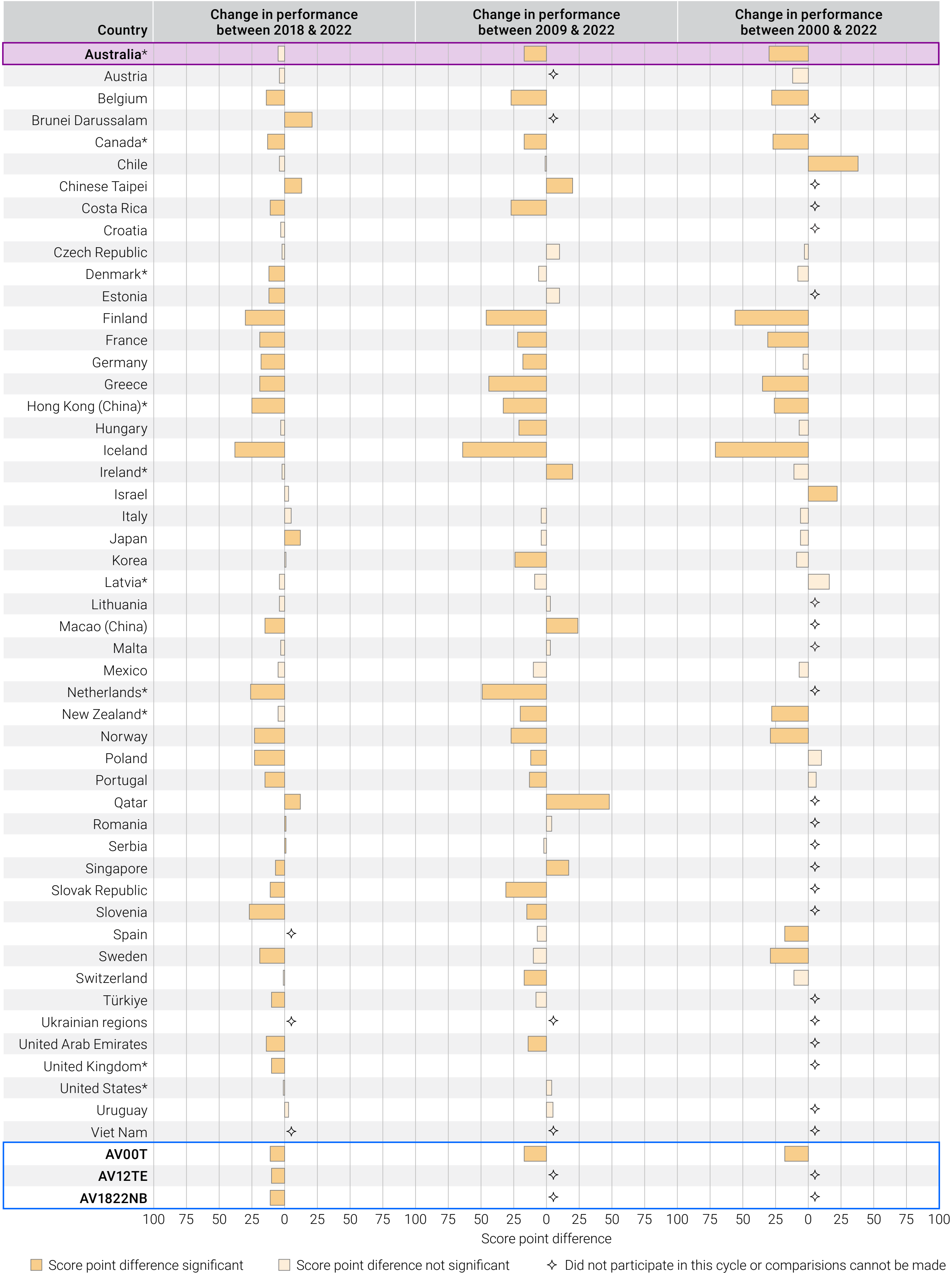
Between PISA 2009 and 2022

- 5 countries (Singapore, Chinese Taipei, Ireland, Macao (China) and Qatar) improved their reading literacy performance. The increase in performance ranged from 17 points in Singapore to 48 points in Qatar.
- 21 countries, including Australia, Canada, Finland, Hong Kong (China) and New Zealand, declined in their reading literacy performance. The decline ranged from 12 points in Poland to 64 points in Iceland.
- Australia's mean performance in PISA 2009 (515 points) declined by 17 points between PISA 2009 and 2022.
- The OECD average (AV00T) was 499 points in PISA 2009, and declined by 18 points in PISA 2022.[3]

Between PISA 2000 and 2022

- Only Chile increased their reading literacy performance by 38 points.
- 12 countries, including Australia, Canada, Finland, Hong Kong (China) and New Zealand, declined in their reading literacy performance. The decline ranged from 18 points in Spain to 71 points in Iceland.
- Australia's mean performance in PISA 2000 (528 points) declined by 30 points in PISA 2022 (498 points).
- The OECD average (AV00T) was 500 points in PISA 2000, and declined by 18 points in PISA 2022.[3]

3 Based on the average across OECD countries that compare performance across all assessments, from PISA 2000 through to 2022 (AV00T).



AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 5.3 Mean differences in student performance on reading literacy, between PISA 2018 and 2022, 2009 and 2022, and 2000 and 2022, by country

Relative trends over time

Table 5.1 shows the position of a participating country relative to Australia in reading literacy performance from PISA 2000 to 2022. Countries are shown in order of highest to lowest performing.

- Across the PISA cycles, 25 countries consistently performed at lower levels than Australia: Austria, Brunei Darussalam, Chile, Costa Rica, Croatia, the Czech Republic, Greece, Hungary, Iceland, Israel, Italy, Latvia, Lithuania, Malta, Mexico, Qatar, Romania, Serbia, the Slovak Republic, Spain, Türkiye, the United Arab Emirates, Uruguay, and Vietnam.
- In PISA 2000 and 2022, the performances of 8 countries (Belgium, Denmark, France, Germany, Norway, Poland, Sweden and Switzerland) were lower than Australia's.
- Singapore has performed at a consistently higher level than Australia.
- The performances of Hong Kong (China) and New Zealand in 2000 and in 2022 were not different to Australia's.

Some countries' relative performance to Australia's has changed over time.

- In the previous 7 PISA cycles, Finland performed at a higher level than Australia; however, in 2022, their performance was lower than Australia's.
- In their first PISA cycle, Canada, Japan, Korea and Ireland were not different to Australia; however, in 2022, their performances were higher than Australia's.
- In their first PISA cycle, Estonia, Chinese Taipei and Macao (China) were lower than Australia; however, in 2022, their performances were higher than Australia's.
- In their first cycle, the United Kingdom and the United States were lower than Australia; however, in 2022, their performances were not different to Australia's.

TABLE 5.1 Relative trends in reading literacy performance, by country

	Position relative to Australia in other PISA cycles							
Country	**2022**	**2018**	**2015**	**2012**	**2009**	**2006**	**2003**	**2000**
Singapore	▲	▲	▲	▲	▲	–	–	–
Ireland*	▲	▲	▲	▲	▼	●	▼	●
Japan	▲	●	▲	▲	●	▼	▼	●
Korea	▲	▲	▲	▲	▲	▲	▲	●
Chinese Taipei	▲	●	●	▲	▼	▼	–	–
Estonia	▲	▲	▲	●	▼	▼	–	–
Macao (China)	▲	▲	▲	●	▼	▼	▼	–
Canada*	▲	▲	▲	▲	▲	▲	●	●
United States*	●	●	●	▼	▼	–	▼	▼
New Zealand*	●	●	▲	●	●	▲	●	●
Hong Kong (China)*	●	▲	▲	▲	▲	▲	▼	●
Australia								
United Kingdom*	●	●	●	▼	▼	▼	–	–
Finland	▼	▲	▲	▲	▲	▲	▲	▲
Denmark*	▼	●	●	▼	▼	▼	▼	▼
Poland	▼	▲	●	●	▼	●	▼	▼
Czech Republic	▼	▼	▼	▼	▼	▼	▼	▼
Sweden	▼	●	●	▼	▼	●	▼	▼
Switzerland	▼	▼	▼	●	▼	▼	▼	▼
Italy	▼	▼	▼	▼	▼	▼	▼	▼
Austria	▼	▼	▼	▼	–	▼	▼	▼
Germany	▼	●	●	●	▼	▼	▼	▼
Belgium	▼	▼	●	●	▼	▼	▼	▼
Portugal	▼	▼	●	▼	▼	▼	▼	▼
Norway	▼	●	▲	▼	▼	▼	▼	▼
Croatia	▼	▼	▼	▼	▼	▼	–	–
Latvia*	▼	▼	▼	▼	▼	▼	▼	▼
Spain	▼	▼	▼	▼	▼	▼	▼	▼
France	▼	▼	●	●	▼	▼	▼	▼
Israel	▼	▼	▼	▼	▼	▼	–	▼
Hungary	▼	▼	▼	▼	▼	▼	▼	▼
Lithuania	▼	▼	▼	▼	▼	▼	–	–
Slovenia	▼	▼	●	▼	▼	▼	–	–
Viet Nam	▼	–	–	–	–	–	–	–
Netherlands*	▼	▼	●	●	●	●	▼	–
Türkiye	▼	▼	▼	▼	▼	▼	▼	–
Chile	▼	▼	▼	▼	▼	▼	–	▼
Slovak Republic	▼	▼	▼	▼	▼	▼	▼	–
Malta	▼	▼	▼	–	–	–	–	–
Serbia	▼	▼	–	▼	▼	▼	–	–
Greece	▼	▼	▼	▼	▼	▼	▼	▼
Iceland	▼	▼	▼	▼	▼	▼	▼	▼
Uruguay	▼	▼	▼	▼	▼	▼	▼	–
Brunei Darussalam	▼	▼	–	–	–	–	–	–
Romania	▼	▼	▼	▼	▼	▼	–	–
Ukrainian regions	▼	–	–	–	–	–	–	–
Qatar	▼	▼	▼	▼	▼	▼	–	–
United Arab Emirates	▼	▼	▼	▼	▼	–	–	–
Mexico	▼	▼	▼	▼	▼	▼	▼	▼
Costa Rica	▼	▼	▼	▼	▼	–	–	–

Note: ▲ Score signficantly higher than Australia's
● Score not significantly different to Australia's
▼ Score signficantly lower than Australia's
– Did not participate in this cycle or comparisons cannot be made

Proficiency over time

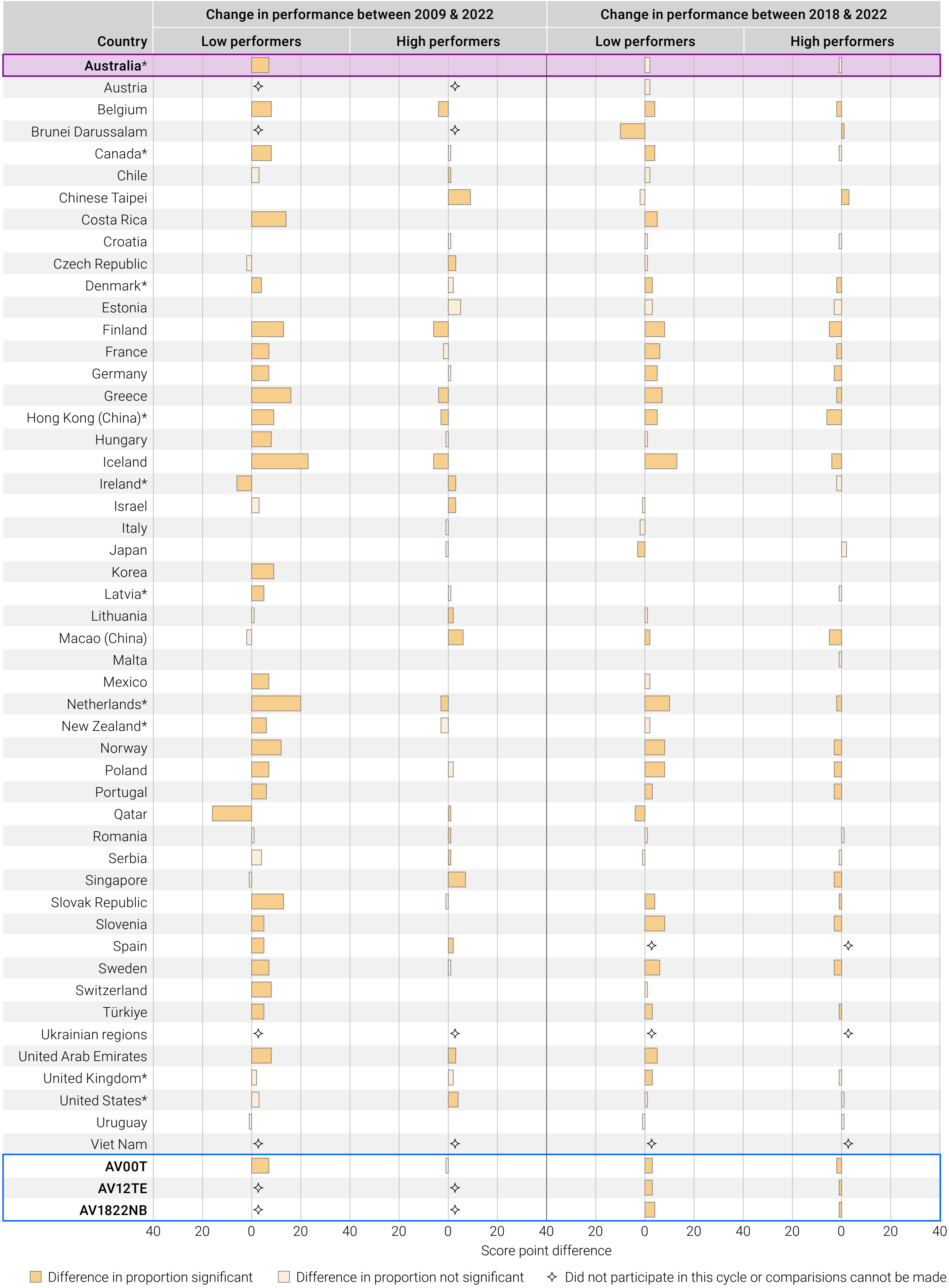
Figure 5.4 shows the difference in the proportions of low and high performers on the reading literacy proficiency scale between PISA 2018 and 2022, and between PISA 2009 and 2022, by country. The proportions of high and low performers in some countries have changed over time.

Between PISA 2018 and 2022

- The percentage of low performers and high performers in Australia did not change.
- The percentage of low performers across the OECD countries increased by 3 percentage points, while the percentage of high performers across the OECD countries (AV00T) decreased by 2 percentage points. (see Footnote 3).
- There were 17 countries, including Finland, Hong Kong (China) and Macao (China), in which the percentage of low performers increased, and the percentage of high performers decreased. The increase in low performers ranged from 2 percentage points in Macao (China) to 13 percentage points in Iceland, while the decrease in high performers ranged from 1 percentage point in the Slovak Republic to 6 percentage points in Hong Kong (China).
- The percentage of low performers increased in 4 countries (Canada, Costa Rica, the United Arab Emirates and the United Kingdom). The increase in low performers ranged from 3 percentage points in the United Kingdom to 5 percentage points in Costa Rica and the United Arab Emirates.
- In Chinese Taipei, the percentage of high performers increased by 3 percentage points, while in Singapore, the percentage of high performers declined by 3 percentage points.

Between PISA 2009 and 2022

- The percentage of Australian low performers and OECD countries (AV00T) increased by 7 percentage points, but there was no difference in the percentage of high performers (see Footnote 3).
- The percentage of low performers increased in 27 other countries, including Canada, New Zealand and Korea. These increases ranged from 4 percentage points in Denmark to 23 percentage points in Iceland.
- There were 6 countries (Belgium, Finland, Greece, Hong Kong (China), Iceland and the Netherlands) in which the percentage of low performers increased and the percentage of high performers decreased; there were more low performers and fewer high performers. The increase in low performers ranged from 8 percentage points in Belgium to 23 percentage points in Iceland, while the decrease in high performers ranged from 3 percentage points in Hong Kong (China) and the Netherlands to 6 percentage points in Finland and Iceland.
- The percentage of high performers increased in 14 countries, including Chinese Taipei, Macao (China), Singapore and the United States. The improvements in high performers ranged from 1 percentage point in Serbia to 9 percentage points in Chinese Taipei.
- In Ireland and Qatar, the percentage of low performers decreased and the percentage of high performers increased; there were fewer low performers and more high performers. The percentage of low performers declined by 6 percentage points in Ireland and 16 percentage points Qatar, while the percentage of high performers improved by 1 percentage point in Qatar and 3 percentage points in Ireland.
- In Spain and the United Arab Emirates, the percentage of low performers increased and the percentage of high performers increased; there were more low performers and more high performers. The percentage of low performers increased by 5 percentage points in Spain and by 8 percentage points in the United Arab Emirates, while the percentage of high performers increased by 2 percentage points in Spain and 3 percentage points in the United Arab Emirates.



AV00T: the average across OECD countries that can compare performance across all assessments, from PISA 2000 through to 2022.
AV12TE: the arithmetical average across OECD countries, excluding Costa Rica, Luxembourg and Spain.
AV1822NB: the average across OECD countries, excluding Luxembourg, Spain and any countries, including Australia, where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

FIGURE 5.4 Change in proportions of low and high performers on reading literacy proficiency scale, between PISA 2009 and 2022, and 2018 and 2022, by country

Countries by gender

Performance

Figure 5.5 provides the reading literacy performance for female and male students on the reading literacy scale, graphs the difference by gender and indicates whether the difference was significant.

In all countries except Costa Rica, female students performed at a higher level than male students in reading literacy. The largest differences by gender were in Finland where female students scored, on average, 45 points or higher than male students. The smallest differences between female and male students were in Chile and Mexico, with a mean score difference of 6 and 8 points respectively.

In Australia, female students scored 509 points on average, which was higher than male students, who scored 487 points; a difference of 22 points.

Country	Females Mean score	Females SE	Males Mean score	Males SE
Finland	509	2.6	487	2.6
Slovenia	491	3.1	470	3.3
United Arab Emirates	492	3.2	465	3.5
Norway	447	1.4	413	1.6
Qatar	519	2.2	495	2.3
Malta	451	3.2	445	3.0
Sweden	529	4.0	502	4.1
Iceland	417	2.6	414	3.2
Brunei Darussalam	493	3.3	459	2.9
Croatia	503	2.6	474	3.2
Korea	499	2.7	479	3.4
Lithuania	525	3.0	498	2.7
Czech Republic	513	2.6	468	2.8
Slovak Republic	484	3.2	464	4.1
Poland	490	3.6	470	4.1
Belgium	451	2.9	426	3.5
Chinese Taipei	512	3.3	489	3.4
Estonia	481	3.4	465	3.5
Latvia*	454	3.1	419	2.7
Romania	525	3.0	507	3.1
Netherlands*	486	3.4	462	5.1
New Zealand*	491	2.9	472	3.7
Greece	524	3.0	508	4.3
Serbia	533	3.6	499	5.2
Spain	488	3.0	461	2.8
Canada*	487	2.4	456	2.7
Israel	518	1.8	503	1.9
OECD average	465	2.7	426	2.8
Türkiye	419	3.3	411	3.1
Hong Kong (China)*	473	4.6	447	4.5
Switzerland	514	3.0	488	2.8
Ukrainian regions	498	2.9	456	3.1
Australia*	488	0.5	464	0.6
United States*	503	3.2	475	3.2
Austria	487	3.0	466	2.9
Portugal	440	2.2	399	2.2
Denmark*	442	4.2	415	4.1
France	453	2.9	428	3.7
Germany	553	2.3	533	2.2
Singapore	462	3.7	433	3.4
Italy	491	2.4	447	2.0
Ireland*	487	1.9	462	2.1
Viet Nam	506	2.6	469	3.1
United Kingdom*	495	2.8	472	2.7
Hungary	468	2.8	444	2.7
Japan	439	3.8	416	5.2
Macao (China)	440	1.4	396	1.8
Uruguay	503	3.1	486	3.2
Mexico	515	4.3	493	5.0
Chile	438	2.9	423	2.7
Costa Rica	471	3.7	453	4.3

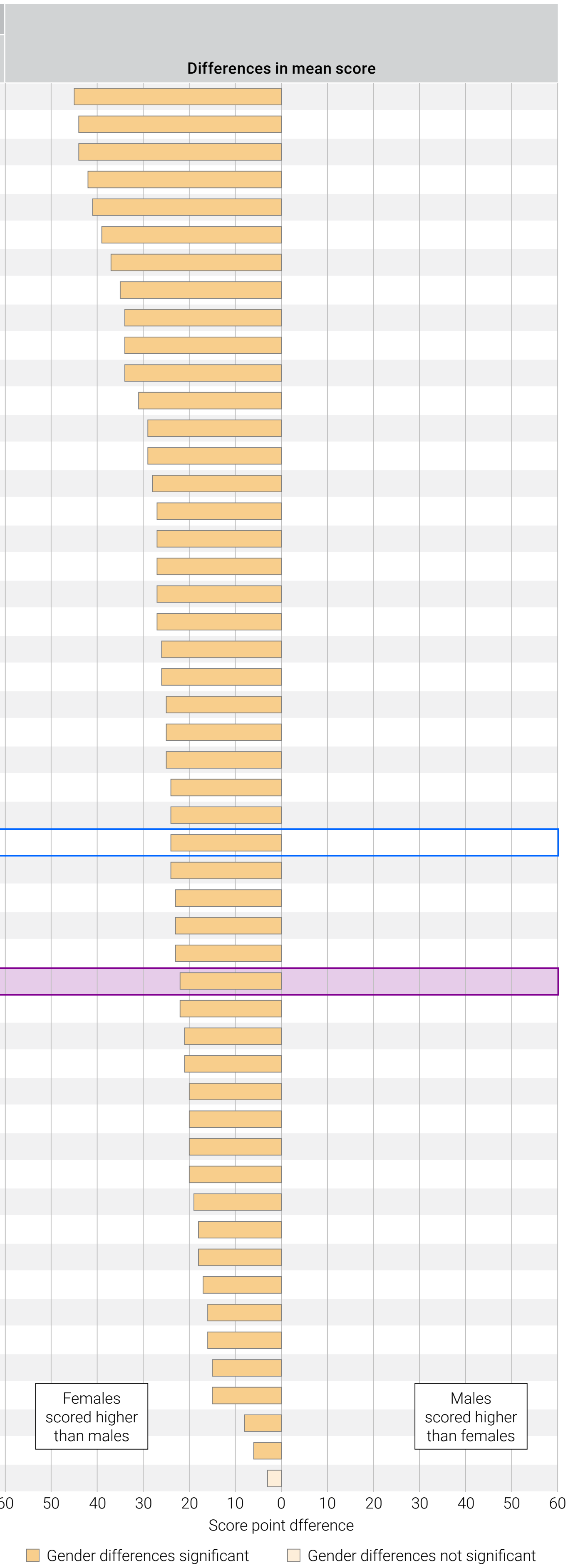


FIGURE 5.5 Mean scores and differences in student performance on the reading literacy scale, by country and gender

Proficiency

Figure 5.6 shows the proportions of low and high performers on the reading literacy proficiency scale, by gender. Generally, there were fewer female low performers than male students, and more female high performers than male students.

- In Australia, there were fewer female low performers (17%) compared to male low performers (25%), while there was no difference between high performing female and male students.
- Across the OECD countries, 22% of female students were low performers compared to 31% of male students and 8% of female students were high performers compared to 6% of male students.
- All countries except Costa Rica had a lower proportion of female low performers than male low performers. There was no gender difference in Costa Rica. The largest gender differences for the low performers were found in Slovenia (18%), Qatar (17%), the United Arab Emirates (16%), Brunei Darussalam (15%) and Iceland, Malta and Norway (14%), while the smallest gender differences were found in Mexico and Chile (4%), Singapore (5%), Macao (China), Uruguay, Ireland, Japan and the United Kingdom (6%).
- Although the proportion of high performers was higher for females than males, these gender differences were smaller than those between the low performers, which ranged from 6% in Finland to 1% in the United Arab Emirates and the Slovak Republic.

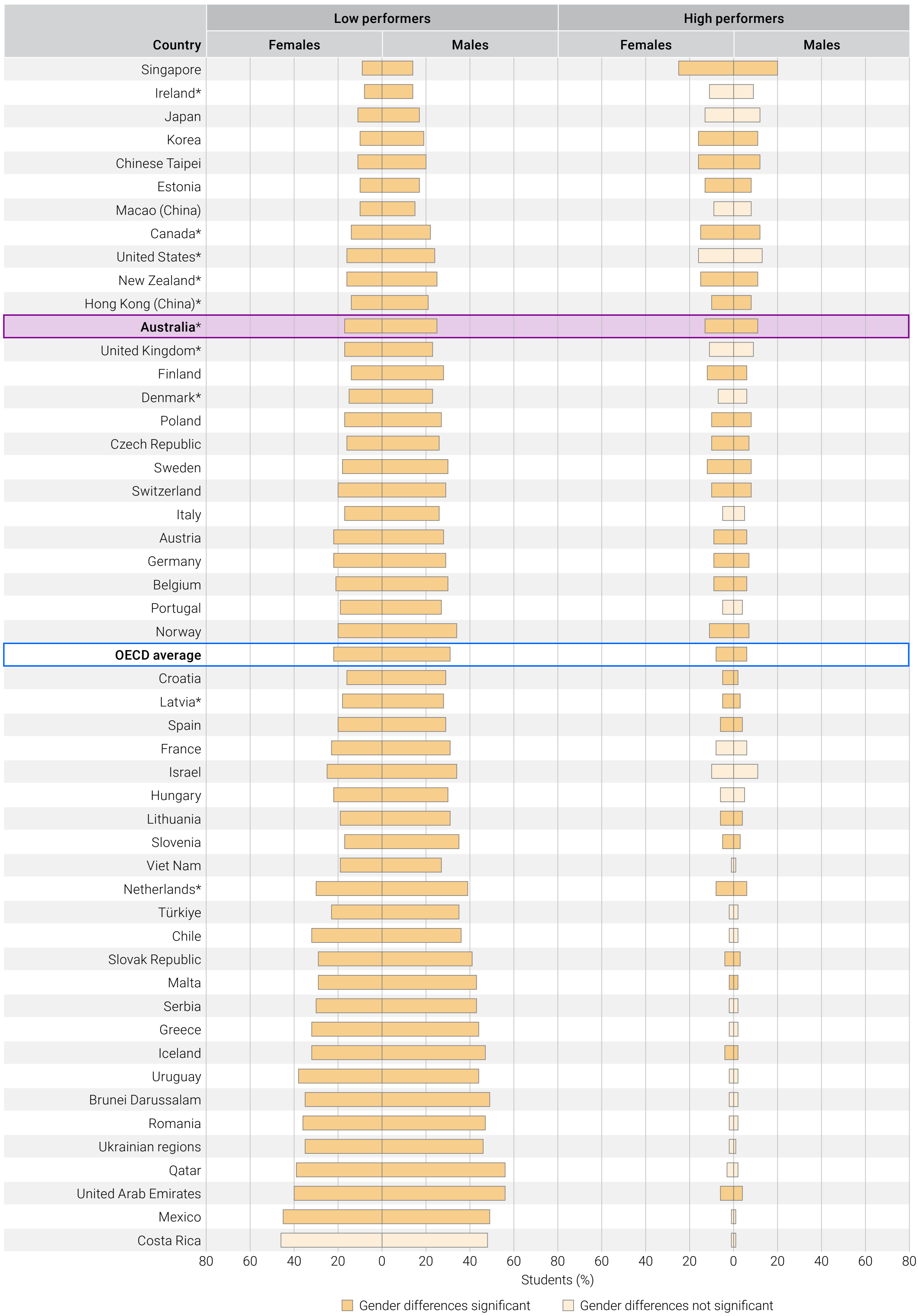


FIGURE 5.6 Proportions of low and high performers on the reading literacy proficiency scale, by country and gender

5.2 Australia's reading literacy results in a national context

Australia

Performance

Figure 5.7 shows the overall reading literacy performance for Australia, the OECD average and for the highest performing country, Singapore. As noted earlier in this chapter, Australian students achieved a mean score of 498 points in reading literacy, which was higher than the OECD average, and lower than the mean score achieved by Singaporean students.

In Australia, the difference between the lowest and highest performing students was 288 points, which was larger than Singapore's (271 points) and across the OECD countries (262 points).

	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Australia	498	2.0	494– 501	288	
OECD average	476	0.5	474–476	262	
Singapore	543	1.9	538–546	271	

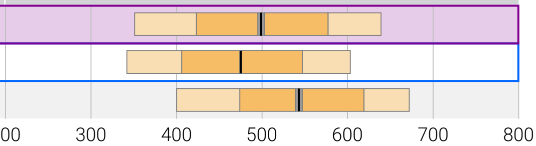


FIGURE 5.7 Mean scores and distribution of student performance on the reading literacy scale, for Australia

Proficiency

Figure 5.8 shows the percentages of students at each reading literacy proficiency level for Australia and the OECD average.

In Australia, at the higher end of the proficiency scale, 3% of students attained Level 6 and 9% of students attained Level 5, which were higher than the percentages for the corresponding levels for the OECD average (1% and 6% respectively).

At the lower end of the proficiency scale, 13% of students attained Level 1a and 6% attained Level 1b. This was lower than the percentages for the corresponding levels for the OECD average (17% and 8% respectively). However, 2% of Australian students attained Level 1c, which was similar to the OECD average.

Sixty-six per cent of Australian students attained Level 2, 3 or 4, which was the same proportion for students across the OECD countries.

In PISA 2022, 57% of Australian students attained the National Proficient Standard (Level 3 or above) in reading literacy, which was higher than across the OECD countries (49%).

	Proficiency levels	Students who attained the National Proficient Standard (%)
OECD average		57
Australia		49

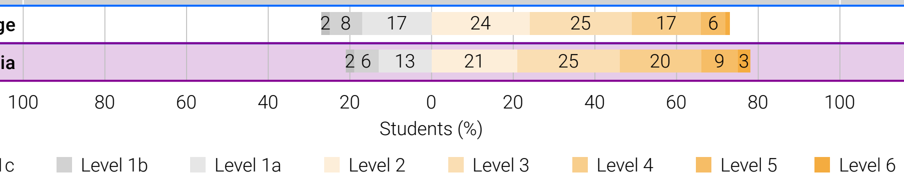


FIGURE 5.8 Percentages of students across the reading literacy scale and proportions of students who attained the National Proficient Standard, for Australia and the OECD average.

Performance over time

Figure 5.9 shows the mean reading literacy performance for Australia for the 8 PISA cycles since 2000, along with details about the changes in performance between the cycles. In 2000, when reading literacy was a major domain for the first time, Australia achieved a mean score of 528 points. In 2009, the second time reading was a major domain, Australia's performance declined by 13 points to 515 points. And the third time it was the major domain, Australia's mean performance declined by another 12 points to 503 points.

There was no difference in reading literacy performance between PISA 2015 to 2022, and between 2018 and 2022. Between PISA 2000 and 2022, Australia's performance has declined by 30 points.

Examining performance at the percentiles provides further detail to help understand where the decline in Australia's reading literacy performance has occurred. Figure 5.10 shows the distribution of reading literacy performance from PISA 2000 to 2022, the mean scores, and the scores at the 10th, 25th, 75th and 90th percentiles.

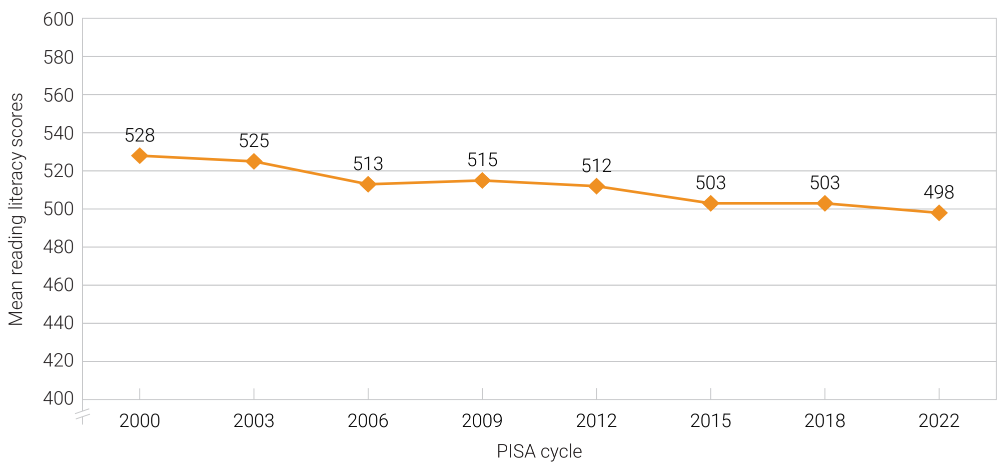
Between PISA 2018 and 2022, there were no declines at any percentiles.

Between PISA 2000 and 2009, the 10th percentile declined by 11 points and the 25th percentile declined by 10 points.

Between PISA 2000 and 2022, there were declines at all the percentiles:

- the 10th percentile declined by 45 points
- the 25th percentile declined by 38 points
- the 75th percentile declined by 24 points
- the 90th percentile declined by 18 points.

Since PISA 2000, the range of performance between the 10th and 90th percentiles increased. In PISA 2000, the difference between the lowest and highest performing students was 261 points, in 2009 it was 254 points, and in 2022 it was 288 points. This indicates that over time there is a greater diversity in performance.



	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-5	-5	-14 ▼	-17 ▼	-15 ▼	-27 ▼	-30 ▼
2018		0	-9 ▼	-12 ▼	-10	-22 ▼	-25 ▼
2015			-9	-12 ▼	-10	-22 ▼	-25 ▼
2012				-3	-1	-13 ▼	-16 ▼
2009					2	-10 ▼	-13 ▼
2006						-12 ▼	-15 ▼
2003							-3

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.9 Mean reading literacy performance and differences from PISA 2000 to 2022, for Australia

FIGURE 5.10 Distribution of student performance on the reading literacy scale from PISA 2000 to 2022, for Australia

Proficiency over time

Figure 5.11 shows the percentage of students who performed at each reading literacy proficiency level and the proportions of students who attained the National Proficient Standard from PISA 2000 to 2022. The results show again that over time there has been a downward shift, and since PISA 2000, there have been more low performers and fewer higher performers.

High performers

- Between PISA 2018 and 2022, there was no difference in the proportion of high performers.
- Between PISA 2009 and 2022, there was no difference in the proportion of high performers.
- Between PISA 2000 and 2022, the proportion of high performers decreased by 5 percentage points.

Low performers

- Between PISA 2018 and 2022, the proportion of low performers increased by 2 percentage points to 21%.
- In PISA 2000, 12% of students were low performers. This proportion did not change between PISA 2000 and 2009. However, between PISA 2009 and 2022, the proportion of low performers increased by 7 percentage points and there was an overall increase of 9 percentage points between PISA 2000 and 2022.

National Proficient Standard

In PISA 2022, 57% of Australian students attained the National Proficient Standard. This was not different from 2018. Between PISA 2009 and 2022, and between 2000 and 2022, the proportion of students who attained the National Proficient Standard decreased by 8 and 12 percentage points, respectively.

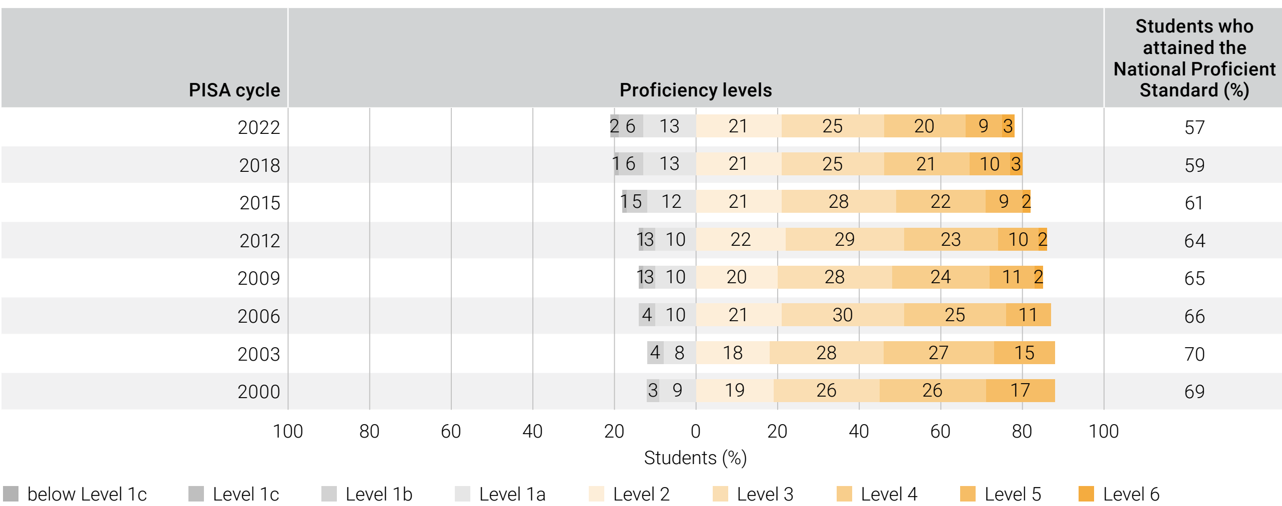


FIGURE 5.11 Percentage of students across the reading literacy proficiency scale and proportion of students who attained the National Proficient Standard from PISA 2000 to 2022, for Australia

Australia by gender

Performance

Figure 5.12 shows the reading literacy performance for Australian females and males and the OECD average. Australian female students scored 22 points higher than Australian male students. Australian females and male students performed higher than their peers across the OECD average.

The difference in the mean performance between Australian female and male students was 35 points at the 10th percentile and 30 points at the 25th percentile, but was smaller at the 75th percentile with 13 points, and not different at the 90th percentile, that is, the highest performing Australian females were performing at a similar level to the highest performing Australian males.

	Gender	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Australia	Females	509	2.6	503–513	273
	Males	487	2.6	482–492	299
OECD average	Females	488	0.5	487–488	249
	Males	464	0.6	462–465	269

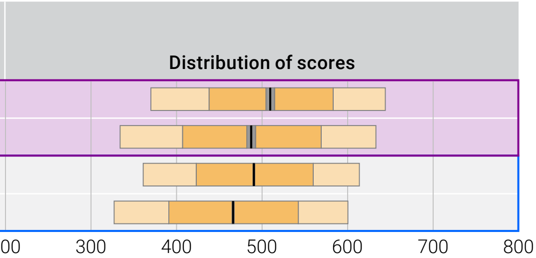


FIGURE 5.12 Mean scores and distribution of student performance on the reading literacy scale, for Australia and the OECD average, by gender

Proficiency

Figure 5.13 shows the percentages of Australian female and male students and the OECD average at each reading literacy proficiency scale level, and the proportion of students who attained the National Proficient Standard.

High performers

- The percentage of Australian female high performers students (13%) was higher than the percentage across the OECD countries (8%).
- The percentage of Australian male high performers (11%) was higher than, and almost double the percentage across the OECD countries (6%).
- There was no difference between the percentage of Australian female and male high performers.

Low performers

- The percentage of Australian female low performers (17%) was lower than the percentage across the OECD countries (22%).
- The percentage of Australian male low performers (25%) was lower than the percentage across the OECD countries (31%).
- There was an 8 percentage point difference between female low performers and male low performers, in favour of Australian females.

National Proficient Standard

- 61% of Australian female students attained the National Proficient Standard, compared to 54% of Australian male students.

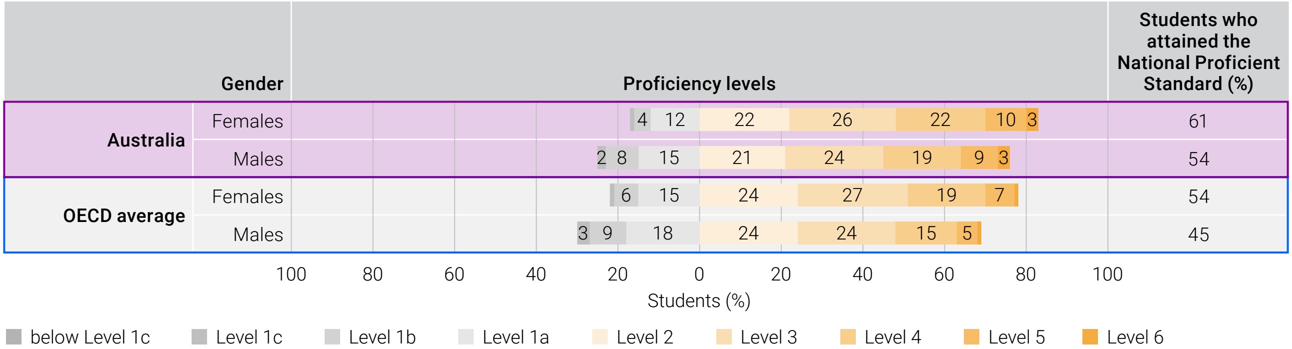


FIGURE 5.13 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard by gender, for Australia and the OECD average

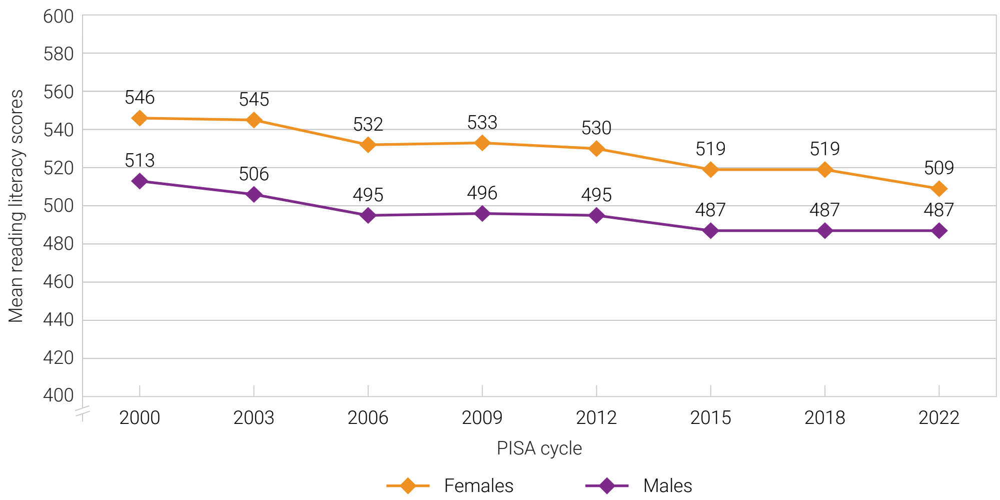
Performance over time

Figure 5.14 shows the mean reading literacy performance for Australian female and male students from 2000 to 2022 and illustrates the overall decline in performance over this time, which has been larger for Australian female students than male students.

Between PISA 2018 and 2022, the mean reading literacy performance for Australian female students declined by 10 points but was not different for Australian male students.

Between PISA 2009 and 2022, the mean performance declined for Australian female students by 24 points but was not different for Australian male students.

Between PISA 2000 and 2022, the mean performance for Australian female and male students declined by 37 points and 26 points respectively.



	Females													
	Difference between PISA cycles													
	2018		2015		2012		2009		2006		2003		2000	
2022	-10	▼	-10	▼	-21	▼	-24	▼	-23	▼	-36	▼	-37	▼
2018			0		-11	▼	-14	▼	-13	▼	-26	▼	-27	▼
2015					-11		-14	▼	-13		-26	▼	-27	▼
2012							-3		-2		-15	▼	-16	▼
2009									1		-12	▼	-13	
2006											-13	▼	-14	▼
2003													-1	

	Males													
	Difference between PISA cycles													
	2018		2015		2012		2009		2006		2003		2000	
2022	0		0		-8		-9		-8		-19	▼	-26	▼
2018			0		-8		-9	▼	-8		-19	▼	-26	▼
2015					-8		-9		-8		-19	▼	-26	▼
2012							-1		0		-11		-18	▼
2009									1		-10		-17	▼
2006											-11		-18	▼
2003													-7	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.14 Mean reading literacy performance and differences from PISA 2000 to 2022, for Australia by gender

Proficiency over time

Figure 5.15 shows the proportions of low and high performers and proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale for Australian female and male students. Generally, across the 8 cycles of PISA (from 2000 when reading literacy was first the major domain), there has been an increase in the proportions of female and male low performers, while the proportions of female and male high performers have decreased, but to a lesser extent for the male high performers.

High performers

- Between PISA 2018 and 2022, there was no difference in the percentages of female or male high performers.
- Between PISA 2009 and 2022, the proportion of female high performers decreased by 2 percentage points.
- Between PISA 2000 and 2022, the proportion of female high performers decreased by 8 percentage points.

Low performers

- Between PISA 2018 and 2022, the proportion of female low performers increased by 3 percentage points but there was no difference in the percentage of male low performers.
- Between PISA 2009 and 2022, the proportion of female low performers increased by 8 percentage points and male low performers increased by 5 percentage points.
- Between PISA 2000 and 2022, female and male low performers increased by 9 percentage points each.

National Proficient Standard

- Between PISA 2018 and 2022, the proportion of female students who attained the National Proficient Standard decreased by 4 percentage points, but the percentage of male students did not change.
- Between PISA 2009 and 2022, the proportion of female and male students who attained the National Proficient Standard decreased by 11 and 4 percentage points, respectively.
- Between PISA 2000 and 2022, the proportion of female students who attained the National Proficient Standard decreased by 15 percentage points and by 9 percentage points for male students.

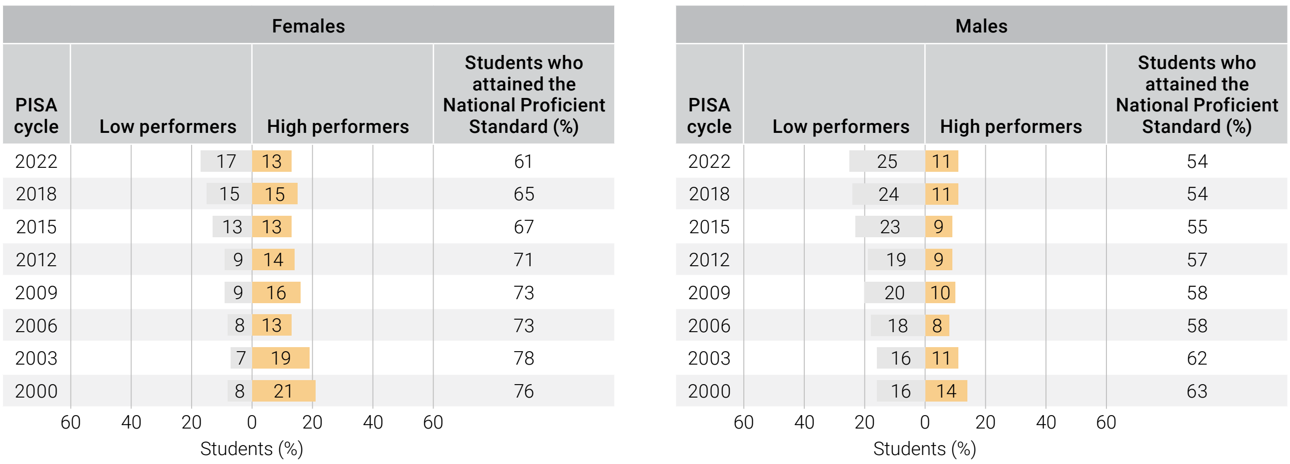


FIGURE 5.15 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, for Australia by gender

States and territories

Performance

Figure 5.16 presents the reading literacy performance for students in each of the Australian states and territories. For comparison, the mean scores and distributions of performance for Australia, the OECD average and Singapore are included.

The mean scores for reading literacy in 2022 ranged from 517 points in the Australian Capital Territory to 482 points in Tasmania. The difference in mean scores between the highest and lowest performing jurisdictions was 35 points.

Singapore performed higher than the Australian Capital Territory (by 26 points) and Tasmania (by 61 points).

The Australian Capital Territory, South Australia and Western Australia had the narrowest range of student performance, with around 275 points between the 10th and 90th percentiles, whereas New South Wales and the Northern Territory had the widest range at 299 points.

Table 5.2 presents the pairwise comparisons of mean reading literacy performance between any 2 states and territories.

- Students in the Australian Capital Territory had the highest level of performance than students in any other jurisdiction.
- Students in Western Australia performed at a higher level than students in South Australia, Queensland and Tasmania.
- Students in Western Australia, Victoria and New South Wales performed at similar levels, while students in Victoria and New South Wales also performed at similar levels to students in South Australia and Queensland.
- Students in Tasmania performed at a similar level to students in South Australia and Queensland.
- Students in the Northern Territory performed at similar levels to all other jurisdictions, except the Australian Capital Territory. This was due to the large standard error associated with the mean score for the Northern Territory.
- Students in Northen Territory and Tasmania performed on par with the OECD average, while all other states and territories performed at a higher level than the OECD average.

State/Territory	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
ACT	517	3.8	509–524	276
NSW	499	4.2	490–507	299
VIC	501	4.8	491–510	285
QLD	492	4.0	483–499	285
SA	492	3.8	484–499	275
WA	505	4.1	496–512	274
TAS	482	5.3	471–492	293
NT	488	8.6	470–504	299
Australia	498	2.0	494–501	288
OECD average	476	0.5	474–476	262
Singapore	543	1.9	538–546	271

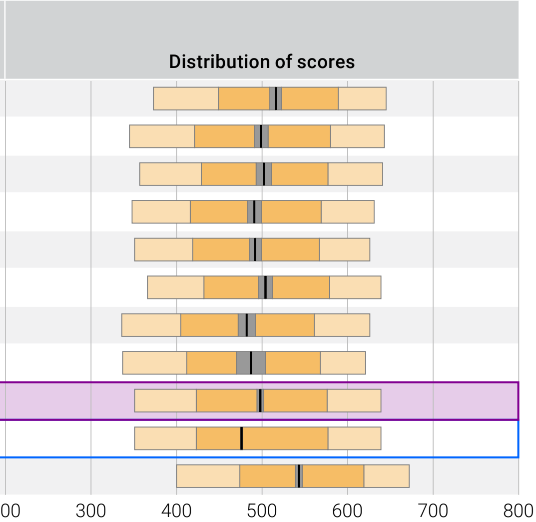


FIGURE 5.16 Mean scores and distribution of student performance on the reading literacy scale, by state and territory

TABLE 5.2 Multiple comparisons of mean reading literacy performance, by state and territory

State/Territory	Mean score	SE	ACT	WA	VIC	NSW	SA	QLD	NT	TAS	OECD average
ACT	517	3.8		▲	▲	▲	▲	▲	▲	▲	▲
WA	505	4.1	▼		●	●	▲	▲	●	▲	▲
VIC	501	4.8	▼	●		●	●	●	●	▲	▲
NSW	499	4.2	▼	●	●		●	●	●	▲	▲
SA	492	3.8	▼	▼	●	●		●	●	●	▲
QLD	492	4.0	▼	▼	●	●	●		●	●	▲
NT	488	8.6	▼	●	●	●	●	●		●	●
TAS	482	5.3	▼	▼	▼	▼	●	●	●		●
OECD average	476	0.4	▼	▼	▼	▼	▼	▼	●	●	

Note: read across the row to compare a state's/territory's performance with the performance of each state or territory listed in the column heading.
▲ Mean performance statistically significantly higher than in comparison state/territory
● No statistically significant difference from comparison state/territory
▼ Mean performance statistically significantly lower than in comparison state/territory

Comparisons between the performance of each jurisdiction and the performance of each country are provided in Appendix G.

Proficiency

Figure 5.17 shows the percentages of students at each level of the reading literacy proficiency scale in PISA 2022 for each state and territory, together with the percentages for Australia, Singapore and the OECD average.

High performers

- 15% of students in the Australian Capital Territory were high performers, which was the highest percentage of any state or territory. This was almost twice as high as the OECD average of 7% but not near the 23% of students in Singapore who achieved this level.
- 13% of students in New South Wales, Victoria and Western Australia were high performers.
- 11% of students in Queensland were high performers.
- 10% of students in South Australia, Tasmania and the Northern Territory were high performers.

Low performers

- 26% of students in Tasmania were low performers. This was similar to the proportions of low performers in the Northern Territory (24%), Queensland (23%), New South Wales and South Australia (22%), and the OECD average (26%), but higher than Singapore (11%).
- 20% of students in Victoria were low performers.
- 19% of students in Western Australia were low performers.
- 16% of students in the Australian Capital Territory were low performers, the lowest proportion of any state or territory.

National Proficient Standard

More than half of the students across all states and territories attained the National Proficient Standard, with the Australian Capital Territory having the highest proportion (66%) and Tasmania the lowest (51%).

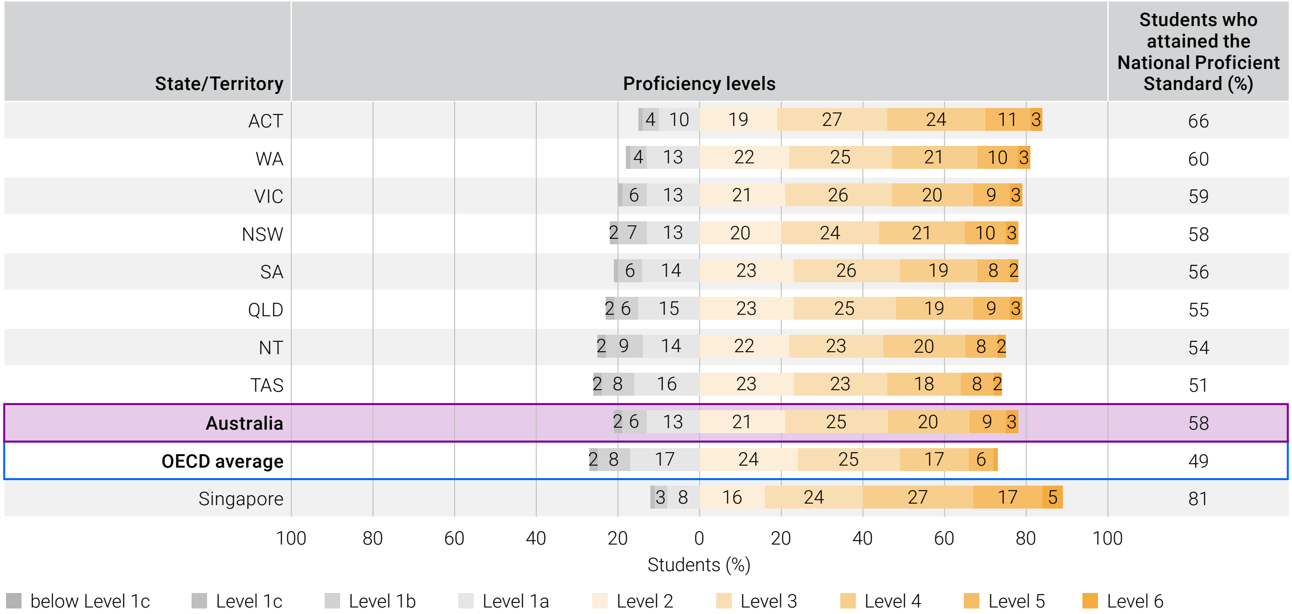


FIGURE 5.17 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory

Performance over time

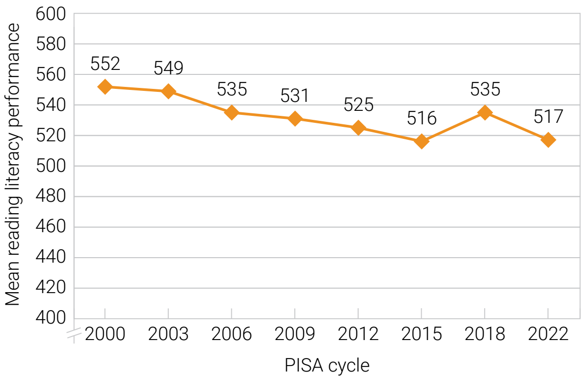
Figure 5.18 shows the mean performance in reading literacy for all PISA cycles by state and territory and the change in scores between 2 cycles. It is noteworthy that Victoria's performance has remained constant over a 22-year period.

Between PISA 2018 and 2022, the mean reading literacy performance declined in 2 jurisdictions: the Australian Capital Territory by 18 points and Queensland by 11 points.

Between PISA 2009 and 2022, the mean reading literacy performance declined in 3 states: the largest decline was in Queensland by 27 points, followed by New South Wales and Western Australia by 17 points.

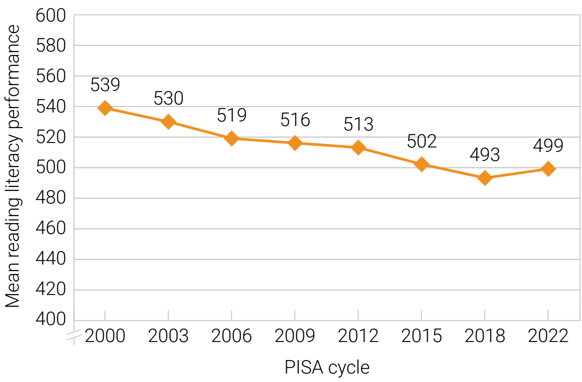
Between PISA 2000 and 2022, the mean performance of students declined in all jurisdictions, except Victoria and the Northern Territory. The largest decline was in South Australia by 45 points, followed by New South Wales by 40 points, Australian Capital Territory by 35 points, Western Australia by 33 points, Tasmania, by 32 points and Queensland by 29 points.

Australian Capital Territory



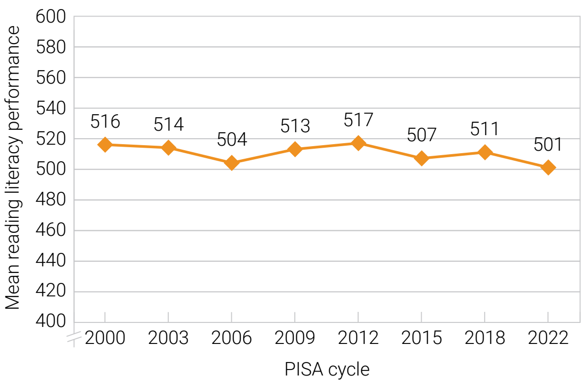
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-18 ▼	1	-8	-14	-18	-32 ▼	-35 ▼
2018		19 ▲	10	4	0	-14	-17 ▼
2015			-9	-15	-19 ▼	-33 ▼	-36 ▼
2012				-6	-10	-24 ▼	-27 ▼
2009					-4	-18	-21 ▼
2006						-14	-17 ▼
2003							-3

New South Wales



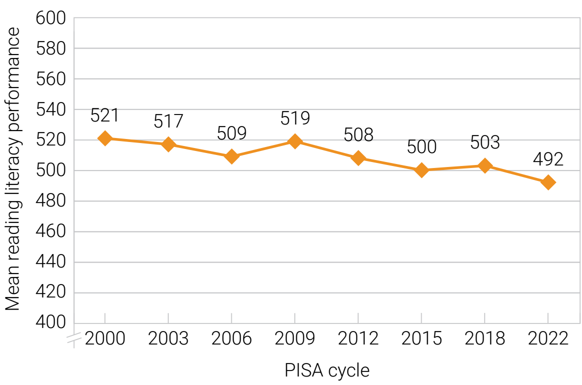
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	6	-3	-14	-17 ▼	-20	-31 ▼	-40 ▼
2018		-9	-19 ▼	-22 ▼	-25 ▼	-37 ▼	-45 ▼
2015			-11	-14	-17	-28 ▼	-37 ▼
2012				-3	-6	-17 ▼	-26 ▼
2009					-3	-14	-23 ▼
2006						-11	-20 ▼
2003							-9

Victoria



	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-10	-6	-16	-12	-3	-13	-15
2018		4	-6	-2	7	-3	-5
2015			-10	-6	3	-7	-9
2012				4	13	3	1
2009					9	-1	-3
2006						-10	-12
2003							-2

Queensland

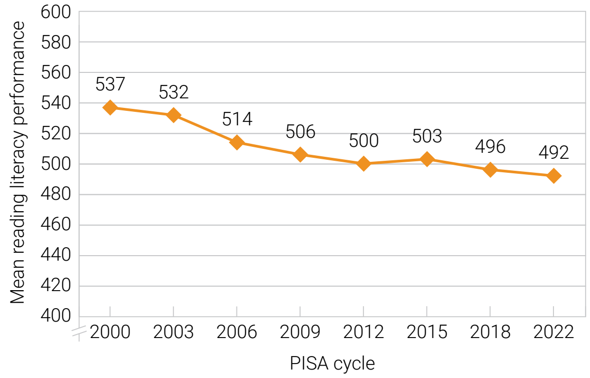


	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-11 ▼	-8	-16 ▼	-27 ▼	-17	-25 ▼	-29 ▼
2018		3	-5	-16	-6	-14	-18
2015			-8	-19 ▼	-9	-17	-21
2012				-11	-1	-9	-13
2009					10	2	-2
2006						-8	-12
2003							-4

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

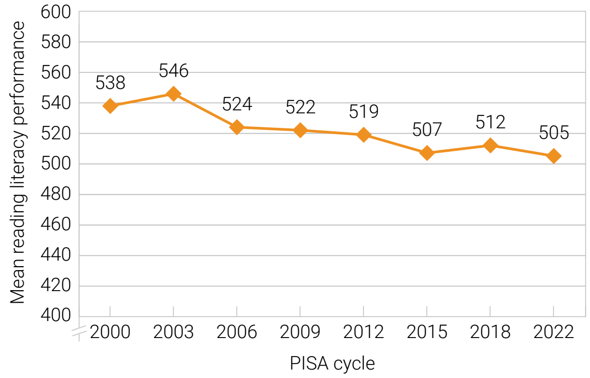
FIGURE 5.18 Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory

South Australia



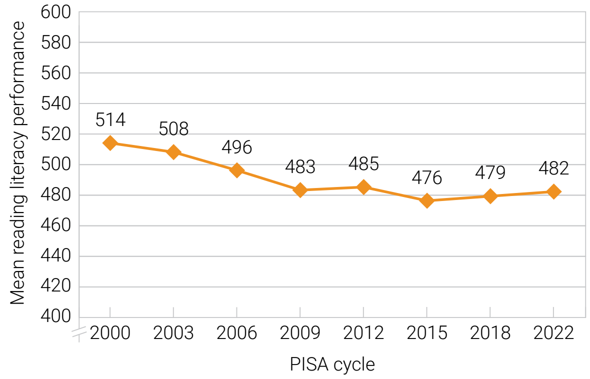
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-4	-11	-8	-14	-22 ▼	-40 ▼	-45 ▼
2018		-7	-4	-10	-18 ▼	-36 ▼	-41 ▼
2015			3	-3	-11	-29 ▼	-34 ▼
2012				-6	-14	-32 ▼	-37 ▼
2009					-8	-26 ▼	-31 ▼
2006						-19 ▼	-23 ▼
2003							-5

Western Australia



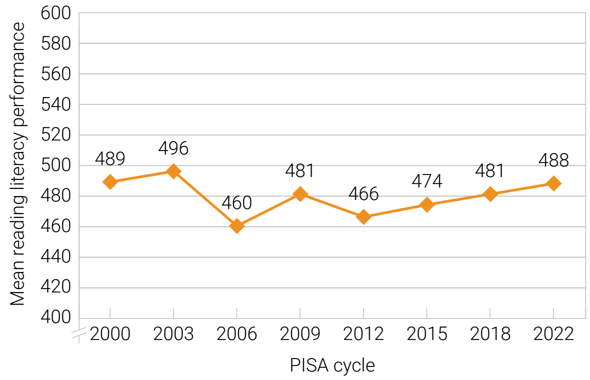
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-7	-2	-14	-17 ▼	-19	-41 ▼	-33 ▼
2018		5	-7	-10	-12	-34 ▼	-26 ▼
2015			-12	-15	-17	-39 ▼	-31 ▼
2012				-3	-5	-27 ▼	-19
2009					-2	-24 ▼	-16
2006						-22 ▼	-14
2003							8

Tasmania



	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	3	6	-3	-1	-14	-26 ▼	-32 ▼
2018		3	-6	-4	-17 ▼	-29 ▼	-35 ▼
2015			-9	-7	-20 ▼	-32 ▼	-38 ▼
2012				2	-11	-23 ▼	-29 ▼
2009					-13	-25 ▼	-31 ▼
2006						-12	-18
2003							-6

Northern Territory



	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	7	14	22	7	28	-8	-1
2018		7	15	0	21	-15	-8
2015			8	-7	14	-22	-15
2012				-15	6	-30 ▼	-23 ▼
2009					21	-15	-8
2006						-36 ▼	-29 ▼
2003							7

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.18 (continued) Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory

Proficiency over time

Figure 5.19 shows the proportions of high and low performers and the proportions of students who attained the National Proficient Standard on the reading literacy scale from PISA 2000 to 2022 for each state and territory.

High performers

Between PISA 2018 and 2022, the Australian Capital Territory was the only jurisdiction to show a decrease in the proportion of high performers with a 7 percentage point decline.

Between PISA 2009 and 2022, there were no differences in the proportions of high performers across the jurisdictions.

Between PISA 2000 and 2022, the proportions of high performers decreased in 4 jurisdictions:

- the Australian Capital Territory by 10 percentage points
- Western Australia by 9 percentage points
- South Australia by 8 percentage points
- New South Wales by 5 percentage points.

Low performers

Between PISA 2018 and 2022, there were no differences in the proportions of low performers across the jurisdictions.

Between PISA 2009 and 2022, the proportions of low performers increased in 5 jurisdictions:

- Queensland by 9 percentage points
- New South Wales by 8 percentage points
- South Australia by 7 percentage points
- Victoria and Western Australia by 6 percentage points.

Between PISA 2000 and 2022, all jurisdictions other than the Northern Territory recorded higher proportions of low performers:

- New South Wales and South Australia increased by 12 percentage points
- Queensland and Tasmania increased by 9 percentage points
- the Australian Capital Territory increased by 8 percentage points
- Western Australia increased by 7 percentage points
- Victoria increased by 6 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, Queensland was the only jurisdiction to show a decrease in the proportion of students who attained the National Proficient Standard (by 5 percentage points).

Between PISA 2009 and 2022, there were declines in the proportions of students who attained the National Proficient Standard:

- Queensland decreased by 12 percentage points
- New South Wales and Western Australia decreased by 8 percentage points
- South Australia decreased by 7 percentage points
- Victoria decreased by 6 percentage points.

Between PISA 2000 and 2022, all jurisdictions other than Victora and the Northern Territory recorded declines in the proportions of students who attained the National Proficient Standard:

- South Australia decreased by 17 percentage points
- New South Wales decreased by 15 percentage points
- Tasmania decreased by 14 percentage points
- the Australian Capital Territory by 12 percentage points
- Queensland and Western Australia all decreased by 11 percentage points

Australian Capital Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	16	15	66
2018	13	21	70
2015	16	14	65
2012	13	15	72
2009	13	18	70
2006	10	16	75
2003	8	22	78
2000	8	25	77

Students (%)

New South Wales

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	13	58
2018	22	11	56
2015	19	12	59
2012	15	13	64
2009	14	13	66
2006	13	13	67
2003	11	16	71
2000	10	18	73

Students (%)

Victoria

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	20	13	59
2018	17	14	62
2015	16	10	63
2012	12	11	68
2009	14	12	65
2006	15	8	63
2003	13	11	67
2000	14	14	64

Students (%)

Queensland

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	23	11	55
2018	20	14	60
2015	19	10	60
2012	15	11	62
2009	14	14	66
2006	14	10	64
2003	15	13	66
2000	14	16	66

Students (%)

South Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	22	10	56
2018	20	11	58
2015	18	10	61
2012	16	8	60
2009	15	10	63
2006	12	10	66
2003	10	15	74
2000	10	19	73

Students (%)

Western Australia

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	19	13	60
2018	17	14	63
2015	17	11	63
2012	12	13	67
2009	13	14	68
2006	10	12	71
2003	8	20	77
2000	11	21	71

Students (%)

Tasmania

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	10	51
2018	28	10	50
2015	26	7	48
2012	21	7	53
2009	23	7	52
2006	19	8	59
2003	16	10	63
2000	17	15	65

Students (%)

Northern Territory

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	9	54
2018	30	12	50
2015	28	8	48
2012	28	7	52
2009	24	9	53
2006	29	7	48
2003	19	10	59
2000	22	10	57

Students (%)

FIGURE 5.19 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by state and territory

States and territories by gender

Performance

Figure 5.20 shows female students performed at a higher level than male students across 5 jurisdictions. Tasmania was found to have the largest mean score differences between female and male students.

On average, female students performed at a higher level than male students in:

- Tasmania by 43 points
- Victoria by 28 points
- the Australian Capital Territory by 27 points
- South Australia by 26 points
- New South Wales by 24 points.

Female students in Queensland and the Northern Territory performed at the same level as female students across the OECD countries, while female students in the other 6 states and territories performed higher than female students across OECD countries.

Male students in Tasmania and the Northern Territory performed at the same level as male students across the OECD countries, while male students in the other 6 states and territories performed higher than male students across the OECD countries.

	Females		Males		
State/Territory	Mean score	SE	Mean score	SE	Differences in mean score
TAS	505	7.8	462	6.8	
VIC	516	6.2	488	5.5	
ACT	531	5.2	504	5.9	
SA	506	4.5	480	4.7	
NSW	510	4.5	487	6.1	
NT	499	10.8	476	10.9	
QLD	497	5.3	486	4.8	
WA	510	5.3	499	4.9	
OECD average	488	0.5	464	0.6	

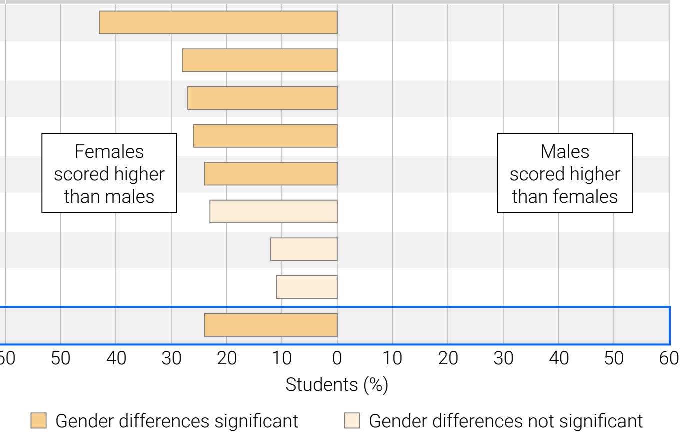


FIGURE 5.20 Mean scores and differences on the reading literacy scale, by state and territory and gender

Proficiency

Figure 5.21 shows the proportions of students in each reading literacy proficiency level for the states and territories by gender. The OECD averages for female and male students have been included in the figure for comparison.

Female high performers

The proportion of female high performers in the Australian Capital Territory was not different to the other states and territories.

Tasmania and the Northern Territory had similar proportions of female high performers as the OECD average. The proportions of female high performers were higher than the OECD average (8%) in these states and territories:

- 16% in the Australian Capital Territory
- 15% in Victoria
- 14% in New South Wales
- 13% in Western Australia and Tasmania
- 11% in Queensland and South Australia.

Male high performers

The proportion of male high performers in the Australian Capital Territory was similar to all states and territories, except Tasmania, where it was lower.

Tasmania and the Northern Territory had similar proportions of male high performers as the OECD average. The proportions of male high performers were higher than the OECD average (6%) in these states and territories:

- 13% in the Australian Capital Territory and Western Australia
- 12% in New South Wales
- 11% in Queensland and the Northern Territory
- 10% in Victoria
- 9% in South Australia
- 7% in Tasmania.

Female low performers

The proportion of female low performers in the Australian Capital Territory was similar to Victoria and the Northern Territory (which was not significant due to the large difference in the standard errors around the proportion) and lower than the other states and territories.

In Queensland and Tasmania, the percentages were not different to the OECD average (22%). In the Australian Capital Territory, New South Wales, the Northern Territory Victoria, South Australia and Western Australia, the proportions were lower than the OECD average:

- 11% in the Australian Capital Territory
- 16% in Western Australia
- 15% in Victoria
- 17% in South Australia
- 18% in New South Wales and the Northern Territory.

Male low performers

The proportion of male low performers in the Australian Capital Territory was similar in Victoria and Western Australia, and lower than in the other states and territories.

Except for the Northern Territory, which had a similar proportion of low-performing males as the OECD average (31%), the proportions of male low performers in the other states and territories were lower than the OECD average:

- 20% in the Australian Capital Territory
- 21% in Western Australia
- 25% in Victoria and Queensland
- 26% in New South Wales and South Australia
- 33% in Tasmania.

National Proficient Standard

The proportion of female students who attained the National Proficient Standard in reading literacy in the Australian Capital Territory was similar to the Northern Territory but higher than the other states and territories. The proportions ranged from 57% in Queensland to 71% in the Australian Capital Territory.

The proportion of male students who attained the National Proficient Standard in reading literacy in the Australian Capital Territory was similar to Western Australia and Victoria, but higher than the other states and territories. The proportions ranged from 45% in Tasmania to 61% in the Australian Capital Territory.

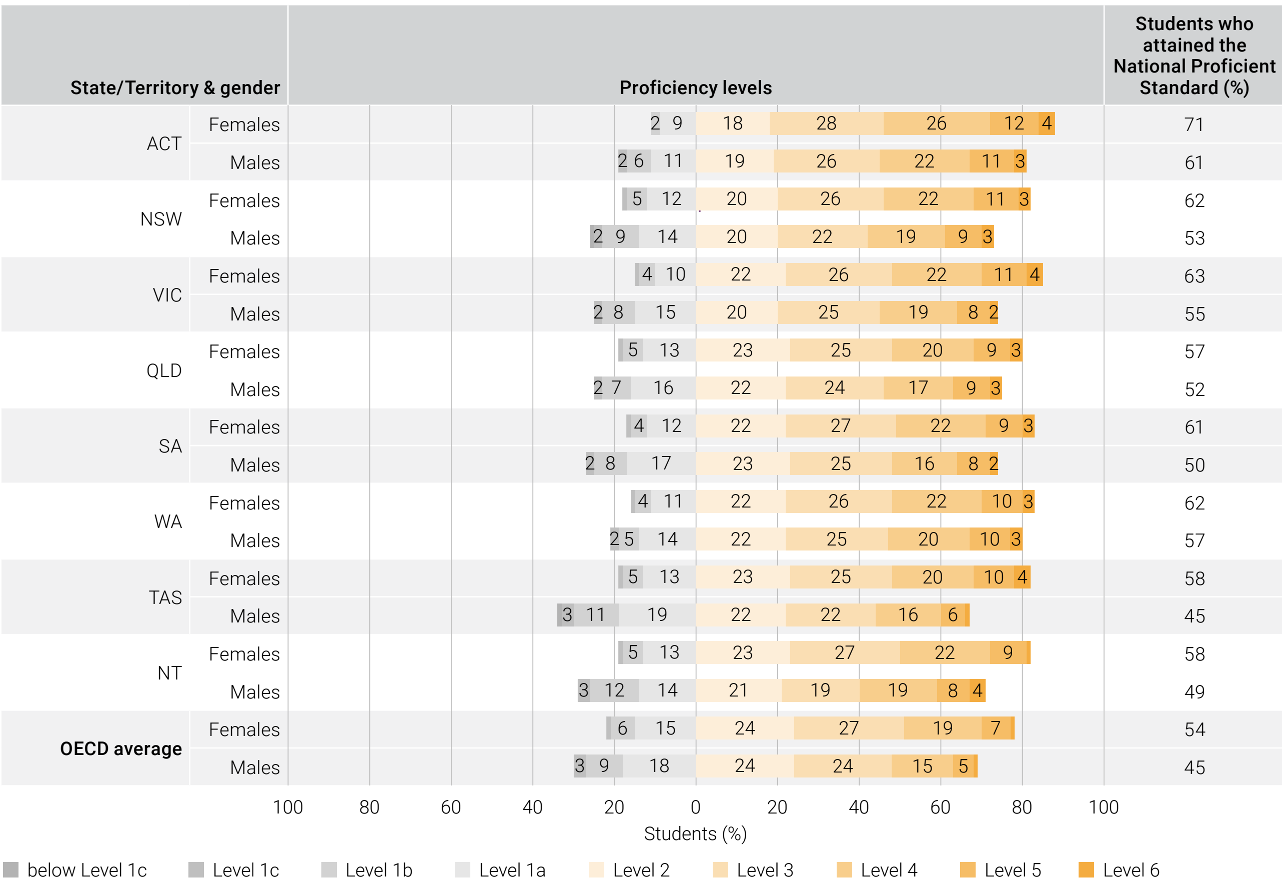


FIGURE 5.21 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by state and territory and gender

Performance over time

Figure 5.22 shows the mean reading literacy performance from PISA 2000 to 2022, along with the change in performance between 2 cycles for the states and territories, by gender.

Between 2018 and 2022, the mean reading literacy performance for female students declined by 25 points in the Australian Capital Territory and Queensland, and by 19 points in Western Australia, while there were no differences for male students in any state or territory.

Between PISA 2009 and 2022, the mean reading literacy performance for female students declined by 26 points in New South Wales, 37 points in Queensland, 18 points in South Australia and 29 points in Western Australia, while there were no differences for male students in any state or territory.

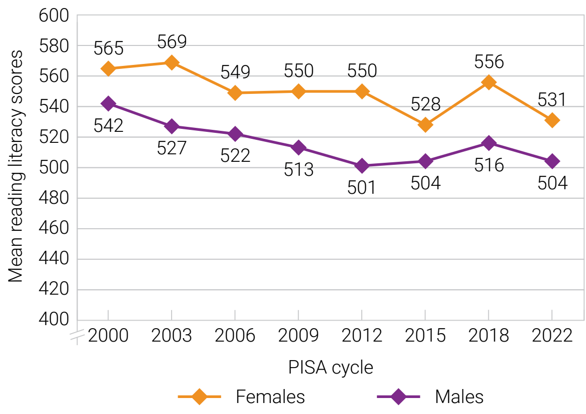
Between PISA 2000 and 2022, with the exception of Victoria and the Northern Territory, all other states and territories recorded declines in the mean reading literacy performance for female students:

- the Australian Capital Territory by 34 points
- New South Wales by 45 points
- Queensland by 48 points
- South Australia by 45 points
- Western Australia by 47 points
- Tasmania declined by 36 points.

While the mean reading literacy performance for male students did not decline in 5 states and territories (Victoria, Queensland, Western Australia, Tasmania and the Northern Territory), there were declines in the following states and territories:

- the Australian Capital Territory and New South Wales by 38 points
- South Australia by 42 points.

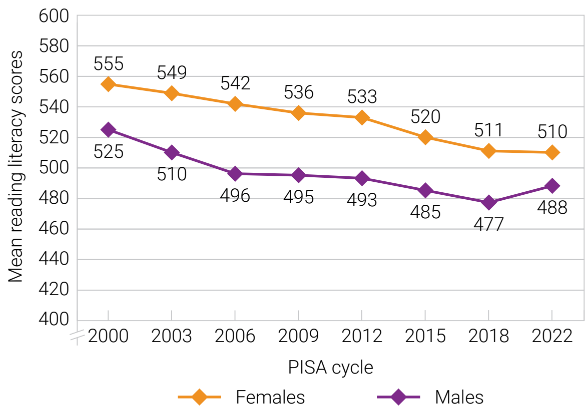
Australian Capital Territory



	Females						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-25 ▼	3	-19 ▼	-19	-18	-39 ▼	-34 ▼
2018		29 ▲	6	6	7	-13	-9
2015			-22 ▼	-22 ▼	-21 ▼	-41 ▼	-37 ▼
2012				0	1	-19	-15
2009					1	-19	-15
2006						-20	-16
2003							4

	Males						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-12	0	3	-9	-18	-23	-38 ▼
2018		12	15	3	-6	-11	-26
2015			3	-9	-18	-23	-38 ▼
2012				-12	-21	-26 ▼	-41 ▼
2009					-9	-14	-29
2006						-5	-20
2003							-15

New South Wales



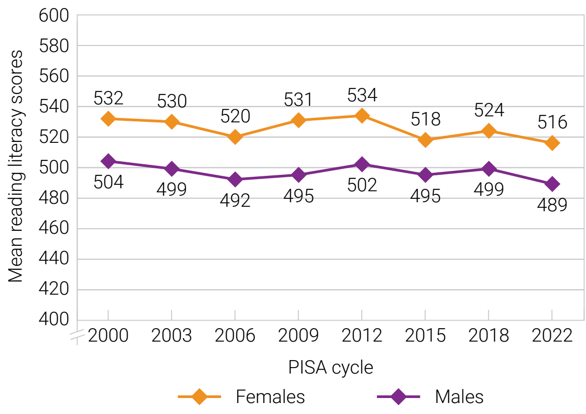
	Females						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-2	-10	-23 ▼	-26 ▼	-32 ▼	-39 ▼	-45 ▼
2018		-9	-22 ▼	-25 ▼	-31 ▼	-39 ▼	-44 ▼
2015			-13	-16	-22 ▼	-29 ▼	-35 ▼
2012				-2	-9	-16 ▼	-22 ▼
2009					-6	-13	-19
2006						-7	-13
2003							-6

	Males						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	10	2	-6	-8	-9	-23 ▼	-38 ▼
2018		-8	-16 ▼	-18	-19	-33 ▼	-48 ▼
2015			-8	-10	-11	-25 ▼	-40 ▼
2012				-2	-3	-17	-32 ▼
2009					-1	-15	-30 ▼
2006						-14	-29 ▼
2003							-15

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.22 Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory and gender

Victoria



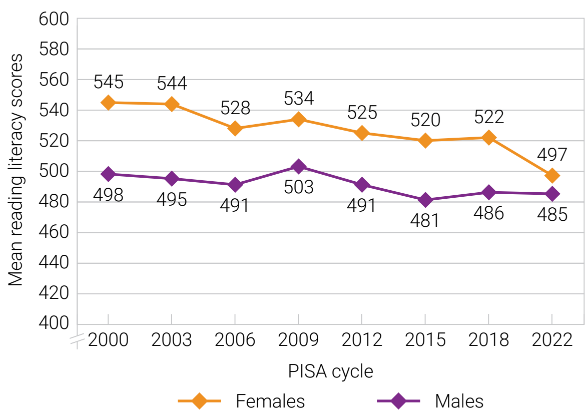
Females — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-8	-2	-18	-15	-4	-14	-16
2018		6	-10	-7	4	-6	-8
2015			-16 ▼	-13	-2	-12	-14
2012				3	14	4	1
2009					11	1	-1
2006						-10	-12
2003							-2

Males — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-11	-7	-14	-7	-4	-11	-16
2018		4	-3	4	7	0	-5
2015			-7	0	3	-4	-9
2012				7	10	3	-2
2009					3	-4	-9
2006						-8	-12
2003							-5

Queensland



Females — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-25 ▼	-23 ▼	-28 ▼	-37 ▼	-31 ▼	-47 ▼	-48 ▼
2018		2	-3	-12	-6	-22 ▼	-23
2015			-5	-14	-8	-23 ▼	-25
2012				-9	-3	-19	-20
2009					6	-10	-11
2006						-16	-17
2003							-1

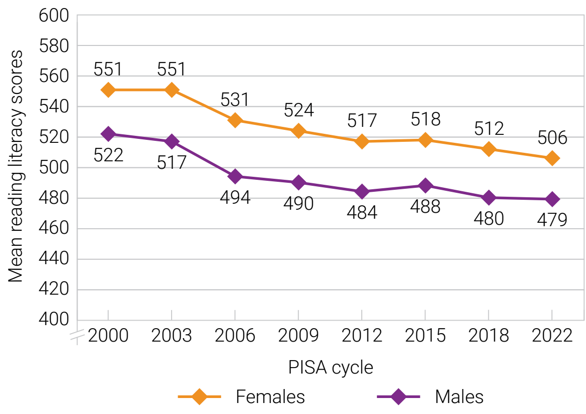
Males — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	0	5	-5	-17	-5	-9	-12
2018		5	-5	-17	-5	-9	-12
2015			-11	-22 ▼	-10	-14	-17
2012				-12	0	-4	-7
2009					12	8	5
2006						-4	-7
2003							-3

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.22 (continued) Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory and gender

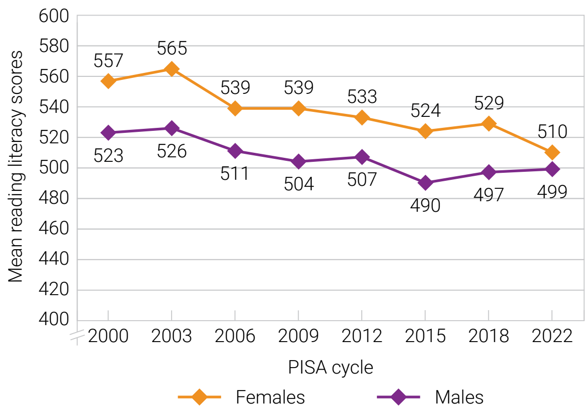
South Australia



Females							
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-6	-12	-11	-18 ▼	-25 ▼	-45 ▼	-45 ▼
2018		-6	-5	-12	-19 ▼	-39 ▼	-39 ▼
2015			1	-6	-13	-33 ▼	-33 ▼
2012				-7	-14	-34 ▼	-34 ▼
2009					-7	-27 ▼	-27 ▼
2006						-20	-20
2003							0

Males							
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	0	-8	-4	-10	-14	-37 ▼	-42 ▼
2018		-8	-4	-10	-14	-37 ▼	-42 ▼
2015			4	-2	-6	-29 ▼	-34 ▼
2012				-6	-10	-33 ▼	-38 ▼
2009					-4	-27 ▼	-32 ▼
2006						-23 ▼	-28 ▼
2003							-5

Western Australia



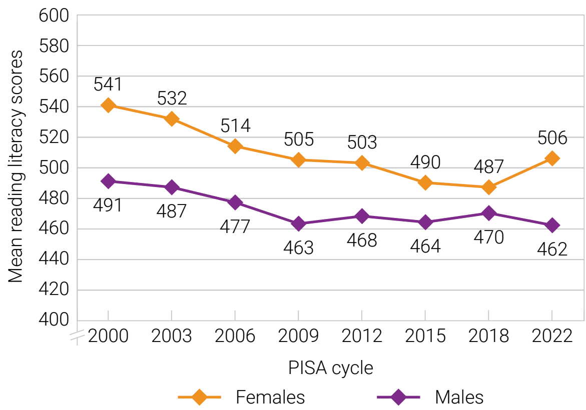
Females							
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-19 ▼	-14	-23 ▼	-29 ▼	-29 ▼	-55 ▼	-47 ▼
2018		5	-4	-10	-10	-36 ▼	-28 ▼
2015			-9	-15	-15	-41 ▼	-33 ▼
2012				-6	-6	-32 ▼	-24 ▼
2009					0	-26 ▼	-18
2006						-26 ▼	-18
2003							8

Males							
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	2	9	-8	-5	-12	-27 ▼	-24
2018		7	-10	-7	-14	-29 ▼	-26 ▼
2015			-17	-14	-21	-36 ▼	-33 ▼
2012				3	-4	-19 ▼	-16
2009					-7	-22 ▼	-19
2006						-15	-12
2003							3

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.22 (continued) Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory and gender

Tasmania



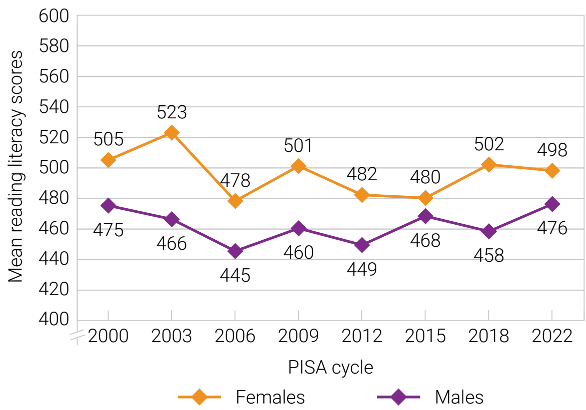
Females — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	18	15	2	0	-9	-27 ▼	-36 ▼
2018		-2	-15	-17	-27 ▼	-45 ▼	-54 ▼
2015			-13	-15	-24 ▼	-42 ▼	-51 ▼
2012				-2	-11	-29 ▼	-38 ▼
2009					-9	-27 ▼	-36 ▼
2006						-18	-27 ▼
2003							-9

Males — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-8	-2	-6	-1	-15	-25	-29
2018		6	2	7	-7	-17	-21
2015			-4	1	-13	-23	-27
2012				5	-9	-19	-23
2009					-14	-24	-28
2006						-10	-14
2003							-4

Northern Territory



Females — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-3	19	17	-2	21	-24	-6
2018		22	20	1	24	-21	-3
2015			-2	-21	2	-43 ▼	-25
2012				-19	4	-41 ▼	-23
2009					23	-23	-4
2006						-45 ▼	-27
2003							18

Males — Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	18	8	27	16	31 ▲	10	1
2018		-10	9	-2	13	-8	-17
2015			19	8	23	2	-7
2012				-11	4	-17	-26
2009					15	-6	-15
2006						-21	-30 ▼
2003							-9

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.22 (continued) Mean reading literacy performance and differences from PISA 2000 to 2022, by state and territory and gender

Proficiency over time

Figure 5.23 shows the proportions of low- and high-performing female and male students and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022 by state and territory and gender.

High performers

Between PISA 2018 and 2022, the proportion of female high performers decreased in the Australian Capital Territory by 11 percentage points and in Queensland by 4 percentage points. There were no differences in the proportions of male high performers in any states or territories.

Between PISA 2009 and 2022, there were no differences in the proportions of female or male high performers in any states or territories.

Between PISA 2000 and 2022, the proportion of female high performers decreased in 5 states and territories:

- the Australian Capital Territory by 11 percentage points
- New South Wales by 7 percentage points
- Queensland by 9 percentage points
- South Australiaby 10 percentage points
- Western Australia by 13 percentage points.

There were no differences in the proportions of high-performing males in any states or territories during this period.

Low performers

Between PISA 2018 and 2022, the proportion of female low performers increased in the Australian Capital Territory by 4 percentage points, in Queensland by 6 percentage points and in Western Australia by 5 percentage points. There were no differences in the proportions of male high performers in any states or territories.

Between PISA 2009 and 2022, the proportions of female low performers increased in 5 states:

- New South Wales by 9 percentage points
- Victoria by 6 percentage points
- Queensland by 11 percentage points
- South Australia by 8 percentage points
- Western Australia by 7 percentage points.
- The proportion of male low performers in Queensland increased by 7 percentage points.

Between PISA 2000 and 2022, there were percentage point increases in low performers in the following jurisdictions:

- the Australian Capital Territory (females by 7 percentage points and males by 8 percentage points)
- New South Wales (females by 11 percentage points and males by 13 percentage points)
- Victoria (males by 8 percentage points)
- Queensland (females by 11 percentage points)
- South Australia (females by 10 percentage points and males by 12 percentage points)
- Western Australia (females by 10 percentage points)
- Tasmania (males by 10 percentage points).

National Proficient Standard

Between PISA 2018 and 2022, the proportions of female students who attained the National Proficient Standard declined in Queensland (by 10 percentage points) and in Western Australia (by 7 percentage points).

Between PISA 2009 and 2022, the proportions of female students who attained the National Proficient Standard decreased in 5 states:

- New South Wales by 11 percentage points
- Victoria by 10 percentage points
- Queensland by 16 percentage points
- South Australia by 9 percentage points
- Western Australia by 12 percentage points.
- The proportion of male students who attained the National Proficient Standard decreased in Queensland by 7 percentage points.

Between PISA 2000 and 2022, the proportions of female students who attained the National Proficient Standard decreased in 6 states and territories:

- the Australian Capital Territory by 11 percentage points
- New South Wales, Queensland, South Australia and Western Australia by 17 percentage points
- Tasmania by 16 percentage points.

Over this time, the proportions of male students who attained the National Proficient Standard decreased in 3 states:

- South Australia by 16 percentage points
- New South Wales by 15 percentage points
- Tasmania decreased by 13 percentage points.

Australian Capital Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	11	16	71	20	13	61
2018	7	26	78	18	17	63
2015	13	15	71	19	13	59
2012	6	19	81	19	11	63
2009	8	21	77	17	15	63
2006	6	18	79	13	14	70
2003	5	27	84	12	15	72
2000	4	27	82	11	23	73

Students (%)

New South Wales

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	18	14	62	26	12	53
2018	17	13	62	27	9	49
2015	14	15	66	24	10	53
2012	8	16	73	21	11	55
2009	9	16	73	20	9	57
2006	6	16	76	19	9	57
2003	6	19	79	16	12	63
2000	6	21	79	13	15	68

Students (%)

Victoria

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	15	15	63	25	10	55
2018	13	17	66	21	12	59
2015	12	11	68	20	10	58
2012	8	14	74	16	9	62
2009	9	14	72	20	9	58
2006	10	10	70	19	7	57
2003	9	13	74	17	9	60
2000	11	19	70	17	11	60

Students (%)

Queensland

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	20	11	57	25	11	52
2018	14	16	67	22	12	53
2015	13	13	67	21	8	52
2012	10	14	69	15	10	56
2009	9	16	73	16	10	59
2006	9	13	72	13	10	56
2003	8	19	76	12	14	57
2000	9	20	74	15	18	57

Students (%)

FIGURE 5.23 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by state and territory and gender

South Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	17	11	61	26	9	50
2018	15	12	64	26	9	51
2015	13	13	67	22	8	55
2012	11	10	67	21	6	54
2009	9	12	70	21	7	56
2006	8	13	73	17	6	58
2003	6	20	81	13	12	67
2000	7	21	78	14	16	67

Students (%)

Western Australia

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	16	13	62	21	13	57
2018	12	16	69	22	12	58
2015	12	13	69	21	8	56
2012	10	16	72	15	10	62
2009	9	19	74	16	10	61
2006	7	15	77	13	10	65
2003	4	26	83	12	14	70
2000	6	26	79	15	18	64

Students (%)

Tasmania

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	19	13	58	33	7	45
2018	25	11	52	31	9	49
2015	21	10	53	31	6	44
2012	16	9	59	25	4	47
2009	17	10	60	29	5	45
2006	13	10	66	25	6	52
2003	9	13	74	21	8	54
2000	11	20	74	24	11	58

Students (%)

Northen Territory

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	18	10	58	30	11	49
2018	22	17	57	37	7	43
2015	27	9	51	30	7	46
2012	24	8	58	33	5	45
2009	18	12	61	31	6	45
2006	23	10	56	34	4	42
2003	12	16	69	28	4	47
2000	18	12	63	27	9	50

Students (%)

FIGURE 5.23 (continued) Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by state and territory and gender

School sector

Performance

Figure 5.24 shows the mean scores for reading literacy by school sector. The performance of students in independent schools was higher than students in Catholic schools and government schools, and the performance of students in Catholic schools was higher than students in government schools.

On average, students in independent schools performed 41 points higher than for students in government schools and 22 points higher than students in Catholic schools. Students in Catholic schools scored 19 points higher than students in government schools.

Students in government schools had the largest range of scores with 297 points between students in the 10th and 90th percentiles, whereas the differences in the spread of scores for Catholic schools and independent schools were smaller, at between 262 and 271 points, respectively.

School sector	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Government	485	3.0	498–510	297	
Catholic	504	3.0	479–491	262	
Independent	526	4.6	517–535	271	

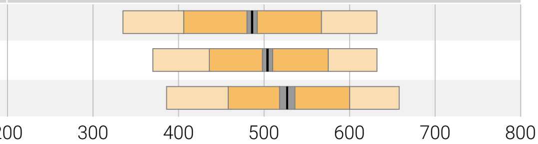


FIGURE 5.24 Mean scores and distribution of student performance on the reading literacy scale (unadjusted for student and school socioeconomic background), by school sector

Table 5.3 shows the mean difference in reading literacy performance after student-level socioeconomic background, and student- and school-level socioeconomic background, are accounted for.

When student-level socioeconomic background was accounted for, students in independent schools still performed at a higher level than students in government and Catholic schools, although the differences were lower than for the unadjusted mean scores. There was no difference between the performance of students in government schools and students in Catholic schools.

When school- and student-level socioeconomic background were accounted for, the differences between students in independent schools and students in Catholic or government schools were not different. However, there was a difference between government and Catholic schools; students who attended government schools achieved at a higher level. This means there was no performance advantage over students who attended an independent school over a Catholic school or government school, but given similar socioeconomic backgrounds, government schools achieved higher results than Catholic schools.

TABLE 5.3 Differences in mean reading literacy scores after adjusting for student- and school-level socioeconomic background

School sector comparison	Difference in score points	Difference in scores after accounting for student-level socioeconomic background	Difference in scores after accounting for student- and school-level socioeconomic background
Catholic–Government	**19**	4	**-13**
Independent–Government	**41**	**17**	-7
Independent–Catholic	**22**	**15**	8

Note: statistically significant values are shown in bold.

Proficiency

Figure 5.25 shows the percentages of students at each proficiency level on the reading literacy proficiency scale by school sector.

There was a higher proportion of high performers in independent schools (17%) than in government schools (11%) and Catholic schools (11%).

There were fewer low performers in independent schools (14%) than in government schools (26%) and Catholic schools (17%).

National Proficient Standard

Around 52% of students in government schools attained the National Proficient Standard in reading literacy, compared to 60% of students in Catholic schools and 68% of students in independent schools.

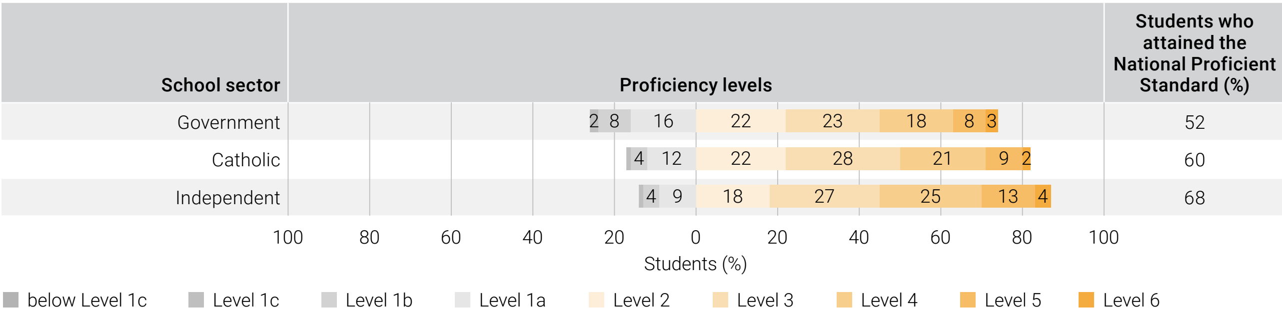


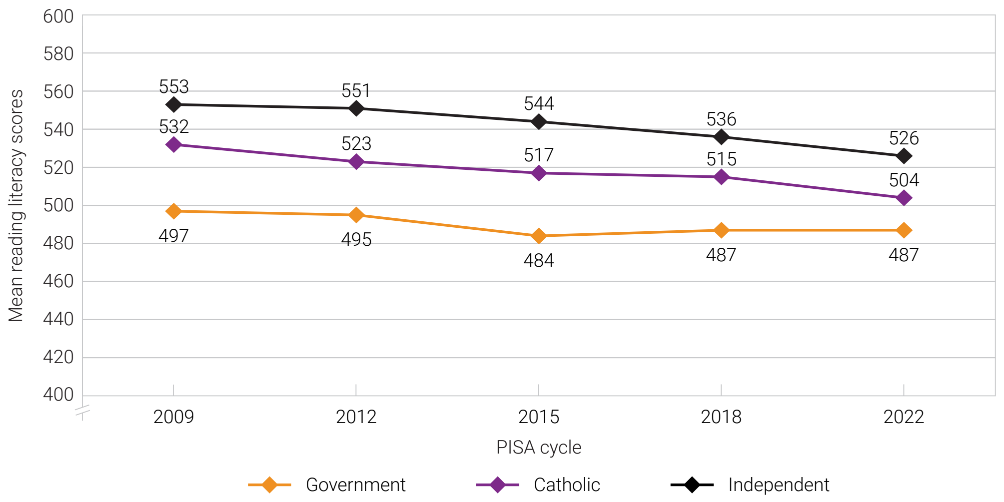
FIGURE 5.25 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector

Performance over time

Figure 5.26 shows the mean reading literacy performance from PISA 2009, when results for school sector were first reported, to PISA 2022, along with the change in performance between cycles.

Between PISA 2018 and 2022, the mean reading literacy performance for students in Catholic schools declined by 11 points.

Between PISA 2009 and 2022, the mean reading literacy performance for students in Catholic and independent schools declined by almost 30 points.



Government								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	0		3		-8		-10	
2018			3		-8		-10	
2015					-12	▼	-13	▼
2012							-1	

Catholic								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-11	▼	-13	▼	-19	▼	-28	▼
2018			-2		-8		-17	▼
2015					-6		-16	▼
2012							-10	

Independent								
	Difference between PISA cycles							
	2018		2015		2012		2009	
2022	-9		-17	▼	-24	▼	-27	▼
2018			-8		-15	▼	-18	▼
2015					-7		-10	
2012							-2	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.26 Mean reading literacy performance and differences from PISA 2000 to 2022, by school sector

Proficiency over time

Figure 5.27 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard from PISA 2009 to 2022 by school sector.

High and low performers

Between PISA 2018 and 2022, the proportions of low performers remained about the same, while the proportions of high performers in Catholic schools decreased by 3 percentage points.

Between PISA 2009 and 2022, the proportions of low performers increased across all school sectors:

- by 6 percentage points in government schools
- by 9 percentage points in Catholic schools
- by 8 percentage points in independent schools.

Between PISA 2009 and 2022, the proportion of high performers decreased in independent schools by 4 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of students in Catholic schools who attained the National Proficient Standard decreased by 4 percentage points, while there were no differences in the proportions in government schools and independent schools.

Between PISA 2009 and 2022, the percentages of students who attained the National Proficient Standard decreased across all school sectors. There was a 5 percentage point decrease for students in government schools, 14 percentage points in Catholic schools and 12 percentage points in independent schools.

Government

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	26	11	52
2018	24	11	53
2015	24	8	53
2012	19	10	57
2009	19	10	58

Catholic

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	17	11	60
2018	16	14	64
2015	13	12	67
2012	9	11	71
2009	8	13	74

Independent

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	14	17	68
2018	11	19	72
2015	7	18	77
2012	6	20	80
2009	6	22	80

Students (%)

FIGURE 5.27 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by school sector

School sector by gender

Performance

Figure 5.28 shows that female students performed at a higher level than male students across all school sectors. Students in government and Catholic schools had a similar gap between the performance of female students and male students with 22 points and 23 points respectively, while for students in independent schools, the gap was smaller with a 16 point difference.

School sector	Females Mean score	Females SE	Males Mean score	Males SE
Government	496	3.6	475	3.8
Catholic	515	3.8	492	4.4
Independent	534	5.5	518	5.3

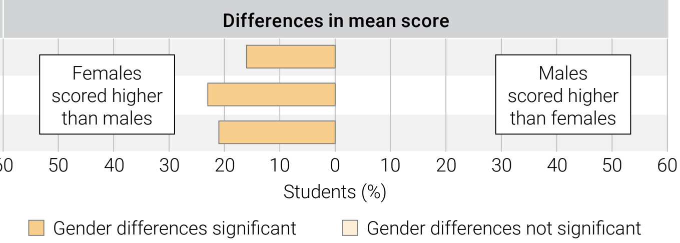


FIGURE 5.28 Mean scores and differences on the reading literacy scale, by school sector and gender

Proficiency

Figure 5.29 shows the percentage of students at each proficiency level on the reading literacy scale by school sector.

High performers

The proportion of female high performers in independent schools (19%) was higher than in Catholic schools (11%) and government schools (12%).

The proportion of male high performers in independent schools (15%) was higher than in Catholic schools (11%) and government schools (10%).

Low performers

The proportions of female low performers in independent schools (12%) and Catholic schools (12%) were similar and lower than in government schools (21%).

The proportion of male low performers in independent schools (15%) was lower than the proportion in Catholic schools (22%) or government schools (29%).

National Proficient Standard

- 56% of female students in government schools attained the National Proficient Standard in reading literacy, compared to 65% in Catholic schools and 70% in independent schools.
- 49% of male students in government schools attained the National Proficient Standard in reading literacy, compared to 55% in Catholic schools and 66% in independent schools.

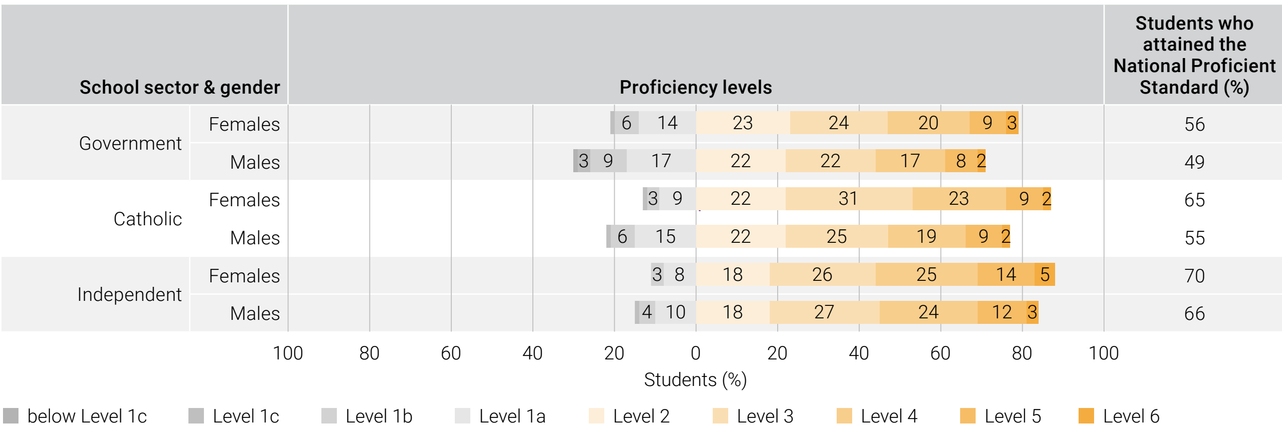


FIGURE 5.29 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by school sector and gender

Performance over time

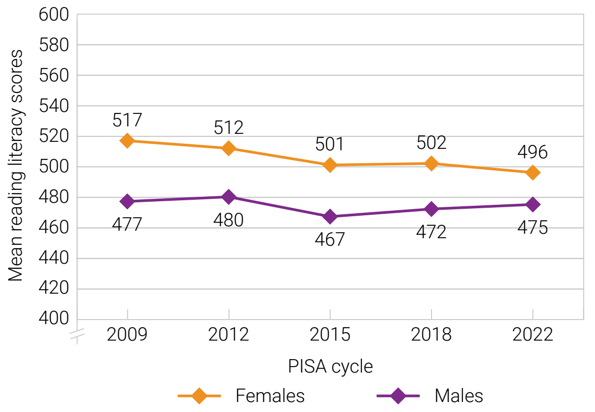
Figure 5.30 shows the mean reading literacy performance from PISA 2009 to 2022, along with the change in performance between 2 cycles for female and male students by school sector.

Between PISA 2018 and 2022, the mean reading literacy performance for female students declined in Catholic schools by 18 points and in independent schools by 17 points.

Between PISA 2009 and 2022, the mean reading literacy performance for female students declined across all school sectors: in government schools by 21 points, Catholic schools by 31 points and in independent schools by 33 points.

Over this same period, the mean reading literacy performance for male students declined in Catholic schools by 26 points and in independent schools by 19 points.

Government



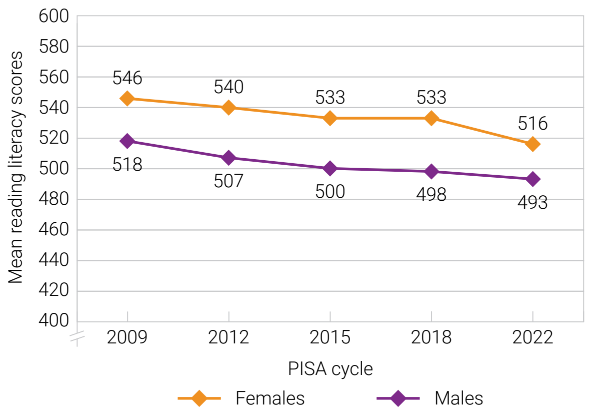
Females — Difference between PISA cycles

	2018		2015		2012		2009	
2022	-6		-5		-16	▼	-21	▼
2018			1		-10		-15	▼
2015					-11		-16	▼
2012							-5	

Males — Difference between PISA cycles

	2018		2015		2012		2009	
2022	3		8		-5		-2	
2018			5		-8		-5	
2015					-13		-10	
2012							3	

Catholic



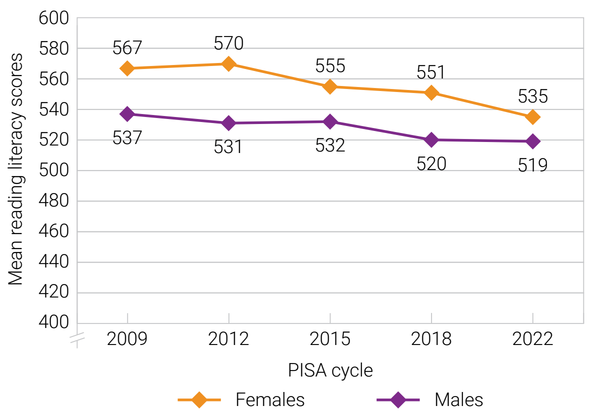
Females — Difference between PISA cycles

	2018		2015		2012		2009	
2022	-18	▼	-18	▼	-25	▼	-31	▼
2018			0		-7		-13	
2015					-7		-13	
2012							-6	

Males — Difference between PISA cycles

	2018		2015		2012		2009	
2022	-6		-8		-15		-26	▼
2018			-2		-9		-20	▼
2015					-7		-18	▼
2012							-11	

Independent



Females — Difference between PISA cycles

	2018		2015		2012		2009	
2022	-17	▼	-21	▼	-36	▼	-33	▼
2018			-4		-19	▼	-16	▼
2015					-15	▼	-12	
2012							3	

Males — Difference between PISA cycles

	2018		2015		2012		2009	
2022	-2		-14		-13		-19	▼
2018			-12		-11		-17	▼
2015					1		-5	
2012							-6	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.30 Mean reading literacy performance and differences from PISA 2009 to 2022, by school sector and gender

Proficiency over time

Figure 5.31 shows the proportions of female and male low performers and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2009 to 2022 by school sector.

High performers

Between PISA 2018 and 2022, the proportions of female high performers in Catholic schools decreased by 5 percentage points.

Between PISA 2009 and 2022, the proportion of female high performers in Catholic schools decreased by 4 percentage points and in independent schools decreased by 7 percentage points.

Low performers

Between PISA 2018 and 2022, the proportions of female low performers in independent schools increased by 5 percentage points.

Between PISA 2009 and 2022, the proportions of female low performers increased in government schools by 9 percentage points, and in Catholic schools and independent schools by 8 percentage points. The proportions of male low performers also increased in Catholic schools by 11 percentage points and in independent schools by 7 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of female students who attained the National Proficient Standard decreased by 6 percentage points in Catholic schools and by 8 percentage points in independent schools.

Between PISA 2009 and 2018, the proportion of female students who attained the National Proficient Standard decreased by 10 percentage points in government schools, and by 14 percentage points in Catholic schools and independent schools. The proportion of male students who attained the National Proficient Standard over this period decreased by 13 percentage points in Catholic schools and by 8 percentage points in independent schools.

Government

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	21	12	56	29	10	49
2018	19	13	58	29	9	48
2015	18	10	59	29	7	47
2012	13	11	64	24	8	50
2009	13	12	66	26	8	49

Catholic

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	12	11	65	22	11	55
2018	11	17	72	20	11	58
2015	8	14	74	17	9	60
2012	5	13	79	13	9	63
2009	5	16	80	11	11	68

Independent

PISA cycle	Females: Low performers	Females: High performers	Females: Students who attained the National Proficient Standard (%)	Males: Low performers	Males: High performers	Males: Students who attained the National Proficient Standard (%)
2022	12	19	70	15	15	66
2018	6	21	78	15	17	66
2015	5	20	82	9	16	73
2012	3	26	86	9	14	73
2009	4	26	85	8	16	75

Students (%): 60 40 20 0 20 40 60

FIGURE 5.31 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2009 to 2022, by school sector and gender

5.3 Australia's reading literacy results for different demographic groups in a national context

Geographic location

Performance

Figure 5.32 shows the reading literacy performance of students from schools classified using the *Australian statistical geography standard*, which categorises schools into 3 regions: major cities, regional areas and remote areas (ABS, 2011). This section reports on students in schools in these areas using this classification.

Students in major city schools outperformed students in regional schools and remote schools, and students in regional schools outperformed students in remote schools.

On average:

- students in major city schools achieved a mean score of 506 points, which was 31 points higher than students in regional schools, who achieved a mean score of 475 points.
- students in major city schools scored 66 points higher than students in remote schools, who achieved a mean score of 440 points.
- students in regional schools scored 35 points higher than students in remote schools.

The spread of scores from the 10th and 90th percentiles for schools across the different geographic locations, ranged from 270 points for students in remote schools to 286 points for students in major city schools.

Geographic location	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Major cities	506	2.6	500–511	286	
Regional areas	475	3.4	468–482	282	
Remote areas	440	10.1	420–449	270	

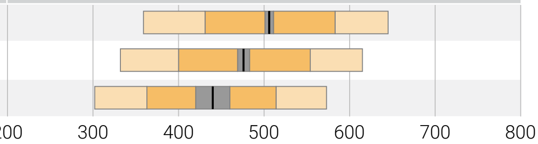


FIGURE 5.32 Mean scores and distribution of student performance on the reading literacy scale, by geographic location

Proficiency

Figure 5.33 shows the percentages of students on the reading literacy proficiency scale using the ASGS.

The proportion of high performers in major city schools (14%) was higher than in regional schools (8%) and in remote schools (4%).

The proportion of low performers in major city schools (19%) was lower than in regional schools (27%) and remote schools (38%).

National Proficient Standard

Sixty per cent of students in major city schools attained the National Proficient Standard in reading literacy, which was higher than in regional schools (49%) and in remote schools (35%).

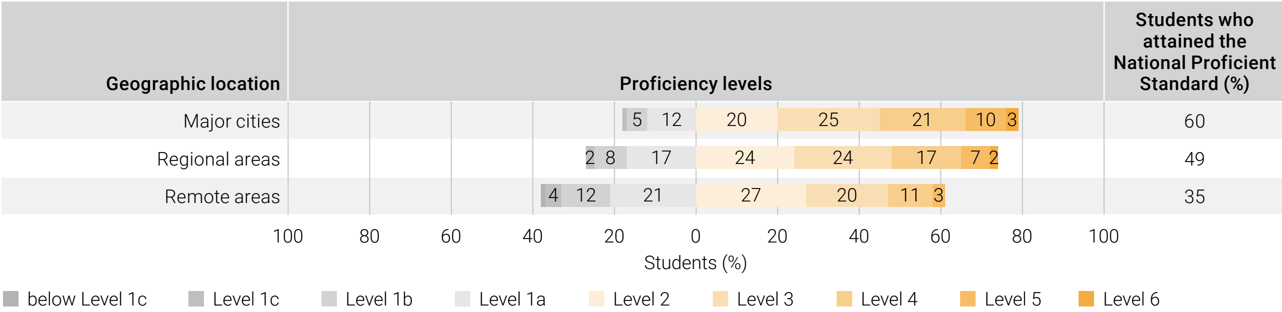
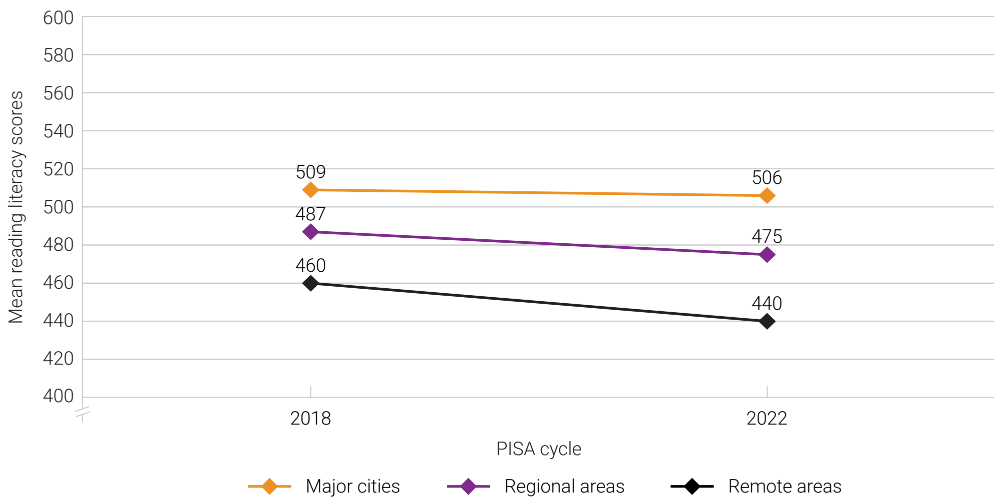


FIGURE 5.33 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by geographic location

Performance over time

Figure 5.34 shows the mean reading literacy performance and change in performance from PISA 2018 to 2022 using the ASGS.

During this period, the mean reading literacy performance was lower for students in regional schools, by 12 points. There were no differences in performance for students in major city schools or remote schools.



	Major cities	
	Difference between PISA cycles	
	2018	
2022	-3	

	Regional areas	
	Difference between PISA cycles	
	2018	
2022	-12	▼

	Remote areas	
	Difference between PISA cycles	
	2018	
2022	-20	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.34 Mean reading literacy performance and differences from PISA 2018 to 2022, by geographic location

Proficiency over time

Figure 5.35 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale for PISA 2018 and 2022 by geographic location.

Between PISA 2018 and 2022, there were no differences in the proportions of low and high performers in any geographic location.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of students who attained the National Proficient Standard decreased by 5 percentage points in regional schools, but there were no differences in major city schools or in remote schools.

Major cities

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	19	14	60
2018	18	14	61

Regional areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	27	8	49
2018	24	10	54

Remote areas

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	38	4	35
2018	38	8	40

Students (%)

FIGURE 5.35 Proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2018 to 2022, by geographic location

Socioeconomic background

Performance

Figure 5.36 shows the performance of students in reading literacy at each socioeconomic background (ESCS)[4] quartile and illustrates that, on average, students from higher socioeconomic backgrounds performed at a higher level than students from lower socioeconomic backgrounds.

On average, students from the highest socioeconomic quartile scored 95 points higher than students in the lowest quartile.

The score difference between one quartile and the next was around 30 points on average, except the difference between students in the third quartile and highest quartile was larger (37 points).

The spread of scores between the lowest and highest performers within each quartile was very similar (ranging from 268 to 270 points.)

Socioecnomic background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
Lowest quartile	453	2.6	447–459	269
Second quartile	481	2.4	476–487	270
Third quartile	518	2.7	513–523	268
Highest quartile	548	3.1	542–554	268

Distribution of scores

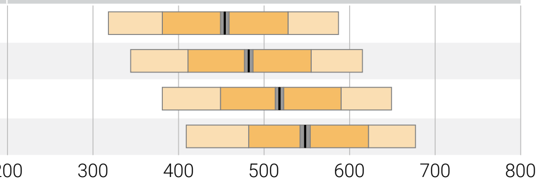


FIGURE 5.36 Mean scores and distribution of student performance on the reading literacy scale, by socioeconomic background

4 For more information about socioeconomic background and the ESCS index, please refer to the Reader's guide.

Proficiency

Figure 5.37 shows the percentage of students on each proficiency level on the reading literacy proficiency scale and the proportions of the students who attained the National Proficient Standard across the socioeconomic quartiles. Students in the lowest socioeconomic quartile were under-represented at the higher end of the scale and over-represented at the lower end of the scale.

High performers

The proportion of high performers increased with each increase in socioeconomic quartile: 4% of students in the lowest quartile, 8% in the second, 15% in the third, and 24% of students in the highest quartile. For the high performers, there was a 20% difference between students in the lowest and highest quartile.

Low performers

The proportion of low performers decreased with each increase in socioeconomic quartile: 34% of students in the lowest quartile, 24% in the second, 15% in the third, and 10% of students in the highest quartile. For the low performers, there was a 24% difference between students in the lowest and highest quartile.

National Proficient Standard

The proportion of students who attained the National Proficient Standard increased with each increase in socioeconomic quartile: 41% of students in the lowest quartile, 51% in the second, 65% in the third, and 75% of students in the highest quartile.

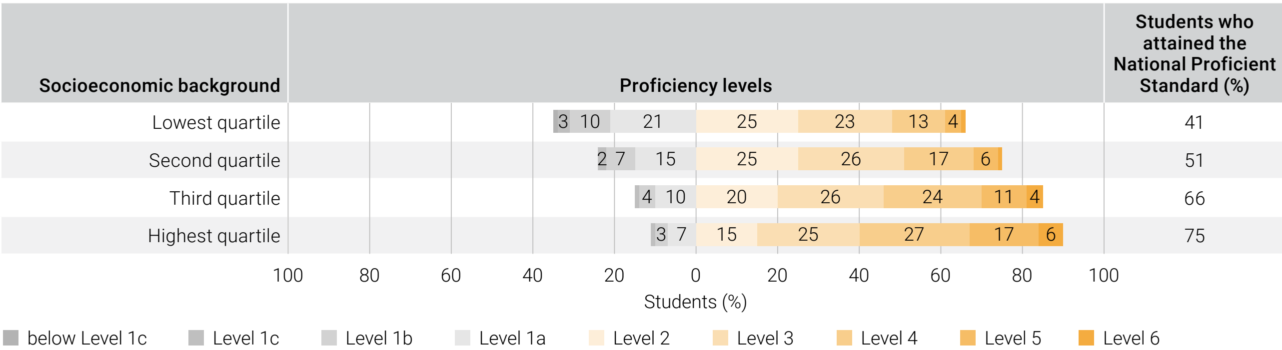


FIGURE 5.37 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by socioeconomic background

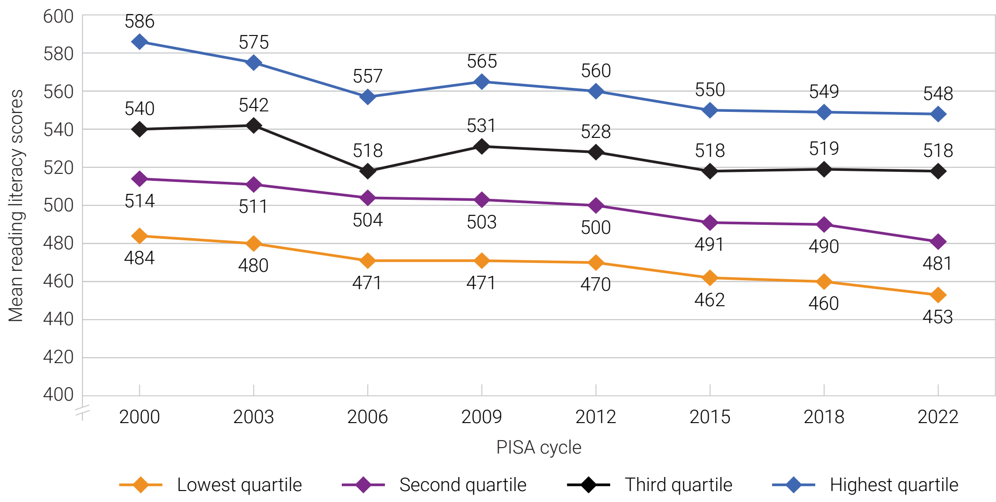
Performance over time

Figure 5.38 shows the mean reading literacy performance for each quartile of socioeconomic background since PISA 2000, along with details about the change in performance between 2 cycles.

Between PISA 2018 and 2022, the mean reading literacy performance was lower for students in the second quartile (by 9 points), but there were no differences in mean performance for students in the other quartiles.

Between PISA 2009 and 2022, there were declines in mean reading literacy performance for all socioeconomic quartiles. There was a decline of 18 points in the lowest quartile, 22 points in the second, 13 points in the third, and 17 points in the highest quartile.

Between PISA 2000 and 2022, there were declines in mean reading literacy performance for all socioeconomic quartiles. There was a decline of 31 points in the lowest quartile, 33 points in the second, 22 points in the third, and 38 points in the highest quartile.



Lowest quartile

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-7	-9	-17 ▼	-18 ▼	-18	-27 ▼	-31 ▼
2018		-2	-10 ▼	-11 ▼	-11	-20 ▼	-24 ▼
2015			-8	-9	-9	-18 ▼	-22 ▼
2012				-1	-1	-10	-14
2009					0	-9	-13
2006						-9	-13
2003							-4

Second quartile

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-9 ▼	-10 ▼	-19 ▼	-22 ▼	-23 ▼	-30 ▼	-33 ▼
2018		-1	-10	-13 ▼	-14 ▼	-20 ▼	-24 ▼
2015			-9	-12 ▼	-13	-20 ▼	-23 ▼
2012				-3	-4	-11	-14
2009					-1	-8	-11
2006						-7	-10
2003							-3

Third quartile

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-1	0	-10	-13 ▼	0	-24 ▼	-22 ▼
2018		1	-9 ▼	-12 ▼	1	-23 ▼	-21 ▼
2015			-10	-13 ▼	0	-24 ▼	-22 ▼
2012				-3	10	-14 ▼	-12
2009					13 ▼	-11 ▼	-9
2006						-24 ▼	-22 ▼
2003							2

Highest quartile

Difference between PISA cycles

	2018	2015	2012	2009	2006	2003	2000
2022	-1	-2	-12	-17 ▼	-9	-27 ▼	-38 ▼
2018		-1	-11 ▼	-16 ▼	-8	-26 ▼	-37 ▼
2015			-10	-15 ▼	-7	-25 ▼	-36 ▼
2012				-5	3	-15 ▼	-26 ▼
2009					8	-10	-21 ▼
2006						-18 ▼	-29 ▼
2003							-11

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.38 Mean reading literacy performance and differences from PISA 2000 to 2022, by socioeconomic background

Proficiency over time

Figure 5.39 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale by socioeconomic background.

High and low performers

Between PISA 2018 and 2022, there were no differences in the proportions of high and low performers across each of the socioeconomic quartiles.

Between PISA 2009 and 2022, the proportion of low performers increased in each socioeconomic quartile. In the lowest and second quartile, there was a 9 percentage point increase, and a 5 percentage point increase in the third and highest quartiles. There was no difference in the proportion of high performers in any socioeconomic quartile over this period.

Between PISA 2000 and 2022, the proportion of low performers increased in each socioeconomic quartile. In the lowest quartile, there was a 12 percentage point increase, a 10 percentage point increase in the second, a 6 percentage point increase in the third, and a 7 point percentage increase in the highest quartile. The proportion of high performers in the highest quartile decreased by 10 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of students who attained the National Proficient Standard decreased in the second quartile by 3 percentage points and did not change for the other socioeconomic quartiles.

Between PISA 2009 and 2022, the proportion of students who attained the National Proficient Standard decreased in each socioeconomic quartile: by 6 percentage points in the lowest, 10 percentage points in the second, 7 percentage points in the third, and 9 percentage points in the highest quartile.

Between PISA 2000 and 2022, the proportion of students who attained the National Proficient Standard decreased in each socioeconomic quartile: by 11 percentage points in the lowest, 14 percentage points in the second, 9 percentage points in the third, and 13 percentage points in the highest quartile.

Lowest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	34	4	41
2018	31	6	43
2015	30	5	43
2012	24	4	46
2009	25	4	47
2006	23	3	47
2003	21	5	53
2000	21	6	52

Second quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	24	8	51
2018	21	10	55
2015	19	8	56
2012	15	7	60
2009	14	8	61
2006	14	8	62
2003	13	9	65
2000	14	11	65

Third quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	15	15	65
2018	14	15	66
2015	13	12	68
2012	9	13	72
2009	10	15	72
2006	11	10	69
2003	7	16	77
2000	9	19	74

Highest quartile

PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	10	24	75
2018	10	24	76
2015	7	21	79
2012	5	24	82
2009	5	25	84
2006	5	21	83
2003	4	29	87
2000	3	34	89

Students (%): 60 40 20 0 20 40 60

FIGURE 5.39 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by socioeconomic background

First Nations background

Performance

Figure 5.40 shows First Nations and non-First Nations student performance in reading literacy. First Nations students achieved a mean score of 420 points, which was 84 points lower than the mean score of 504 points for non-First Nations students.[5]

First Nations student performance was similar to the performance of students in the lower-performing countries (Uruguay, Brunei Darussalam, Romania, Ukrainian regions, United Arab Emirates, Mexico and Costa Rica).

The spread of scores between the 10th and 90th percentiles for First Nations and non-First Nations students were similar.

First Nations background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
First Nations	420	5.8	499–507	277	
Non-First Nations	504	2.1	409–431	284	

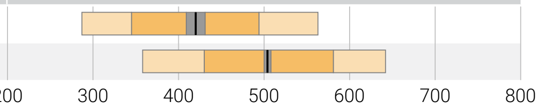


FIGURE 5.40 Mean scores and distribution of student performance on the reading literacy scale, by First Nations background

5 For more information about First Nations background, please refer to the Reader's guide.

Proficiency

Figure 5.41 shows the large under-representation of First Nations students at the higher end of the reading literacy proficiency scale and the similarly the large over-representation of First Nations students at the lower end of the proficiency scale.

High performers

Only 3% of First Nations students were high performers, compared to 13% for non-First Nations students.

Low performers

The proportion of low-performing First Nations students (47%) was higher, and more than double the proportion of low-performing non-First Nations students (19%).

National Proficient Standard

Almost 30% of First Nations students attained the National Proficient Standard in reading literacy compared to just over half (59%) of the non-First Nations students.

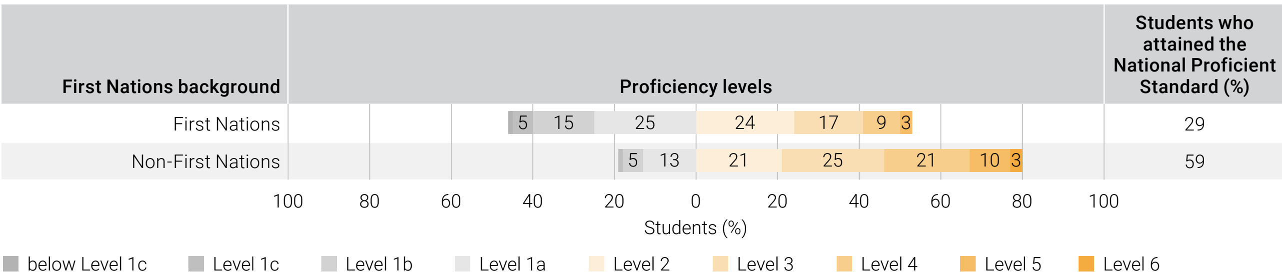


FIGURE 5.41 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by First Nations background

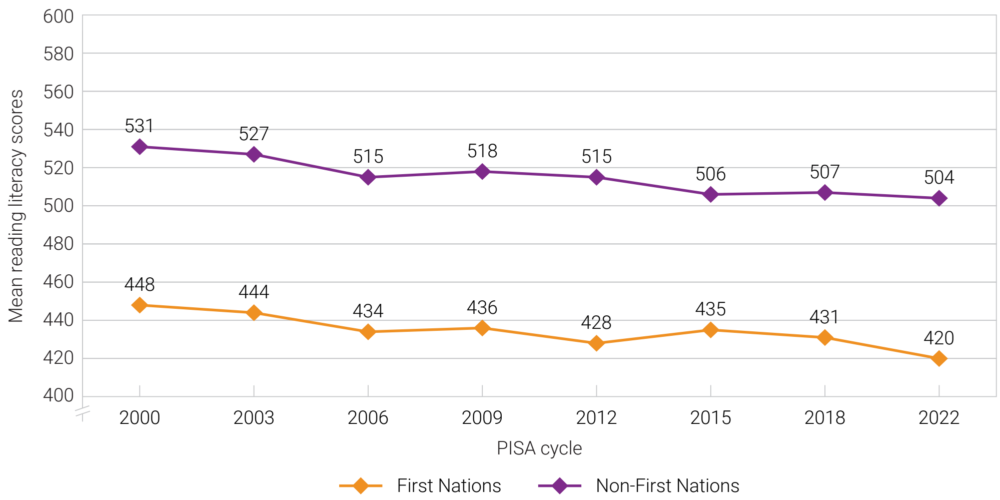
Performance over time

Figure 5.42 shows the mean reading literacy performance and change in performance across the PISA cycles for First Nations and non-First Nations students.

Between PISA 2018 and 2022, there were no differences in the reading literacy performance for either First Nations or non-First Nations students.

Between PISA 2009 and 2022, the mean reading literacy performance for non-First Nations students declined by 14 points, but did not change for First Nations students.

Between PISA 2000 and 2022, the mean reading literacy performance declined equally, and just below 30 points, for both First Nations and non-First Nations students.



	First Nations						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-11	-15	-8	-16	-14	-24 ▼	-28 ▼
2018		-4	3	-5	-3	-13	-17
2015			7	-1	1	-9	-13
2012				-8	-6	-16	-20 ▼
2009					2	-8	-12
2006						-10	-14
2003							-4

	Non-First Nations						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-3	-2	-11	-14 ▼	-12	-23 ▼	-27 ▼
2018		1	-8	-11 ▼	-8	-20 ▼	-24 ▼
2015			-9	12 ▼	-9	-21 ▼	-25 ▼
2012				-3	0	-12 ▼	-16 ▼
2009					2	-10	-13 ▼
2006						-12 ▼	-16 ▼
2003							-4

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.42 Mean reading literacy performance and differences from PISA 2000 to 2022, by First Nations background

Proficiency over time

Figure 5.43 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale by First Nations background.

High and low performers

Between PISA 2018 and 2022, there were no differences in the proportions of low and high performers for either First Nations students or non-First Nations students.

Between PISA 2009 and 2022, the proportion of low-performing non-First Nations students increased by 5 percentage points.

Between PISA 2000 and 2022, the proportion of low-performing First Nations students increased by 14 percentage points and of non-First Nations students by 8 percentage points. The proportion of high-performing non-First Nations students decreased by 4 percentage points.

National Proficient Standard

Between PISA 2018 and 2022, the proportions of First Nations students and non-First Nations students who attained the National Proficient Standard did not change.

Between PISA 2009 and 2022, the proportions of non-First Nations students who attained the National Proficient Standard decreased by 7 percentage points.

Between PISA 2000 and 2022, there was around a 10 percentage point decrease in the proportions of First Nations students and non-First Nations students who attained the National Proficient Standard.

	First Nations			Non-First Nations		
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	47	3	29	19	13	59
2018	43	5	32	18	14	61
2015	40	3	32	17	11	62
2012	39	2	31	13	12	65
2009	39	2	35	13	13	66
2006	38	3	33	13	11	67
2003	38	4	38	11	15	71
2000	33	4	38	12	17	70

Students (%)

FIGURE 5.43 Proportions of low and high performers and the students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by First Nations background

Immigrant background

Performance

Figure 5.44 shows that the reading literacy performance levels of first-generation students and foreign-born students were similar, and that both groups outperformed Australian-born students.[6]

On average, first-generation students achieved a mean score of 509 points, which was 14 points higher than Australian-born students, who achieved a mean score of 495 points. Foreign-born students also performed higher than Australian students, by 12 points. There was no difference between the performance of first-generation and foreign-born students.

The spread of scores for Australian-born students (284 points) and first-generation students (283 points) was similar and smaller than the spread of scores for foreign-born students (298 points).

Immigrant background	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles	Distribution of scores
Australian-born	495	2.3	490–499	284	
First-generation	509	2.8	503–514	283	
Foreign-born	507	4.9	497–516	298	

200 300 400 500 600 700 800

FIGURE 5.44 Mean scores and distribution of student performance on the reading literacy scale, by immigrant background

6 For more information about immigrant background, please refer to the Reader's guide.

Proficiency

Figure 5.45 shows the percentage of students by immigrant background on the reading literacy proficiency scale.

High performers

The proportion of high-performing Australian-born students (12%) was lower than the proportions of high-performing first-generation students (14%). There was no difference between the proportions of high-performing Australian-born students and foreign-born students, and the proportions of high-performing first-generation students and foreign-born students.

Low performers

The proportion of low-performing Australian-born students (22%) was higher than proportions of high-performing first-generation students (18%). There was no difference between the proportions of high-performing Australian-born students and foreign-born students, and the proportions of high-performing first-generation students and foreign-born students.

National Proficient Standard

Fifty-six per cent of Australian-born students attained the National Proficient Standard in reading literacy, which was lower than for first-generation students (62%) and foreign-born students (61%). There was no difference in the proportions between first-generation and foreign-born students.

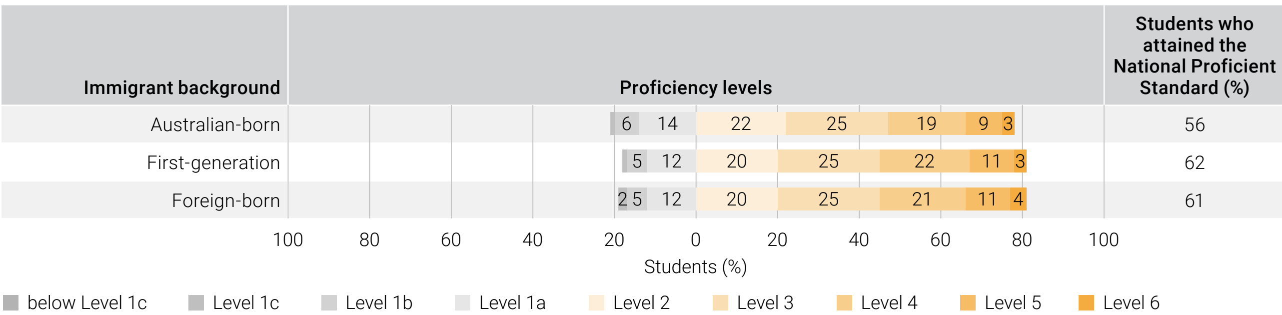


FIGURE 5.45 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by immigrant background

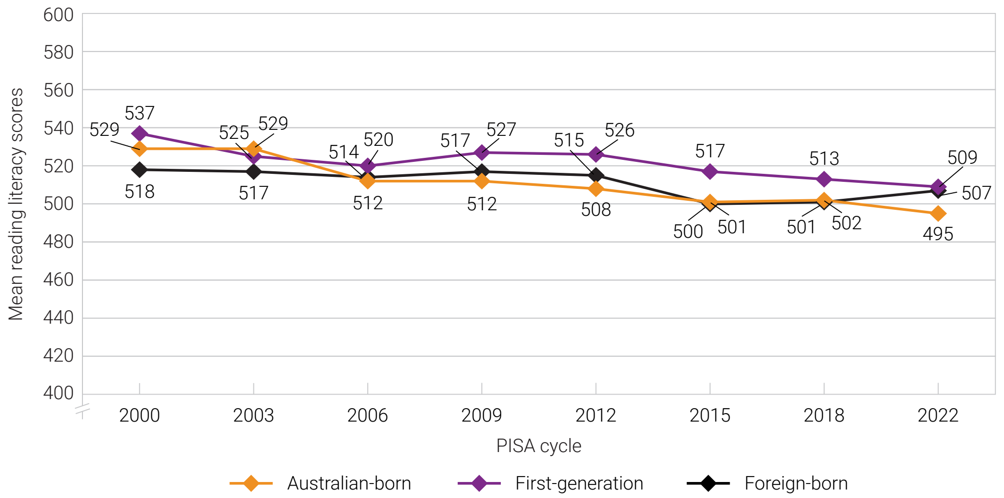
Performance over time

Figure 5.46 shows the reading literacy performance for students from different immigrant background, and changes in performance over time.

Between 2018 and 2022, the mean reading literacy performance of Australian-born students declined by 7 points. There was no difference in the performance of first-generation students and foreign-born students.

Between 2009 and 2022, performance declined by 17 points for Australian-born students, and by 18 points for first-generation students, while there was no difference in mean performance for foreign-born students.

Between 2000 and 2022, the mean performance declined by 34 points for Australian-born students and by 28 points for first-generation students, while there was no difference in mean performance for foreign-born students.



	Australian-born						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-7 ▼	-6	-13 ▼	-17 ▼	-17	-34 ▼	-34 ▼
2018		1	-6	-10	-10	-27 ▼	-27 ▼
2015			-7	-11 ▼	-11	-28 ▼	-28 ▼
2012				-4	-4	-21 ▼	-21 ▼
2009					0	-17 ▼	-17 ▼
2006						-17 ▼	-17 ▼
2003							0

	First-generation						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	-4	-8	-17 ▼	-18 ▼	-11	-16 ▼	-28 ▼
2018		-4	-13 ▼	-14 ▼	-7	-12	-24 ▼
2015			-9	-10 ▼	-3	-8	-20 ▼
2012				-1	6	1	-11
2009					7	2	-10
2006						-5	-17 ▼
2003							-12

	Foreign-born						
	Difference between PISA cycles						
	2018	2015	2012	2009	2006	2003	2000
2022	6	7	-8	-10	-7	-10	-11
2018		1	-14 ▼	-16	-13	-16	-17
2015			-15 ▼	-17 ▼	-14	-17 ▼	-18
2012				-2	1	-2	-3
2009					3	0	-1
2006						-3	-4
2003							-1

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.46 Mean reading literacy performance and differences from PISA 2000 to 2022, by immigrant background

Proficiency over time

Figure 5.47 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale for PISA 2000 to 2022 by immigrant background.

High and low performers

Between PISA 2018 and 2022, the only change among the 3 immigrant background groups was a 2 percentage point increase in the proportion of low performers among Australian-born students.

Between PISA 2009 and 2022, the proportions of low performers increased by 7 percentage points for Australian-born students and for first-generation students, and a 4 percentage point increase for foreign-born students.

Between PISA 2000 and 2022, there were increases in the proportions of low performers, with a 10 percentage point increase for Australian-born students and an 8 percentage point increase for first-generation students, while there were decreases in the proportions of high perforrmers, with a 5 percentage point decrease for Australian-born and first-generation students.

National Proficient Standard

Between PISA 2018 and 2022, the proportion of Australian-born students who attained the National Proficient Standard decreased by 3 percentage points. There were no differences in the proportions of first-generation students or foreign-born students who attained this standard.

Between PISA 2009 and 2022, the proportion of Australian-born students and first-generation students who attained the National Proficient Standard each decreased by 8 percentage points. There was no difference in the proportion of foreign-born students who attained this standard.

Between PISA 2000 and 2022, the proportion of Australian-born students who attained the National Proficient Standard decreased by 13 percentage points and the proportion of first-generation students by 10 percentage points. There was no difference in the proportion of foreign-born students who attained this standard.

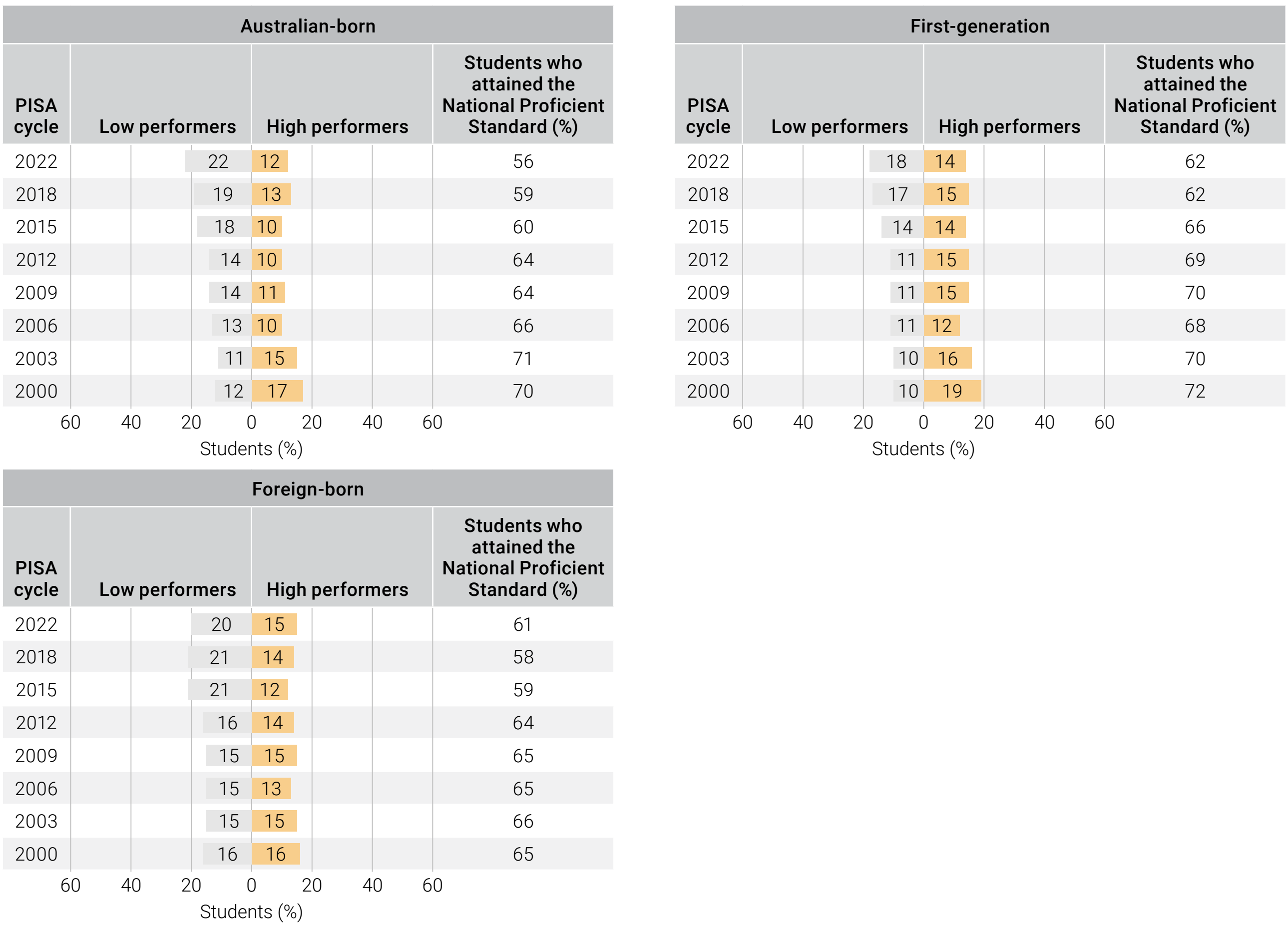


FIGURE 5.47 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2000 to 2022, by immigrant background

Language background

Performance

Figure 5.48 shows the reading literacy performance of students by language background.[7] There was no difference in performance between students whose main language spoken at home was English and students who spoke a language at home other than English.

The spread of scores between the 10th and 90th percentiles was larger for students who spoke a language other than English at home (309 points) compared to the spread of scores for students who spoke English at home (284 points).

Main language spoken at home	Mean score	SE	Confidence interval	Difference between 10th & 90th percentiles
English	501	1.8	497–504	284
Other language	491	5.7	479–501	309

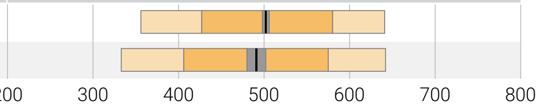


FIGURE 5.48 Mean scores and distribution of student performance on the reading literacy scale, by language background

Proficiency

Figure 5.49 shows the percentages of students for the 2 language background groups.

There was no difference between the proportion of high performers who spoke English at home and those who spoke a language other than English at home (13%).

There were fewer low performers who spoke English at home (20%) than low performers who spoke a language other than English at home (25%).

National Proficient Standard

There was no difference between the proportions of the 2 language backgrounds who attained the National Proficient Standard.

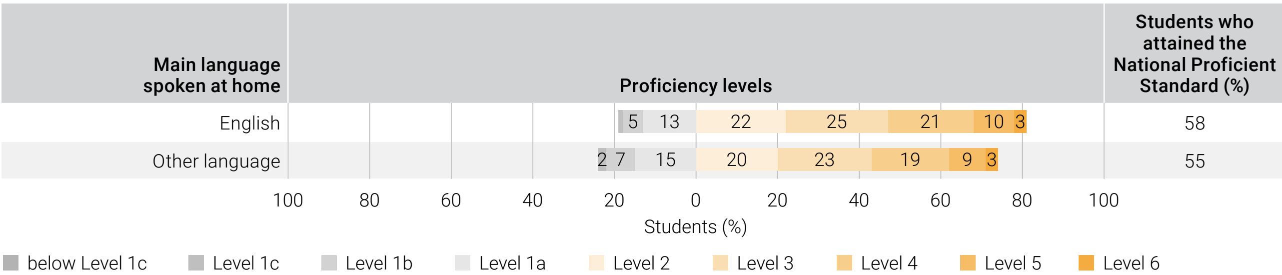


FIGURE 5.49 Percentages of students across the reading literacy proficiency scale and proportions of students who attained the National Proficient Standard, by language background

Performance over time

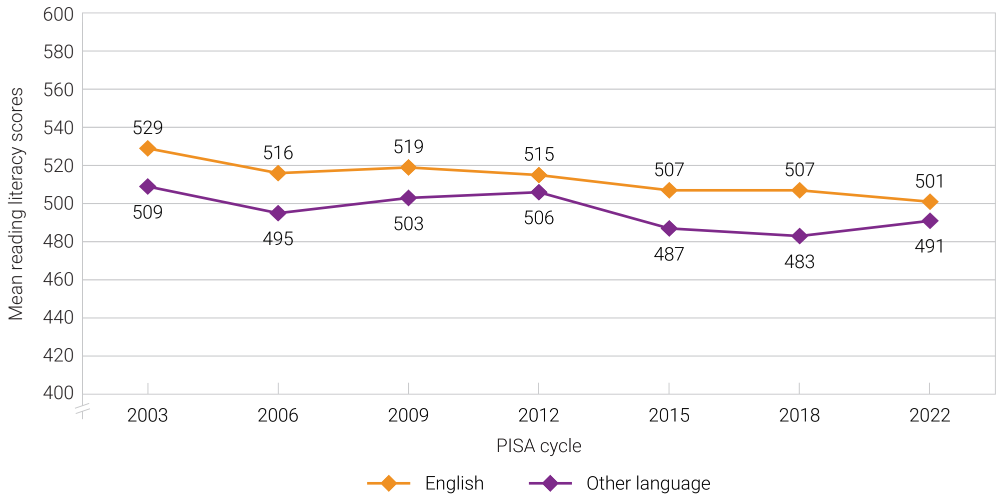
Figure 5.50 shows the mean reading literacy performance from 2003, when results for the main language spoken at home were first reported, to PISA 2022, and their changes in performance over time.

Between PISA 2018 and 2022, the mean reading literacy performance declined for students who spoke English at home by 6 points but did not change for students who spoke a language other than English at home.

7 For more information about language background, please refer to the Reader's guide.

Between PISA 2009 and 2022, the mean reading literacy performance declined for students who spoke English at home by 18 points but did not change for students who spoke a language other than English at home.

Between PISA 2003 and 2022, the mean reading literacy performance declined by 28 points for students who spoke English at home but did not change for students who spoke a language other than English at home.



	English											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	-6	▼	-6		-14	▼	-18	▼	-15		-28	▼
2018			0		-8		-12	▼	-9		-22	▼
2015					-8		-12	▼	-9		-22	▼
2012							-4		-1		-14	▼
2009									3		-10	▼
2006											-13	▼

	Other language											
	Difference between PISA cycles											
	2018		2015		2012		2009		2006		2003	
2022	8		4		-15		-12		-5		-18	
2018			-4		-23	▼	-20		-12		-26	▼
2015					-19	▼	-16		-8		-22	▼
2012							3		11		-3	
2009									8		-6	
2006											-14	

Note: read across the row to determine whether the performance in the row year is significantly higher (▲) or signifcantly lower (▼) than the performance in the column year.

FIGURE 5.50 Mean reading literacy performance and differences from PISA 2003 to 2022, by language background

Proficiency over time

Figure 5.51 shows the proportions of low and high performers and the proportions of students who attained the National Proficient Standard on the reading literacy proficiency scale by language background.

High and low performers

Between PISA 2018 and 2022, there was a 2 percentage point increase in low performers who spoke English at home.

Between PISA 2009 and 2022, the proportion of low performers who spoke English at home decreased by 7 percentage points, and the proportion of low performers who spoke a language other than English at home increased by 6 percentage points.

Between PISA 2003 and 2022, the proportion of low performers who spoke English at home increased by 9 percentage points, while the proportion of high performers declined by 2 percentage points. For students who spoke a language other than English at home, the proportion of low performers increased by 10 percentage points, but the proportion of high performers did not change.

National Proficient Standard

Between PISA 2018 and 2022, there was a 2 percentage point decrease in the percentage of students who attained the National Proficient Standard for students who spoke English at home.

Between PISA 2009 and 2022, there was a 8 percentage point decrease in the percentage of students who attained the National Proficient Standard for students who spoke English at home.

Between PISA 2003 and 2022, the proportions of students who attained the National Proficient Standard decreased by 13 percentage points for students who spoke English at home and by 7 percentage points for students who spoke a language other than English at home.

English			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	20	13	59
2018	18	14	61
2015	17	11	62
2012	13	12	66
2009	13	13	67
2006	12	11	67
2003	11	15	71

Students (%)

Other language			
PISA cycle	Low performers	High performers	Students who attained the National Proficient Standard (%)
2022	25	13	55
2018	27	13	51
2015	26	11	53
2012	19	13	60
2009	20	13	60
2006	20	9	59
2003	16	13	62

Students (%)

FIGURE 5.51 Proportions of low and high performers and students who attained the National Proficient Standard on the reading literacy proficiency scale from PISA 2003 to 2022, by language background

6

Equity in learning opportunities and outcomes

Key findings

- The difference between advantaged and disadvantaged students in mathematical literacy in Australia was 101 score points.
- In Australia, on average, disadvantaged students were 6 times more likely than advantaged students to be low performers in mathematics.
- The socioeconomic gradient for Australia is such that each increment of the PISA index of economic, social and cultural status (ESCS) is associated with an increase in performance of 45 score points in mathematical literacy.
- The slope of the socioeconomic gradient in Australia was similar to the OECD average. In Australia, the effect of socioeconomic background on performance in mathematical literacy was the same as the average across the OECD.
- Tasmania had the flattest slope across the Australian jurisdictions, indicating there was less of a relationship between ESCS and performance in Tasmania than in other jurisdictions on average across Australia. Each increment on the ESCS scale was associated with an increase of 37 score points in Tasmania. The Australian Capital Territory had the steepest slope, with a unit increase in ESCS reflected in a 48 point increase in mathematics score.
- The key proxy for equity in PISA is the strength of the relationship between socioeconomic background and performance – that is the degree to which variance in mathematical literacy performance scores was explained by students' socioeconomic background. On this measure, the strength of the relationship in Australia was not significantly different than that, on average, across the OECD countries.

- The strength of the relationship between socioeconomic background and performance was not significantly different to the OECD average in any of the states and territories.
- The proportion of disadvantaged students varied widely by state. Schools in Tasmania and the Northern Territory enrolled the highest proportions of disadvantaged students, while schools in the Australian Capital Territory were skewed in the opposite direction.
- The proportion of disadvantaged students also varied widely across sectors. Government schools enrolled a substantially higher proportion of disadvantaged students than Catholic or independent schools, while independent schools enrolled a substantially higher proportion of advantaged students.
- 10% of disadvantaged students in Australia were classed as academically resilient; that is, they scored in the top quarter of achievement.

6.1 Introduction

The *Alice Springs (Mparntwe) education declaration* (Education Council, 2019) commits Australian governments to promoting excellence and equity in Australian schools. Among other things, this means that governments aim to:

- provide all young Australians with access to high-quality education that is inclusive and free from any form of discrimination
- improve outcomes for educationally disadvantaged young Australians.

This understanding of equity in education resonates in the Sustainable Development Goals, adopted by the United Nations in September 2015. In particular, Goal 4 encourages all countries to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (UNESCO, 2016).

PISA collects a wealth of background data that, along with the performance data, enables us to examine progress towards both national and international goals. This chapter focuses on socioeconomic background and its relationship with performance, in terms of how it relates to fairness and inclusion.

Fairness (or equity) in education means that schools and education systems provide equal learning opportunities for all students. As a result, students of different socioeconomic backgrounds, gender or family background can enjoy a similar provision of education and can achieve their full potential. Equity does not mean that all students will achieve equally, but rather, these differences are unrelated to their background or to economic and social circumstances over which the students have no control. Education systems that combine high levels of fairness and inclusion are considered to be highly equitable.

6.2 Equal opportunity by student socioeconomic background

Variations in socioeconomic background both within and between countries can be taken into account when comparing student performance. Figure 6.1 shows the average socioeconomic status – measured by the PISA ESCS index – for a number of comparison countries (other English-speaking countries and high-performing countries), and the spread of ESCS values between the 10th and 90th percentiles. Countries are arranged in order of average ESCS.

Australia's average ESCS is the fourth highest of all participating countries and economies, behind Norway, Denmark and Canada.[1]

1 Norway and Denmark are not included in Figure 6.1.

Figure 6.1 also shows how socioeconomic status varies within the selected countries, shown by the spread of values between the most disadvantaged students (the 10th percentile of ESCS) and the most advantaged students (the 90th percentile of ESCS). Of the countries chosen for comparison, Japan had the least socioeconomically heterogeneous society, with the narrowest range of scores on socioeconomic background. Hong Kong (China) was the most heterogeneous, with the largest range.

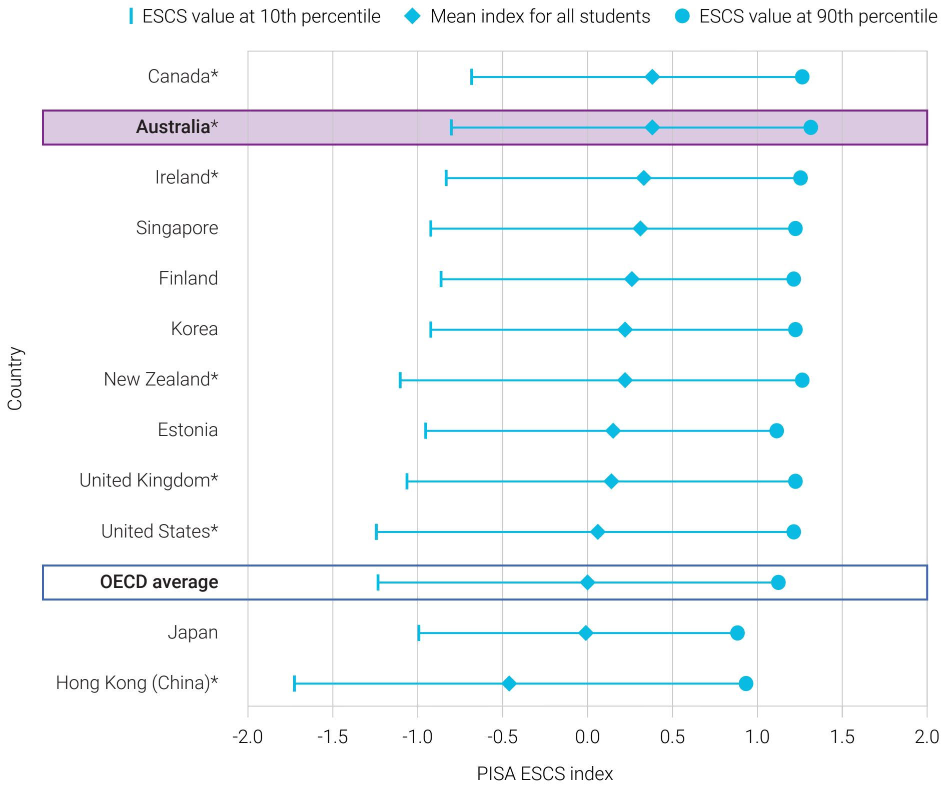


FIGURE 6.1 Means and variation in student socioeconomic status within selected countries

Figure 6.2 provides the same information for the 8 Australian states and territories. The average socioeconomic status was highest in the Australian Capital Territory and lowest in the Northern Territory. The Australian Capital Territory was also the least heterogeneous, with the smallest range in ESCS between disadvantaged and advantaged students, while Tasmania was the most heterogeneous with the widest range.

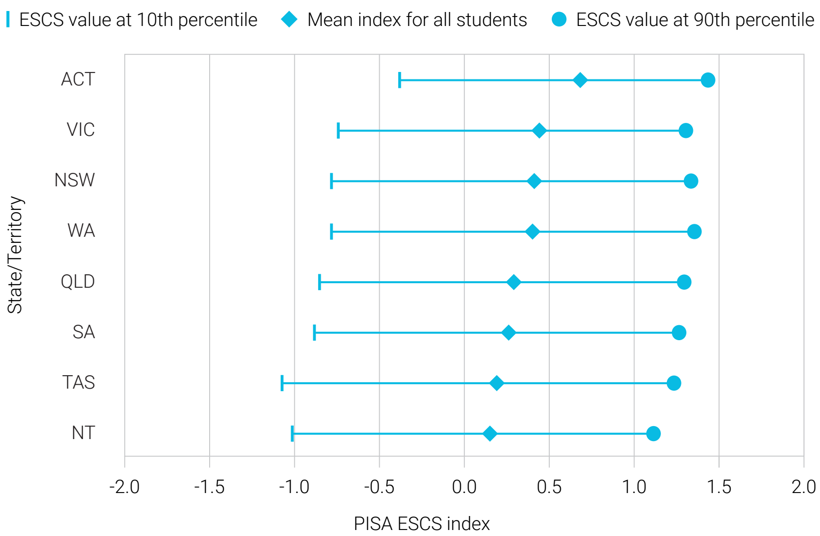


FIGURE 6.2 Means and variation in student socioeconomic status, by state and territory

6.3 Performance of Australian students by socioeconomic status

The results of students' performance in PISA are presented in the previous chapters of this report. Table 6.1 recaps those findings in terms of students' socioeconomic status.

Differences in performance between the highest and lowest socioeconomic quartiles were large in all domains for Australian students. In mathematical literacy, the difference was 101 points; in scientific literacy it was 102 points; and, in reading literacy it was 95 points.

TABLE 6.1 Performance on cognitive assessments, PISA 2022, Australia, by socioeconomic background

	Cognitive achievement					
	Mathematical literacy		Reading literacy		Scientific literacy	
	Mean score	SE	Mean score	SE	Mean score	SE
Disadvantaged	439	2.0	453	2.6	459	2.7
Advantaged	540	2.8	548	3.1	561	3.1

Socioeconomic gradients

The term 'socioeconomic gradient' refers to the relationship between an outcome and socioeconomic background. In the case of PISA, the outcome is students' performance and the measure of socioeconomic background is the ESCS index. PISA data show that there is a significant relationship between students' performance and their socioeconomic background as measured by ESCS. This relationship is evident in Australia and all other PISA countries, although the strength of the relationship differs among countries.

The analysis of socioeconomic gradients is a means of characterising equity in terms of student performance and providing guidance for educational policy. Socioeconomic gradients can be used to compare the relationships between outcomes and student background across and within countries, and to examine changes in equity that occur from one cycle of PISA to another. Two of the key measures of this relationship are the strength of the gradient and the slope of the gradient.

Gradient strength

The **strength** of the gradient refers to how well socioeconomic background predicts performance – or socioeconomic fairness. It is important to consider how close individual results are to the line of best fit. In other words, are the points that represent the performance and ESCS measures for all the individual students situated close to the line of best fit or are they widely scattered about it? The closer all the points are to the line of best fit, the greater the strength of the relationship. This aspect of the social gradient is represented by the percentage of the variation in performance that can be explained by the ESCS index. If the percentage is large, it indicates that performance is relatively highly determined by ESCS, whereas if it is small, it indicates that performance is not highly determined by ESCS. Across the OECD countries on average, the strength of the relationship between performance in mathematical literacy and socioeconomic background was 15%, meaning that 15% of the variation in student performance was accounted for by socioeconomic background (and 85% by other factors). In Australia the strength of the relationship was also 15%.

In the United States, Estonia, New Zealand, Singapore and Australia, the level of socioeconomic fairness was not different to the OECD average. Of the comparison countries, Hong Kong (China), Japan, Korea, Canada, Ireland, the United Kingdom, and Finland all had a level of socioeconomic fairness significantly higher than the OECD average, particularly Hong Kong (China), for which just 6% of variance in performance was explained by ESCS.

However, while a weak association between student socioeconomic status and performance is necessary in terms of fairness, it is also important to look at this in the context of overall performance. A country with high levels of fairness but very low performance – indicating poor performance across the board regardless of socioeconomic background – is not a desirable outcome.

Hong Kong (China), Japan and Korea were notable because they achieved both fairness and excellence, with high levels of fairness and very high levels of performance (average score of 527 points or higher) in mathematical literacy.

There are many differences in the extent to which countries are able to moderate the association between socioeconomic status and performance; however, the ideal school system is one in which there is high performance among all students, regardless of socioeconomic background. The relationship between equity and mean mathematical literacy performance for the comparison countries in PISA 2022 is shown in Figure 6.3. The horizontal axis represents the strength of the relationship between socioeconomic background and performance, used as a proxy for equity in the distribution of learning opportunities. Countries such as Hong Kong (China), Canada and the United Kingdom in which the strength of the relationship between socioeconomic background and performance was significantly lower than for the OECD on average, are plotted to the right of the line that delineates the average strength of the relationship across the OECD. Mean performance is plotted on the vertical axis, with the line at 472 representing the OECD average.

Countries whose performance places them in the top right-hand quadrant, with mathematical literacy scores **higher** than the OECD average and the strength of the relationship between socioeconomic background **lower** than that of the OECD, are classified as High Quality, High Equity. Similarly, countries to the left of the OECD average fairness line have a **higher** impact of socioeconomic background than the OECD average, and so are classified as Low Equity. Those that performed at a higher level than the OECD average are classed as High Quality and those below as Low Quality. As with all data there are confidence intervals. The markers on Figure 6.3 indicate whether the difference between the score for the country and the OECD average for equity was significant or not.

Hong Kong (China), Japan, Korea, Canada, Ireland, the United Kingdom and Finland all achieved high performance with a weaker influence of socioeconomic background than on average across the OECD countries. The strength of the relationship for Australia, and for each of the jurisdictions, was not different to the OECD average.

The Australian Capital Territory, New South Wales, Western Australia, Victoria and Queensland all performed at a level higher than the OECD average but the strength of the relationship with socioeconomic background was the same as the OECD average, making them High Quality – Average Equity. In South Australia, Tasmania and the Northern Territory, the levels of both performance and equity were the same as the OECD average.

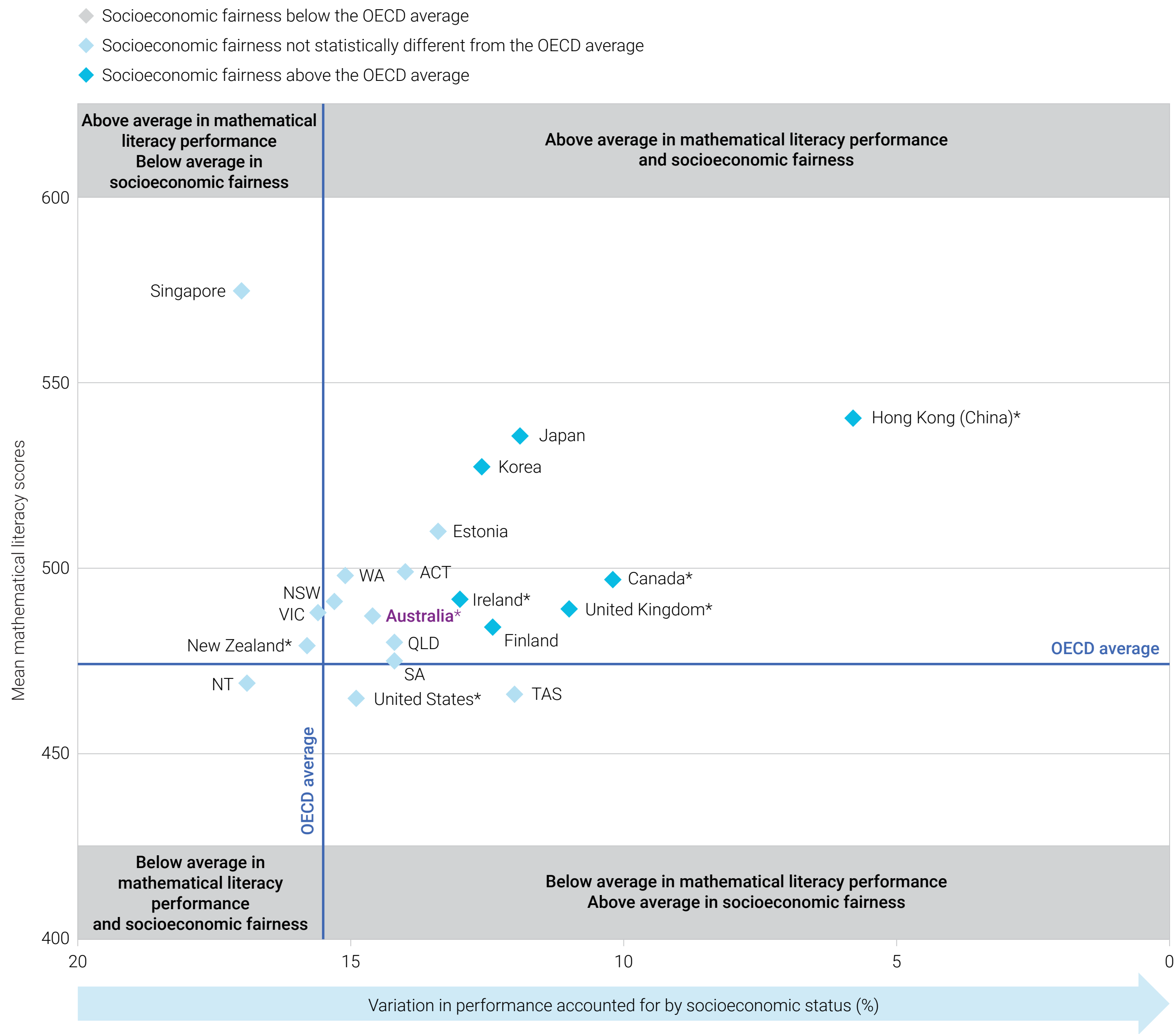


FIGURE 6.3 Strength of socioeconomic gradient and mathematical literacy performance

The **slope** of the gradient line refers to the impact of socioeconomic background on performance. A positive slope indicates the degree of the disparity in mean performance between 2 students whose socioeconomic status differs by one unit on the ESCS scale. The slope of the gradient line for Australia for mathematical literacy was 45, meaning an increase of 45 score points on the assessment for every one unit increase in ESCS. This was significantly higher than the OECD average of 39 score points. In the highest performing country Singapore, the slope was 51 points. Greater equity would thus be indicated by a flatter gradient; however, again this is with the caveat that overall performance should be considered. In 17 countries and economies, the slope of the gradient line was lower than 20, however all these were low-performing countries or economies.

To illustrate the range of results, 10% of students were randomly chosen from the Australian sample and their results plotted as points on the graph. Each point represents one student. While there is a wide range of results, there is more of a tendency for high performers to also be advantaged students. The socioeconomic gradient for Australia is superimposed on this scatter plot.[2]

2 In previous national reports, the socioeconomic gradient for the OECD was also included. In this cycle, the OECD has not provided the information necessary to reproduce this.

Care should be taken in interpreting the association between performance and socioeconomic background, however, especially when it is expressed as a single line as in Figure 6.4. The line represents an average indication of the association between performance and socioeconomic background. If all students were situated on the line, it would mean that mathematical literacy performance could be predicted accurately simply by knowing a student's socioeconomic background. This, however, is not the case, as there were a range of scores that do not fall on the line, meaning that many students scored higher or lower than expected based on their socioeconomic background.

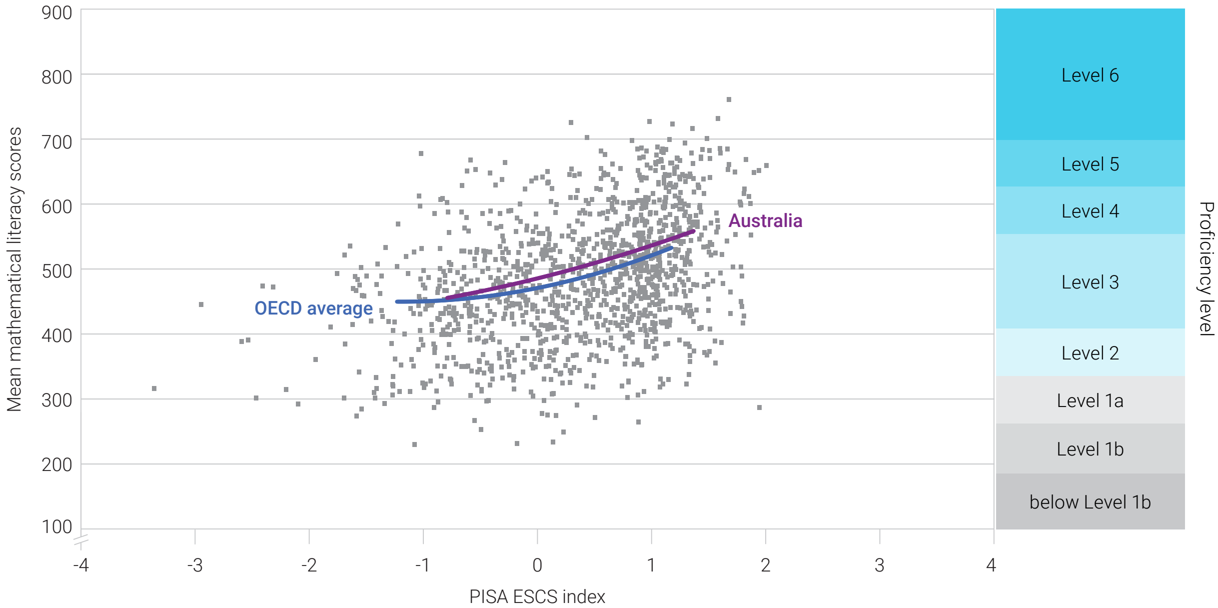


FIGURE 6.4 Relationship between students' socioeconomic status and performance for Australia and the OECD average

Figure 6.5 presents the socioeconomic gradients for the Australian states and territories. There were small differences between the slopes, indicating that the relationship between socioeconomic status and mathematical literacy performance was similar in each jurisdiction. At the highest levels of ESCS, the scores for the Australian Capital Territory, New South Wales, Victoria and Western Australia were almost the same.

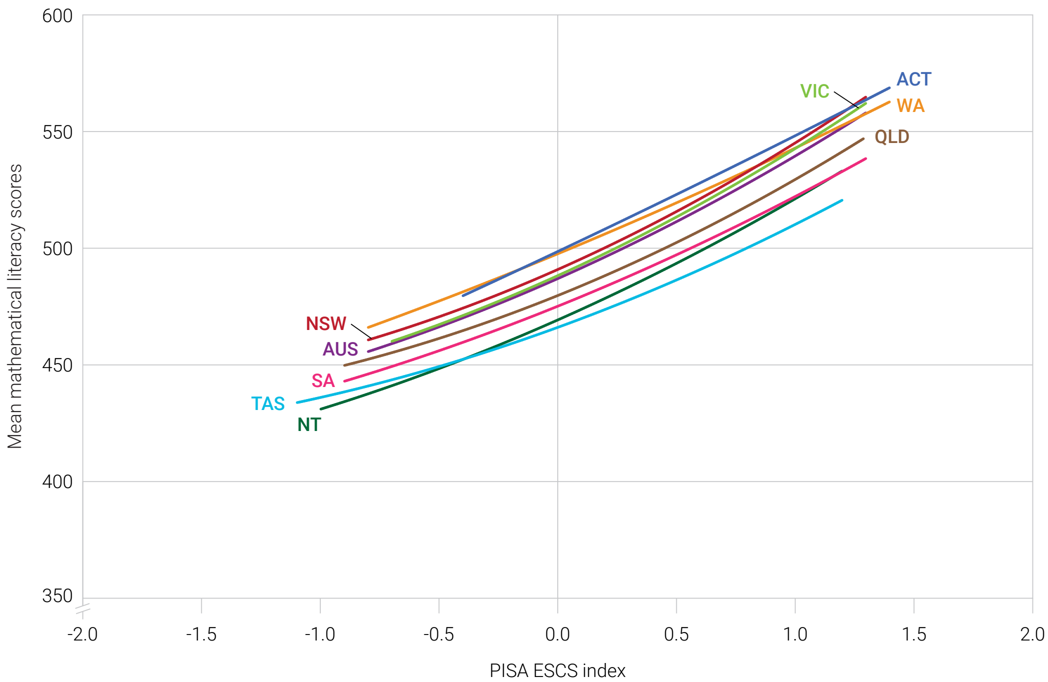


FIGURE 6.5 Socioeconomic gradients for Australia and the states and territories

The slope and the strength of the gradient measure different aspects of the relationship between socioeconomic background and performance. If the slope of the gradient is steep and the strength of the relationship between socioeconomic background and performance is strong, the challenges for systems are the greatest. That is, students in these systems are more likely to perform at a level determined by their socioeconomic background and there is a greater performance differential between students from the most advantaged and least advantaged backgrounds.

A different way to measure socioeconomic equity is to relate performance gaps to differences in socioeconomic status between the most and least advantaged students within a country. This metric is shown, instead, by the mean performance of students belonging to the top and bottom quarters of socioeconomic status in a country, as shown in Figure 6.6.

Advantaged and disadvantaged schools are defined in terms of the socioeconomic profile of schools. All schools in each PISA-participating education system were ranked according to their average PISA index of ESCS and then divided into 4 groups with approximately an equal number of students (quarters). Schools in the bottom quarter are referred to as ‘socioeconomically disadvantaged schools’; and schools in the top quarter are referred to as ‘socioeconomically advantaged schools’.

On average across the OECD countries, advantaged students (those in the highest quartile of the distribution in the ESCS index) scored 93 points more in mathematics than disadvantaged students (those in the bottom quartile). Across all participating PISA countries and economies, the gap between these 2 groups of students was 90 score points or more in 26 countries or economies while the gap was 50 points or less in 12 countries or economies. Of the comparison countries, the gap was widest in Singapore (112 points). This gap was also greater than in Australia (101 points), New Zealand (102 points), and the United States (102 points). It was lowest in Hong Kong (China) (65 points), Canada (77 points) and Ireland (74 points).

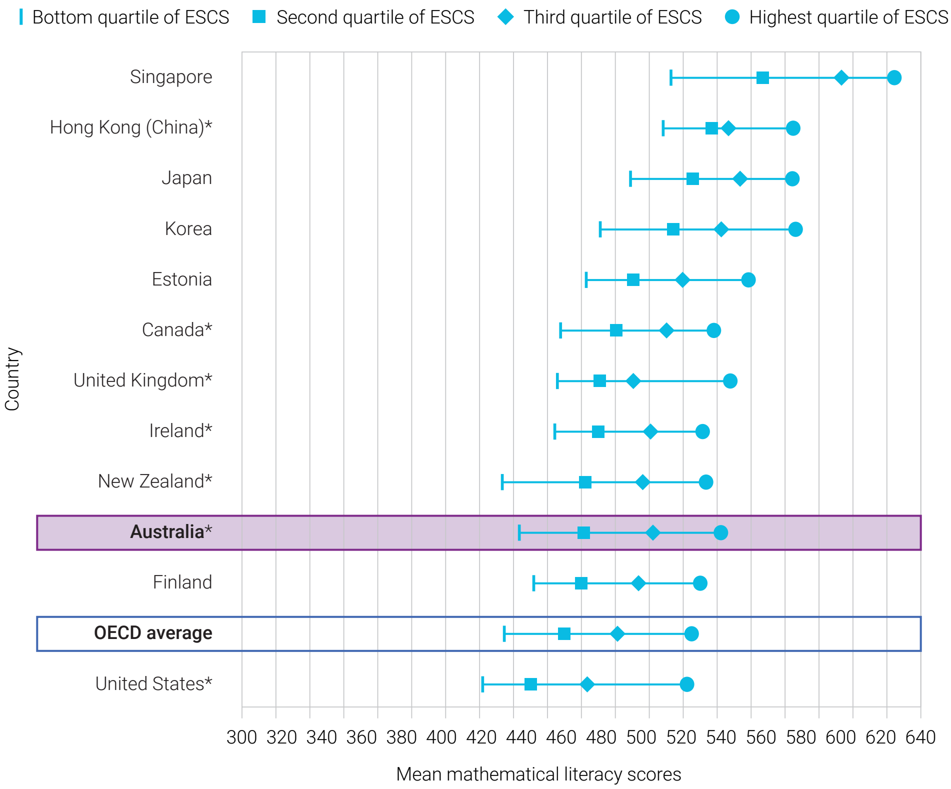


FIGURE 6.6 Mean mathematical literacy performance for selected countries, by socioeconomic quartiles

The same information is provided for the Australian states and territories in Figure 6.7, with Table 6.2 providing the background data for the figure. ESCS quartiles are defined nationally so that 25% per cent of the Australian population is in each of the 4 quartiles. The greatest disparity in scores between advantaged and disadvantaged students was in New South Wales, with a gap of 105 points.

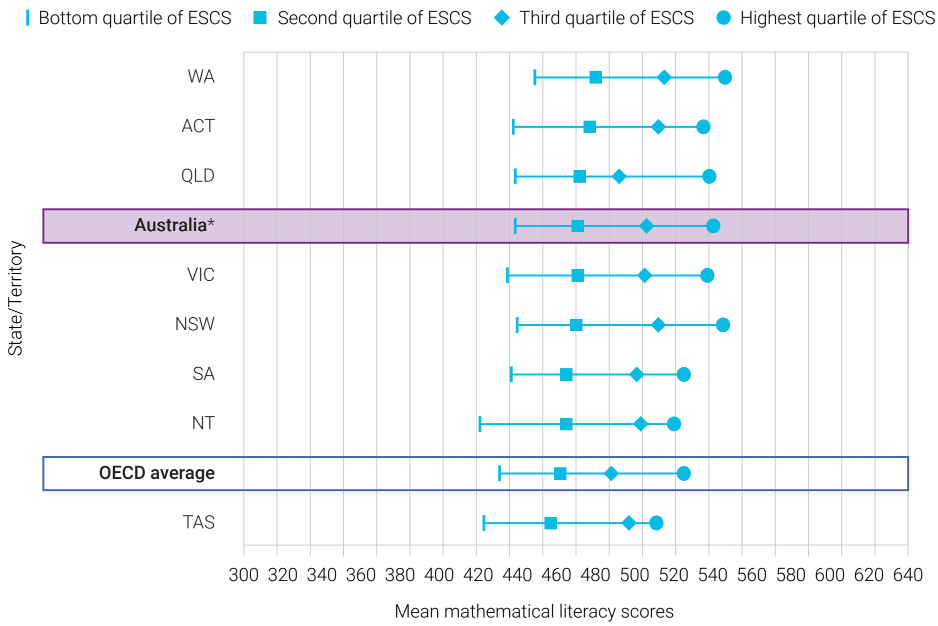


FIGURE 6.7 Mean mathematical literacy performance by socioeconomic quartiles for states and territories

TABLE 6.2 Socioeconomic relationships for the Australian states and territories

				Strength of the relationship between student performance and the ESCS	Slope of the socioeconomic gradient	Length of the projection of the gradient line	
State/Territory	Adjusted mean score	SE	Average ESCS	Percentage of explained variance in student performance	Score point difference associated with one unit increase in the ESCS	10th percentile of the ESCS index	90th percentile of the ESCS index
ACT	470	4.4	0.68	14.0	48	-0.38	1.43
NSW	474	3.5	0.44	15.3	45	-0.74	1.30
VIC	469	3.2	0.41	15.6	46	-0.78	1.33
QLD	469	2.8	0.40	14.2	41	-0.78	1.35
SA	467	2.9	0.29	14.2	41	-0.85	1.29
WA	482	3.5	0.26	15.1	42	-0.88	1.26
TAS	461	4.1	0.19	12.0	37	-1.07	1.23
NT	462	7.0	0.15	16.9	45	-1.01	1.11

As was seen in Figure 6.2, the average ESCS varied substantially across each jurisdiction, and as shown in Table 6.2, once ESCS is taken into account, there were few significant differences in performance between many of the jurisdictions. (The adjusted mean score is the expected mean performance if all students had the same socioeconomic background.) Figure 6.8 shows the percentage of advantaged and disadvantaged students in each jurisdiction.

While ESCS groups were equal in size at the national level (25% of the population), they varied in size across the states and territories. Schools in Tasmania and the Northern Territory had the highest proportions of disadvantaged students (34%), followed fairly closely by Queensland and South Australia (30%). In comparison, the student population in schools in the Australian Capital Territory was skewed in the opposite direction, with 13% of students from a disadvantaged background and 38% of students from an advantaged background.

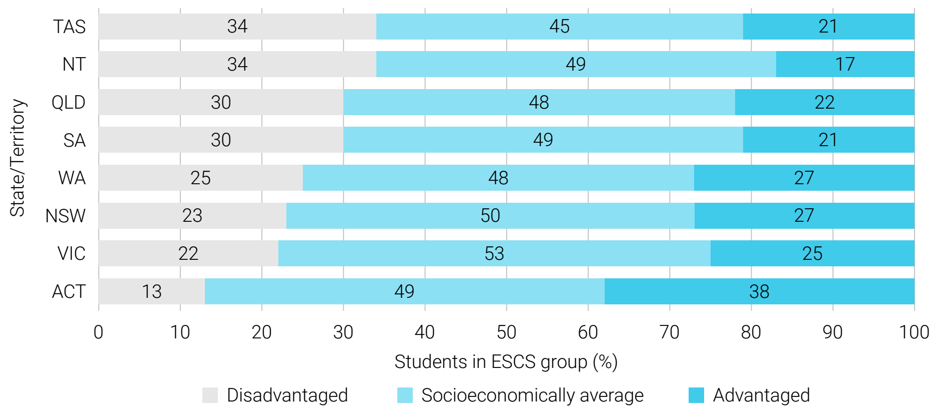


FIGURE 6.8 Proportion of students in each ESCS group by state and territory

As shown in Chapter 3, there was also a substantial difference in scores between sectors when adjusted for ESCS. Figure 6.9 shows the percentage of advantaged and disadvantaged students in each school sector. This figure shows that a third of the students in government schools were disadvantaged compared to 18% and 12% in Catholic and independent schools, respectively. On the other side of the scale, 40% of students in independent schools were advantaged compared to 18% in government schools.

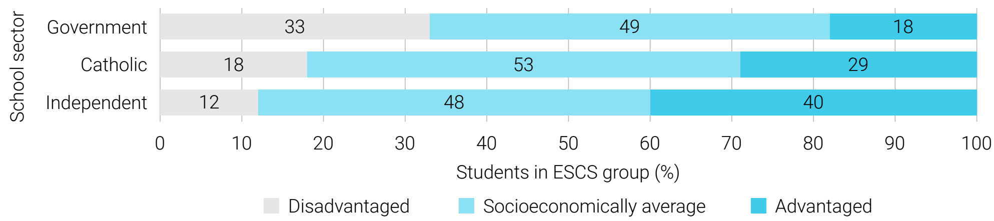


FIGURE 6.9 Proportion of students in each ESCS group by school sector

6.4 Low performers and socioeconomic background

Figure 6.10 shows that 47% per cent of socioeconomically disadvantaged students and 14% of advantaged students scored below proficiency Level 2 (low performers) on average across the OECD countries. As a contrast, in Singapore, 19% of disadvantaged students fell below the basic proficiency level, compared to just 2% of advantaged students. In Australia, 43% of disadvantaged students and 12% of advantaged students did not attain Level 2. According to OECD calculations, socioeconomically disadvantaged students were 7 times more likely than advantaged students to score below Level 2 in mathematics across the OECD countries. In Australia, on average, disadvantaged students were 6 times more likely than advantaged students to be low performers.

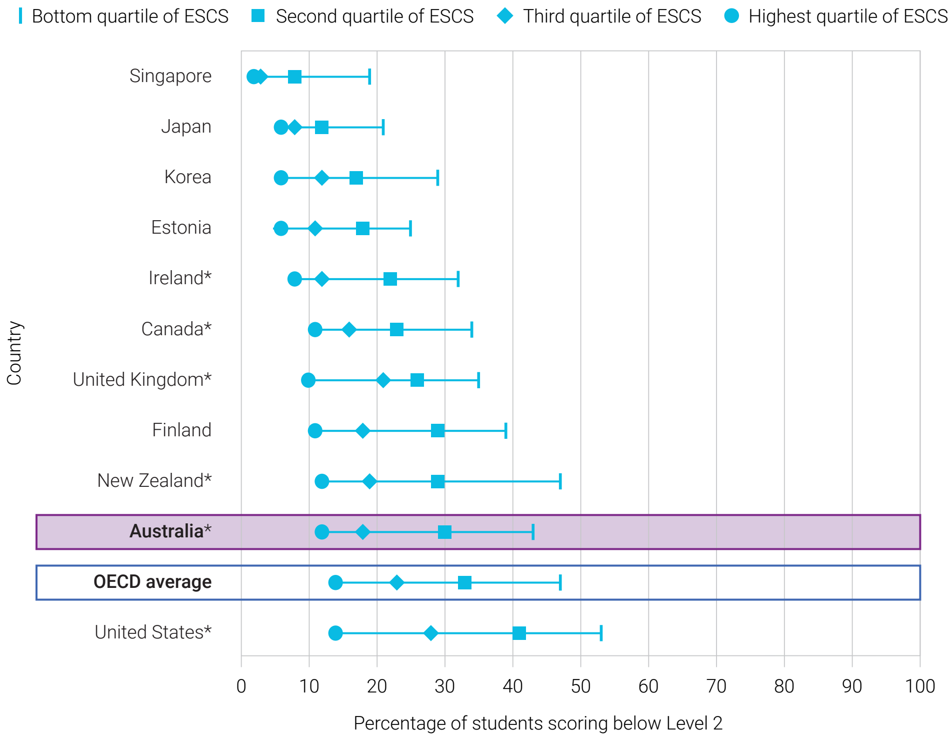


FIGURE 6.10 Low performers in mathematical literacy in comparison countries, by socioeconomic status

Figure 6.11 shows the proportion of low performers in mathematical literacy by socioeconomic status across the Australian jurisdictions. In the highest performing state or territory, the Australian Capital Territory, 41% of its disadvantaged students failed to achieve proficiency Level 2. In the Northern Territory, 51% of disadvantaged students failed to achieve this level. In the Australian Capital Territory and Western Australia, 10% of advantaged students did not achieve proficiency Level 2, compared to 21% of advantaged students in Tasmania.

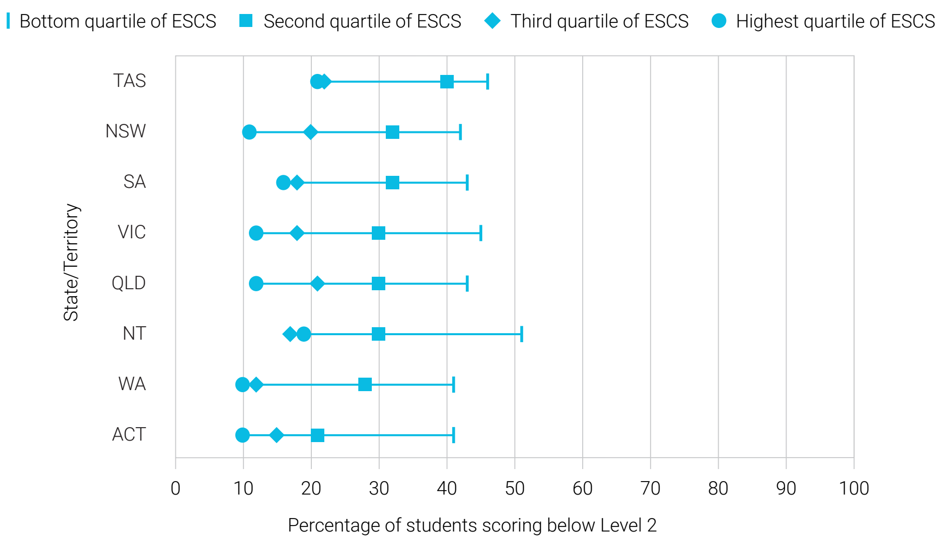


FIGURE 6.11 Low performers in mathematical literacy, by socioeconomic status, by state and territory

6.5 Disadvantaged students who are academically resilient

There are exceptions to the general trend shown across OECD countries of the positive association between socioeconomic status and performance. A proportion of students overcame their socioeconomically disadvantaged background and went on to sustain high academic performance. These students have been labelled by the OECD as 'resilient students'. Academic resilience reflects the extent to which performance is associated with socioeconomic disadvantage. The weaker the association, the larger the proportion of disadvantaged students who end up performing in the top quartile of mathematical literacy proficiency.

While all students face difficulties of one sort or another, the previous section of this chapter showed that the most disadvantaged students are much more likely to be low performers at school. According to PISA, a student can be classed as academically resilient if they score in the bottom quartile of the PISA ESCS index but perform in the highest quartile of achievement in their country.

Figure 6.12 shows that on average across the OECD countries and in Australia, about 10% of disadvantaged students were academically resilient. This proportion varied widely between countries, even among the subset of countries for which comparisons were made. In Hong Kong (China), almost 17% of students were academically resilient, while in the highest performing country, Singapore, around 10% of students could be classified in this way. Academic resilience reflects the extent to which performance is associated with socioeconomic disadvantage. The weaker the association, the larger the proportion of disadvantaged students who end up performing in the top quartile of mathematical proficiency.

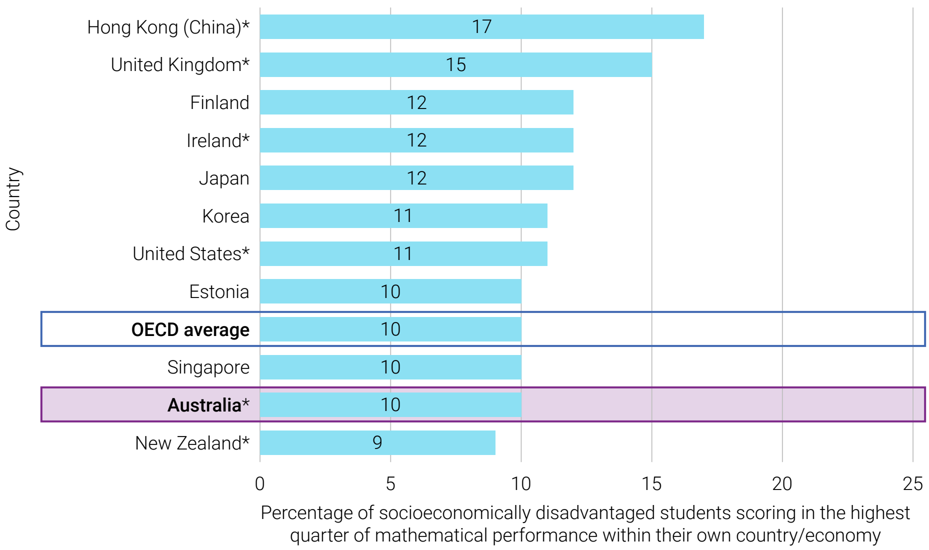


FIGURE 6.12 Academically resilient students in mathematical literacy performance

References

Australian Bureau of Statistics. (2011). *Australian statistical geography standard (ASGS) remoteness structure*. https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026

Australian Bureau of Statistics. (2021). *Socio-economic indexes for areas (SEIFA). Australia*. https://www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release

Australian Curriculum, Assessment and Reporting Authority. (2020). *Measurement framework for schooling in Australia*. Education Council and ACARA. https://acara.edu.au/reporting/measurement-framework-for-schooling-in-australia

Avvisati, F. (2021). *How much do 15-year-olds learn over one year of schooling?* (PISA in Focus. No. 115). OECD Publishing. https://doi.org/10.1787/22260919

Avvisati, F, & Givord, P. (2023). *How much do 15-year-olds learn over one year of schooling? An international comparison based on PISA*. (OECD Education Working Paper No. 257). Organisation for Economic Co-operation and Development. https://one.oecd.org/document/EDU/WKP(2021)14/En/pdf

Education Council. (2019). *Alice Springs (Mparntwe) education declaration*. Australian Government Department of Education. https://www.education.gov.au/alice-springs-mparntwe-education-declaration/resources/alice-springs-mparntwe-education-declaration

Organisation for Economic Co-operation and Development. (2017). *PISA 2015 technical report*. https://www.oecd.org/pisa/data/2015-technical-report/PISA2015_TechRep_Final.pdf

Organisation for Economic Co-operation and Development. (2018). *PISA 2015 Released field trial cognitive items. Produced for the OECD*. http://www.oecd.org/pisa/pisaproducts/PISA2015-Released-FT-Cognitive-Items.pdf

Organisation for Economic Co-operation and Development. (2019a). *PISA 2018 assessment and analytical framework*. OECD Publishing. https://doi.org/10.1787/b25efab8-en

Organisation for Economic Co-operation and Development. (2019b). *PISA 2018 results (Volume I): What students know and can do*. OECD Publishing. https://www.oecd.org/publications/pisa-2018-results-volume-i-5f07c754-en.htm

Organisation for Economic Co-operation and Development. (2019c). *PISA 2018 Released field trial reading literacy items. Produced for the OECD*. https://www.oecd.org/pisa/test/PISA-2018-Released-New-REA-Items.pdf

Organisation for Economic Co-operation and Development. (2020). *PISA 2022 technical standards*. https://www.oecd.org/pisa/pisaproducts/PISA-2022-Technical-Standards.pdf

Organisation for Economic Co-operation and Development. (2023). *PISA 2022 assessment and analytical framework*. OECD Publishing. https://doi.org/10.1787/dfe0bf9c-en

United Nations. (2016). *Sustainable Development Goals No. 4*. https://sdgs.un.org/goals/goal4

Appendices

A Appendix A: PISA procedures

The scope and operations of PISA are provided in this account of some aspects of its procedures. A thorough account will be available in the *PISA 2022 technical report* (OECD, forthcoming).

Most of PISA's operational procedures have both international and national components; information on how the 2022 assessment was implemented internationally is given first, followed by details of its national implementation.

International PISA operations

The OECD Secretariat has overall managerial responsibility for the program, monitors its implementation on a day-to-day basis and serves as the Secretariat for the PISA Governing Board (PGB), fostering consensus building between the countries/economies involved. A group of 4 international contractors led all aspects of PISA 2022 implementation under the close guidance of the OECD Secretariat.

International consortium

The contractors were led by Educational Testing Service (ETS), based at Princeton University in the United States in cooperation with:

- cApStAn Linguistic Quality Control (Belgium)
- BranTra (Belgium)
- Westat Inc. (United States), in cooperation with the Australian Council for Educational Research (ACER) (Australia)
- the International Association for Evaluation of Educational Achievement (IEA) (the Netherlands)
- the Research Triangle Institute (United States)
- ACT (United States)
- Cito (the Netherlands)

Collaborative development

PISA is an international assessment that has been jointly developed by participating OECD countries. Countries have been able to contribute to the survey, through their national project managers and national advisory committees, by providing sample assessment material to the consortium and offering comment on many aspects of the project to the international bodies described below, the PGB and Functional Expert Groups.

Each OECD country participating in PISA has one member, usually from an education ministry, as a representative on the PGB. This group sets the policy objectives of the assessment and the policy priorities for the implementation of the assessment. This includes endorsing the assessment frameworks, approving the bank of items developed for the assessment, and agreeing to the plans for international reporting of results. The PGB also considers advice and endorses recommendations from the PISA Technical Advisory Group (TAG) on technical aspects of design, for example, the balance of multiple-choice and open-ended items, the number of assessment forms or the design for rotation of material in the assessment booklets.

For PISA 2022, the subject matter expert groups (SMEGs) consisted of 6 subject matter and technical experts from participating countries for each of the assessment domains – mathematical, scientific and reading literacy. There was also an expert group for financial literacy and creative thinking1 and the questionnaire expert group. These groups, together with the TAG, linked the policy objectives specified by the PGB with expertise in the field of international comparative assessment to provide input into the frameworks for the assessment and to monitor the quality of assessment items prepared. A SMEG typically contains between 8 and 10 members. The members provide a cross-section of the world's most renowned experts in each area. A smaller group of consultants assisted with the PISA 2022 questionnaire development. All of these groups provide advice and recommendations to the consortium and, through the international consortium, to the PGB.

Operational stages

Very high standards are set for sampling, assessment materials and operational procedures in PISA to ensure that the data are comparable across countries. Many of the operational steps are briefly referred to here. More detail is provided on how the various procedures worked in Australia further on in this appendix.

Framework and item review

The development of the assessment frameworks has been a continuous effort since the inception of PISA. In PISA 2022, the framework for the assessment of mathematical literacy as a major domain was revised to reflect the current thinking about assessment. This framework was circulated for comment, with the aim of reaching consensus on the nature and detail of the assessment domains. Similarly, drafts of assessment items were sent to each country for review by local experts. Countries could provide feedback and suggestions on the items, which were then revised and subjected to a field trial. The scientific and reading literacy frameworks developed in 2015 and 2018, respectively, remained essentially the same for PISA 2022.

Field trial

The eighth cycle of PISA should have taken place in 2021, but was postponed to 2022 due to COVID-19. This cycle was renamed to PISA 2022, as such the field trial in schools took place in Australia from 24 May to 18 June 2021. Due to ongoing COVID-19 lockdowns the field trial was extended until Friday 30 July.

The field trial played an integral part in the preparations for the PISA main study. It allowed the assessment materials to be refined, new items for the major assessment domain (mathematical literacy) to be trialed, and all operational procedures rehearsed. The field trial also tested the functionality of the assessment delivery software.

Internationally, thousands of students took part in the field trial, including approximately 2,000 Australian students (approximately 75 students per school).

All sampled students were randomly assigned to respond to computer-based assessment (CBA) items in one of 3 groups: CBA (trend items only), CBA (trend/new mathematics items), and CBA (new mathematics items).

In addition, the principal or a nominated designate at participating schools completed a web-based School Questionnaire. Principals completed the School Questionnaire during the field trial period. In each participating school a sample of teachers participated in a web-based Teacher Questionnaire.

Main study

For most countries, the PISA main study was administered between March and August 2022. For many Northern Hemisphere countries, where the academic year begins in September and ends in June, the assessment was conducted between March and May. For countries in the Southern Hemisphere, where the academic year typically extends from early February until December, the assessment was conducted between the end of July and the start of September. The international requirement was that the assessment had to be conducted within an 8-week window, which is referred to as the testing period.

Within the majority of countries, between 4,000 and 9,000 students were tested. Some countries oversampled their age-eligible 15-year-olds. (For more detail refer to the *PISA 2022 technical report* (OECD, forthcoming).

Details of Australia's field trial and main study are provided later in this appendix. The remainder of this section describes some of the more technical features of PISA's assessment design.

Design aspects

Computer forms

In PISA 2022, forms were prepared for the CBA. Both closed and open-ended assessment items were used. Closed items have one correct answer and open-ended-items require students to construct their own response. Open-ended items allow a wider range of skills to be assessed.

Each PISA assessment task provides some stimulus material followed by a series of questions (items) that relate to the stimulus. The stimulus and its items are called a unit. Each unit is allocated to a test cluster. Each cluster typically contains about 4 units and is designed to take 30 minutes to complete.

In PISA 2022, the CBA was designed as a 2-hour test with mathematics as the major domain. Ninety-four per cent of students received a test form that included 60 minutes of mathematical literacy, and 60 minutes of one of the 3 domains (scientific literacy, reading literacy, creative thinking). The remaining 6% of students received a test form that included the assessment of 2 minor domains (any 2 of either scientific literacy, reading literacy and creative thinking).

The mathematical, scientific, and reading literacy, clusters were organised into 36 different computer forms. Each computer form was completed by a sufficient number of students for appropriate estimates to be made of the performance levels on all items by students in each country and in relevant sub-groups within a country (such as females and males, and students from different social and economic backgrounds).

The main survey assessment design included multi-stage adaptive testing for mathematics based on approximately 15 x 30-minute clusters of test material. The mathematics assessment was composed of a core stage followed by stage 1 and stage 2. At the beginning of stages 1 and 2, students were assigned blocks of items of either greater or lesser difficulty, depending on their performance in earlier stages (see the Reader's guide for more detailed information on the multi-stage adaptive approach). A multi-stage adaptive testing approach was also taken for reading based on approximately 12 x 30-minute clusters of material. For both mathematical literacy and reading literacy, material was organised into blocks rather than clusters. Science comprised 6 clusters of material and did not use multi-adaptive testing, while the innovative domain assessing creative thinking comprised 4 clusters of test material. Australia did not participate in the assessment of financial literacy.

Questionnaires

As well as the computer-based forms, in 2022 Australia participated in 3 contextual questionnaires. Principals each completed a School Questionnaire.

Students each completed a Student Questionnaire. The questionnaires were designed to enable achievement data to be analysed in relation to these respondents' different background characteristics, living conditions, educational programs and other factors that might an impact their performance. As well as gathering information about students and their family background, academic environments and self-regulated learning, the Student Questionnaire also included optional sections to assess students' familiarity with information technology. This optional component was placed at the end of the Student Questionnaire. There was also an opportunity for countries to include additional items of national interest.

A sample of teachers completed a Teacher Questionnaire administered as an integrated questionnaire that used routing to direct respondents to either a mathematics or a general teacher module. After completing the initial module, all respondents then received a creative thinking module.

Quality monitoring

Quality monitoring is an integral part of PISA. Checking and verification procedures within all components and stages of the assessment have ensured that PISA produces data of a very high standard. The quality monitoring procedures have been reviewed and endorsed by the PGB.

The international contractors, set up by ETS, managed the implementation of PISA internationally and gave advice to countries as requested, monitored countries' progress continuously and proactively provided assistance with procedures.

Translation procedures

Experts in translation procedures ensured that the materials to be translated were as equivalent in meaning and level of complexity as possible. Translating the CBA forms, questionnaires and manuals involved extensive and thorough processes. Materials from the international contractors were provided to countries in both English and French. In countries where the language is neither English nor French, the countries were required to translate the assessment materials separately from both versions. A reconciliation of these independent translations then took place at the country level, and the resulting translation was then reviewed by the team of tri-lingual verifiers working for the international contractors.

Sampling procedures

Ensuring the quality of sampling in PISA was the responsibility of Westat Inc who appointed a senior staff member to be the international sampling referee for the project. A team of sampling experts at Westat Inc employed rigorous procedures for the random selection of schools and students to represent each country. Countries were assisted in preparing sampling forms, which included the school sampling frame (that is, a list of all schools containing students in the PISA target population). Countries had to use the ACER Maple sampling software to select the student sample within schools. Stringent criteria for adequate response rates were specified at the school and student level. Participating countries agreed to meet the international criteria for response rates; otherwise, their data could not be included fully in reports. The sampling procedures helped to ensure that the data would be of a high standard to make valid comparisons of results between countries.

Test administration procedures

Criteria for Test Administrators were set internationally. Test Administrators could not be the mathematics, science or reading instructor of any student in any session they would be administering. In a very small number of remote schools, ACER sought assistance from schools to administer the assessment. The school-based Test Administrator was a senior member of staff. These criteria were set partly to minimise the burden on schools but mostly to establish PISA as a valid and unbiased assessment with uniformly administered test sessions. Standardised administration procedures were developed by the consortium and provided in a Test Administrator's manual. Comprehensive training sessions were held covering administration procedures, both for the field trial and again for the main survey. Training sessions were held firstly for a country's National Project Managers (NPMs) or their designated staff, who were then responsible for training the Test Administrators in their country. These methods were established to achieve standardised administration of the PISA tests. Completion of the Test Administrator training was a mandatory prerequisite for all Test Administrators before they could go into a school to administer PISA.

Monitoring of procedures

During the main study, PISA Quality Monitors (PQMs) were nominated by national project teams but were employed by and worked on behalf of the international consortium. They were not allowed to be connected in any way to a national centre, the national centre being the organisation conducting PISA in their country. PQMs observed testing sessions to ensure that testing procedures were implemented according to the specifications in the Test Administrator's manual. They were also trained in PISA procedures by the international contractors and then made unannounced visits to a subset of schools during the assessment sessions.

Coding of responses to open-ended items

Approximately 33% of items in total across reading, mathematical and scientific literacy items were open-ended constructed response items and required coding.

Coding was undertaken using open-ended coding system (OECS) software. Standardised coding guides were developed by consortium staff and reviewed by PISA national project staff before they were finalised. These guides required translation in countries where languages other than English or French were spoken. The same training methods used to train Test Administrators were used to of train coders. NPMs or their designated staff first attended international training sessions and then trained the coders in their country.

The OECS is a computer tool that codes the CBA responses and was used to code all All PISA 2022 CBA open-ended responses. The OECS organises all anchor, multiple and single coding. Some responses were coded by one person only – while other responses were coded by more than one person (multiple-coded). The anchor responses (in English) assess reliability across countries. The coder accesses the individual response and allocates an acceptable code for each question. The OECS system automatically saves the selected code as they are entered.

For the main study, the OECS coding design for each country met the intended sample size. In Australia, coding was undertaken by 4 mathematics coders, 6 science, and 7 reading and creative thinking coders who coded their subject area's assigned open-ended responses. The OECS tool makes the coding process efficient so the same responses automatically receive the appropriate code to minimise the coding load.

Three table leaders (one for each domain) fielded queries, reviewed issues from coders, documented difficulties to be resolved by the international contractors, and monitored the coding process generally.

The OECS software generated reliability reports to ensure that coders applied the criteria consistently and to quantify any variation between coders. This monitoring was required to correct systematic errors. Reliability reports identified the proportion of agreement between coders, the distribution of codes assigned to each item and the identification of items that may have been deferred, un-coded or had missing codes. Goal of coding was to reach an inter-rater reliability of 92% agreement across all items, with at least 85% agreement for each item.

Data entry procedures

Another step that ensured the high quality of PISA data was countries using specifically developed software to enter and validate the data. All data files from the complete Australian PISA datasets were contained in the Data Management Expert (DME) Database. It was integral that data was submitted to the international contractors in a standard format to combine into a single international data set. Many data-cleaning integration and data verification procedures were carried out before the data were considered ready for analysis.

National PISA operations

Project management

Each country appointed a NPM to ensure that the survey was implemented according to the international timeline and that all duties were carried out according to the specified procedures and standards. NPMs play a critical role in evaluating assessment results in a national context and a large role in ensuring the operational success of the assessment in their country.

Countries are encouraged by the OECD to set up one or more committees to monitor the progress of the project, assist with reviewing materials, and to provide a forum for discussing issues of implementation at the national level. In Australia, the International Assessments Joint National Advisory Committee (IAJNAC) guides all aspects related to the implementation of PISA. The IAJNAC's members are from many areas of Australian education system and include subject-matter experts to advise the NPM and the national PGB representative on the content and methods of the assessment. The education department of each jurisdiction and the Catholic and independent schools' sectors in Australia have representatives on the IAJNAC.

The Committee's involvement in policy decisions that relate to international and national options, their comments on frameworks, and input into assessment materials and dissemination of results, ensure that any issues of concern in Australia are not overlooked by the consortium.

Item review

Curriculum experts reviewed the assessment items and questionnaire items for their relevance and appropriateness for Australian 15-year-old students.

Field trial

In Australia, the field trial took place in 2021 between 24 May and 18 June. A summary of its scope is presented here. All students completed the CBA via their school desktop computers, class set of laptops or attended schools with bring-your-own device (BYOD) policies.

Schools

The selection of schools for the field trial was much less rigorous than the selection of schools for the main survey. Schools were chosen by convenience sampling and represented schools from a range of communities and socioeconomic areas. In all, 41 schools from New South Wales, Queensland and Victoria were sampled to participate in the field trial. All schools in New South Wales and Queensland completed their testing. In Victoria, 3 schools did not complete their testing and 6 schools became non-participating schools due to Covid-19 lockdown restrictions.

Students

The target population for the field trial was students born between 1 March 2005 and 28 February 2006. At each sampled school, the nominated school coordinator provided a list of all age-eligible students, regardless of year level. To comply with international sampling procedures, ACER staff randomly sampled 75 students from each participating school.

For the PISA 2022 field trial assessment, of the approximate 2,814 age-eligible students sampled, 1,845 students participated.

The total testing time for assessing the domains was 2 hours. The test forms comprised 4 x 30-minute clusters, covering one or more domains. In all, there were 69 different computer forms across 2 groups:

- 31% of students had a test form assembled from 2 of the 3 core domains
- 31% of students had a test form comprised of trend and new mathematical literacy clusters
- 38% of students had a test form comprised of new mathematical literacy and new creative thinking clusters.

Adaptations to manuals, assessment forms and questionnaires

All countries who participated in PISA were required to undertake an adaptation, translation (for countries that tested in a language other than English and French) and verification process of all documentation used in the conduct of PISA. Australia only needed minimal adaptations to the administrative manuals, coding guides, assessment forms and questionnaires. Amendments to assessment forms, such as vocabulary, were submitted to and approved by the international contractors.

Test administration

Assessment sessions took place in the morning. Each student completed an assessment form (consisting of multiple-choice and open-ended items) plus a background contextual questionnaire.

Students had to first complete a 20-minute tutorial to become familiar with the testing environment. They were then allocated 2 hours plus administration time. The questionnaire required an additional 35 minutes.

ACER employed and trained 16 experienced teachers to administer the field trial sessions. These Test Administrators administered the CBA in their allocated schools. Given the number of sampled students (75 students) per school, 3 assessment sessions were scheduled per school. Test Administrators completed compulsory online modules and had to satisfactorily complete each before attempting the next. Test Administrators also attended a webinar session. Multiple sessions were held to allow for Test Administrators to 'attend' more than one if they wished.

Training provided Test Administrators with a thorough overview of all administrative aspects and forms associated with the administration of PISA and a strong working knowledge of how to administer the CBA in a school environment.

Coding

Almost half of the field trial items were open-ended and required coders to code the students' responses to the mathematical literacy items. Ten experienced coders were trained in coding procedures using internationally prepared coding guides adapted for national purposes. Training was conducted remotely during July 2021 and coders were required to code computer-based forms using the OECS software specially developed by the international contractors. The coding process also included multiple coding as specified internationally.

Data entry

When the open-ended responses were coded using the OECS software, the files were imported into DME software. Session report forms that were completed by each Test Administrator for each assessment session were entered into the DME software.

Main study

Assessment dates in Australia

In Australia, the main study assessment took place from late July to early September in 2022.

School and students

Full details of the Australian school and student samples are presented in Appendix B. In PISA 2022, Australia did not satisfy the international response rate criteria fully. Australia achieved a weighted school response rate of 95.63% of the selected schools; however, Australia's student response rate of 76.05% did not meet the OECD PISA Technical Standard of 80% across responding schools.

If school or student participation rates fall short of an OECD Technical Standard, countries must submit Non-Response Bias Analyses (NRBA), which are reviewed by the Adjudication Group. Full details of the Australian student response rate are provided in Chapter 1 and in Appendix B.

Obtaining the school sample

PISA is one of a suite of assessments in Australia's National Assessment Program (NAP). Liaison Officers were appointed from each jurisdiction's education department, Catholic education offices and associations of independent schools to communicate to schools that they had been sampled to participate in PISA. Schools were sent an information package in late October 2020. Response rates and the sampling of students are discussed in Appendix B.

Contact persons in schools

Each participating school nominated an experienced staff member to become the PISA school coordinator and act as ACER's main administrative contact. The coordinator set the date for the session, organised a testing room, sent lists of age-eligible students to the national centre, notified sampled students of their participation obligation and liaised with their allocated Test Administrator.

Each school also nominated a staff member from their IT department to become the PISA IT coordinator. ACER liaised with the IT coordinator to assess the school's computer resources, and ran compatibility testing of the school's computers with the PISA assessment delivery software using a systems diagnostic tool. The IT coordinator also provided IT support to the Test Administrator as required.

National options

Countries were permitted to introduce additional aspects of national relevance into PISA, subject to approval from the international contractors. Australia chose to include optional material to the Student Questionnaire, as described in the following paragraphs.

Additional questionnaire items

Information was sought on students' indigenous background. The questions on language spoken at home and on parents' and respondent's countries of birth were adapted in the Australian questionnaire. It was felt, for example, that responses to the international format question of 'Were you born in Australia?' (Yes/No) would not accurately indicate ethnic background.

Test administrators

Approximately 100 casual Test Administrators external to the schools were employed by ACER to administer the main study assessment sessions.4 Many Test Administrators were experienced in previous PISA cycles. All Test Administrators were highly experienced teachers, many of whom were also experienced in conducting test sessions according to standardised procedures.

The Test Administrators undertook compulsory training which included audible power point presentations and a webinar using a Q&A format with ACER staff. The webinar provided the Test Administrators with an opportunity to ask questions or clarify any part of the test administration process, and pass on 'handy hints', based on prior experience.

The training modules were made available to the Test Administrators in mid-June and remained open until the end of the testing period in early September. The extended access to the modules allowed Test Administrators to re-watch the modules leading up to and during the testing period.

Scheduling of sessions: Logistics

The number of assessment sessions scheduled in one school depended on how many school computers were available to run the PISA software, the number of computers in an area, for example, a computer laboratory, and the number of sampled students. Altogether, around 830 regular and 130 follow-up sessions took place. In around 20% of schools, more than one regular assessment session was required to be scheduled because of the number of available computers and to accommodate the larger number of sampled students. A very small number of schools had some variations to the assessment sessions, which included either 2 or 3 Test Administrators administering sessions at the same time in one school.

Assessment sessions were mostly carried out in classrooms, although the school library, the school hall, or areas such as common or meeting rooms or the computer laboratory were also used as an assessment venue.

In about 5% of schools, the assessment session had to be rescheduled because of technical issues (no administrative rights to run the software, USB drive not loading and a no-USB drive policy), Test Administrators falling ill or a clash of dates between the PISA assessment date and a prior scheduled school commitment.

In the majority of schools, the administration was carried out in computer labs or in classrooms (with students using their BYOD laptops).

In all schools, PISA testing was completed in one day, the cognitive assessment and the Student Questionnaire were administered in the morning. The amount of time required to conduct the assessment was 3 hours and 45 minutes, which included breaks. Following the PISA testing each Test Administrator completed details about the assessment sessions (session report form).

Coding processes

Six mathematics coders, 4 science coders and 7 reading and creative thinking coders were employed for the whole duration of the coding. All coders were experienced secondary teachers but were employed as teachers. The coders were trained in the use of the coding guide and undertook an initial training session in mid-September 2022.

Following the procedures specified by the international contractors, coding was done by cluster. Further training and practice on coding the clusters new to 2022 was carried out. Within clusters, coding was done by item. The OECS software that handled the open-ended responses randomly allocated items to the coders. However, a proportion of responses were machine coded.

Three table leaders (one for each literacy assessment domain) were used to field queries from individual coders, to review with individual coders any issues, to document difficulties that needed resolution from the international contractors and to monitor the coding process generally.

Reliability analyses were carried out to ensure that coders applied the criteria consistently and quantified any variations between coders. Monitoring the consistency in applying the coding criteria was required daily so that systematic errors could be corrected.

The coding across all literacy assessment domains was completed in approximately 6 weeks.

Data entry

After the assessment sessions, the Test Administrators copied the student data files from each student USB onto a master USB (one per school). The master USB was returned with the administration forms to ACER for processing. The student data was extracted from the master USB drives and imported into the DME software.

The administration forms, which listed the sampled students, provided data about student participation (attendance, exclusion category if applicable) were entered into the DME and ACER Maple software packages.

In addition, occupational coding of students' expected occupation at age 30 years, and coding of mother's and father's occupations was undertaken. Occupational data in written format was exported from the DME and coding was completed using the 2008 International Standard Classification of Occupations (ISCO-08) as stipulated by the international contractors. Coding was to be reported to the 4-digit level where possible with only minimal use 1 or 2-digit level was permitted. ISCO-08 code responses were imported into the DME.

Preliminary data checks on the sampling data began while the data entry of administration forms was still taking place. The sampling data was submitted to the international contractors 6 weeks after the end of the testing period. Further data checks, verification and cleaning of the data continued to be carried out up until the Australian datasets were submitted to the international contractors in November 2022.

Both the School Questionnaire and Teacher Questionnaire were administered as a web-based questionnaire. Completed questionnaire data was later imported into the DME software and checked, cleanerd and verified. This data was submitted as part of the Australian datasets to the international contractors accompanying the sampling data, cognitive data and Student Questionnaire data in November 2022.

Ensuring quality in national operations

Monitoring of operations and procedures was built into every stage of PISA in Australia, and encompassed the following tasks:

- selection of the school and student samples
- initiating and maintaining contact with schools
- preparation of materials
- printing, packing, mailing, receiving and tallying returns
- ensuring the reliability of the open-ended responses and coding of occupations.

Other aspects of quality assurance included training and monitoring Test Administrators, coders and data entry.

PQMs, on behalf of the international contractors, visited a sample of 15 Australian schools when the testing was taking place to ensure that procedures were followed accurately, and instructions were adhered to.

B Appendix B: Australia's sampling procedures and participation rates

Appendix B focuses on the Australian sampling results from PISA 2022. Appendix B1 provides a focus on sampling from the international perspective.

Australia's sample

Sampling in PISA was carried out in 2 stages in Australia and in most countries. First, schools were selected using the latest available data in ACER's sampling frame based on a probability that was proportional to the school's enrolment of 15-year-olds. Thus, large schools had a greater chance of being selected than small schools.

Stratification of the sample ensured that the PISA sample represented the Australian population of 15-year-olds. Stratification variables used in Australia were state and territory, school sector (government, Catholic and independent), geographic location, sex of students at the school, and a socioeconomic background variable (based on SEIFA).

To define the PISA population, estimates of the number of 15-year-olds were provided by Australian state and territory education authorities or based on previous PISA data on the proportion of 15-year-old students.

As schools were sampled, 2 replacement schools were simultaneously identified in case a sampled school was unable to participate in PISA 2022. The replacement schools are the most similar to the sampled school according to statistical criteria. However, statistical similarities notwithstanding, sampling bias is still possible if the replacement schools differ from sampled schools in ways that might not be considered for sampling.

PISA falls under the international suite of assessments that comprise the NAP and it is an obligation for sampled schools to participate in PISA under the *Australian Education Act* (2013). However, schools can request an exemption for extenuating circumstances but must demonstrate those circumstances. Examples of these include being impacted by flood, bush fire, or other significant natural disaster, traumatic event, or a death in the school community. In PISA 2022, because all schools nationally were impacted by the Covid-19 pandemic, circumstances arising from the pandemic such as staff shortages, staff and student illness, were not considered a reason for a school to be granted an exemption from participating in PISA as all schools nationally had been impacted by the pandemic.

The school sample selection process was undertaken by sampling experts at Westat Inc. Internationally, the minimum required sample for each country administering PISA using the computer-based mode was 150 schools and 6,300 assessed students. In Australia, a larger sample was drawn to enable results to be reported at the jurisdictional levels and be disaggregated to give results by First Nations status, immigrant background and language spoken at home. Table B.1 provides the details of the designed Australian school sample.

TABLE B.1 Designed PISA school sample by jurisdiction and school sector

	School sector			
State/Territory	**Government**	**Catholic**	**Independent**	**Total**
ACT	28	9	14	51
NSW	113	46	30	189
VIC	75	31	27	133
QLD	84	27	27	138
SA	64	21	23	108
WA	62	22	26	110
TAS	38	12	11	61
NT	25	6	8	39
Australia	489	174	166	829

In the second stage of the selection process, students were sampled within sampled schools. Each participating school was asked to prepare a list of their age-eligible students (students born between 1 May 2006 and 30 April 2007). From this list, the student sample was drawn with equal probability. In each of the states, 26 students in each school were sampled; in the Australian Capital Territory, 36 students in each school; and in the Northern Territory, 48 students in each school were sampled. If there were fewer than the required number of students, all eligible students were selected.

Exclusion

School and student exclusions from the sample

Permission was granted from the international sampling referee to exclude a number of categories of schools from the sample. These included hospital and correctional schools, remote offshore and very remote mainland schools and schools instructing in a language other than English. Of the 892 schools sampled for the PISA 2022 main study, 35 schools were ineligible (on the basis that there were 2 or fewer age-eligible students or the school had closed) and therefore, were not included in the school sample.

Nationally, school coordinators identified 841 students who at the time of the assessment were no longer enrolled at their respective school. They also excluded 919 students. The categories for exclusion of students with special education needs were equivalent to those in the international PISA manual. Students were excluded on the basis of:

- Exclusion 1 – a functional disability: student has a moderate to severe permanent physical disability
- Exclusion 2 – a cognitive, behavioural or emotional disability: student has a mental or emotional disability and has either been tested as cognitively delayed or is considered in the professional opinion of qualified staff to be cognitively delayed
- Exclusion 3 – limited assessment language experience: student is not a native speaker of any of the languages of the assessment in the country and has limited proficiency in these languages.

Exclusions at the student level accounted for 6.9% of the designed sample. Students with exclusions were spread throughout the country.

Participation in Australia

Fifty-one schools became non-participants due to varying reasons including non-compliance, technical issues on the scheduled day of testing and extenuating circumstances at the school. In addition, data from schools with a student participation rate lower than 33% were removed from all datasets, and these schools were considered non-participants. In Australia, 38 schools had a student response rate below 33%. These 38 schools became non-participating schools. Australia's number of participating students included in the international database is 13,437. Table B.2 shows the final number of schools who participated in the PISA main study.

TABLE B.2 Achieved school sample by jurisdiction and school sector

	School sector			
State/Territory	**Government**	**Catholic**	**Independent**	**Total**
ACT	27	9	11	47
NSW	101	44	29	174
VIC	68	30	26	124
QLD	79	24	26	129
SA	58	19	22	99
WA	57	20	26	103
TAS	28	10	11	49
NT	8	4	6	18
Australia	426	160	157	743

Note: these numbers are based on unweighted data.

Of the eligible students participating in PISA, 3,624 students were absent on the day of the assessment session.

Of the total number of students sampled to participate in PISA (21,770 students), 5,384 sampled students did not participate in PISA. Non-participation was due to a variety of reasons such as students no longer being enrolled at their school, absenteeism on the day of the assessment or falling within one or more of the PISA-defined exclusion categories. Table B.3 provides a breakdown, by jurisdiction, of the numbers of students in each category who were non-participants.

TABLE B.3 Student non-participation in Australia, by jurisdiction

State/Territory	No longer enrolled at the school	Special education need exclusion	Absentees	Total
ACT	24	79	220	323
NSW	153	160	773	1086
VIC	106	171	499	776
QLD	173	169	557	899
SA	93	105	527	725
WA	120	55	492	667
TAS	50	103	279	432
NT	122	77	277	476
Australia	841	919	3624	5384

The 734 participating schools in PISA 2022 represented a weighted response rate of 95.6% after replacements and a weighted student participation rate after replacements of 76.1% which did not meet the international sampling technical standards. The OECD Technical Standards are the set of principles on which PISA is based.

At the school level, Australia met the technical standard for response rates, which is ‘Standard 1.11 The final weighted school response rate is at least 85% of sampled eligible and non-excluded schools. If a response rate is below 85% then an acceptable response rate can still be achieved through agreed upon use of replacement schools.’ (OECD, 2020, p.6).

However, PISA 2022 was the first cycle of PISA since its inception in which Australia did not meet the required student participation rate of 80% as stipulated in the OECD PISA Technical Standards, which is ‘Standard 1.12 The final weighted student response rate is at least 80% of all sampled students across responding schools.’ (OECD, 2020, p. 6).

Non-response bias analysis

Non-response bias is a distortion in the results, caused by differences in the characteristics of the sampled students who participated in PISA and those who did not participate, whether that be due to absence on the day(s) of testing, students who refused to participate, or school refusers.

The methodology used for PISA corrects for bias caused by non-participation. However, when participation rates fall below the technical standard, the methodology may not be able to correct sufficiently. The size of the bias depends not only on the percentage of non-participation, it also depends on the reason for non-participation. It is not possible to determine the exact size of the bias, because both the results from a sample with a 100% participation rate and often the reason for non-participation are unknown. However, non-response bias analysis serves to estimate the likelihood of a small or large bias in the results. For example, if the reason for non-response is not related to achievement, then the non-respondents are a random selection of the full sample and will not affect the results. However, if the reason for non-response causes more absenteeism in remote areas, or in government schools, or in First Nations communities, then the results are likely to be positively biased.

Where school and/or student participation rate(s) fell short of the standard, and therefore created a potential threat for bias in the results, countries were requested to submit a NRBA report. The evidence produced by countries was reviewed by the Adjudication Group. The PISA Adjudication Group is formed by the TAG and the international sampling referee. Its role is to review information collected about each country that was relevant to meeting the requirements of the PISA technical standards and each national PISA database to recommend adequate treatment to preserve the quality of PISA data in line with the OECD's PISA technical standards (OECD, 2020).

Broadly speaking, the purpose of the NRBA is to investigate the likelihood of bias in the Australian results by comparing the sampled students who participated in PISA with sampled students who were absent from testing. If students who completed the assessment differ from students who did not complete the assessment, non-response bias may affect the results. The intention of the NRBA report was to support the OECD and PGB's evaluation of Australia's data to include in the international PISA database, and how the results should be reported.

Figure B.1 shows Australia's student response rates for each cycle of PISA 2000–2022 to illustrate the change in student participation rates over the cycles of PISA. The figure shows that participation rates have been consistently high until the most recent PISA cycle, in which it dropped below the technical standard of 80%.

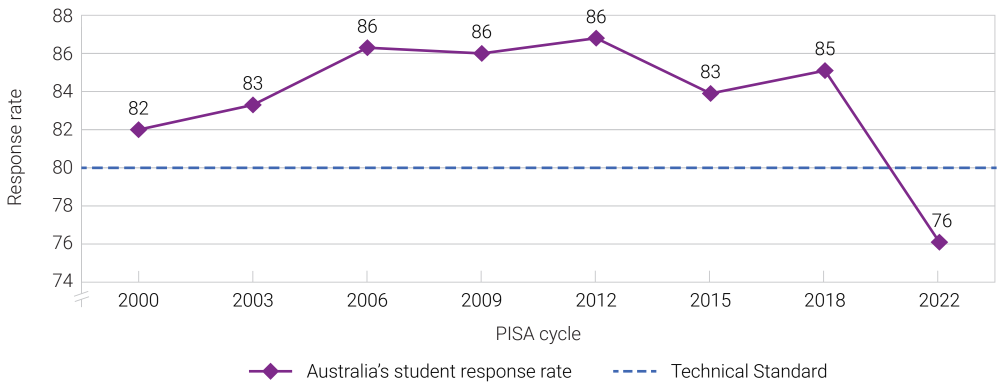


FIGURE B.1 Australia's student participation rates over time

The Australian National Centre was formally notified in April 2022 that the Australian weighted student response rate was 76.1%, which did not meet the OECD PISA Technical Standard of 80%.

The school response rate standard was not met by the following 14 countries/economies: the United States (51%), Hong Kong (China) (60%), New Zealand (61%), the Netherlands (66%), the United Kingdom (67%), Belgium (80%), Ukrainian regions (80%), Brazil (81%), Canada (81%), Chinese Taipei (83%), Chile (84%), Latvia (84%), Panama (84%), and one adjudicated region.

Adjudication of Australia's results

The Adjudication Group noted a significant increase in the number of countries that failed to meet the required student response rates in PISA 2022. The standard of 80% student participation rate was not met by the following 9 countries/economies: Jamaica (68%), New Zealand (72%), Hong Kong (China) (75%), the United Kingdom (75%), Australia (76%), Canada (77%), Ireland (77%), Panama (77%), and Malta (79%).It was also noted that Australia did not meet the PISA Technical Standard related to school-level exclusions. The PISA Adjudication Group noted about one-fifth of all adjudicated entities had exclusion rates exceeding the limits set by the Technical Standards (Standard 1.7). In Australia the exclusion rate was 6.9%.

> **Standard 1.7** The PISA Defined Target Population covers 95% or more of the PISA Desired Target Population. That is, school-level exclusions and within-school exclusions combined do not exceed 5%.

Australia's representative on the PGB was advised by the OECD that, based on Australia not meeting the minimum student response rate nor the maximum school exclusion rate and based on the results from the non-response bias analysis, Australia's database *will* be included in the international database, and Australia's data *will* be presented in the international report but with the following annotation:

> Exclusion and/or response rates did not meet the PISA technical standards. Care is required when comparing estimates based on PISA 2022 with other countries, economies and or with earlier results (see Reader's Guide, Annexes A2 and A4) (*PISA 2022 technical report*, OECD, forthcoming).

C Appendix C: International sampling results

Internationally, the desired minimum number of students to be assessed per school was specified as 6,300 students. Some countries, including Australia, sampled more students so that language groups, or regions within countries could be adequately represented.

Sampling procedures and response rates

The accuracy of any assessment results depends on the quality of the information on which national samples are based as well as on the sampling procedures. Quality standards, procedures, instruments, and verification mechanisms have been developed for PISA that ensured that national samples yielded comparable data and that the results could be compared across countries and economies with confidence. Sampling experts from the PISA consortium monitored the sample selection process in each participating country.

Data quality standards in PISA required minimum participation rates for schools as well as for students. These standards were established to minimise the potential for response biases. In the case of countries meeting these standards, it is likely that any bias resulting from non-response will be negligible, that is, typically smaller than the sampling error.

Internationally, the minimum required sample for each country administering PISA using the computer-based mode was 150 schools and 6,300 assessed students. In each country, a random sample of 42 students was selected with equal probability from each of the randomly selected schools using a list of all 15-year-old students submitted by the schools.

As mentioned in Appendix B, a larger sample was drawn in Australia to enable results to be reported at the jurisdictional levels and be disaggregated to give results by geographic background, socioeconomic background First Nation's background, immigrant background and language spoken at home. Table C1 provides the details of the Australian school sample design.

A minimum response rate of 85% was required for the schools initially selected. If the initial response rate of schools was between 65% and 85%, an acceptable school-response rate could still be achieved through the use of replacement schools. This procedure brought with it a risk of increased response bias. Participating countries were, therefore, encouraged to persuade as many of the schools in the original sample as possible to participate.

The PISA 2022 Technical Standards (OECD, 2020), state that data from schools where the (unweighted) student response rate is greater than 33%1 will be included in the PISA dataset and the school counted as a respondent. Otherwise, the school will be a non-respondent, and no student, school or teacher data will be retained. In addition, a PISA-eligible student recorded in the database as not doing the minimum required number of questions of the main cognitive part of the PISA assessment will be counted as a non-participant.

The school response rate standard of 85% weighted school participation rate was not met by the following 14 countries/economies: the United States (51%), Hong Kong (China) (60%), New Zealand (61%), the Netherlands (66%), the United Kingdom (67%), Belgium (80%), Ukrainian regions (80%), Brazil (81%), Canada (81%), Chinese Taipei (83%), Chile (84%), Latvia (84%), Panama (84%), and one adjudicated region. After replacement schools were included, 7 countries, the United States (63%), New Zealand (72%), Hong Kong (China) (80%), the United Kingdom, (82%), Chinese Taipei (84%), Canada (86%) and the Netherlands (90%) still failed to reach target participation rates.

In Australia, 38 schools had a student response rate below 33%. These 38 schools became non-participating schools. As such, Australia's number of participating students included in the international database is 13,437.

PISA 2022 also required a minimum participation rate of 80% of students within participating schools (original sample). This minimum participation rate had to be met at the national level, not necessarily by each participating school. Follow-up sessions were required in schools in which too few students had participated in the original assessment sessions. Student participation rates were calculated over all original schools, and over all schools whether original or replacement schools, and from the participation of students in both the original assessment and any follow-up sessions.

Table C.1 shows the response rate for students and schools for each country that participated in PISA 2022, before and after including replacement schools. Column 1 shows the weighted participation rate of schools before replacement; it is equivalent to Column 2 divided by Column 3 (multiplied by 100 to give a percentage).

- Column 2 shows the number of responding schools before school replacement, weighted by student enrolment.
- Column 3 shows the number of sampled schools before school replacement, weighted by student enrolment. This includes both responding and non-responding schools.
- Column 4 shows the unweighted number of responding schools before school replacement.
- Column 5 shows the unweighted number of sampled schools before school replacement, including both responding and non-responding schools.
- Columns 6 to 10 repeat Columns 1 to 5 for schools after school replacement, i.e., after non-responding schools were substituted by the replacement schools identified during the initial sampling procedure.
- Columns 11 to 15 repeat Columns 6 to 10 but for students in schools after school replacement. Note that the weighted and unweighted numbers of students sampled (Columns 13 and 15) include students who were assessed and those who should have been assessed but who were absent on the day of assessment. As mentioned above, any students in schools where the student response rate was less than 50% were not considered to be attending participating schools and were thus excluded from Columns 14 and 15 (and, similarly, from Columns 4, 5, 9 and 10).

TABLE C.1 Student response rates, PISA 2022

	Initial sample – before school replacement				
	Weighted school participation rate before replacement (%)	Weighted number of responding schools (weighted also by enrolment)	Weighted number of schools sampled (responding and non-responding) (weighted also by enrolment)	Number of responding schools (unweighted)	Number of responding and non-responding schools (unweighted)
Country	(1)	(2)	(3)	(4)	(5)
Albania	95	27530	29067	274	294
Argentina	98	661503	673069	454	461
Australia*	92	260643	281781	722	794
Austria	96	77289	80733	300	318
Baku (Azerbaijan)	100	31925	31925	178	178
Belgium	80	101303	126138	243	318
Brazil	81	2153176	2660537	505	636
Brunei Darussalam	100	6675	6675	54	54
Bulgaria	85	47378	56052	177	207
Cambodia	100	205960	206763	182	183
Canada	81	305746	375877	828	1049
Chile	84	187116	222091	205	250
Chinese Taipei	83	161354	195232	180	216
Colombia	97	658016	681141	249	264
Costa Rica	99	64480	65122	198	200
Croatia	100	37398	37475	180	182
Cyprus	98	8875	9100	101	105
Czech Republic	100	98609	98609	430	430
Denmark	90	53540	59431	325	371
Dominican Republic	98	131827	133900	249	257
El Salvador	100	73847	74135	288	291
Estonia	99	13659	13745	196	199
Finland	99	60180	60501	241	245
France	100	790568	794003	282	283
Georgia	94	40653	43421	250	268
Germany	93	674828	726200	241	264
Greece	90	90812	100785	217	242
Guatemala	85	143290	168547	265	361
Hong Kong (China)	60	32428	54402	122	204
Hungary	89	82009	92393	249	279
Iceland	96	4435	4601	134	149
Indonesia	99	3985101	4011189	408	411
Ireland	99	68814	69234	169	170
Israel	91	124237	137007	188	210
Italy	96	493350	513656	334	350
Jamaica	90	41020	45680	145	163
Japan	92	949447	1033001	182	199
Jordan	100	146365	146365	260	260
Kazakhstan	99	279305	283489	565	571
Korea	89	369002	415104	166	187
Kosovo	96	23183	24127	229	251
Latvia	84	15494	18464	208	259
Lithuania	100	25311	25418	288	293
Macao (China)	100	4453	4453	46	46
Malaysia	100	406803	407861	199	200
Malta	100	4114	4114	46	46
Mexico	96	1473466	1535688	272	289
Moldova	100	29607	29687	265	268
Mongolia	100	43631	43631	195	195
Montenegro	99	6581	6659	63	64
Morocco	100	479666	480608	177	178
Netherlands	66	116517	177833	114	175
New Zealand	61	35524	57847	140	227
North Macedonia	100	17919	17919	111	111
Norway	99	62129	62943	266	271
Palestinian Authority	99	94105	95053	271	274
Panama	84	54532	64834	190	243
Paraguay	99	87772	88922	278	284
Peru	94	489130	520113	308	338
Philippines	100	1719012	1719012	188	188
Poland	89	309061	348856	223	252
Portugal	95	95312	100641	213	227
Qatar	100	18927	18927	229	229
Romania	100	167589	167589	262	262
Saudi Arabia	92	300026	326333	178	195
Serbia	99	63599	64435	183	189
Singapore	98	41915	42567	164	167
Slovak Republic	91	44081	48692	271	301
Slovenia	97	18729	19264	344	375
Spain	98	473996	485037	959	985
Sweden	98	113994	116574	259	268
Switzerland	95	73464	77247	249	267
Thailand	99	685471	693755	276	280
Türkiye	99	1079992	1086638	195	196
Ukrainian regions (18 of 27)	80	178606	223859	141	189
United Arab Emirates	100	63395	63507	840	843
United Kingdom	67	490313	728369	388	580
United States	51	2019439	3927302	125	253
Uruguay	99	43188	43447	221	223
Uzbekistan	100	510406	510406	202	202
Viet Nam	100	1020528	1020528	178	178

Note: for a full explanation of the details in this table please refer to the *PISA 2022 technical report* (OECD, forthcoming).

TABLE C.1 (continued) Student response rates, PISA 2022

	Final sample – after school replacement				
	Weighted school participation rate before replacement (%)	Weighted number of responding schools (weighted also by enrolment)	Weighted number of schools sampled (responding and non-responding) (weighted also by enrolment)	Number of responding schools (unweighted)	Number of responding and non-responding schools (unweighted)
Country	(6)	(7)	(8)	(9)	(10)
Albania	95	27530	29067	274	294
Argentina	99	668001	673236	457	461
Australia*	96	269918	282241	743	794
Austria	96	77799	80750	302	318
Baku (Azerbaijan)	100	31925	31925	178	178
Belgium	91	115591	126446	285	318
Brazil	96	2541343	2659664	599	636
Brunei Darussalam	100	6675	6675	54	54
Bulgaria	98	54795	56079	202	207
Cambodia	100	207046	207046	183	183
Canada	86	321877	376040	867	1049
Chile	94	208702	221439	230	250
Chinese Taipei	84	163590	195232	182	216
Colombia	99	683439	688995	262	264
Costa Rica	99	64480	65122	198	200
Croatia	100	37398	37475	180	182
Cyprus	98	8875	9100	101	105
Czech Republic	100	98609	98609	430	430
Denmark	96	57254	59517	347	371
Dominican Republic	99	133159	133900	253	257
El Salvador	100	74136	74212	290	291
Estonia	99	13659	13745	196	199
Finland	99	60180	60501	241	245
France	100	790568	794003	282	283
Georgia	100	43539	43611	267	268
Germany	98	712724	725905	257	264
Greece	96	96821	100772	230	242
Guatemala	93	155960	168475	290	361
Hong Kong (China)	80	43491	54402	163	204
Hungary	99	90673	91964	270	279
Iceland	96	4435	4601	134	149
Indonesia	100	4002841	4011189	410	411
Ireland	100	69234	69234	170	170
Israel	93	127287	137007	193	210
Italy	99	510819	513842	345	350
Jamaica	91	41545	45680	147	163
Japan	92	949447	1033001	182	199
Jordan	100	146365	146365	260	260
Kazakhstan	100	283481	283481	571	571
Korea	100	413724	415104	186	187
Kosovo	96	23183	24127	229	251
Latvia	89	16424	18516	225	259
Lithuania	100	25408	25414	292	293
Macao (China)	100	4453	4453	46	46
Malaysia	100	406803	407861	199	200
Malta	100	4114	4114	46	46
Mexico	99	1519261	1535688	280	289
Moldova	100	29607	29687	265	268
Mongolia	100	43631	43631	195	195
Montenegro	99	6581	6659	63	64
Morocco	100	479939	479939	178	178
Netherlands	90	159228	177613	154	175
New Zealand	72	41871	57865	169	227
North Macedonia	100	17919	17919	111	111
Norway	99	62393	62943	267	271
Palestinian Authority	100	94988	95027	273	274
Panama	91	59341	64996	215	243
Paraguay	100	88602	88922	281	284
Peru	100	521500	522136	337	338
Philippines	100	1719012	1719012	188	188
Poland	96	335389	348856	240	252
Portugal	99	99768	100578	224	227
Qatar	100	18927	18927	229	229
Romania	100	167589	167589	262	262
Saudi Arabia	100	325174	326372	193	195
Serbia	99	63599	64435	183	189
Singapore	98	41915	42567	164	167
Slovak Republic	96	46387	48549	288	301
Slovenia	97	18747	19264	345	375
Spain	99	480541	485037	966	985
Sweden	99	115248	116574	262	268
Switzerland	98	76060	77488	259	267
Thailand	100	690286	693755	279	280
Türkiye	100	1086638	1086638	196	196
Ukrainian regions (18 of 27)	91	204043	224119	164	189
United Arab Emirates	100	63395	63507	840	843
United Kingdom	82	593600	725986	451	580
United States	63	2485876	3926991	154	253
Uruguay	100	43395	43447	222	223
Uzbekistan	100	510406	510406	202	202
Viet Nam	100	1020528	1020528	178	178

Note: for a full explanation of the details in this table please refer to the *PISA 2022 technical report* (OECD, forthcoming).

TABLE C.1 (continued) Student response rates, PISA 2022

	Final sample – students within schools after school replacement				
	Weighted student participation rate before replacement (%)	Number of students assessed (weighted)	Number of students (assessed and absent) (weighted)	Number of students assessed (unweighted)	Number of students sampled (assessed and absent)
Country	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**
Albania	86	23274	26915	6129	7089
Argentina	86	508035	592257	12111	14014
Australia*	76	193102	253899	13437	17771
Austria	89	65057	73230	6151	7092
Baku (Azerbaijan)	88	26799	30529	7720	8793
Belgium	87	101344	117082	8286	9533
Brazil	84	1832626	2177600	10798	12879
Brunei Darussalam	93	5576	5980	5576	5980
Bulgaria	89	46335	52192	6107	6878
Cambodia	99	125643	126409	5279	5308
Canada	77	233773	303622	23073	29234
Chile	84	168773	201037	6488	7627
Chinese Taipei	82	131517	159821	5857	7038
Colombia	92	532284	580114	7804	8469
Costa Rica	92	52220	56750	6113	6656
Croatia	85	29804	34963	6135	7194
Cyprus	84	7190	8578	6515	7765
Czech Republic	91	91518	100330	8460	9282
Denmark	84	46126	54775	6200	7455
Dominican Republic	93	112417	121281	6868	7417
El Salvador	94	63767	68101	6705	7158
Estonia	88	11693	13262	6392	7236
Finland	89	52007	58641	10239	11811
France	91	705197	777730	6770	7509
Georgia	98	39587	40348	6583	6712
Germany	88	588741	669277	6116	6964
Greece	92	87038	94215	6403	6921
Guatemala	91	143084	156600	5190	5709
Hong Kong (China)	75	29278	38858	5907	7819
Hungary	92	80160	86877	6198	6705
Iceland	80	3360	4195	3360	4195
Indonesia	95	3602554	3782864	13439	14040
Ireland	77	50274	65497	5569	7258
Israel	84	103556	123165	6251	7437
Italy	92	452653	492440	10552	11429
Jamaica	68	15622	23123	3873	5791
Japan	92	858514	934656	5760	6290
Jordan	97	140640	144269	7799	8014
Kazakhstan	98	267773	272446	19769	20128
Korea	94	383999	406986	6454	6840
Kosovo	91	18427	20220	6027	6616
Latvia	88	13215	14935	5373	6067
Lithuania	93	22470	24245	7257	7826
Macao (China)	99	4384	4423	4384	4423
Malaysia	94	362809	387928	7069	7554
Malta	79	3127	3955	3127	3955
Mexico	95	1313477	1383827	6288	6675
Moldova	94	27114	28799	6235	6623
Mongolia	98	39969	40828	6999	7155
Montenegro	95	5954	6291	5793	6117
Morocco	98	446431	454986	6867	7000
Netherlands	81	113351	140125	5046	6221
New Zealand	72	29219	40758	4682	6567
North Macedonia	90	14832	16548	6610	7380
Norway	87	50577	58362	6611	7635
Palestinian Authority	96	85017	88348	7905	8239
Panama	77	29491	38418	4544	6017
Paraguay	92	74217	80700	5084	5522
Peru	97	486292	498888	6968	7136
Philippines	95	1698135	1782896	7193	7550
Poland	81	266114	328452	6011	7422
Portugal	86	82496	95838	6793	7888
Qatar	89	16346	18361	7676	8649
Romania	97	157838	162019	7364	7543
Saudi Arabia	97	307363	316501	6928	7144
Serbia	91	53150	58297	6413	7033
Singapore	91	37797	41358	6606	7235
Slovak Republic	91	41319	45438	5824	6375
Slovenia	82	15142	18355	6721	8134
Spain	86	392413	454692	30800	35472
Sweden	85	91230	107261	6072	7133
Switzerland	91	67555	74335	6829	7471
Thailand	96	580014	601524	8495	8816
Türkiye	98	914714	933402	7250	7387
Ukrainian regions (18 of 27)	87	131271	151104	3876	4508
United Arab Emirates	93	56369	60658	24600	26592
United Kingdom	75	448396	596519	12972	17023
United States	80	1866014	2336430	4552	5719
Uruguay	87	35308	40728	6618	7637
Uzbekistan	98	472726	482059	7293	7445
Viet Nam	99	933854	939459	6068	6105

Note: for a full explanation of the details in this table please refer to the *PISA 2022 technical report* (OECD, forthcoming).

Population coverage

All countries and economies attempt to maximise the coverage of eligible 15-year-old students in their national sample.

According to the PISA standards, countries and economies are permitted to exclude a total of 5% of the total relevant population either by excluding schools or by excluding students within schools. Eligible school-level exclusions included geographically inaccessibility or where the administration of the PISA assessment was not considered feasible. Student-level exclusions included students with an intellectual disability, students with a functional disability, students with limited assessment language proficiency or other (a category defined by the national centres and approved by the international centre).

Sixteen countries exceeded the student level exclusion rate: Ukrainian regions (14.9%), Denmark (11.6%), the Netherlands (8.4%), Latvia (7.9%), Sweden (7.4%), Norway (7.3%), Australia (6.9%), one adjudicated region (6.6%), Lithuania (6.5%), the United States (6.1%), Estonia (5.9%), Canada (5.8%), Switzerland (5.8%), New Zealand (5.8%), Türkiye (5.6%) and Croatia (5.4%). In 31 countries/economies, the overall exclusion rate was less than 2%.

Table C.2 describes the target population of the countries and economies participating in PISA 2022. Further information on the target population and the implementation of PISA sampling standards can be found in the *PISA 2022 technical report* (OECD 2023, forthcoming).

- Column 1 shows the total number of 15-year-olds according to the most recent available information, which in most countries and economies means from 2021, the year before the assessment.
- Column 2 shows the number of 15-year-olds enrolled in school in Grade 7 or above, which is referred to as the 'eligible population'.
- Column 3 shows the national desired target population. Countries/economies were allowed to exclude up to 0.5% of students a priori from the eligible population, essentially for practical reasons if agreed upon with the PISA consortium.
- Column 4 shows the number of students enrolled in schools that were excluded from the national desired target population, either from the sampling frame or later in the field during data collection. In other words, these are school-level exclusions.
- Column 5 shows the size of the national desired target population after subtracting the students enrolled in excluded schools. This column is obtained by subtracting Column 4 from Column 3.
- Column 6 shows the percentage of students enrolled in excluded schools. This is obtained by dividing Column 4 by Column 3 and multiplying by 100.
- Column 7 shows the number of students who participated in PISA 2022. Note that in some cases, this number does not account for 15-year-olds assessed as part of additional national options.
- Column 8 shows the weighted number of participating students, that is, the number of students in the nationally defined target population that the PISA sample represents.
- Column 9 shows the total number of students excluded within schools. In each sampled school, all eligible students – namely, those 15 years of age, regardless of grade – were listed, and a reason for the exclusion was provided for each student who was to be excluded from the sample. These reasons are further described and classified into specific categories in Table A2.4.
- Column 10 shows the weighted number of students excluded within schools, that is, the overall number of students in the national defined target population represented by the number of students from the sample excluded within schools. This weighted number is also described and classified by exclusion categories in Table A2.4.

- Column 11 shows the percentage of students excluded within schools. This is equivalent to the weighted number of excluded students (Column 10) divided by the weighted number of excluded and participating students (the sum of Columns 8 and 10), multiplied by 100.
- Column 12 shows the overall exclusion rate, which represents the weighted percentage of the national desired target population excluded from PISA either through school-level exclusions or through the exclusion of students within schools. It is equivalent to the school-level exclusion rate (Column 6) plus the product of the within-school exclusion rate and 1 minus the school-level exclusion rate expressed as a decimal (Column 6 divided by 100).
- Column 13 shows an index of the extent to which the national desired target population was covered by the PISA sample. As mentioned above, 15 countries/economies fell below the coverage of 95%. This is also known as Coverage Index 1.
- Column 14 shows an index of the extent to which 15-year-olds enrolled in school were covered by the PISA sample. The index, also known as Coverage Index 2, measures the overall proportion of the national enrolled population that is covered by the non-excluded portion of the student sample, and takes into account both school- and student-level exclusions. Values close to 100 indicate that the PISA sample represents the entire (grade 7 and higher) education system as defined in PISA 2022. This is calculated in a similar manner to Column 13; however, the total enrolled population of 15-year-olds in grade 7 or above (Column 2) is used as a base instead of the national desired target population (Column 3).
- Column 15 shows an index of the coverage of the 15-year-old population. The index is the weighted number of participating students (Column 8) divided by the total population of 15-year-old students (Column 1). This is also known as Coverage Index 3.

TABLE C.2 Student non-participation in Australia, by jurisdiction

	Population and sample information						
	Total population of 15-year-olds	Total enrolled population of 15-year-olds at grade 7 or above	Total in national desired target population	Total school-level exclusions	Total in national desired target population after all school exclusions and before within-school exclusions	School-level exclusion rate (%)	Number of participating students
Country	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Albania	35891	29095	29095	56	29039	0.19	6129
Argentina	712733	693636	693636	5376	688260	0.78	12111
Australia*	296220	290738	290738	5302	285436	1.82	13437
Austria	85760	82619	82619	1595	81024	1.93	6151
Baku (Azerbaijan)	41633	29636	29636	1161	28475	3.92	7720
Belgium	129814	127559	127537	2438	125100	1.91	8286
Brazil	2973643	2757493	2757493	64960	2692533	2.36	10798
Brunei Darussalam	6100	6633	6633	0	6633	0.00	5576
Bulgaria	66769	56791	56791	730	56061	1.29	6107
Cambodia	348485	203291	203291	1329	201962	0.65	5279
Canada*	388205	385342	380510	5757	374753	1.51	23073
Chile	247550	230294	230175	5831	224344	2.53	6488
Chinese Taipei	205632	201379	201379	1760	199619	0.87	5857
Colombia	805258	685807	685807	632	685175	0.09	7804
Costa Rica	73787	64582	64582	0	64582	0.00	6113
Croatia	39271	39114	39114	1562	37552	3.99	6135
Cyprus	9324	9324	9323	210	9113	2.25	6515
Czech Republic	109596	102464	102464	1014	101450	0.99	8460
Denmark*	68110	66650	66650	1160	65490	1.74	6200
Dominican Republic	189635	138535	138535	1705	136830	1.23	6868
El Salvador	111637	75686	75686	686	75000	0.91	6705
Estonia	14210	14097	14097	457	13640	3.25	6392
Finland	61957	62104	62104	1191	60913	1.92	10239
France	836624	808703	808703	13612	795091	1.68	6770
Georgia	46845	45174	45174	1437	43737	3.18	6583
Germany	741506	741494	741494	12164	729330	1.64	6116
Greece	107294	102085	102085	529	101556	0.52	6403
Guatemala	353214	168154	168154	0	168154	0.00	5190
Hong Kong (China)*	59241	55505	55505	1076	54429	1.94	5907
Hungary	102077	93826	93826	2725	91101	2.90	6198
Iceland	4623	4602	4602	25	4577	0.54	3360
Indonesia	4462518	4069960	4069960	61569	4008391	1.51	13439
Ireland*	64051	63256	63256	52	63204	0.08	5569
Israel	147380	140599	140599	2876	137723	2.05	6251
Italy	572210	527539	527539	232	527307	0.04	10552
Jamaica*	43643	51024	51024	264	50760	0.52	3873
Japan	1109590	1070375	1070375	26926	1043449	2.52	5760
Jordan	153442	142601	142601	1158	141443	0.81	7799
Kazakhstan	291678	291490	291490	5246	286244	1.80	19769
Korea	418028	417968	417968	3418	414550	0.82	6454
Kosovo	24400	24238	24238	102	24136	0.42	6027
Latvia*	19801	19501	19501	994	18507	5.10	5373
Lithuania	26228	26027	26027	802	25225	3.08	7257
Macao (China)	4500	4469	4469	16	4453	0.36	4384
Malaysia	521400	424736	424736	3184	421552	0.75	7069
Malta	4273	4177	4177	52	4125	1.24	3127
Mexico	2193794	1592537	1592537	9720	1582817	0.61	6288
Moldova	29660	29638	29638	5	29633	0.02	6235
Mongolia	46889	43616	43616	350	43266	0.80	6999
Montenegro	6825	6808	6808	73	6735	1.07	5793
Morocco	597425	482740	482740	1917	480823	0.40	6867
Netherlands*	198577	193138	193138	12948	180190	6.70	5046
New Zealand*	62470	59286	59286	1410	57876	2.38	4682
North Macedonia	18249	18249	18249	330	17919	1.81	6610
Norway	64792	64478	64478	974	63504	1.51	6611
Palestinian Authority	113056	95013	95013	284	94729	0.30	7905
Panama*	73004	65523	65523	711	64812	1.09	4544
Paraguay	112659	92326	92326	1183	91143	1.28	5084
Peru	578489	536459	536459	16350	520109	3.05	6968
Philippines	2140435	1767303	1727028	17533	1709495	1.02	7193
Poland	382777	359547	359547	13321	346226	3.70	6011
Portugal	104433	102916	102916	1038	101878	1.01	6793
Qatar	19574	19427	19427	301	19126	1.55	7676
Romania	212530	173572	173572	4400	169172	2.53	7364
Saudi Arabia	389709	367963	347934	11217	336717	3.22	6928
Serbia	68172	65603	65603	655	64948	1.00	6413
Singapore	44037	43215	43215	589	42626	1.36	6606
Slovak Republic	49662	48584	48584	476	48108	0.98	5824
Slovenia	18932	19728	19728	434	19294	2.20	6721
Spain	507740	487620	487620	2432	485188	0.50	30800
Sweden	121723	121197	121197	1450	119747	1.20	6072
Switzerland	83388	81012	81012	2904	78108	3.58	6829
Thailand	810264	708606	708606	9065	699541	1.28	8495
Türkiye	1266433	1153239	1153239	43932	1109307	3.81	7250
Ukraine	398426	335307	333807	88853	244954	26.62	3876
Ukrainian regions	258974	234139	232639	511896	227520	2.20	3876
United Arab Emirates	64967	64914	64867	838	64029	1.29	24600
United Kingdom*	754547	744428	744428	17491	726937	2.35	12972
United States*	4235296	4141007	4141007	20265	4120742	0.49	4552
Uruguay	48233	43849	43849	75	43774	0.17	6618
Uzbekistan	547432	529571	529571	19623	509948	3.71	7293
Viet Nam	1374000	1164190	1164190	7455	1156735	0.64	6068

Note: for a full explanation of the details in this table please refer to the *PISA 2022 technical report* (OECD, forthcoming).

TABLE C.2 (continued) Student non-participation in Australia, by jurisdiction

	Population and sample information					Coverage indices		
	Weighted number of participating students	Number of excluded students	Weighted number of excluded students	Within-school exclusion rate (%)	Overall exclusion rate (%)	Coverage Index 1: Coverage of national desired population	Coverage Index 2: Coverage of national enrolled population	Coverage Index 3: Coverage of 15-year-old population
Country	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Albania	28426	22	135	0.47	0.66	0.993	0.993	0.792
Argentina	596301	204	5228	0.87	1.64	0.984	0.984	0.837
Australia*	265196	1045	14375	5.14	6.87	0.931	0.931	0.895
Austria	76153	97	1253	1.62	3.52	0.965	0.965	0.888
Baku (Azerbaijan)	30529	20	76	0.25	4.16	0.958	0.958	0.733
Belgium	128642	53	663	0.51	2.41	0.976	0.976	0.991
Brazil	2262972	115	18927	0.83	3.17	0.968	0.968	0.761
Brunei Darussalam	5980	53	53	0.88	0.88	0.991	0.991	0.980
Bulgaria	53421	87	777	1.43	2.70	0.973	0.973	0.800
Cambodia	126409	2	35	0.03	0.68	0.993	0.993	0.363
Canada*	357911	1120	16390	4.38	5.83	0.942	0.930	0.922
Chile	214108	21	738	0.34	2.87	0.971	0.971	0.865
Chinese Taipei	190787	44	1136	0.59	1.46	0.985	0.985	0.928
Colombia	586683	40	2882	0.49	0.58	0.994	0.994	0.729
Costa Rica	57250	5	35	0.06	0.06	0.999	0.999	0.776
Croatia	35033	104	533	1.50	5.43	0.946	0.946	0.892
Cyprus	8795	137	205	2.28	4.48	0.955	0.955	0.943
Czech Republic	100266	73	1005	0.99	1.97	0.980	0.980	0.915
Denmark*	56909	902	6311	9.98	11.55	0.884	0.884	0.836
Dominican Republic	121876	12	204	0.17	1.40	0.986	0.986	0.643
El Salvador	68170	18	165	0.24	1.15	0.989	0.989	0.611
Estonia	13345	190	373	2.72	5.88	0.941	0.941	0.939
Finland	58955	200	832	1.39	3.28	0.967	0.967	0.952
France	781286	170	16501	2.07	3.72	0.963	0.963	0.934
Georgia	40416	126	717	1.74	4.87	0.951	0.951	0.863
Germany	681399	59	5935	0.86	2.49	0.975	0.975	0.919
Greece	98087	40	932	0.94	1.45	0.985	0.985	0.914
Guatemala	168484	8	232	0.14	0.14	0.999	0.999	0.477
Hong Kong (China)*	48245	184	1204	2.43	4.33	0.957	0.957	0.814
Hungary	87990	103	1639	1.83	4.68	0.953	0.953	0.862
Iceland	4352	188	195	4.30	4.82	0.952	0.952	0.941
Indonesia	3790846	0	0	0.00	1.51	0.985	0.985	0.849
Ireland*	65497	266	2409	3.55	3.63	0.964	0.964	1.023
Israel	132475	129	2354	1.75	3.76	0.962	0.962	0.899
Italy	496263	399	15467	3.02	3.07	0.969	0.969	0.867
Jamaica*	25495	33	86	0.34	0.85	0.991	0.991	0.584
Japan	1021370	0	0	0.00	2.52	0.975	0.975	0.920
Jordan	144269	28	597	0.41	1.22	0.988	0.988	0.940
Kazakhstan	272446	358	6879	2.46	4.22	0.958	0.958	0.934
Korea	428012	37	2835	0.66	1.47	0.985	0.985	1.024
Kosovo	21045	13	38	0.18	0.60	0.994	0.994	0.863
Latvia*	16833	178	514	2.96	7.91	0.921	0.921	0.850
Lithuania	24251	288	887	3.53	6.50	0.935	0.935	0.925
Macao (China)	4423	0	0	0.00	0.36	0.996	0.996	0.983
Malaysia	390447	56	2807	0.71	1.46	0.985	0.985	0.749
Malta	3955	108	108	2.66	3.87	0.961	0.961	0.926
Mexico	1393727	50	11244	0.80	1.41	0.986	0.986	0.635
Moldova	28879	110	508	1.73	1.75	0.983	0.983	0.974
Mongolia	40828	1	8	0.02	0.82	0.992	0.992	0.871
Montenegro	6340	65	191	2.92	3.96	0.960	0.960	0.929
Morocco	454986	5	324	0.07	0.47	0.995	0.995	0.762
Netherlands*	155987	118	2939	1.85	8.43	0.916	0.916	0.786
New Zealand*	56382	239	2031	3.48	5.77	0.942	0.942	0.903
North Macedonia	16548	162	330	1.96	3.73	0.963	0.963	0.907
Norway	58970	464	3659	5.84	7.27	0.927	0.927	0.910
Palestinian Authority	88383	3	16	0.02	0.32	0.997	0.997	0.782
Panama*	42090	2	20	0.05	1.13	0.989	0.989	0.577
Paraguay	81004	10	153	0.19	1.47	0.985	0.985	0.719
Peru	499075	19	1275	0.25	3.29	0.967	0.967	0.863
Philippines	1782896	23	5144	0.29	1.30	0.987	0.965	0.833
Poland	341562	80	3872	1.12	4.78	0.952	0.952	0.892
Portugal	96607	248	3028	3.04	4.02	0.960	0.960	0.925
Qatar	18348	132	217	1.17	2.70	0.973	0.973	0.937
Romania	162019	20	672	0.41	2.94	0.971	0.971	0.762
Saudi Arabia	317452	0	0	0.00	3.22	0.968	0.915	0.815
Serbia	59250	516	1753	2.87	3.84	0.962	0.962	0.869
Singapore	41958	43	239	0.57	1.92	0.981	0.981	0.953
Slovak Republic	47453	81	729	1.51	2.48	0.975	0.975	0.956
Slovenia	18850	59	125	0.66	2.84	0.972	0.972	0.996
Spain	459029	1266	16836	3.54	4.02	0.960	0.960	0.904
Sweden	108499	473	7251	6.26	7.39	0.926	0.926	0.891
Switzerland	75696	167	1760	2.27	5.77	0.942	0.942	0.908
Thailand	604573	21	1121	0.18	1.46	0.985	0.985	0.746
Türkiye	933402	130	17393	1.83	5.57	0.944	0.944	0.737
Ukraine	165592	708	24674	12.97	36.13	0.639	0.636	0.416
Ukrainian regions	165592	708	24674	12.97	14.92	0.851	0.846	0.639
United Arab Emirates	60765	351	798	1.30	2.57	0.974	0.974	0.935
United Kingdom*	731225	512	19772	2.63	4.92	0.951	0.951	0.969
United States*	3661328	330	220753	5.69	6.15	0.939	0.939	0.864
Uruguay	40778	13	61	0.15	0.32	0.997	0.997	0.845
Uzbekistan	482059	36	2437	0.50	4.19	0.958	0.958	0.881
Viet Nam	939459	2	686	0.07	0.71	0.993	0.993	0.684

Note: for a full explanation of the details in this table please refer to the *PISA 2022 technical report* (OECD, forthcoming).

D Appendix D: Scaling of the cognitive items

Information about the scaling of the items has been taken from Chapter 2 in the OECD's *PISA 2022 results (Volume 1): What students know and can do.*

The assessment design used in PISA has enabled a single continuous scale1 of proficiency for each assessment domain to be constructed. The reporting scales are called 'proficiency scales' rather than 'performance scales' because they describe what students typically know and can do at given levels of proficiency, rather than how individuals who were tested actually performed on a single test administration. This emphasis reflects the primary goal of PISA, which is to report general population-level results rather than the results for individual students.

The proficiency scale was constructed using item-response theory models, with each item associated with a particular point on the scale indicating its difficulty, and each student's performance is associated with a particular point on the same scale indicating their estimated proficiency. On this scale, the relative difficulty of items in an assessment can be estimated by considering the proportion of students getting each item correct. It is possible to estimate the location of individual students and to describe the degree of proficiency that they possess. Higher values on the scale indicate a student's ability to correctly respond to more difficult items, which are demonstrated by a greater proficiency in the domain.

The estimates of student proficiency are based on the different kinds of tasks students are expected to successfully perform, that is, students are likely to be able to successfully answer questions located at or below the level of difficulty associated with their own position on the scale ('likely' in this context refers to a probability of at least 62%). Students are unlikely (based on a probability below 62%), to be able to successfully answer questions above the level of difficulty associated with their position on the scale.

Figure D.1 shows that the relationship between items and students on the proficiency scale is probabilistic. The estimate of student proficiency reflects the kinds of tasks they would be expected to successfully complete. A student whose ability places them at a certain point on the PISA proficiency scale would most likely be able to successfully complete tasks at or below that location, and they would increasingly be more likely to be able to complete tasks located at progressively lower points on the scale, but they would be less likely to be able to complete tasks above that point, and they would be increasingly less likely to be able to complete tasks located at progressively higher points on the scale.

Once the proficiency scale has been established, it is possible to divide the proficiency scale into proficiency levels, and then describe the kinds of skills and knowledge that students can correctly perform most of the time, and which can then be used as characterisations of the substantive meaning of each level. The simplest tasks correspond to the lower proficiency levels, for example, Levels 1b and 1c on the mathematical literacy proficiency scale, and the more difficult tasks correspond to the higher proficiency levels, Levels 5 and 6 on the mathematical literacy proficiency scale.

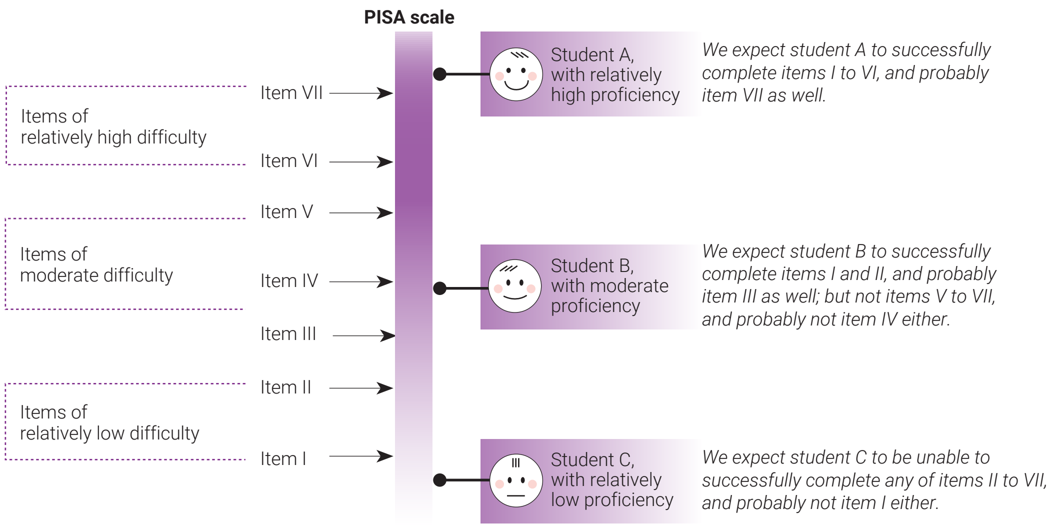


FIGURE D.1 Simplified relationship between items and student performance on a proficiency scale

1 The scaling procedures used in PISA 2022 are described in greater detail in the *PISA 2022 technical report* (OECD, forthcoming).

E Appendix E: Distribution of items to the assessment framework

Construct coverage

Tables E.1 to E.3 shows the number and proportion of items selected for each assessment domain by construct coverage.

TABLE E.1 Distribution of items in the mathematical literacy assessment by content, context and processes

Mathematical literacy construct components	Items	
	No.	%
Content		
Change and relationships	55	23
Quantity	76	32
Space and shape	43	18
Uncertainty and data	60	26
Context		
Personal	60	26
Societal	54	23
Occupational	50	21
Scientific	70	30
Processes		
Formulating situations mathematically	48	20
Employing mathematical concepts, facts and procedures	75	32
Interpreting, applying and evaluating mathematical outcomes	57	24
Reasoning	54	23

Note: due to rounding, some percentages may not match to totals in the text.
This relates to all tables and graphs in this chapter. See the Reader's guide for more information.

TABLE E.2 Distribution of items in the scientific literacy assessment by competencies, knowledge, systems and context

Scientific literacy construct components	Items	
	No.	%
Competencies		
Evaluate and design scientific enquiry	30	26
Explain phenomena scientifically	49	43
Interpret data and evidence scientifically	36	31
Knowledge types		
Content	49	43
Epistemic	19	17
Procedural	47	41
Systems		
Earth & Space	30	26
Living	47	41
Physical	38	33
Context		
Global	34	30
Local/National	70	61
Personal	11	10

Note: due to rounding, some percentages may not match to totals in the text.
This relates to all tables and graphs in this chapter. See the Reader's guide for more information.

TABLE E.3 Distribution of items in the reading literacy assessment by cognitive process, text type, text format, text structure and situations

Reading literacy construct components	Items	
	No.	%
Cognitive processes		
Single text		
Scanning and locating	21	11
Represent literal meaning	41	21
Integrate and generate inferences	62	31
Assessing quality and credibility	8	4
Reflecting on content and form	30	15
Multiple text		
Searching for and selecting relevant text	19	10
Corroborating/handling conflict	16	8
Text type		
Argumentative	35	18
Description	26	13
Exposition	59	30
Instruction	9	5
Multiple	19	10
Narrative	24	12
Transactional	25	13
Text format		
Continuous	123	62
Non-continuous	19	10
Mixed	55	28
Text structure		
Single	66	34
Multiple	131	66
Situations		
Educational	43	22
Multiple	5	3
Occupational	22	11
Personal	35	18
Public	92	47

Note: due to rounding, some percentages may not match to totals in the text.
This relates to all tables and graphs in this chapter. See the Reader's guide for more information.

Item response formats

Table E.4 shows the number and proportion of item response formats used in PISA 2022.

TABLE E.4 Distribution of the item response formats by assessment domain

Item format	Mathematical literacy		Scientific literacy		Reading literacy	
	No.	%	No.	%	No.	%
Multiple choice						
Simple	98	42	33	29	104	53
Complex	49	21	47	41	49	14
Constructed response						
Closed (computer scored)	52	22	3	3	2	1
Open (human coded)	35	15	32	28	35	32

F Appendix F: Sample mathematical, scientific and reading literacy items and responses

Following each cycle of PISA, a number of items are released into the public domain by the OECD (OECD, 2018; OECD, 2019c). These items are replaced with newly created ones which undergo an extensive field trial process to ensure they have similar levels of difficulty as the released items. A selection of example items and responses are provided to show the type of assessment items included in PISA and to illustrate the range of assessment tasks students encounter as a means of assessing their performance in mathematical, scientific and reading literacy.

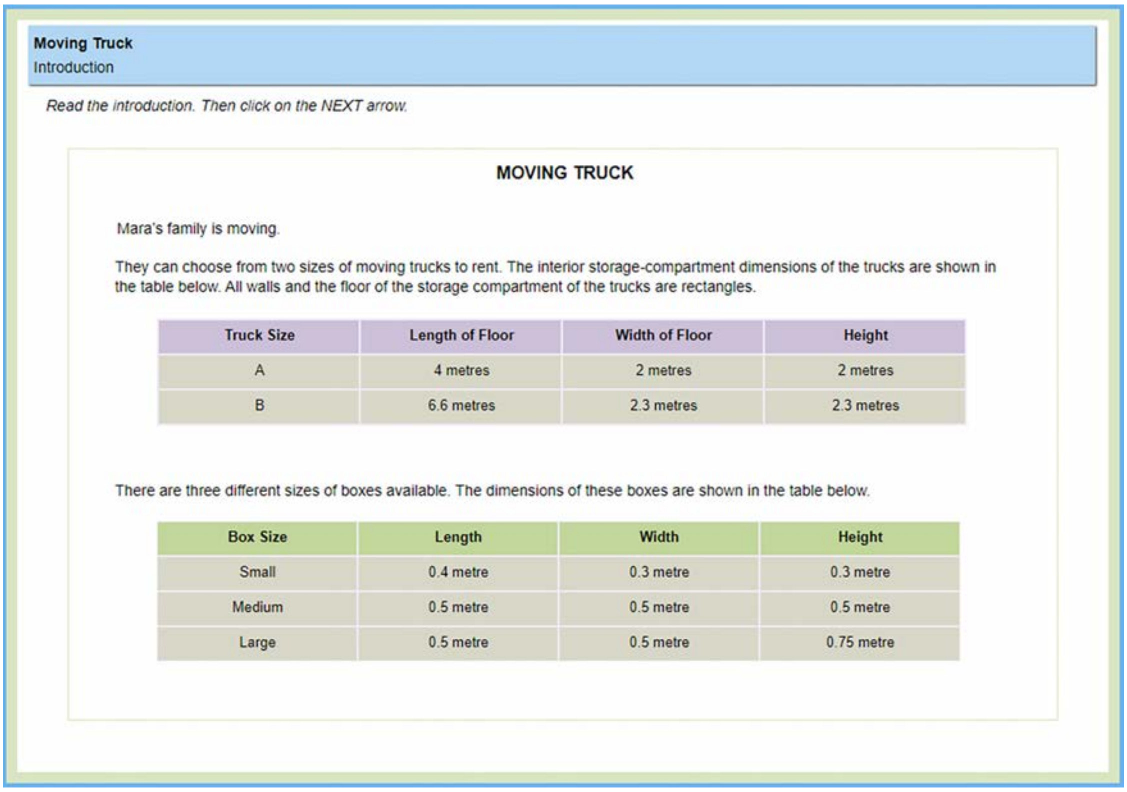
Details about the item format, the competency being assessed, and difficulty of the item have been presented for this selection of items.

Mathematical literacy

Moving Truck – Item 1

Item type:	Simple Multiple-choice – Computer Scored
Competency:	Space and Shape
Difficulty:	Proficiency Level 2

This is the introduction screen for the unit Moving Truck, which provides students with some background information on the context of the unit – a family moving – and shows the interior dimensions of the storage compartment in the different moving trucks that can be rented, as well as the dimensions of the 3 different size boxes that are available. The introduction also notes that all the interior surfaces of the moving trucks are rectangles.



Moving Truck
Introduction

Read the introduction. Then click on the NEXT arrow.

MOVING TRUCK

Mara's family is moving.

They can choose from two sizes of moving trucks to rent. The interior storage-compartment dimensions of the trucks are shown in the table below. All walls and the floor of the storage compartment of the trucks are rectangles.

Truck Size	Length of Floor	Width of Floor	Height
A	4 metres	2 metres	2 metres
B	6.6 metres	2.3 metres	2.3 metres

There are three different sizes of boxes available. The dimensions of these boxes are shown in the table below.

Box Size	Length	Width	Height
Small	0.4 metre	0.3 metre	0.3 metre
Medium	0.5 metre	0.5 metre	0.5 metre
Large	0.5 metre	0.5 metre	0.75 metre

For the first item in the unit, students are told that the family is going to rent truck A, and they are asked to determine the greatest number of medium-size boxes that can fit inside truck A. The student is required to select a response from 4 options.

Moving Truck
Question 1 / 2

Refer to "Moving Truck" on the right. Click on a choice to answer the question.

Mara's family decides to rent truck A.

What is the greatest number of medium boxes that could fit into truck A?

- ○ 320
- ○ 128
- ○ 26
- ○ 16

MOVING TRUCK

Interior Storage-Compartment Dimensions

Truck Size	Length of Floor	Width of Floor	Height
A	4 metres	2 metres	2 metres

Box Dimensions

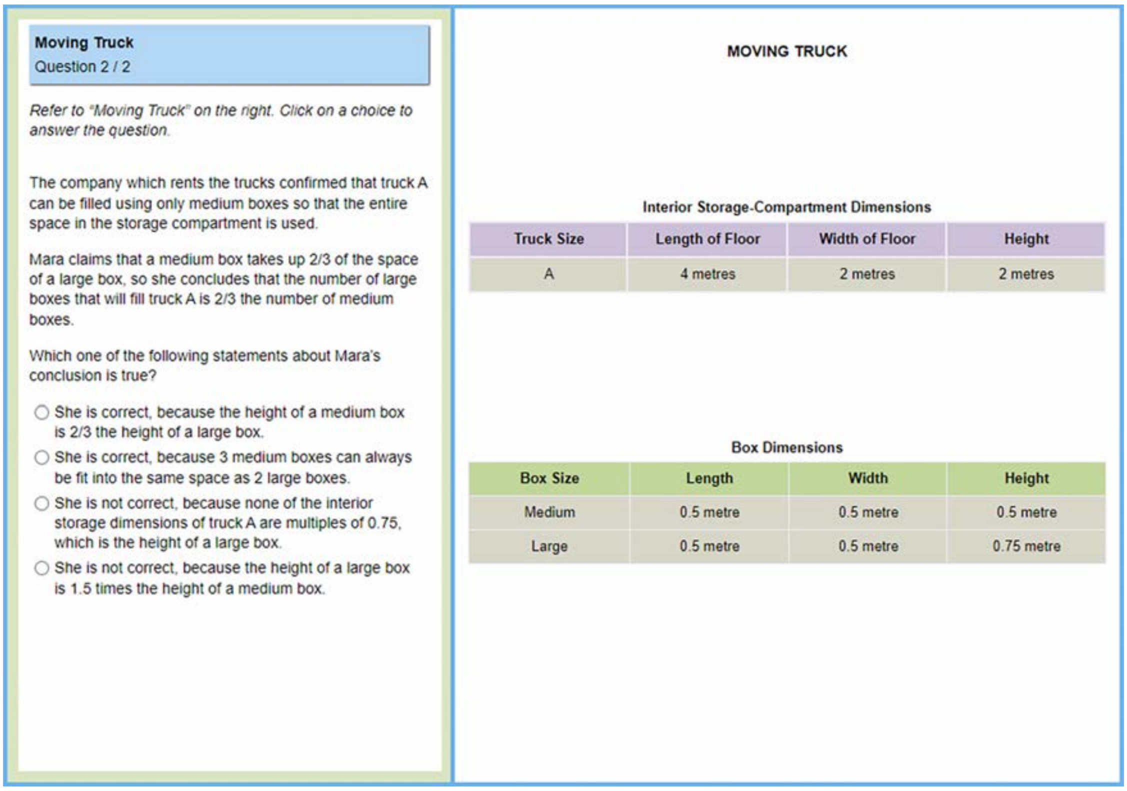
Box Size	Length	Width	Height
Medium	0.5 metre	0.5 metre	0.5 metre

Full credit for this question is achieved by students who select the second option, 128. The truck is tall enough to stack the boxes in 4 layers (2 ÷ 0.5), so the total number of medium-size boxes that can fit in truck A is 8 × 4 × 4 = 128. All other responses do not receive any credit.

Moving Truck – Item 2

Item type:	Simple Multiple-choice – Computer Scored
Competency:	Space and Shape
Difficulty:	Proficiency Level 6

For the second item in this unit, the dimensions of the large box have been added to the table, and students are presented with a claim about how many large boxes might be able to fit inside truck A, which is based on a comparison of the volume of the medium boxes to the volume of the large boxes. Students then have to analyse 4 statements related to the claim to identify which statement is true. This is a very difficult item as some of the statements are true with respect to the dimensions of the boxes or the volumes, but they do not actually support the claim that was made with regards to the truck.



Moving Truck
Question 2 / 2

Refer to "Moving Truck" on the right. Click on a choice to answer the question.

The company which rents the trucks confirmed that truck A can be filled using only medium boxes so that the entire space in the storage compartment is used.

Mara claims that a medium box takes up 2/3 of the space of a large box, so she concludes that the number of large boxes that will fill truck A is 2/3 the number of medium boxes.

Which one of the following statements about Mara's conclusion is true?

- She is correct, because the height of a medium box is 2/3 the height of a large box.
- She is correct, because 3 medium boxes can always be fit into the same space as 2 large boxes.
- She is not correct, because none of the interior storage dimensions of truck A are multiples of 0.75, which is the height of a large box.
- She is not correct, because the height of a large box is 1.5 times the height of a medium box.

MOVING TRUCK

Interior Storage-Compartment Dimensions

Truck Size	Length of Floor	Width of Floor	Height
A	4 metres	2 metres	2 metres

Box Dimensions

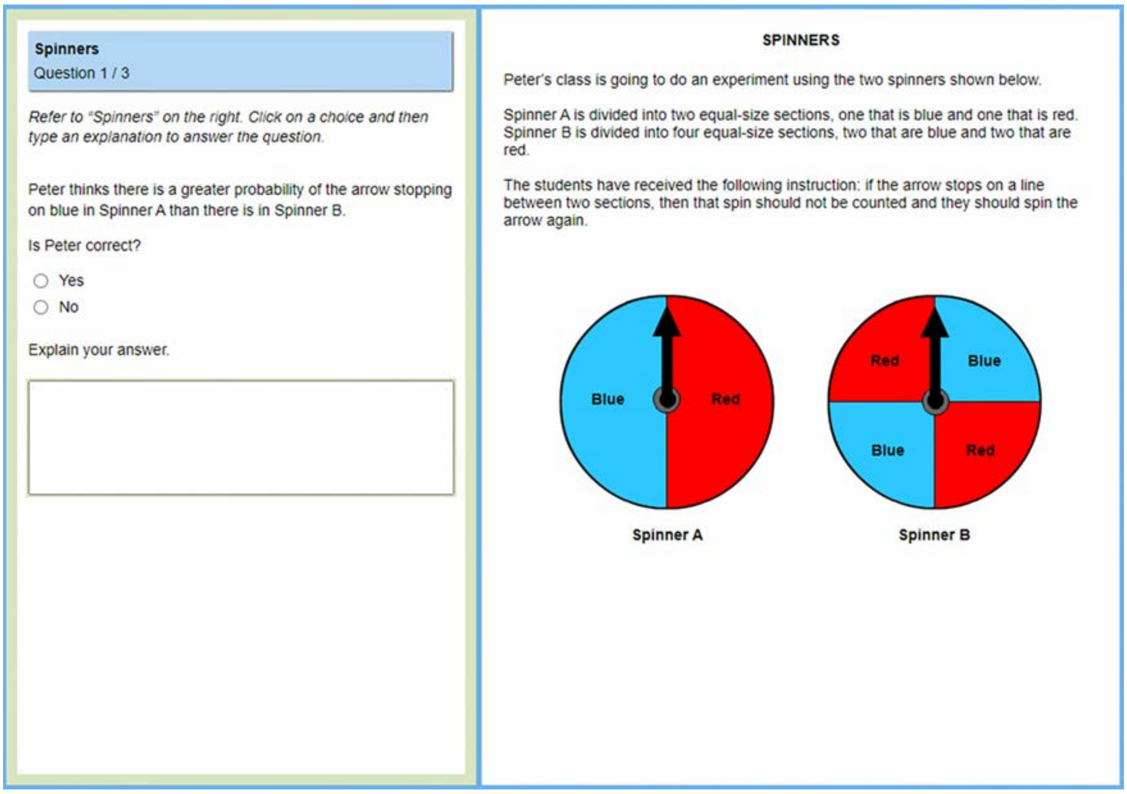
Box Size	Length	Width	Height
Medium	0.5 metre	0.5 metre	0.5 metre
Large	0.5 metre	0.5 metre	0.75 metre

Full credit for this question is achieved by students who select the third statement. The number of large boxes that can be packed in truck A can vary depending on how the boxes are arranged. All other responses do not receive any credit.

Spinners – Item 1

Item type:	Open Response – Human Coded
Competency:	Uncertainty and Data
Difficulty:	Proficiency Level 3 (full credit) Proficiency Level 3 (partial credit)

This is the first item in the unit Spinners. There is no introduction screen before this item. For this task, students are presented with 2 spinners that a class are using and asked to determine if a person's claim is correct that there is a greater chance of the arrow stopping on a blue section in Spinner A than there is of the arrow stopping on a blue section in Spinner B.



Examples of responses provided by students

Full Credit

Code 2: Selects No and explanation recognises that in each spinner the probability of the arrow stopping on blue is the same or that the area that is blue is the same.

- [No] The probability of stopping on blue is the same in each spinner.
- [No] In each spinner half the circle is blue.
- [No] it is equal.
- [No] Because $\frac{1}{2} = \frac{2}{4}$
- He is not correct because the probability is the same for each spinner.

Partial Credit

Code 1: Selects Yes but provides an acceptable explanation in support of No.

- [Yes] The probability of stopping on blue is the same in each spinner.
- [Yes] Because $\frac{1}{2} = \frac{2}{4}$

No Credit

Code 0: Other responses, including selecting Yes or No but giving an incorrect explanation or without giving an explanation.

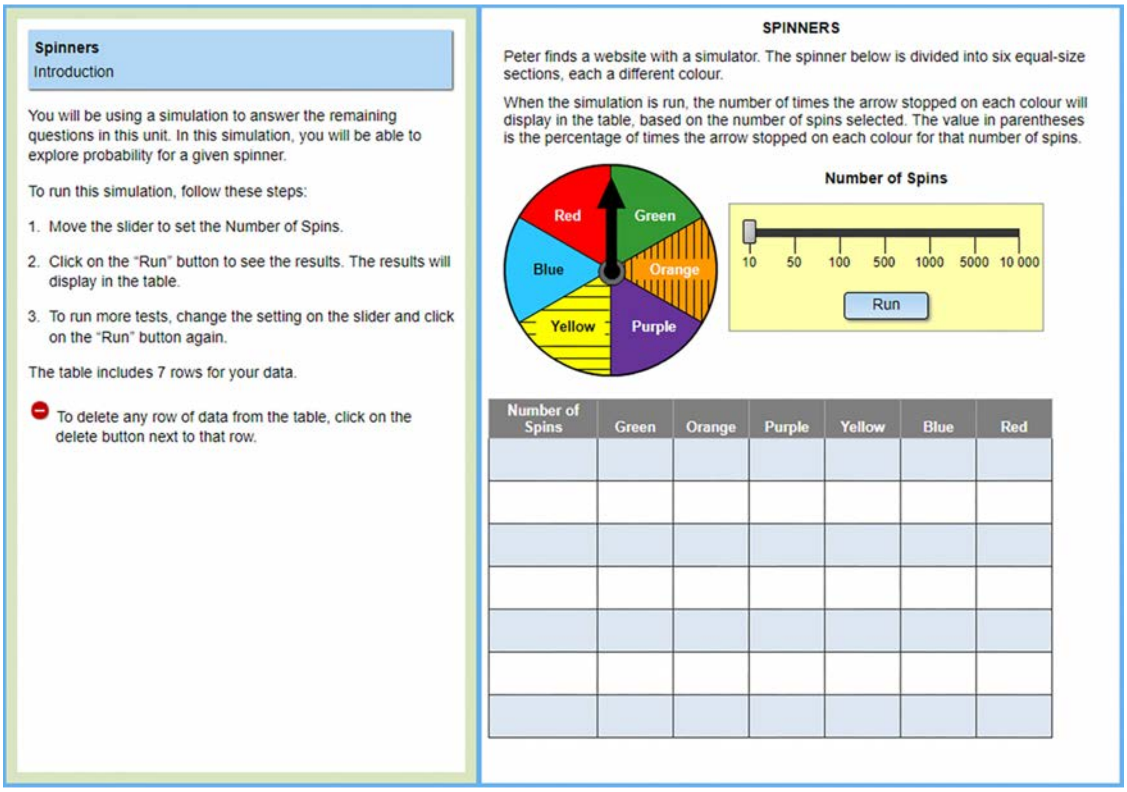
- [No] There is an equal probability of it stopping on red or blue.
- [No].
- [Yes] Because the blue area in Spinner A is greater than in Spinner B.

Code 9: Missing

This introduction/practice screen in the unit Spinners appears after the first item. The next 2 items are both interactive, and students need to use the simulator to generate data (that is, the number of times the arrow stops on each colour, and the percentage of times the arrow stops on each colour for that number of spins), which they will have to use to help them respond to the items.

Spinners – Item 2

Item type:	Open Response – Human Coded
Competency:	Uncertainty and Data
Difficulty:	Proficiency Level 5 (full credit) Proficiency Level 5 (partial credit)



The second item is based on the spinner that is shown in this introduction screen (that is, 6 equal-size sections that are each a different colour).

In this unit, students are asked to compare the percentage of times the arrow stops in each section versus the theoretical probability of 1/6, as the number of spins increases. In the image above, data were generated for each of the 7 possible numbers of spins for illustrative purposes, but this is not necessarily how students will use the simulator for this item or the results they will see. Regardless of how students use the simulator, the central concept here is that as the number of spins increases, the percentage of times that the arrow stops on each colour gets much closer to the theoretical probability. That is, $1/6 \approx 16.67$, and with many spins, the percentage of times that the arrow stops on each colour is generally between 16% and 17%.

Spinners
Question 2 / 3

▸ **How to Run the Simulation**

Refer to "Spinners" on the right. Use the simulator to help you answer the question below. Type your answer to the question.

The theoretical probability that the arrow will stop on any one of the six colours in the spinner shown to the right is $\frac{1}{6}$.

As the number of spins increases, how does the percentage of times that the arrow stops on each colour relate to the theoretical probability?

Explain your answer.

SPINNERS

Peter finds a website with a simulator. The spinner below is divided into six equal-size sections, each a different colour.

When the simulation is run, the number of times the arrow stopped on each colour will display in the table, based on the number of spins selected. The value in parentheses is the percentage of times the arrow stopped on each colour for that number of spins.

Number of Spins

10 50 100 500 1000 5000 10 000

Run

Number of Spins	Green	Orange	Purple	Yellow	Blue	Red
10	1 (10.00%)	3 (30.00%)	3 (30.00%)	1 (10.00%)	1 (10.00%)	1 (10.00%)
50	5 (10.00%)	6 (12.00%)	10 (20.00%)	10 (20.00%)	9 (18.00%)	10 (20.00%)
100	22 (22.00%)	11 (11.00%)	15 (15.00%)	17 (17.00%)	19 (19.00%)	16 (16.00%)
500	88 (17.60%)	92 (18.40%)	79 (15.80%)	67 (13.40%)	83 (16.60%)	91 (18.20%)
1000	161 (16.10%)	165 (16.50%)	167 (16.70%)	172 (17.20%)	174 (17.40%)	161 (16.10%)
5000	821 (16.42%)	805 (16.10%)	856 (17.12%)	851 (17.02%)	855 (17.10%)	812 (16.24%)
10000	1673 (16.73%)	1631 (16.31%)	1691 (16.91%)	1725 (17.25%)	1602 (16.02%)	1678 (16.78%)

Examples of responses provided by students

Full Credit

Code 2: Explanation addresses the idea that as the number of spins increases, the percentage more closely approximates the theoretical probability.

- The percentage gets closer and closer to $\frac{1}{6}$ for each colour.
- With 10,000 spins the percentages are all about 16-17%, which is close to the theoretical probability of 16.667%.
- As the number of spins increases, the percentage for each colour gets closer to the theoretical possibility.

Partial Credit

Code 1: Explanation address the idea that as the number of spins increases, the percentage for each colour is approximately the same OR provides an acceptable explanation based on an incorrect theoretical probability.

- The percentages get closer to each other as the number of spins increases.
- They are all around 16% or 17%.
- The percentage gets closer and closer to $\frac{1}{5}$ for each colour.

No Credit

Code 0: Other responses.

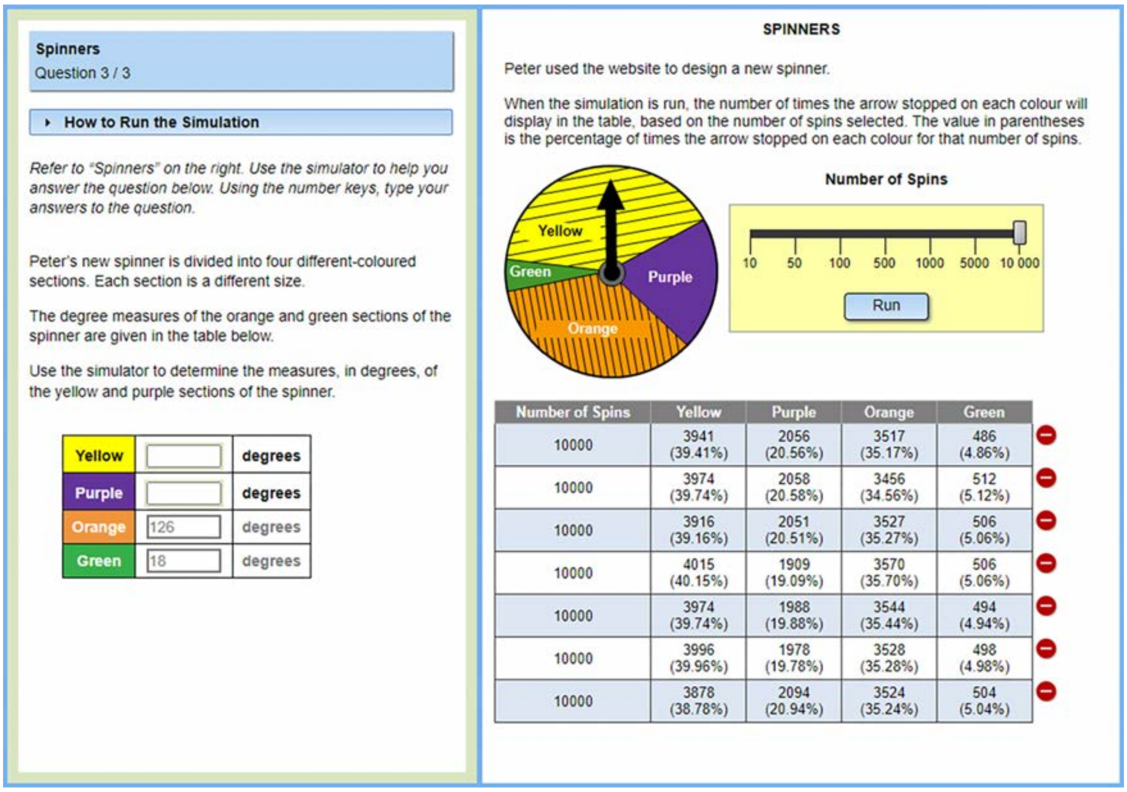
- Because $\frac{1}{6}$ is about 16.67%.

Code 9: Missing

Spinners – Item 3

Item type:	Open Response – Computer Scored
Competency:	Interpret/Evaluate
Difficulty:	Proficiency Level 5 (full credit) Proficiency Level 4 (partial credit)

Item 3, which presents a new spinner that has 4 sections that are each a different size. Students are asked to use the simulator to determine the angle measure of the yellow and the purple sections of this spinner. Two of the angle measures are included in the table already. This is done to reduce the amount of time students will have to spend responding to the item, as well as to provide some guidance to students. That is, students that may not know how to respond to this item, can generate some data and use the 2 known angle measures to explore how the data can be used to determine an angle measure.



Number of Spins	Yellow	Purple	Orange	Green
10000	3941 (39.41%)	2056 (20.56%)	3517 (35.17%)	486 (4.86%)
10000	3974 (39.74%)	2058 (20.58%)	3456 (34.56%)	512 (5.12%)
10000	3916 (39.16%)	2051 (20.51%)	3527 (35.27%)	506 (5.06%)
10000	4015 (40.15%)	1909 (19.09%)	3570 (35.70%)	506 (5.06%)
10000	3974 (39.74%)	1988 (19.88%)	3544 (35.44%)	494 (4.94%)
10000	3996 (39.96%)	1978 (19.78%)	3528 (35.28%)	498 (4.98%)
10000	3878 (38.78%)	2094 (20.94%)	3524 (35.24%)	504 (5.04%)

Examples of responses provided by students

Full Credit

Code 2:
- Yellow = 144° [accept answer from 140 through 148]
- Purple = 72° [accept answers from 68 through 76]

Partial Credit

Code 1:
- Acceptable value for yellow only, or
- Acceptable value for purple only, or
- Reverses responses: Yellow = 68 through 76, Purple = from 10 through 148.

No Credit

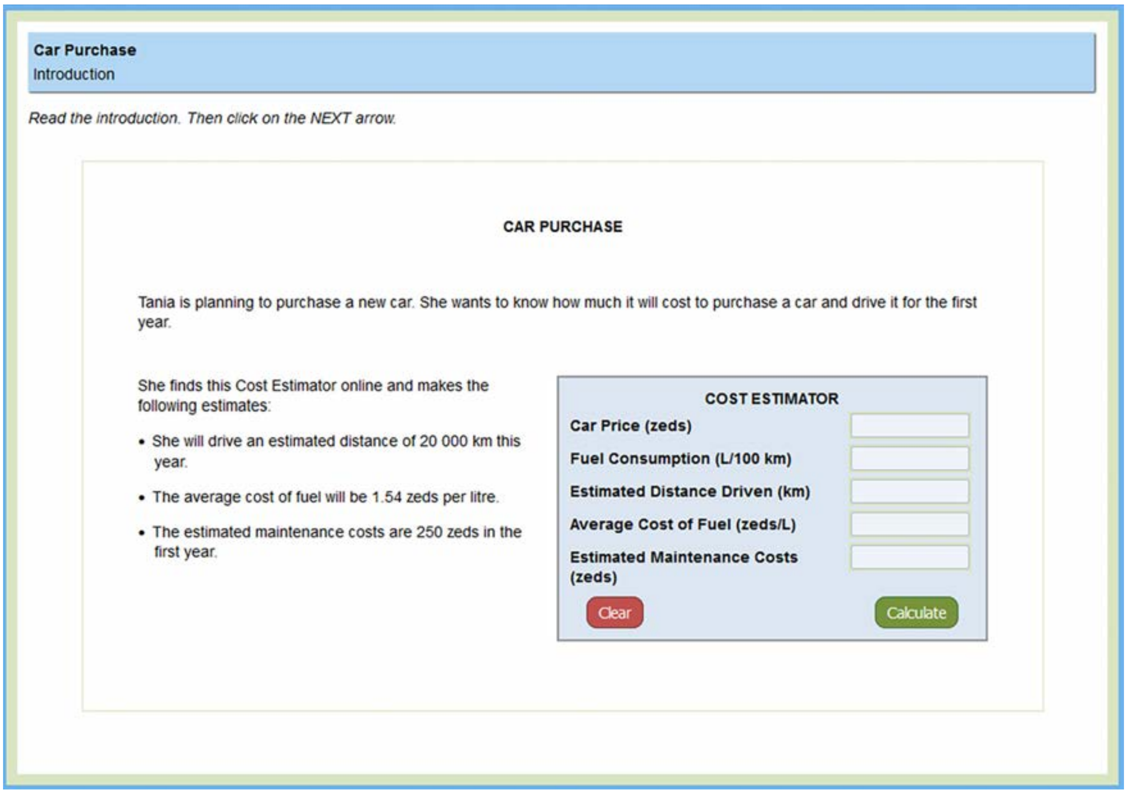
Code 0: Other responses.

Code 9: Missing

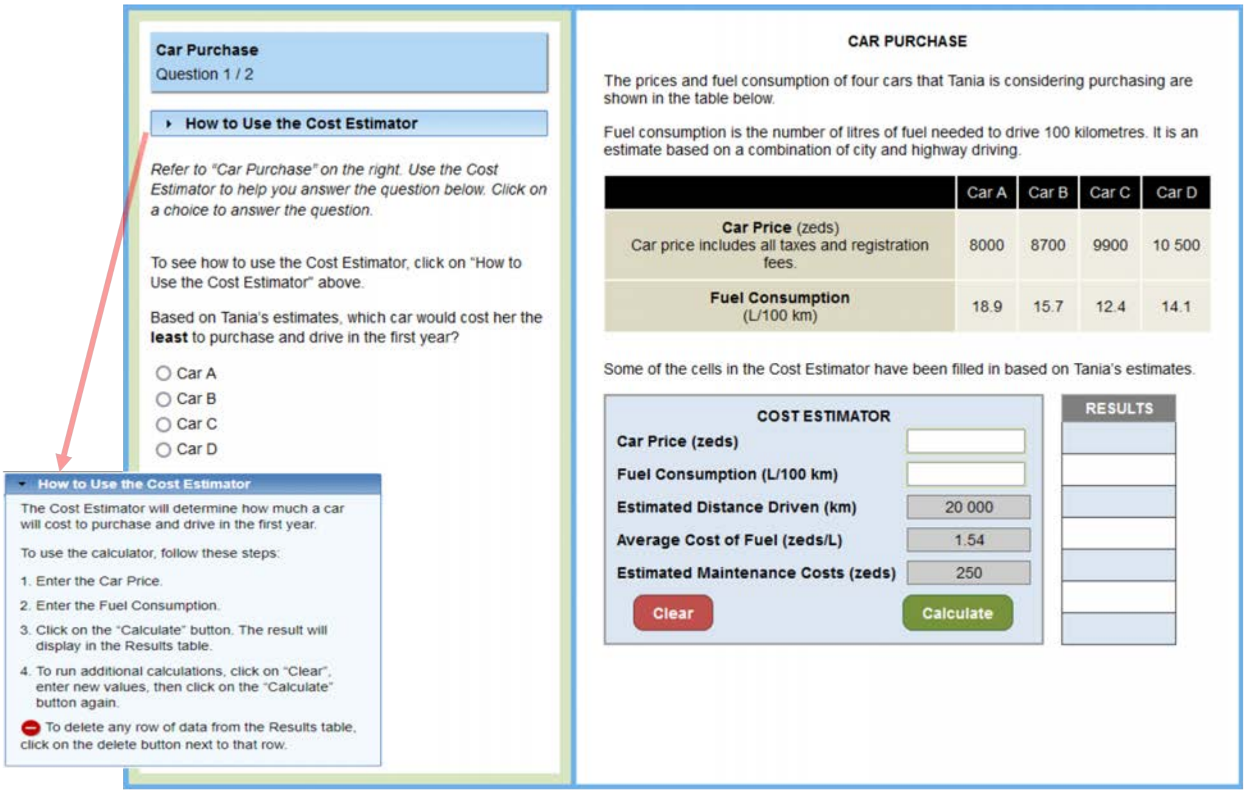
Car Purchase – Item 1

Item type:	Simple Multiple-choice – Computer Scored
Competency:	Quantity
Difficulty:	Proficiency Level 2

This unit is reflective of a real-world situation a person might find themselves in when preparing to make a large purchase, so they might look online for information to assist them in making their decision.



For this item, students need to enter the car price and fuel consumption for each car into the cost estimator to determine which of the 4 cars will cost the least in the first year. Instructions for using the tool were available in the left panel. If students clicked on the ‘How to Use the Cost Estimator’ banner, then a box with the instructions would open. Fuel consumption was defined for the students in case they were not familiar with the term, even though an understanding of this concept was not required for responding to this item.


Car Purchase
Question 1 / 2

How to Use the Cost Estimator

Refer to "Car Purchase" on the right. Use the Cost Estimator to help you answer the question below. Click on a choice to answer the question.

To see how to use the Cost Estimator, click on "How to Use the Cost Estimator" above.

Based on Tania's estimates, which car would cost her the **least** to purchase and drive in the first year?

- Car A
- Car B
- Car C
- Car D

How to Use the Cost Estimator

The Cost Estimator will determine how much a car will cost to purchase and drive in the first year.

To use the calculator, follow these steps:

1. Enter the Car Price.
2. Enter the Fuel Consumption.
3. Click on the "Calculate" button. The result will display in the Results table.
4. To run additional calculations, click on "Clear", enter new values, then click on the "Calculate" button again.

To delete any row of data from the Results table, click on the delete button next to that row.

CAR PURCHASE

The prices and fuel consumption of four cars that Tania is considering purchasing are shown in the table below.

Fuel consumption is the number of litres of fuel needed to drive 100 kilometres. It is an estimate based on a combination of city and highway driving.

	Car A	Car B	Car C	Car D
Car Price (zeds) Car price includes all taxes and registration fees.	8000	8700	9900	10 500
Fuel Consumption (L/100 km)	18.9	15.7	12.4	14.1

Some of the cells in the Cost Estimator have been filled in based on Tania's estimates.

COST ESTIMATOR

Car Price (zeds)	
Fuel Consumption (L/100 km)	
Estimated Distance Driven (km)	20 000
Average Cost of Fuel (zeds/L)	1.54
Estimated Maintenance Costs (zeds)	250

Clear Calculate

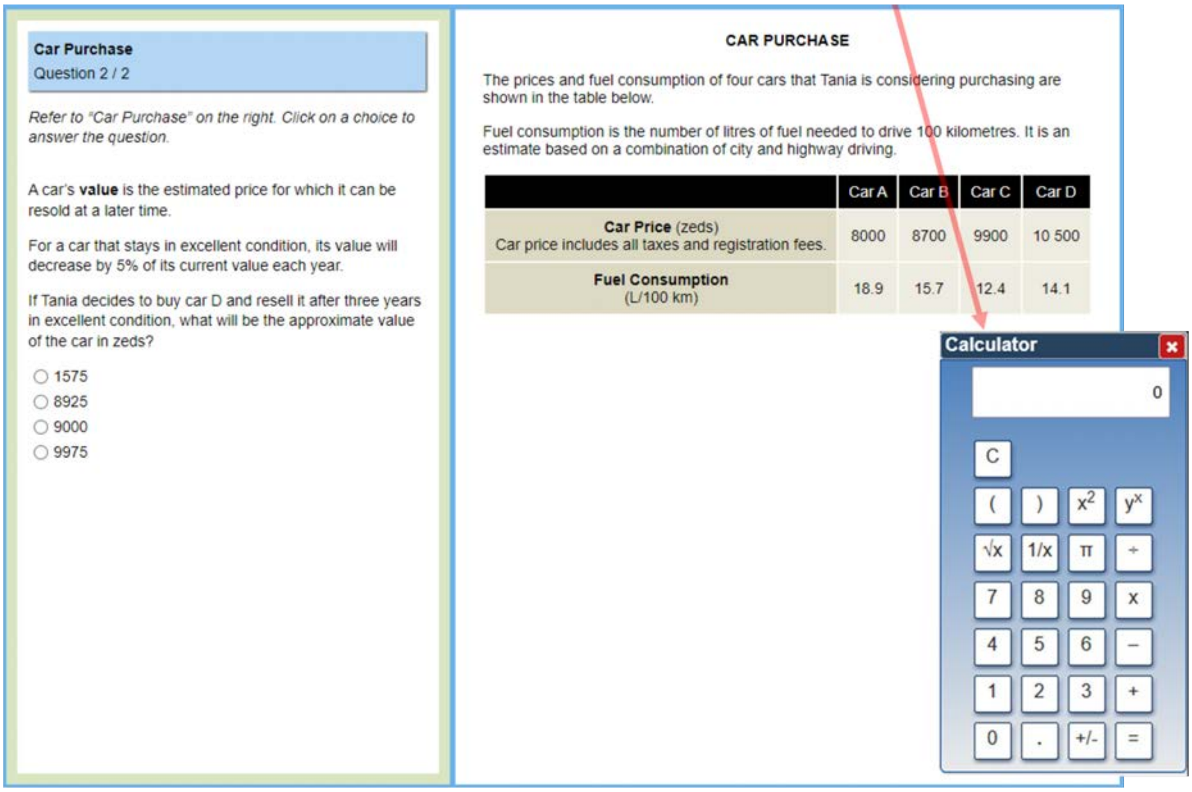
RESULTS

To receive credit for this item, the student after using the tool, sees that Car B (at 13, 785.60 zeds) will cost the least to purchase and drive/maintain in the first year.

Car Purchase – Item 2

Item type:	Simple Multiple-choice – Computer Scored
Competency:	Change and Relationships
Difficulty:	Proficiency Level 6

The second item in this unit explores non-linear behaviour (specifically, exponential decay) to determine the approximate value of car D after 3 years of ownership. Using the given information that a car in excellent condition loses 5% of its value each year, students had to decide on a process to employ to determine how much the car would be worth after 3 years.

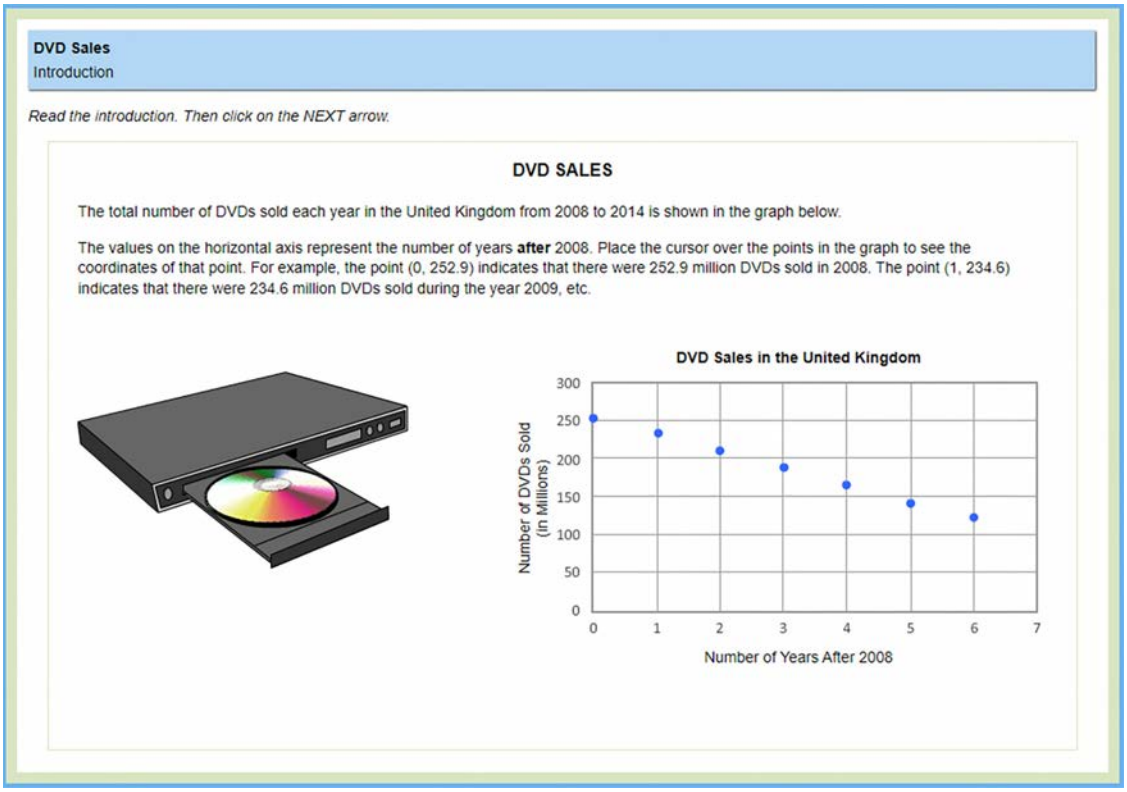


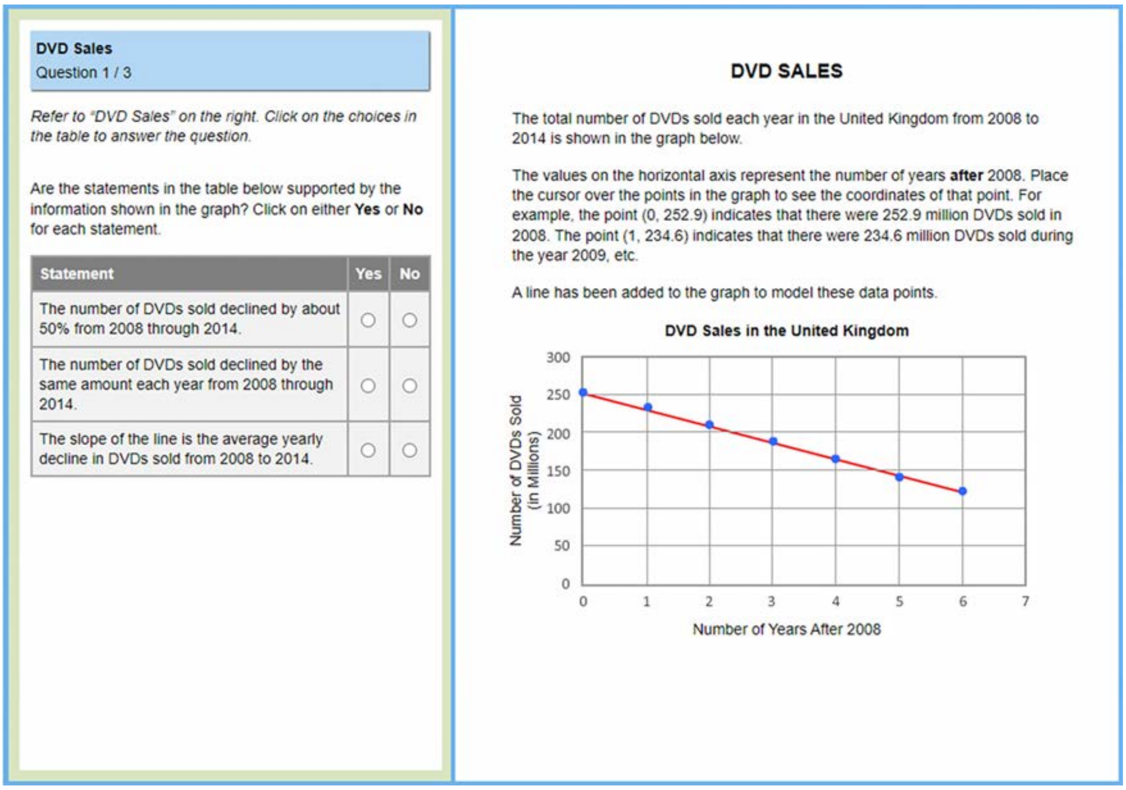
To receive credit for this item, the student using the given information that a car in excellent condition loses 5% of its value each year, would calculate car D would be worth about 9002.44 zeds after 3 years, so the correct answer to this item is 9000.

DVD Sales – Item 1

Item type:	Complex multiple-choice –– Computer Scored
Competency:	Uncertainty and Data
Difficulty:	Proficiency Level 4 (full credit) Proficiency Level 1a (partial credit)

For the first item in this unit, students see a table containing 3 statements about DVD sales in the United Kingdom for the years 2008 through 2014, and they have to decide whether each statement is supported by the information shown in the graph.





DVD Sales
Question 1 / 3

Refer to "DVD Sales" on the right. Click on the choices in the table to answer the question.

Are the statements in the table below supported by the information shown in the graph? Click on either **Yes** or **No** for each statement.

Statement	Yes	No
The number of DVDs sold declined by about 50% from 2008 through 2014.	○	○
The number of DVDs sold declined by the same amount each year from 2008 through 2014.	○	○
The slope of the line is the average yearly decline in DVDs sold from 2008 to 2014.	○	○

DVD SALES

The total number of DVDs sold each year in the United Kingdom from 2008 to 2014 is shown in the graph below.

The values on the horizontal axis represent the number of years **after** 2008. Place the cursor over the points in the graph to see the coordinates of that point. For example, the point (0, 252.9) indicates that there were 252.9 million DVDs sold in 2008. The point (1, 234.6) indicates that there were 234.6 million DVDs sold during the year 2009, etc.

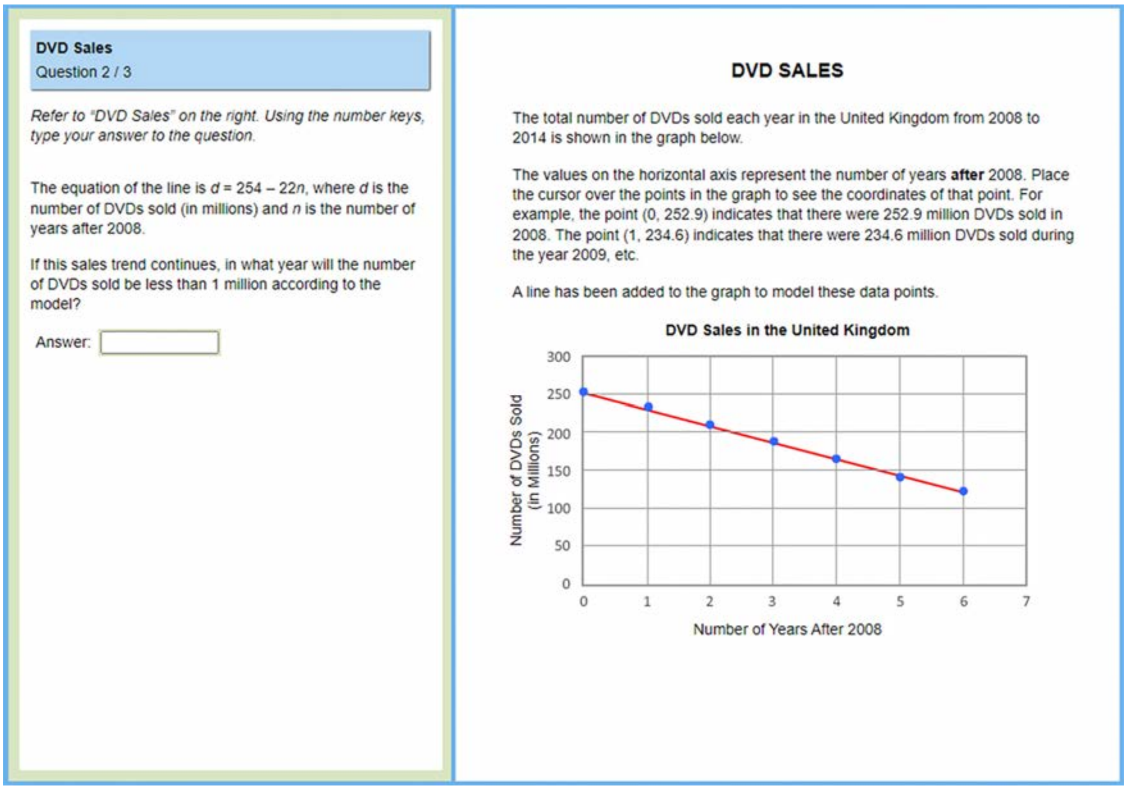
A line has been added to the graph to model these data points.

Full credit for this item is achieved by students who select from the top row to bottom row: Yes, No, Yes. A student achieves partial credit if they select 2 correct responses out of the 3.

DVD Sales – Item 2

Item type:	Open responses – Computer Scored
Competency:	Change and Relationships
Difficulty:	Proficiency Level 6 (full credit) Proficiency Level 5 (partial credit)

For the second item in this unit, students are given the equation of the linear model and asked to use the model to estimate in what year the DVD sales first would fall below one million, a data point that is not shown on the graph.

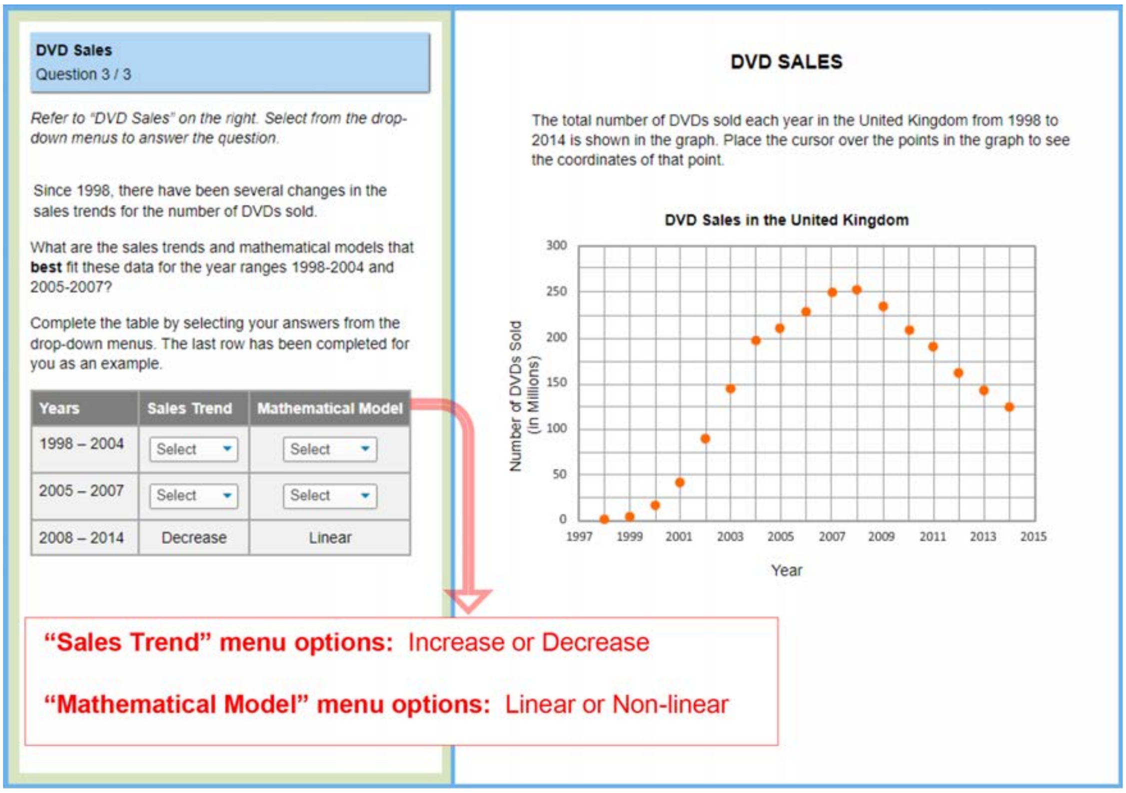


Full credit for this item is achieved by students who calculate 2020. A student achieves partial credit if they calculate 2019 or 11.5.

DVD Sales – Item 3

Item type:	Complex Multiple-choice – Computer Scored
Competency:	Interpret/Evaluate
Difficulty:	Proficiency Level 3 (full credit) Proficiency Level 1a (partial credit)

For the third item in this unit, students are shown a larger data set that shows DVD sales in the United Kingdom from 1998 through 2014. In this item, the independent variable for these data points is the actual year instead of the number of years after 2008. Students are given a table with the data set divided into smaller ranges of years, and they have to identify what type of sales trend (increase or decrease) and what type of mathematical model (linear or non-linear) best represent the data for the years specified.



Full credit for this item is achieved by students who select 1998 – 2004: increase, non-linear, and also select 2005 – 2007: increase, linear. Students achieve partial credit if they make a correct selection only for 1998 – 2004 or a correct selection only for 2005 – 2007, or any 3 selections are correct.

Scientific literacy

Slope-Face Investigation – Item 1

Item type:	Open constructed-response – Human Coded
Competency:	Evaluate and design scientific enquiry
Difficulty:	Proficiency Level 3

This first item requires students to apply epistemic knowledge to explain the design of the investigation presented in this unit. This Level 3 item allows students to demonstrate their understanding of the underlying rationale for the procedure of taking 2 independent measures of the phenomena being investigated. Knowledge of this rationale is the aspect of this question that assesses epistemic knowledge.

SLOPE-FACE INVESTIGATION

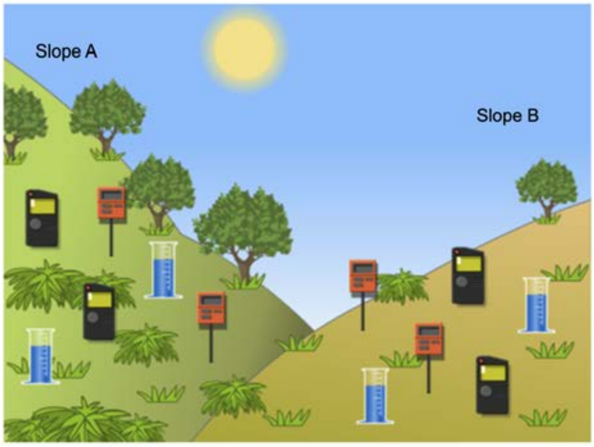
Data Collection

The students place two of each of the following three instruments on each slope, as shown below.

Solar radiation sensor: measures the amount of sunlight, in megajoules per square metre (MJ/m^2)

Soil moisture sensor: measures the amount of water as a percentage of a volume of soil

Rain gauge: measures the amount of rainfall, in millimetres (mm)



Slope-Face Investigation

Question 1

Refer to "Data Collection". Type your answer to the question.

In investigating the difference in vegetation from one slope to the other, why did the students place 2 of each instrument on each slope?

Examples of responses provided by students

Full Credit

Code 1: Gives and explanation that identifies a scientific advantage of using more than one measurement instrument on each slope: for example, correcting for variation of conditions within a slope, increasing the precision of measurement for each slope.

- So they could determine whether a difference between slopes is significant.
- Because there is likely to be variation within a slope.
- To increase the precision of the measurement for each slope.
- The data will be more accurate.
- In case one of the 2 malfunctions.

No Credit

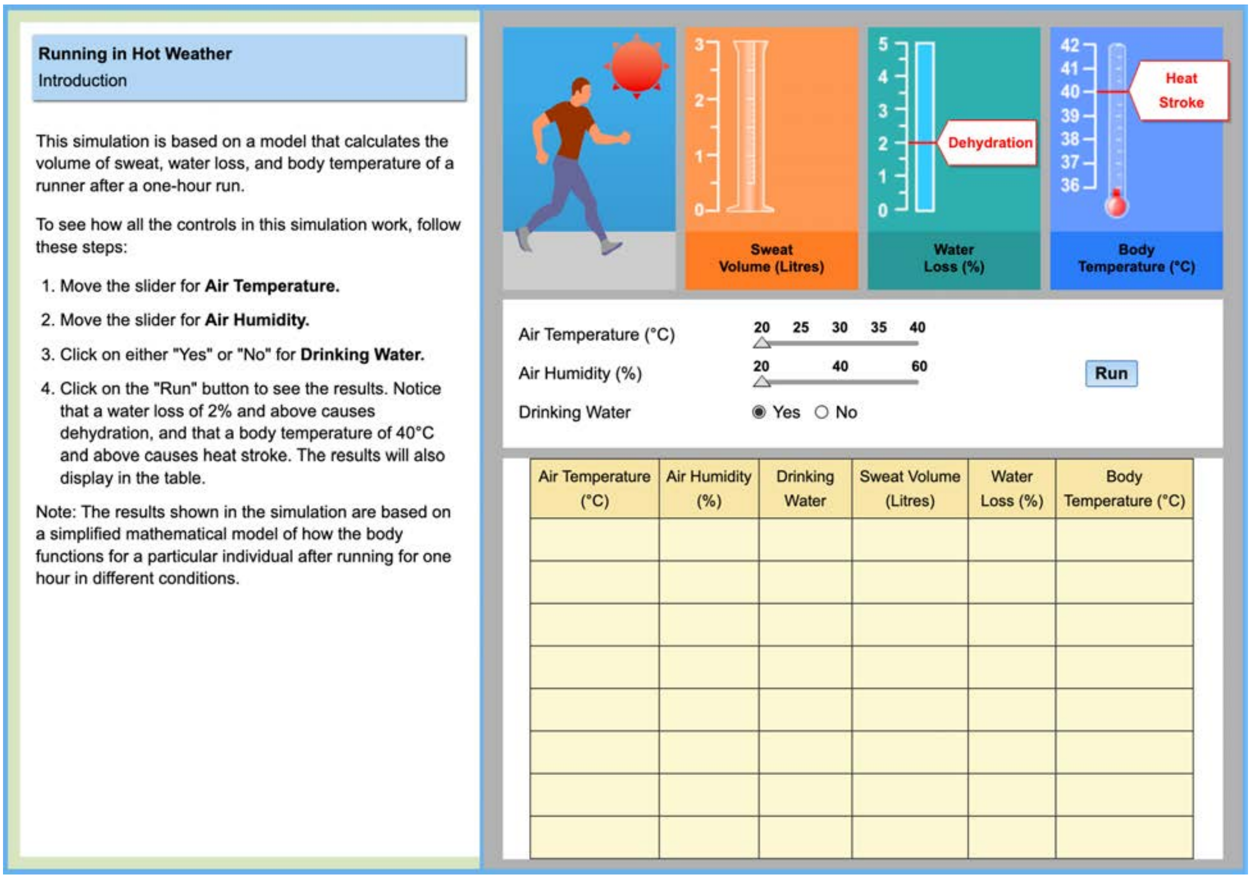
Code 0: Other responses, including responses that simply indicate that more data is better without an explanation of the scientific advantage, and responses that address only why sensors are placed on 2 slopes, but not why 2 of each instrument are placed on each slope.

- Two are better than one.
- The slope might be larger.
- The data will be more equal.
- To be sure that a fair test is carried out.

Running in Hot Weather – Item 4

Item type:	Open constructed-response – Human Coded
Competency:	Interpret data and evidence scientifically
Difficulty:	Proficiency Level 3

In this item, students are provided with the specific values for each of the variables in the simulation. They must set the controls as specified and run the simulation once. A red flag is displayed indicating that, under these conditions, the runner would suffer from water loss leading to dehydration. This is the easiest item in the unit, requiring students to carry out a straightforward procedure, identify the flagged condition in the display as shown below, and interpret the display to correctly identify water loss as the cause of the runner's dehydration.



Running in Hot Weather

Question 4

When the air humidity is 65%, what is the effect of an increase in air temperature on sweat volume after a one-hour run?

- Select 2 rows of data in the table to support your answer.

What is the biological reason for this effect?

Examples of responses provided by students

Note: The computer will separately score 0 or 1 for the selection and the rows of data.

Full Credit

Code 1: Indicates or implies the function of sweat in cooling the body and/or regulating body temperature.

- Sweat evaporates to cool the body when temperatures are high.
- Increasing sweat levels in high temperature keeps the body from getting too hot.
- Sweating helps maintain body temperature..

No Credit

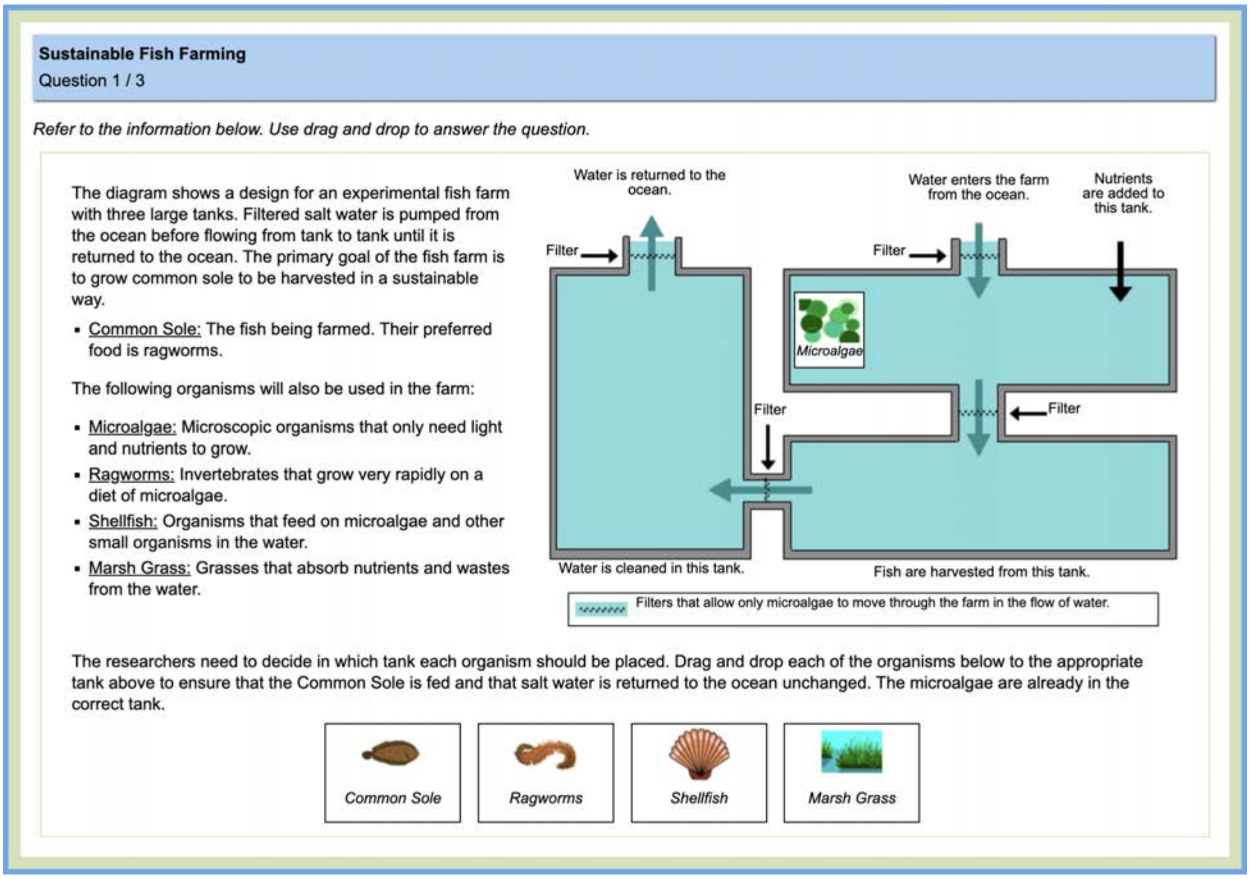
Code 0: Other responses.

- Our body is made this way.
- Sweat is telling you to slow down.

Sustainable Fish Farming – Item 1

Item type:	Complex Multiple-choice – Computer Scored
Competency:	Explain phenomena scientifically
Difficulty:	Proficiency Level 6

This item requires students to understand a system and the role of several organisms within that system. In order to answer correctly, students must understand the goal of the fish farm, the function of each of the 3 tanks therein, and which organisms will best fulfil each function. Students must use information provided in the stimulus and the diagram, including a footnote under the diagram. An additional component that adds difficulty is the open-ended nature of the task. Any of the 4 organisms can be placed in any of the 3 tanks and there is no restriction on the number of organisms in each tank. As a result, there are multiple ways of getting this item incorrect.



Examples of responses provided by students

Note: The computer scores this item.

Full Credit

Code 1: • Ragworms and Common Sole dragged into Tank 2 (bottom right) and Marsh Grass and Shell fish dragged into Tank 3 (Left).

No Credit

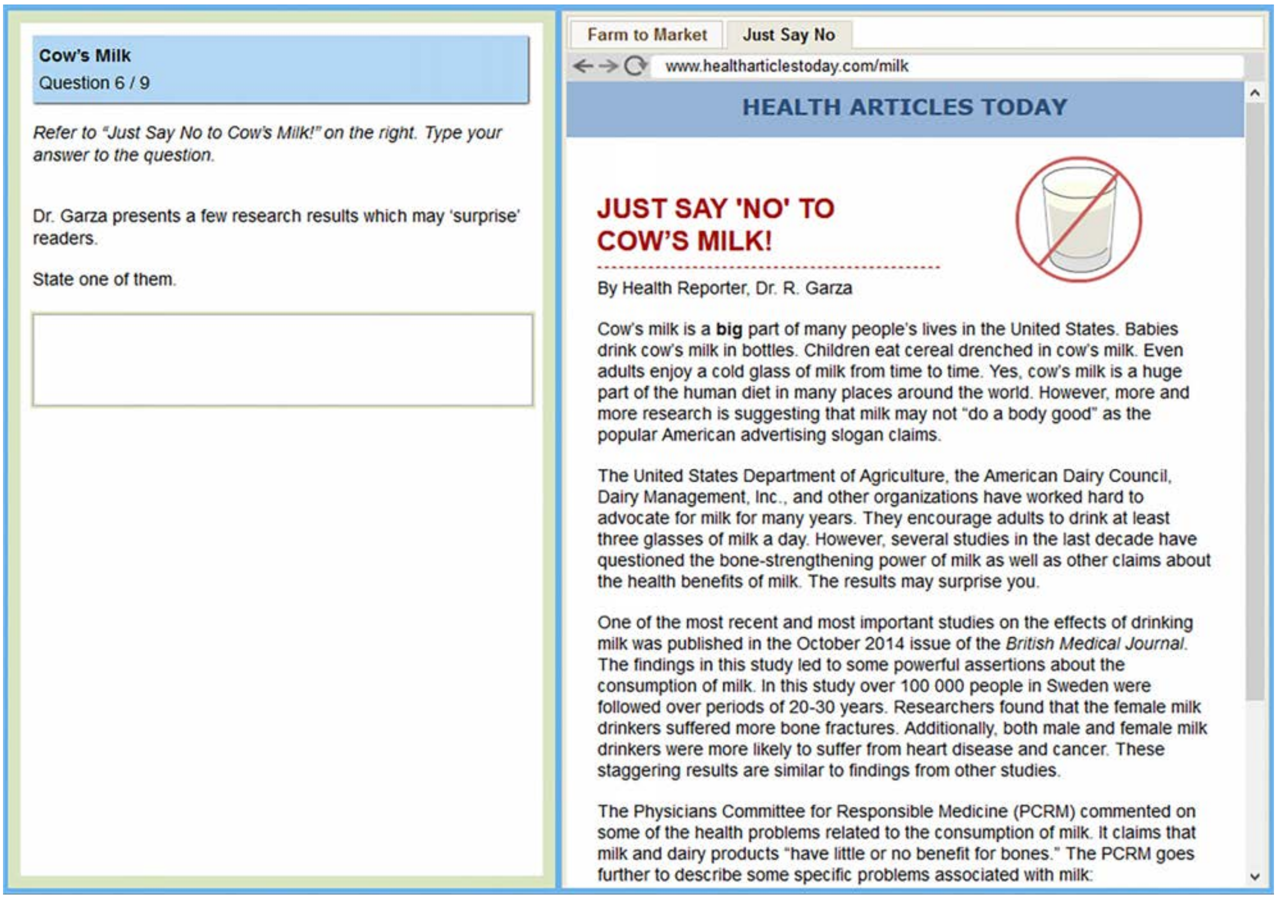
Code 0: • Organisms have been placed in Tank 2 and 3 other than described above.

Reading literacy

Cow's Milk – Item 6

Item type:	Open Response – Human Coded
Competency:	Represent literal meaning
Difficulty:	Proficiency Level 3

This item asks the student to identify the research results reported in the article and to state one of them. Here, the student needs to represent the literal meaning of information in the article by identifying one of the findings and providing it.



Cow's Milk
Question 6 / 9

Refer to "Just Say No to Cow's Milk!" on the right. Type your answer to the question.

Dr. Garza presents a few research results which may 'surprise' readers.

State one of them.

Farm to Market | Just Say No

www.healtharticlestoday.com/milk

HEALTH ARTICLES TODAY

JUST SAY 'NO' TO COW'S MILK!

By Health Reporter, Dr. R. Garza

Cow's milk is a **big** part of many people's lives in the United States. Babies drink cow's milk in bottles. Children eat cereal drenched in cow's milk. Even adults enjoy a cold glass of milk from time to time. Yes, cow's milk is a huge part of the human diet in many places around the world. However, more and more research is suggesting that milk may not "do a body good" as the popular American advertising slogan claims.

The United States Department of Agriculture, the American Dairy Council, Dairy Management, Inc., and other organizations have worked hard to advocate for milk for many years. They encourage adults to drink at least three glasses of milk a day. However, several studies in the last decade have questioned the bone-strengthening power of milk as well as other claims about the health benefits of milk. The results may surprise you.

One of the most recent and most important studies on the effects of drinking milk was published in the October 2014 issue of the *British Medical Journal*. The findings in this study led to some powerful assertions about the consumption of milk. In this study over 100 000 people in Sweden were followed over periods of 20-30 years. Researchers found that the female milk drinkers suffered more bone fractures. Additionally, both male and female milk drinkers were more likely to suffer from heart disease and cancer. These staggering results are similar to findings from other studies.

The Physicians Committee for Responsible Medicine (PCRM) commented on some of the health problems related to the consumption of milk. It claims that milk and dairy products "have little or no benefit for bones." The PCRM goes further to describe some specific problems associated with milk:

Examples of responses provided by students

Full Credit

Code 1: Quotes or paraphrases one of the following research results stated in the text:

1. Female milk drinkers suffered more bone fractures
2. Both male and female milk drinkers were more likely to suffer from heart disease and cancer.

- Women who drank milk had more broken bones.
- People who drank milk had more heart disease and cancer.

No Credit

Code 0: Does not mention one of the research results described in Code 1 description OR given an incorrect, vague, or irrelevant response.

- Milk makes people/children obese.
- Milk is unhealthy.
- People shouldn't drink 3 glasses of milk a day.

Code 9: Missing

Metrotransit – Item 1

Item type:	Open constructed-response – Human Coded
Competency:	Access and retrieve: retrieve information
Difficulty:	Proficiency Level 1

Item 1 in the Metrotransit unit, though relatively simple, includes a complicating element – a key of symbols – the application of which is required to gain full credit for the question reproduced below. This kind of authentic task exemplifies PISA's emphasis on using reading for practical purposes in everyday life. The item requires students to interpret the map key and apply it to the map to determine which station meets the criteria specified in the question. Only one station within the map meets the criteria.

Metrotransit

Question 1

From which Metrotransit station is it possible to take both intercity buses and intercity trains?

Examples of responses provided by students

Full Credit

Code 1: Refers explicitly to Central Station. May mention the line.

- Central Station.
- Central.
- Central (Eastgate)
- Central (Line 1).

No Credit

Code 0: Other responses.

- At the station.
- Tower.
- Line 1.

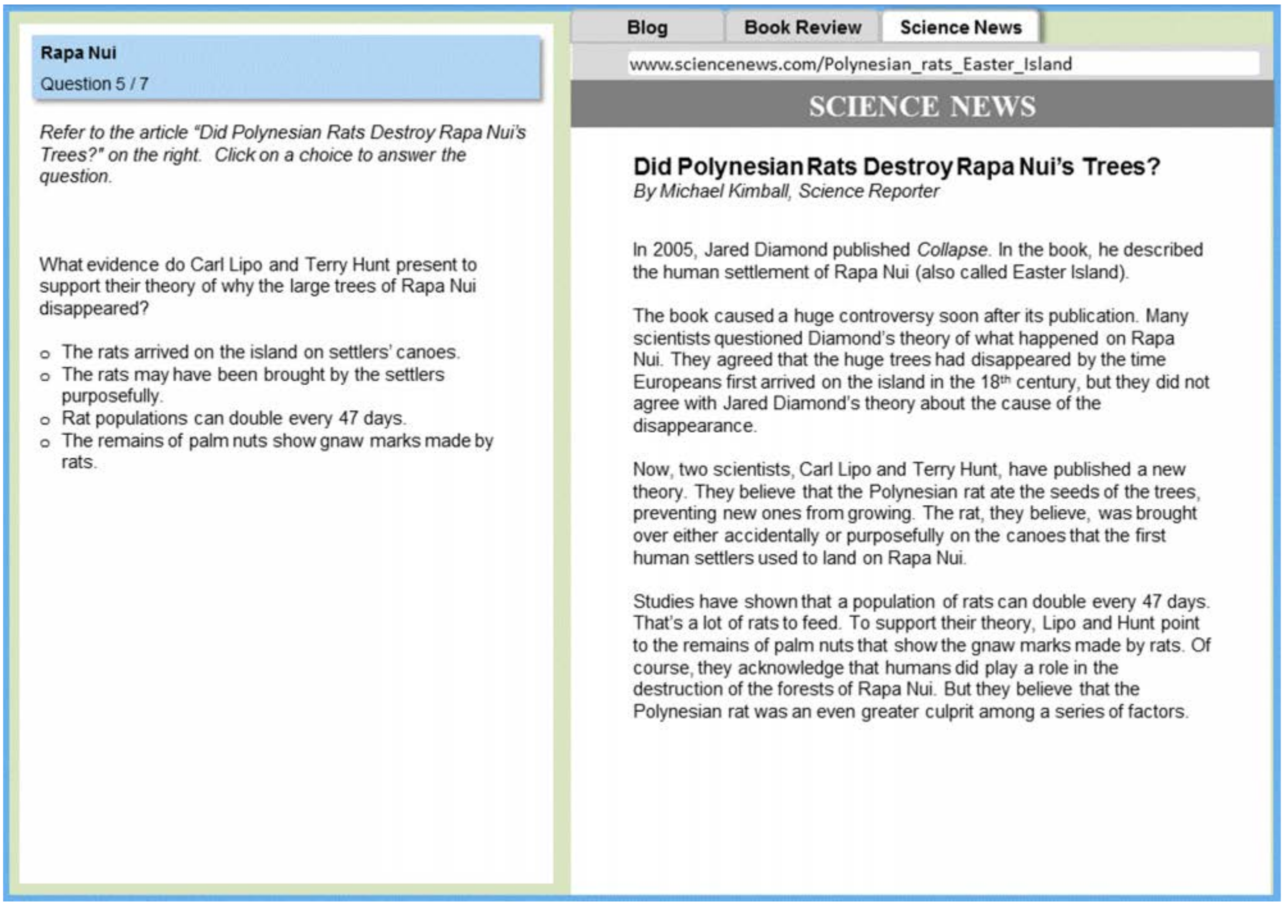
Rapa Nui

In this unit's scenario, the student is preparing to attend a lecture about a professor's field work that was conducted on the island of Rapa Nui. The situation is classified as educational because it represents a student conducting background research on Rapa Nui in preparation for attendance at a lecture.

Rapa Nui – Item 5

Item type:	Simple Multiple-choice – Computer Scored
Competency:	Detect and handle conflict
Difficulty:	Proficiency Level 4

For Item 5, the student is presented with an article from an online science magazine. At this point in the unit, 3 texts are available to the student using a tab structure; the student can click on any tab to toggle back and forth between the texts. The item itself remains fixed on the left side of the screen during any toggling action. In this item, the student is required to locate the section of the article that contains the reference to the scientists and Jared Diamond (paragraph 2) and identify the sentence that contains the information agreed upon. The difficulty of this item is influenced by the existence of plausible (but incorrect) distracting information within the paragraph with respect to human settlement.



Rapa Nui
Question 5 / 7

Refer to the article "Did Polynesian Rats Destroy Rapa Nui's Trees?" on the right. Click on a choice to answer the question.

What evidence do Carl Lipo and Terry Hunt present to support their theory of why the large trees of Rapa Nui disappeared?

- The rats arrived on the island on settlers' canoes.
- The rats may have been brought by the settlers purposefully.
- Rat populations can double every 47 days.
- The remains of palm nuts show gnaw marks made by rats.

Blog | Book Review | Science News

www.sciencenews.com/Polynesian_rats_Easter_Island

SCIENCE NEWS

Did Polynesian Rats Destroy Rapa Nui's Trees?
By Michael Kimball, Science Reporter

In 2005, Jared Diamond published *Collapse*. In the book, he described the human settlement of Rapa Nui (also called Easter Island).

The book caused a huge controversy soon after its publication. Many scientists questioned Diamond's theory of what happened on Rapa Nui. They agreed that the huge trees had disappeared by the time Europeans first arrived on the island in the 18th century, but they did not agree with Jared Diamond's theory about the cause of the disappearance.

Now, two scientists, Carl Lipo and Terry Hunt, have published a new theory. They believe that the Polynesian rat ate the seeds of the trees, preventing new ones from growing. The rat, they believe, was brought over either accidentally or purposefully on the canoes that the first human settlers used to land on Rapa Nui.

Studies have shown that a population of rats can double every 47 days. That's a lot of rats to feed. To support their theory, Lipo and Hunt point to the remains of palm nuts that show the gnaw marks made by rats. Of course, they acknowledge that humans did play a role in the destruction of the forests of Rapa Nui. But they believe that the Polynesian rat was an even greater culprit among a series of factors.

Full credit for this item is achieved by students who select option (D) The remains of palm nuts show gnaw marks made by rats. All other responses do not receive any credit.

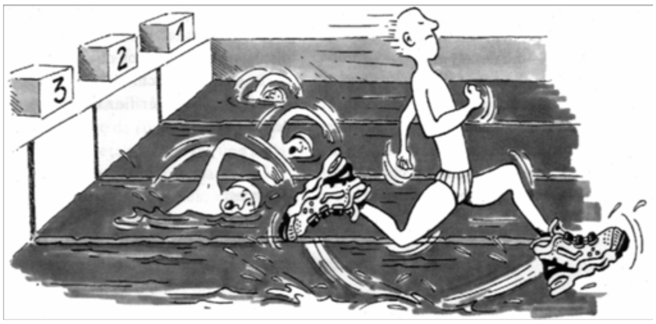
Feel good in your runners – Item 2

Item type:	Open constructed-response – Human Coded
Competency:	Access and retrieve
Difficulty:	Proficiency Level 1a

Item 2 in the Feel good in your runners unit requires students to recognise the main idea in a magazine article. The main idea is implied in the subheading and repeated several times in the body of the article.

FEEL GOOD IN YOUR RUNNERS

For 14 years the Sports Medicine Centre of Lyon (France) has been studying the injuries of young sports players and sports professionals. The study has established that the best course is prevention … and good shoes.



Knocks, falls, wear and tear...

Eighteen per cent of sports players aged 8 to 12 already have heel injuries. The cartilage of a footballer's ankle does not respond well to shocks, and 25% of professionals have discovered for themselves that it is an especially weak point. The cartilage of the delicate knee joint can also be irreparably damaged and if care is not taken right from childhood (10–12 years of age), this can cause premature osteoarthritis. The hip does not escape damage either and, particularly when tired, players run the risk of fractures as a result of falls or collisions.

According to the study, footballers who have been playing for more than ten years have bony outgrowths either on the tibia or on the heel. This is what is known as "footballer's foot", a deformity caused by shoes with soles and ankle parts that are too flexible.

Protect, support, stabilise, absorb

If a shoe is too rigid, it restricts movement. If it is too flexible, it increases the risk of injuries and sprains. A good sports shoe should meet four criteria:

Firstly, it must *provide exterior protection*: resisting knocks from the ball or another player, coping with unevenness in the ground, and keeping the foot warm and dry even when it is freezing cold and raining.

It must *support the foot*, and in particular the ankle joint, to avoid sprains, swelling and other problems, which may even affect the knee.

It must also provide players with good *stability* so that they do not slip on a wet ground or skid on a surface that is too dry.

Finally, it must *absorb shocks*, especially those suffered by volleyball and basketball players who are constantly jumping.

Dry feet

To avoid minor but painful conditions such as blisters or even splits or athlete's foot (fungal infections), the shoe must allow evaporation of perspiration and must prevent outside dampness from getting in. The ideal material for this is leather, which can be water-proofed to prevent the shoe from getting soaked the first time it rains.

Feel good in your runners

Question 2

According to the article, why should sports shoes not be too rigid?

Examples of responses provided by students

Full Credit

Code 1: Refers to restriction of movement.

- They restrict movement.
- They restrict you from running easily.

No Credit

Code 0: Shows inaccurate comprehension of the material given or an implausible or irrelevant answer.

- To avoid injuries.
- They can't support the foot.
- Because you need to support the foot and ankle
- Otherwise they are not suitable.

G Appendix G: Multiple comparison tables for states and territories and PISA 2022 countries

Mathematical literacy

Table G.1 shows the mathematical literacy multiple comparisons for the states and territories and PISA 2022 countries.[2]

These comparisons show that the performance level of:

- the Australian Capital Territory was lower than for 8 countries and not different to 3 countries
- Western Australia was lower than for 8 countries and not different to 7 countries
- New South Wales was lower than for 8 countries and not different to 12 countries
- Victoria was lower than for 8 countries and not different to 14 countries
- Queensland was lower than for 15 countries and not different to 14 countries
- South Australia was lower than 20 countries and not different to 11 countries
- the Northern Territory was lower than for 17 countries and not different to 21 countries
- Tasmania was lower than for 22 countries and not different to 15 countries
- all Australian jurisdictions were higher than all other participating countries including Brunei Darassalam, Ukrainian regions, Serbia, the United Arab Emirates, Greece, Romania, Kazakhstan, Mongolia, Cyprus, Bulgaria, Moldova, Qatar, Chile, Uruguay, Malaysia, Montenegro, Baku (Azerbaijan), Mexico, Thailand, Peru, Georgia, Saudia Arabia, Northern Macedonia, and Costa Rica).

2 Differences are statistically significant, unless specifically stated otherwise. References to 'not different' mean that the statistical requirement for significants was note met. Refer to the Readers' guide for further details.

TABLE G.1 Mathematical literacy multiple comparison table for the states and territories and PISA 2022 countries

		Country	Singapore	Macao (China)	Chinese Taipei	Hong Kong (China)*	Japan	Korea	Estonia	Switzerland	Canada*	Netherlands*	Ireland*	Belgium	Denmark*	United Kingdom*	Poland	Austria	Czech Republic	Slovenia	Finland	Latvia*	Sweden	New Zealand*	Lithuania	Germany	France	Spain	Hungary	**OECD average**	Portugal	Italy	Viet Nam	Norway	Malta	United States*	Slovak Republic	Croatia	Iceland	Israel	Türkiye	Brunei Darussalam
		Mean score	575	552	547	540	536	527	510	508	497	493	492	489	489	489	489	487	487	485	484	483	482	479	475	475	474	473	473	472	472	471	469	468	466	465	464	463	459	458	453	442
State/ Territory	**Mean score**	**SE**	1.2	1.1	3.8	3.0	2.9	3.9	2.0	2.1	1.6	3.8	2.0	2.2	1.9	2.2	2.3	2.3	2.1	1.2	1.9	2.0	2.1	2.0	1.8	3.1	2.5	1.5	2.5	0.4	2.4	3.1	3.9	2.1	1.6	4.0	2.9	2.4	1.6	3.3	1.6	0.9
ACT	498	3.3	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WA	497	3.8	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
NSW	491	4.0	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
VIC	488	4.4	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
QLD	480	3.5	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SA	475	3.1	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲
NT	469	9.0	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲
TAS	466	4.6	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲

Note: Read across the row to compare a state's or territory's performance with the performance of each country listed in the column heading.

▲ Mean performance statistically significantly higher than in comparison country

● No statistically significant difference from comparison country

▼ Mean performance statistically significantly lower than in comparison country

Scientific literacy

Table G.2 shows the mathematical literacy multiple comparisons for the states and territories and PISA 2022 countries (see Footnote 2).

These comparisons show that the performance level of:

- the Australian Capital Territory was lower than for 4 countries and not different to 4 countries
- Western Australia was lower than for 4 countries and not different to 5 countries
- Victoria was lower than for 7 countries and not different to 9 countries
- New South Wales was lower than for 7 countries and not different to 9 countries
- Queensland was lower than for 9 countries and not different to 12 countries
- South Australia was lower than for 9 countries and not different to 15 countries
- the Northern Territory was lower than for 8 countries and not different to 22 countries
- Tasmania was lower than for 11 countries and not different to 19 countries
- all Australian jurisdictions was higher than all other participating countries (including Italy, Türkiye, Viet Nam, Malta, Israel, Slovak Republic, Ukrainian regions, Serbia, Iceland, Brunei Darussalam, Chile, Greece, Uruguay, Qatar, the United Arab Emirates, Romania, Kazakhstan, Bulgaria, Moldova, Malaysia, Mongolia, Colombia, and Costa Rica).

TABLE G.2 Scientific literacy multiple comparison table for the states and territories and PISA 2022 countries

		Country	Singapore	Japan	Macao (China)	Chinese Taipei	Korea	Estonia	Hong Kong (China)*	Canada*	Finland	New Zealand*	Ireland*	Switzerland	Slovenia	United Kingdom*	United States*	Poland	Czech Republic	Latvia*	Denmark*	Sweden	Germany	Austria	Belgium	Netherlands*	France	Hungary	**OECD average**	Spain	Lithuania	Portugal	Croatia	Norway	Italy
		Mean score	561	547	543	537	528	526	520	515	511	504	504	503	500	500	499	499	498	494	494	494	492	491	491	488	487	486	485	485	484	484	483	478	477
State/ Territory	**Mean score**	**SE**	1.3	2.8	1.1	3.3	3.6	2.1	2.8	1.9	2.5	2.2	2.3	2.2	1.4	2.4	4.3	2.5	2.3	2.3	2.5	2.4	3.5	2.7	2.5	4.1	2.7	2.7	0.4	1.6	2.3	2.6	2.4	2.4	3.2
ACT	523	3.7	▼	▼	▼	▼	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WA	518	4.0	▼	▼	▼	▼	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
VIC	508	4.2	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
NSW	508	4.2	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
QLD	502	3.9	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SA	498	3.7	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲
NT	497	8.6	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲
TAS	492	5.3	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲

Note: Read across the row to compare a state's or territory's performance with the performance of each country listed in the column heading.

▲ Mean performance statistically significantly higher than in comparison country

● No statistically significant difference from comparison country

▼ Mean performance statistically significantly lower than in comparison country

Reading literacy

Table G.3 shows the reading literacy multiple comparisons for the states and territories and PISA 2022 countries (see Footnote 2).

These comparisons show that the performance level of:

- the Australian Capital Territory was lower than 1 country and not different to 6 countries
- Western Australia was lower than for 5 countries and not different to 6 countries
- Victoria was lower than for 5 countries and not different to 7 countries
- New South Wales was lower than for 7 countries and not different to 6 countries
- Queensland was lower than for 10 countries and not different to 8 countries
- South Australia was lower than for 10 countries and not different to 7 countries.
- the Northern Territory was lower than for 8 countries and not different to 23 countries
- Tasmania was lower than for 12 countries and not different to 19 countries
- all Australian jurisdictions were higher than all other participating countries (including Viet Nam, the Netherlands*, Türkiye, Chile, Slovak Republic, Malta, Serbia, Greece, Iceland, Uruguay, Brunei Darussalam, Romania, Ukrainian regions, Qatar, the United Arab Emirates, Mexico, and Costa Rica)

TABLE G.3 Reading literacy multiple comparison table for the states and territories and PISA 2022 countries

		Country	Singapore	Ireland*	Japan	Korea	Chinese Taipei	Estonia	Macao (China)	Canada*	United States*	New Zealand*	Hong Kong (China)*	United Kingdom*	Finland	Denmark*	Poland	Czech Republic	Sweden	Switzerland	Italy	Austria	Germany	Belgium	Portugal	Norway	**OECD average**	Croatia	Latvia*	Spain	France	Israel	Hungary	Lithuania	Slovenia	Viet Nam
		Mean score	543	516	516	515	515	511	510	507	504	501	500	494	490	489	489	489	487	483	482	480	480	479	477	477	476	475	475	474	474	474	473	472	469	462
State/ Territory	**Mean score**	**SE**	1.9	2.3	3.2	3.6	3.3	2.4	1.3	2.0	4.3	2.1	2.8	2.4	2.3	2.6	2.7	2.2	2.5	2.3	2.7	2.7	3.6	2.5	2.7	2.5	0.5	2.4	2.5	1.7	3.1	3.5	2.8	2.2	1.6	3.9
ACT	517	3.8	▼	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
WA	505	4.1	▼	▼	▼	▼	▼	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
VIC	501	4.8	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
NSW	499	4.2	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
QLD	492	4.0	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
SA	492	3.8	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
NT	488	8.6	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲
TAS	482	5.3	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	▲	▲

Note: Read across the row to compare a state's or territory's performance with the performance of each country listed in the column heading.

▲ Mean performance statistically significantly higher than in comparison country

● No statistically significant difference from comparison country

▼ Mean performance statistically significantly lower than in comparison country

www.acer.org/pisa