TIMSS 2023
AUSTRALIA

Highlights on Australian student performance

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ACER

HIGHLIGHTS ON AUSTRALIAN STUDENT PERFORMANCE

1 Background on TIMSS 2023

Australia participated in the eighth cycle of the Trends in International Mathematics and Science Study (TIMSS). TIMSS is an international sample study that assesses the mathematics and science achievement of Year 4 and Year 8 students every 4 years. Australia has participated in all cycles of TIMSS since it commenced in 1995 and over this 28-year period has collected rich data about trends in mathematics and science achievement.

The 2023 cycle of TIMSS completed its transition to a digital assessment; this was the first time it was offered completely online. TIMSS 2023 made innovations to the assessment through the benefits of the digital platform, which included:

- presenting complex and innovative item types that captured both responses and process indicators
- interactive opportunities and provision of digital tools for students to use in developing and providing their responses
- problem-solving and inquiry tasks based on interactive scenarios that allowed students to follow a series of steps toward a solution or goal
- the increased use of automated scoring to improve scoring accuracy and comparability across countries
- research into using machine learning to evaluate graphical and short written responses.

TIMSS 2023 expanded its scope to assess environmental knowledge and attitudes. This new component provides valuable insights into students' understanding of environmental issues, including climate change, biodiversity, and conservation.

This Highlights report summarises the key findings from *TIMSS 2023. Volume I: Student performance*, where detailed information about the background and management of TIMSS 2023 is also available.

WHO PARTICIPATED IN TIMSS 2023?

Year 4

58 countries

12,000 schools

359,000+ students

Year 8

44 countries

8,700 schools

297,000+ students

WHICH AUSTRALIANS TOOK PART?

TIMSS is a sample assessment. It isn't possible to test every Year 4 or Year 8 student (that would take too long and cost too much) so we take a sample of these students. We know how many Year 4 and Year 8 students there are in Australia, which lets us extrapolate the results to make inferences about the populations of Year 4 and Year 8 Australian students.

Schools were selected from all states and territories and include government and non-government schools; schools in major cities, regional and remote areas; and schools from areas that differ in levels of advantage and disadvantage.

In addition to the students that took part in the TIMSS assessment and responded to the student questionnaire, their principals and mathematics and science teachers also responded to questionnaires about their school and classroom environments for learning mathematics and science.

Australian Year 4s

283 schools in Australia

5,470 students

representing about **322,000** students

Australian Year 8s

276 schools in Australia

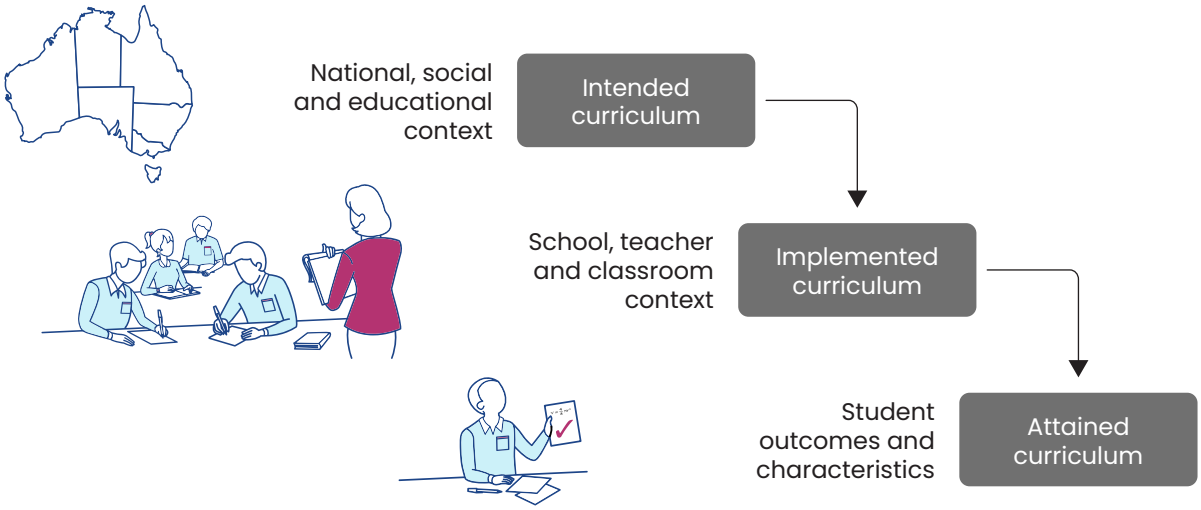
8,442 students

representing about **308,000** students

WHAT DOES TIMSS ASSESS?

TIMSS assesses mathematics and science as separate subjects structured around national curricula. The assessments are based on comprehensive frameworks that are built in collaboration with participating countries to describe the knowledge and skills expected of students at Year 4 and Year 8. In addition, the TIMSS school, teacher, student, and home questionnaires gather extensive information about the contextual factors at school and home that are associated with learning and student achievement.

TIMSS is based on a research model that uses the curriculum, in broad terms, as its foundation. The TIMSS curriculum model includes 3 curriculum levels, considered in relation to the context in which they occur.



The TIMSS assessment frameworks for mathematics and science are organised around 2 dimensions:

- a content dimension that specifies the subject matter to be assessed
- a cognitive dimension that specifies the thinking processes to be assessed as students engage with the content.

Mathematics content domains

Number	50%
Measurement and geometry	30%
Data	20%

Number	30%
Algebra	30%
Geometry and measurement	20%
Data and probability	20%

Science content domains

Life science	45%
Physical science	35%
Earth science	20%

Biology	35%
Chemistry	20%
Physics	25%
Earth science	20%

Sample items

Students in a class made three different origami animals using blue, red, and yellow paper. The table shows the number of animals that were made with each color paper.

Animal	Color Paper		
	Blue	Red	Yellow
Tortoise	8	4	3
Giraffe	3	2	10
Fish	10	6	

Complete the table by solving this puzzle:

Year 4 mathematics example item – *Data, Applying*

Eric has 50 minutes to make as many model planes as he can.
It takes Eric 5 minutes to make Model A and 3 minutes to make Model B.

A. Eric wants to make 5 of Model A and 10 of Model B.

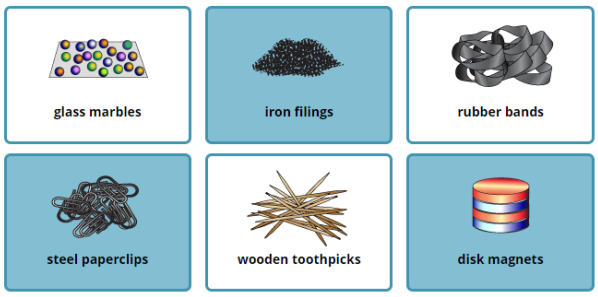
Explain why he will **not** have enough time to complete these models.

it will take him 55 minutes

Year 8 mathematics example item – *Algebra, Reasoning*

Joseph has several piles of objects to pick up. Which objects can he pick up using a magnet?

Click **all** the sets of objects that Joseph could pick up using a magnet.



Year 4 science example item – *Physical science, Knowing*

The bones of birds are hollow.

What advantage do hollow bones give to birds?

Hollow bones make it easier for birds to fly

Year 8 science example item – *Biology, Reasoning*

2 Australia's results in an international context

PERFORMANCE RESULTS

TIMSS results are reported as mean scores – a measure of average performance – and through other data that reflects the distribution of performance. This provides a summary of student performance and allows different countries and subgroups to be compared.

This report focuses on the differences that were statistically significant (in other words, were unlikely to have arisen by chance). When the commentary states that there was a difference between sets of numbers, whether these were score, percentage or percentage point differences, it means that the difference satisfied this condition. When the commentary 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.[1]

1 For more information about statistical significance, refer to the Reader's guide in *TIMSS 2023 Australia. Volume I: Student performance*

Year 4 mathematics

Australia 525

TIMSS International average 503

Highest country: **Singapore** 615

Australia's mean score was:

90 pts ↓ than **Singapore**

22 pts ↑ than **TIMSS International average**

▼ **14 countries**
● **10 countries**
▲ **33 countries**

Year 8 mathematics

Australia 509

TIMSS International average 478

Highest country: **Singapore** 605

Australia's mean score was:

96 pts ↓ than **Singapore**

31 pts ↑ than **TIMSS International average**

▼ **8 countries**
● **8 countries**
▲ **25 countries**

● No significant difference

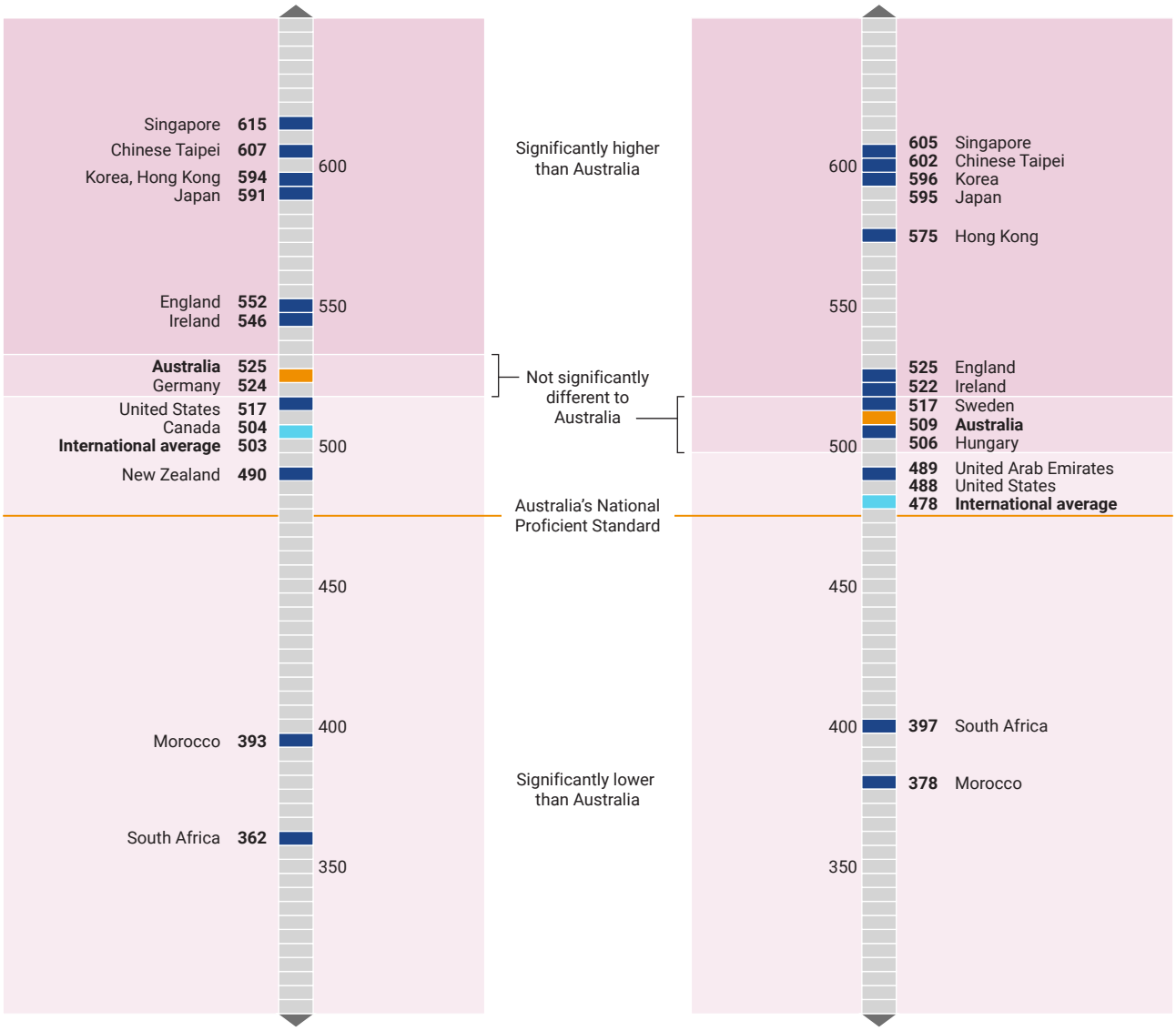


FIGURE 2.1 Year 4 and Year 8 mean mathematics scores, selected countries

Year 4 science

Australia 550

TIMSS International average 494

Highest country: **Singapore** 607

Australia's mean score was:

57 pts ↓ than **Singapore**

56 pts ↑ than **TIMSS International average**

▼ **4 countries**
● **4 countries**
▲ **49 countries**

Year 8 science

Australia 520

TIMSS International average 478

Highest country: **Singapore** 606

Australia's mean score was:

86 pts ↓ than **Singapore**

42 pts ↑ than **TIMSS International average**

▼ **7 countries**
● **7 countries**
▲ **27 countries**

● No significant difference

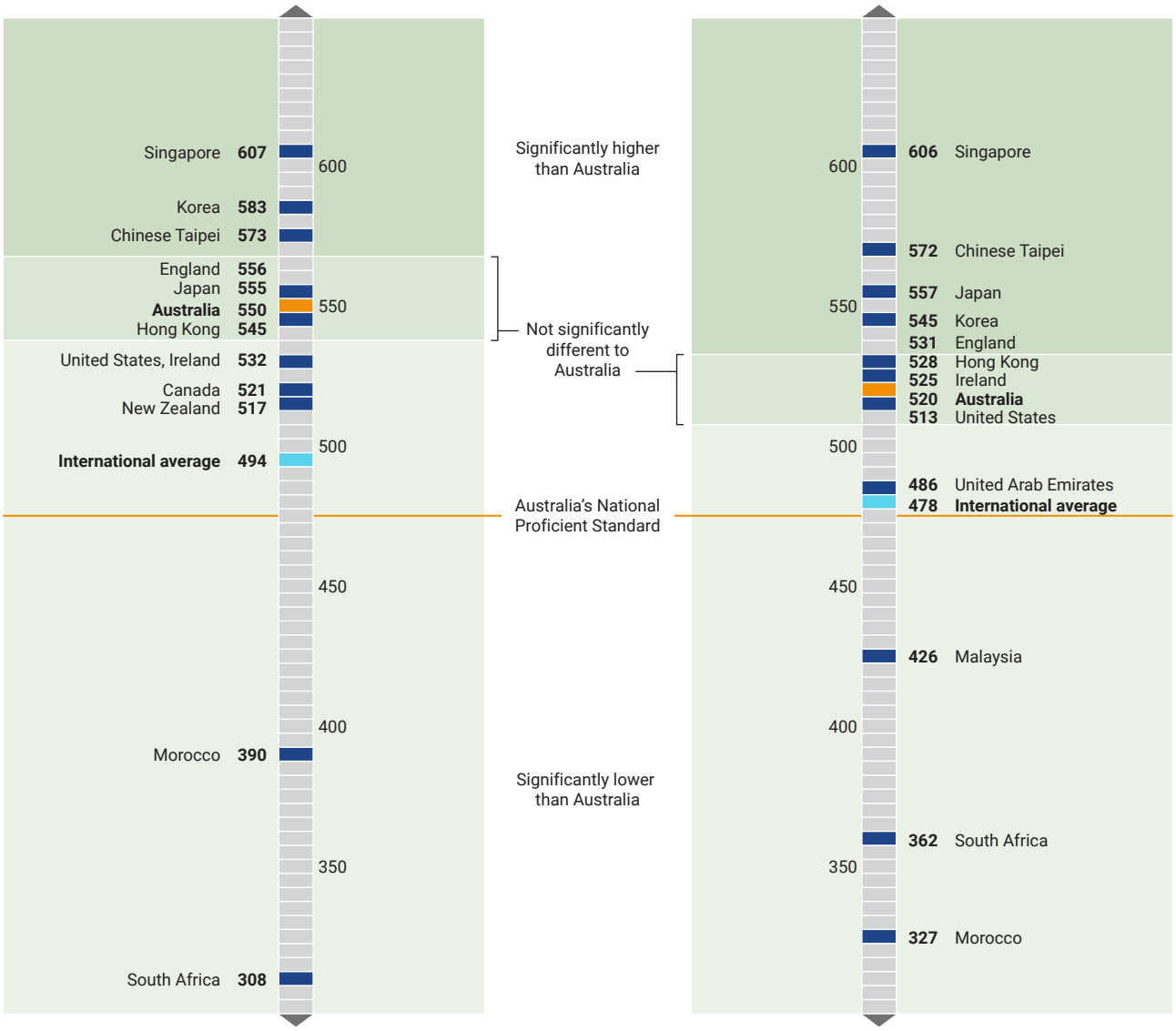


FIGURE 2.2 Year 4 and Year 8 mean science scores, selected countries

PROFICIENCY RESULTS

To interpret the results on the Year 4 and Year 8 mathematics and science achievement scales, TIMSS describes achievement on a scale with 4 international benchmarks. The following tables summarise the skills and knowledge that students can display at each of the international benchmarks.

	TIMSS international benchmarks for mathematics			
	Advanced	High	Intermediate	Low
	625 points	550 points	475 points	400 points
	Students can select and relate information to implement appropriate operations to solve problems.	Students relate concepts or representations in extended contexts.	Students demonstrate mathematical knowledge in simple situations and relate representations.	Students demonstrate basic mathematical understanding.
	Students can extend their understanding beyond working with integers alone to solve a variety of problems in novel contexts.	Students can apply their conceptual understanding in a variety of relatively complex situations.	Students can apply mathematical knowledge in a variety of situations.	Students have knowledge of integers, basic shapes, and visual representations.

	TIMSS international benchmarks for science			
	Advanced	High	Intermediate	Low
	625 points	550 points	475 points	400 points
	Students can show, apply, and communicate their knowledge of life, physical, and Earth sciences, and engage in multiple scientific inquiry practices.	Students show and apply knowledge of life, physical, and Earth science, and they engage in some scientific inquiry practices.	Students show and apply knowledge of some scientific concepts.	Students show knowledge of some science facts.
	Students can show, apply, and reason with knowledge of concepts related to biology, chemistry, physics and Earth science in various contexts, and they can engage in more complex scientific practices.	Students show and apply knowledge of concepts from biology, chemistry, physics, and Earth science, and they engage in multiple scientific practices.	Students can apply understanding of some concepts from biology, chemistry, physics, and Earth science, and they engage in some scientific practices.	Students show and apply knowledge of some science facts.

This report groups the international benchmarks that describe performance of students who attained the **National Proficient Standard** (NPS), **very low performers** and **very high performers**.

In Australia, students who achieved the NPS were those who scored at or above the Intermediate international benchmarks in mathematics and science. This level represents a 'challenging but reasonable' level of performance where students need to demonstrate more than the minimal skills expected'.[2]

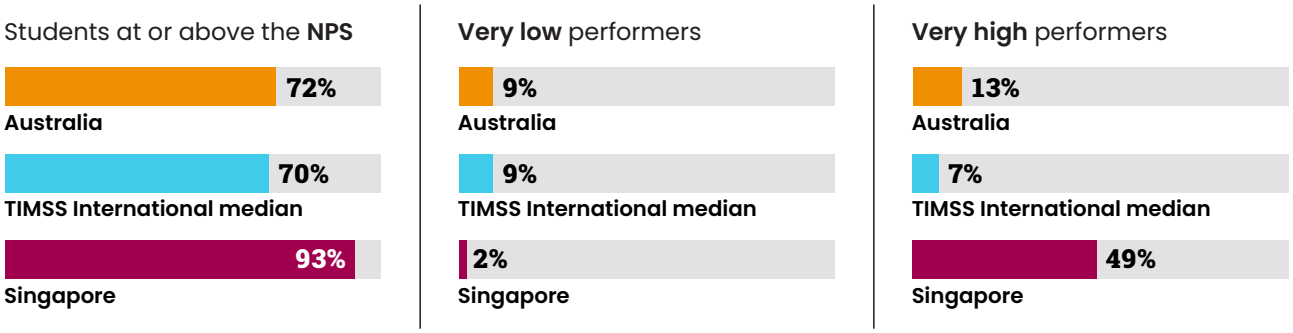
Very low performers are students who scored below the Low international benchmark and struggled to display even basic mathematical or scientific knowledge and understanding.

Very high performers are students who scored at the Advanced international benchmark and were highly proficient in mathematics or science for their year level.

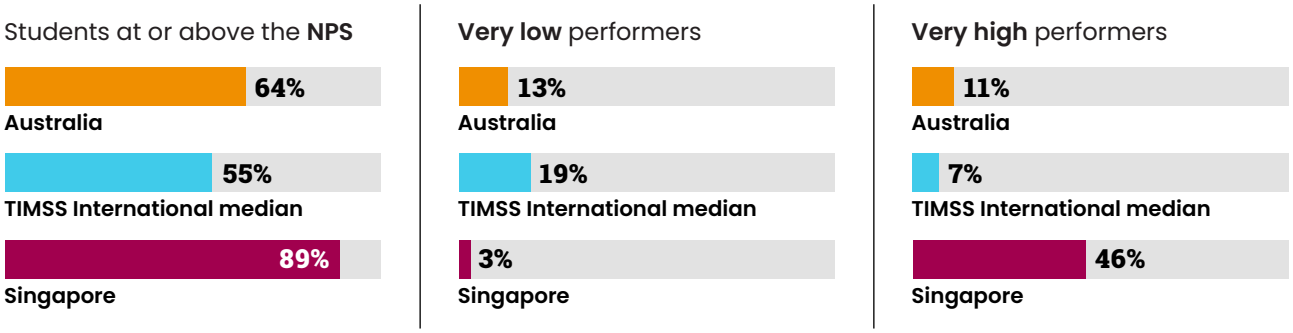
The proportions of students who attained the NPS, very low performers and very high performers and students for Year 4 and 8 mathematics and science are presented in the following bar charts. Singapore (the highest performing country) and the international median (by definition, half the countries have a percentage above the median and half below the median) are included for comparison.

2 Australian Curriculum, Assessment and Reporting Authority. (2019). *Measurement framework for schooling in Australia 2019.*

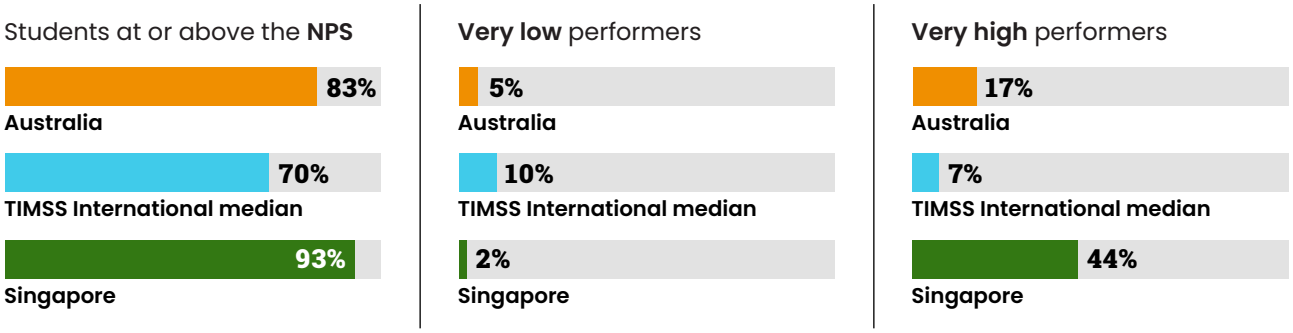
Year 4 mathematics



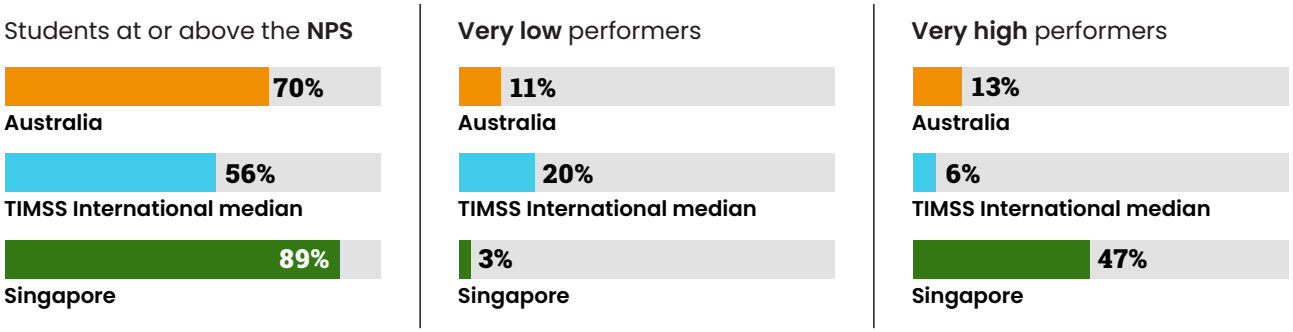
Year 8 mathematics



Year 4 science



Year 8 science



AUSTRALIA'S PERFORMANCE AND PROFICIENCY OVER TIME

From TIMSS 2019 to 2023

Australia's mean performance in Year 4 mathematics and science improved significantly since TIMSS 2019. This was not the case for Year 8 mathematics and science.

The increases in Year 4 mean achievement appear to be mainly due to increases in the proportion of high performers.

	M4	M8	S4	S8
Average performance	516 → 525 (2019 → 2023)	●	533 → 550 (2019 → 2023)	●
Students at or above the **NPS**	●	●	▲ 5 pp	▼ 4 pp
Very low performers	●	▲ 3 pp	●	▲ 3 pp
Very high performers	▲ 3 pp	●	▲ 6 pp	●

From TIMSS 1995 to 2023

Australia's mean performance in Year 4 mathematics and science has improved significantly since TIMSS 1995. This was not the case for Year 8 mathematics and science.

The improvement at Year 4 was across all levels of achievement.

	M4	M8	S4	S8
Average performance	495 → 525 (1995 → 2023)	●	521 → 550 (1995 → 2023)	●
Students at or above the **NPS**	▲ 11 pp	●	▲ 12 pp	●
Very low performers	▼ 5 pp	●	▼ 6 pp	●
Very high performers	▲ 7 pp	▲ 4 pp	▲ 5 pp	▲ 3 pp

pp = percentage points
● No significant difference between the cycles

3 Australia's results in a national context

YEAR 4 MATHEMATICS PERFORMANCE AND PROFICIENCY

Table 3.1 provides the Year 4 mathematics performance results for the states and territories (jurisdictions).

Students in New South Wales, the Australian Capital Territory and Victoria performed significantly higher than students in each of the other jurisdictions.

Students in Western Australia performed significantly higher than those in Tasmania.

TABLE 3.1 Multiple comparisons of Year 4 mathematics achievement, by jurisdiction

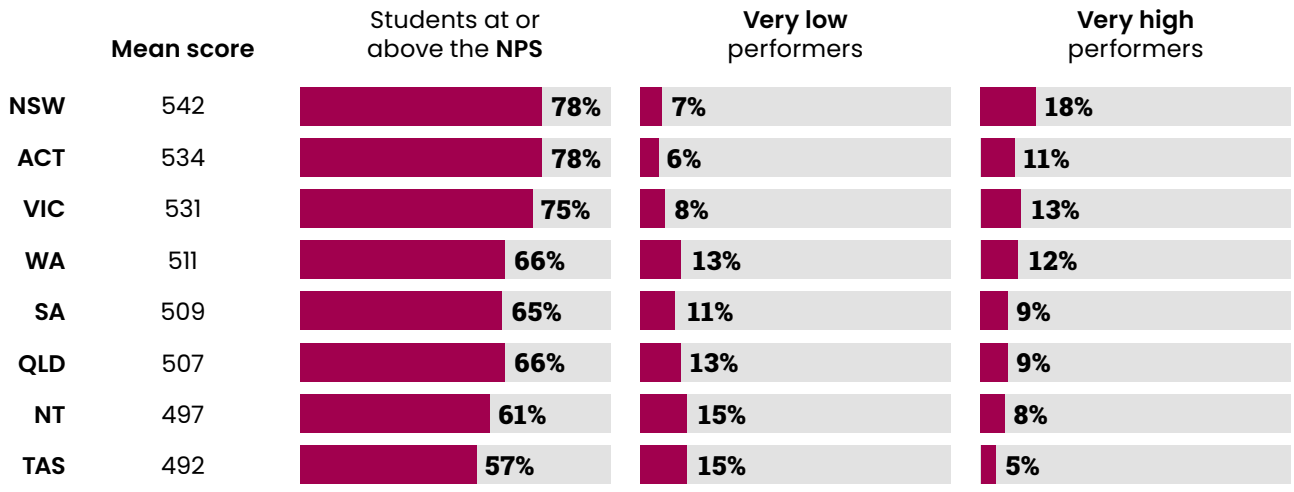
Jurisdiction	Mean score	SE	NSW	ACT	VIC	WA	SA	QLD	NT	TAS
NSW	542	5.9		●	●	▲	▲	▲	▲	▲
ACT	534	5.6	●		●	▲	▲	▲	▲	▲
VIC	531	4.4	●	●		▲	▲	▲	▲	▲
WA	511	7.1	▼	▼	▼		●	●	●	▲
SA	509	6.4	▼	▼	▼	●		●	●	●
QLD	507	5.3	▼	▼	▼	●	●		●	●
NT	497	10.1	▼	▼	▼	●	●	●		●
TAS	492	6.4	▼	▼	▼	▼	●	●	●	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.
● Not significantly different from comparison jurisdiction.
▼ Mean performance significantly lower than in comparison jurisdiction.

The bar charts below show the proportions of students who attained the NPS, were very low performers and very high performers in Year 4 mathematics, by state and territory.

The percentages of students who attained the NPS ranged from 78% in the Australian Capital Territory and New South Wales to 57% in Tasmania.



YEAR 8 MATHEMATICS PERFORMANCE AND PROFICIENCY

Table 3.2 provides the Year 8 mathematics performance results for the states and territories.

The performance of students in the Australian Capital Territory was not significantly different to that of students in Western Australia, Victoria and New South Wales.

Students in the Australian Capital Territory and Western Australia performed significantly higher than students in Queensland, South Australia, Tasmania and the Northern Territory.

Students in Victoria performed significantly higher than students in South Australia, Tasmania and the Northern Territory, while students in New South Wales performed significantly higher than students in the Northern Territory.

TABLE 3.2 Multiple comparisons of Year 8 mathematics achievement, by jurisdiction

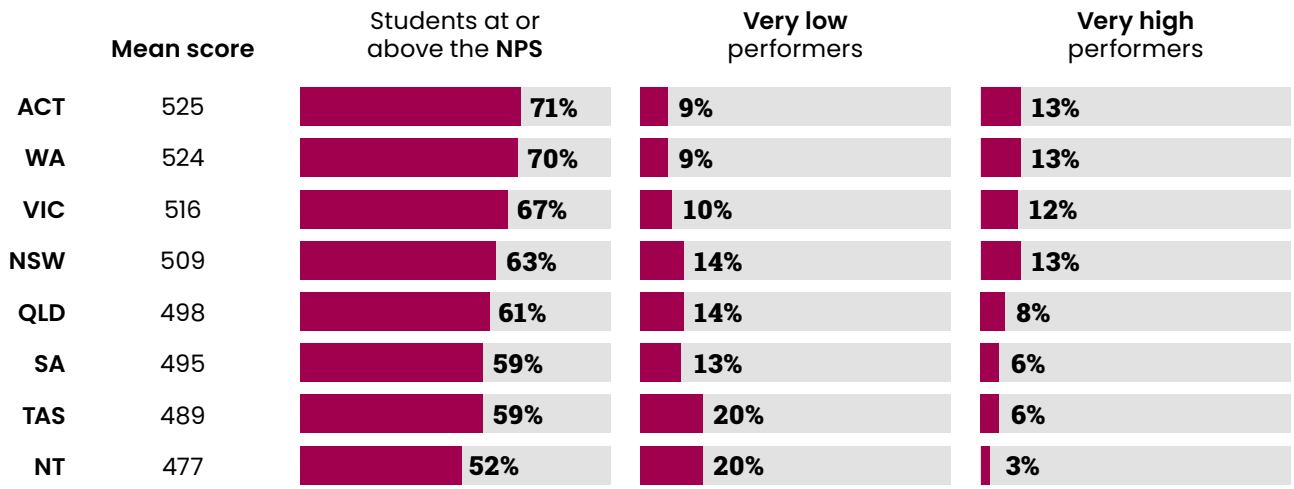
Jurisdiction	Mean score	SE	ACT	WA	VIC	NSW	QLD	SA	TAS	NT
ACT	525	8.7		●	●	●	▲	▲	▲	▲
WA	524	5.4	●		●	●	▲	▲	▲	▲
VIC	516	5.6	●	●		●	●	▲	▲	▲
NSW	509	8.2	●	●	●		●	●	●	▲
QLD	498	7.5	▼	▼	●	●		●	●	●
SA	495	5.2	▼	▼	▼	●	●		●	●
TAS	489	7.6	▼	▼	▼	●	●	●		●
NT	477	13.6	▼	▼	▼	▼	●	●	●	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.
● Not significantly different from comparison jurisdiction.
▼ Mean performance significantly lower than in comparison jurisdiction.

The bar charts below show the proportions of students who attained the NPS, were very low performers and very high performers in Year 8 mathematics, by state and territory.

The percentages of students who attained the NPS ranged from 71% in the Australian Capital Territory to 52% in the Northern Territory.



YEAR 4 SCIENCE PERFORMANCE AND PROFICIENCY

Table 3.3 provides the Year 4 science performance results for the states and territories.

The performance of students in the Australian Capital Territory was not significantly different to that of students in New South Wales and Victoria.

Students in the Australian Capital Territory and New South Wales performed significantly higher than students in Queensland, South Australia, Western Australia, Tasmania and the Northern Territory.

Students in Victoria performed significantly higher than students in the Northern Territory and Tasmania.

TABLE 3.3 Multiple comparisons of Year 4 science achievement, by jurisdiction

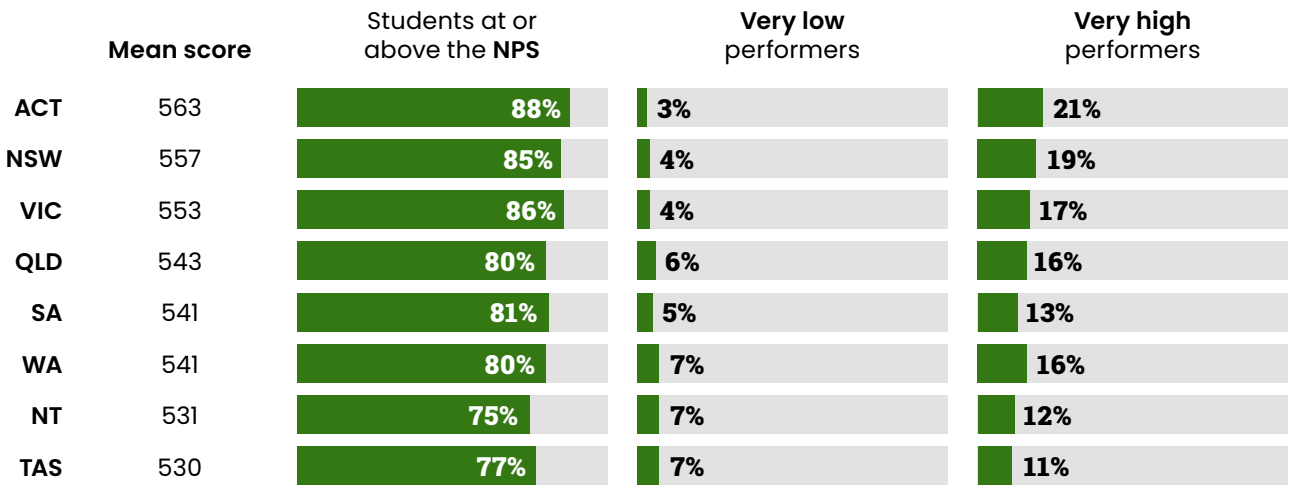
Jurisdiction	Mean score	SE	ACT	NSW	VIC	QLD	SA	WA	NT	TAS
ACT	563	6.1		●	●	▲	▲	▲	▲	▲
NSW	557	4.4	●		●	▲	▲	▲	▲	▲
VIC	553	4.0	●	●		●	●	●	▲	▲
QLD	543	4.9	▼	▼	●		●	●	●	●
SA	541	5.1	▼	▼	●	●		●	●	●
WA	541	6.0	▼	▼	●	●	●		●	●
NT	531	7.2	▼	▼	▼	●	●	●		●
TAS	530	6.0	▼	▼	▼	●	●	●	●	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.
● Not significantly different from comparison jurisdiction.
▼ Mean performance significantly lower than in comparison jurisdiction.

The bar charts below show the proportions of students who attained the NPS, were very low performers and very high performers in Year 4 science, by state and territory.

The percentages of students who attained the NPS ranged from 88% in the Australian Capital Territory to 75% in the Northern Territory.



YEAR 8 SCIENCE PERFORMANCE AND PROFICIENCY

Table 3.4 provides the Year 8 science performance results for the states and territories.

The performance of students in the Australian Capital Territory was not significantly different to that of students in Western Australia and Victoria.

Students in the Australian Capital Territory and Western Australia performed significantly higher than students in Queensland, New South Wales, South Australia, Tasmania and the Northern Territory.

Students in Western Australia performed significantly higher than students in Victoria.

TABLE 3.4 Multiple comparisons of Year 8 science achievement, by jurisdiction

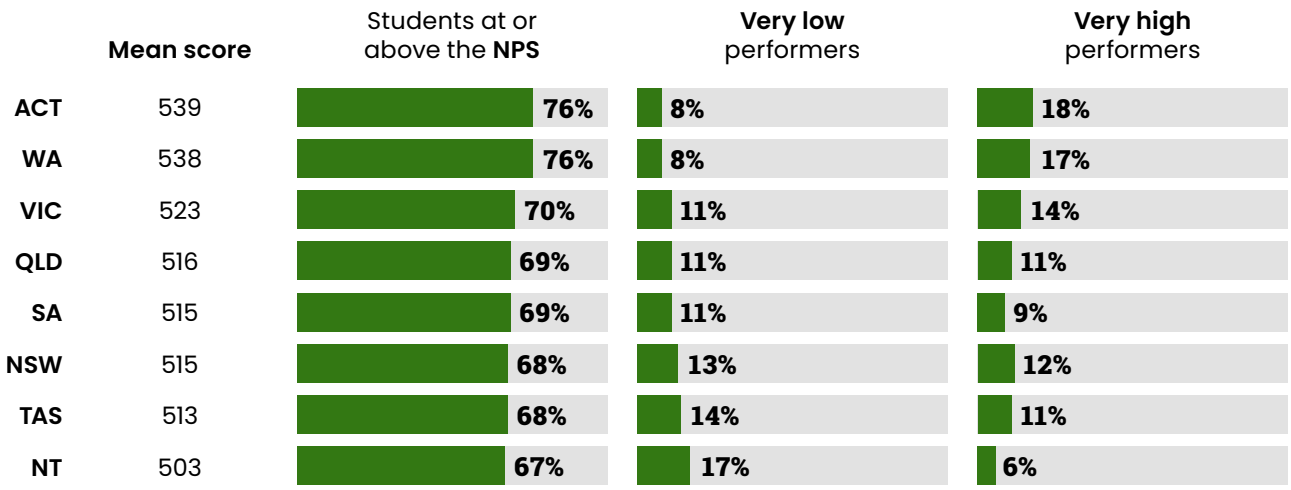
Jurisdiction	Mean score	SE	ACT	WA	VIC	QLD	NSW	SA	TAS	NT
ACT	539	8.7		●	●	▲	▲	▲	▲	▲
WA	538	5.2	●		▲	▲	▲	▲	▲	▲
VIC	523	5.1	●	▼		●	●	●	●	●
QLD	516	7.5	▼	▼	●		●	●	●	●
NSW	515	7.0	▼	▼	●	●		●	●	●
SA	515	5.1	▼	▼	●	●	●		●	●
TAS	513	8.6	▼	▼	●	●	●	●		●
NT	503	16.0	▼	▼	●	●	●	●	●	

Read across the row to compare a state/territory's performance with the performance of each jurisdiction listed in the column heading.

▲ Mean performance significantly higher than in comparison jurisdiction.
● Not significantly different from comparison jurisdiction.
▼ Mean performance significantly lower than in comparison jurisdiction.

The bar charts below show the proportions of students who attained the NPS, were very low performers and very high performers in Year 8 science, by state and territory.

The percentages of students who attained the NPS ranged from 76% in the Australian Capital Territory and Western Australia to 67% in the Northern Territory.



4 Jurisdictions' performance and proficiency over time

FROM TIMSS 2019 TO 2023

- The changes in performance for the jurisdictions varied across the indicators.
- New South Wales and the Northern Territory both had significant improvements in Year 4 mathematics and science; the Northern Territory showed significant improvement in the percentage of very low performers and also in the proportion of students who attained the NPS in both subjects.

TABLE 4.1 Changes in performance over time for the Australian jurisdictions, TIMSS 2019–2023

2019–2023		Mean achievement	Students at or above the **NPS**	**Very low** performers	**Very high** performers
M4	ACT	●	●	●	●
	NSW	▲ 20 pts	●	●	●
	VIC	●	●	●	●
	QLD	●	●	●	●
	SA	●	●	●	●
	WA	●	●	●	●
	TAS	▼ 22 pts	▼ 11 pp	●	●
	NT	▲ 36 pts	▲ 15 pp	▼ 13 pp	●
M8	ACT	●	●	●	●
	NSW	▼ 25 pts	●	●	●
	VIC	●	●	●	●
	QLD	●	●	●	●
	SA	●	●	●	●
	WA	●	●	●	●
	TAS	●	●	●	●
	NT	●	●	●	●
S4	ACT	●	●	●	●
	NSW	▲ 22 pts	▲ 6 pp	●	▲ 8 pp
	VIC	▲ 18 pts	●	●	▲ 6 pp
	QLD	●	●	●	●
	SA	●	●	●	●
	WA	●	●	●	▲ 6 pp
	TAS	●	●	●	●
	NT	▲ 46 pts	▲ 20 pp	▼ 13 pp	●
S8	ACT	●	●	●	●
	NSW	▼ 25 pts	▼ 10 pp	●	●
	VIC	●	●	●	●
	QLD	●	●	●	●
	SA	●	●	●	●
	WA	●	●	●	●
	TAS	●	●	●	●
	NT	●	●	●	●

FROM TIMSS 1995 TO 2023

- Year 4 mathematics and science had the greatest change in performance for most jurisdictions; New South Wales, Victoria, Queensland, South Australia and Western Australia all showed improvement in performance.
- For Year 4 mathematics, the improvements were mainly in very high performers, whereas for Year 4 science the improvements were in decreases in very low performers.

TABLE 4.2 Changes in performance over time for the Australian jurisdictions, TIMSS 1995–2023

1995–2023		Mean achievement	Students at or above the **NPS**	**Very low** performers	**Very high** performers
	ACT	●	●	●	●
	NSW	▲ 46 pts	▲ 17 pp	▼ 7 pp	▲ 11 pp
	VIC	▲ 24 pts	●	●	▲ 6 pp
	QLD	▲ 23 pts	▲ 9 pp	●	▲ 4 pp
	SA	▲ 24 pts	▲ 10 pp	▼ 7 pp	●
	WA	▲ 28 pts	▲ 11 pp	●	▲ 7 pp
	TAS	●	●	●	●
	NT	●	●	●	●
	ACT	●	●	●	●
	NSW	●	●	●	●
	VIC	●	●	●	▲ 7 pp
	QLD	●	●	●	●
	SA	▼ 18 pts	▼ 13 pp	▲ 7 pp	●
	WA	●	●	▲ 5 pp	●
	TAS	●	●	▲ 8 pp	●
	NT	●	●	●	●
	ACT	●	●	●	●
	NSW	▲ 34 pts	▲ 14 pp	▼ 7 pp	▲ 6 pp
	VIC	▲ 24 pts	▲ 11 pp	▼ 5 pp	●
	QLD	▲ 39 pts	▲ 15 pp	▼ 8 pp	▲ 7 pp
	SA	▲ 22 pts	▲ 11 pp	▼ 6 pp	●
	WA	●	●	●	●
	TAS	●	●	●	●
	NT	●	●	●	●
	ACT	●	●	●	●
	NSW	●	●	●	●
	VIC	▲ 23 pts	●	●	▲ 7 pp
	QLD	●	●	●	●
	SA	●	●	▼ 5 pp	●
	WA	●	●	●	●
	TAS	●	●	●	●
	NT	●	●	●	●

5 Results for different demographic groups

STUDENT GENDER

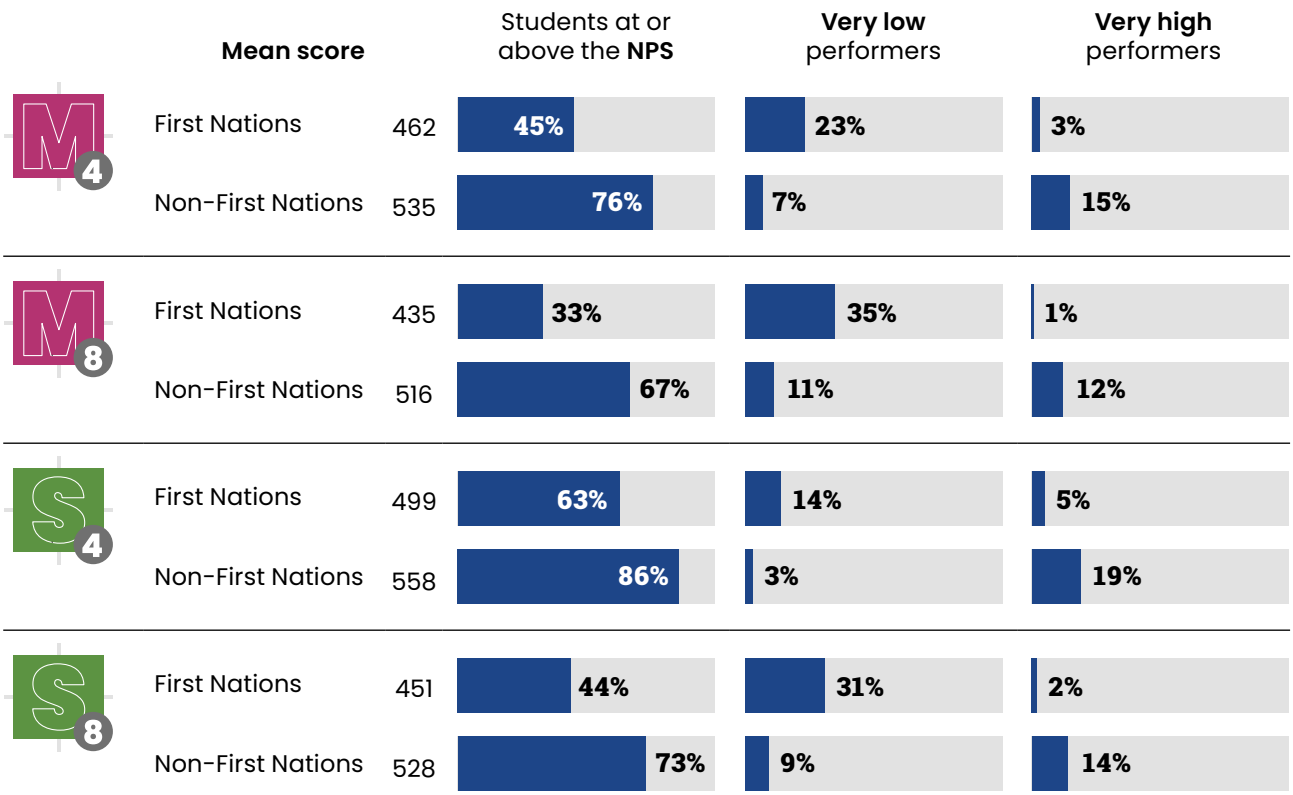
In both mathematics and science for Year 4 and Year 8 students, male students had higher average achievement than female students. This difference was primarily due to a significantly higher percentage of male students being very high performers.

	Mean score		Students at or above the **NPS**	**Very low** performers	**Very high** performers
M4	Females	514	68%	10%	10%
	Males	537	76%	8%	17%
M8	Females	502	61%	13%	9%
	Males	515	67%	13%	13%
S4	Females	545	83%	5%	14%
	Males	555	84%	5%	20%
S8	Females	513	68%	12%	10%
	Males	526	71%	11%	15%

FIRST NATIONS BACKGROUND

Information about the First Nations background of Australian students was collected in the student questionnaire.[3] Ten per cent of the TIMSS 2023 Year 4 sample and 7% per cent of the Year 8 sample identified as being a First Nations Australian.

- The performance of First Nations students was lower than of non-First Nations students for both mathematics and science at Year 4 and Year 8.
- Both First Nations students and non-First Nations students improved in average performance since 1995 in Year 4 mathematics and Year 4 science. The improvement in average performance was greater for First Nations students in Year 4 science compared to non-First Nations students.

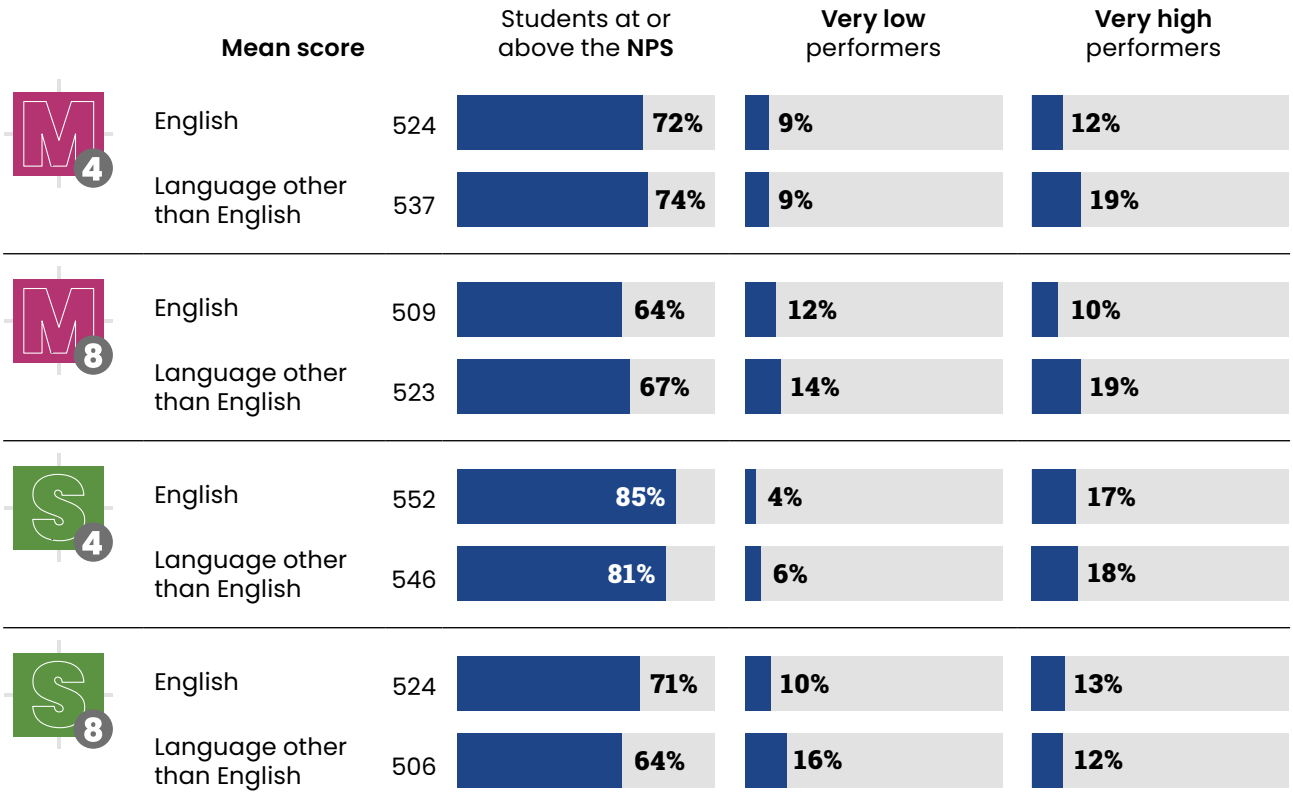


3 For more information about First Nations background, refer to the Reader's guide in *TIMSS 2023 Australia. Volume I: Student performance.*

LANGUAGE BACKGROUND

Information about the language background of Australian students was collected in the student questionnaire.[4]

- In Year 4 mathematics, students who spoke a language other than English at home performed at a higher level than students who spoke English at home, with a higher mean score and a higher percentage of very high performers.
- In Year 8 mathematics, while there was no significant difference in mean score according to language background, a higher percentage of students who spoke a language other than English at home were very high performers, compared to students who spoke English at home.
- In Year 4 science, there were no significant differences between students who spoke a language other than English at home and students who spoke English at home.
- In Year 8 science, on average, students who spoke English at home performed at a higher level than students who spoke a language other than English at home. This was due to better performance at the lower end of the scale as well as a greater proportion of students who attained the NPS.



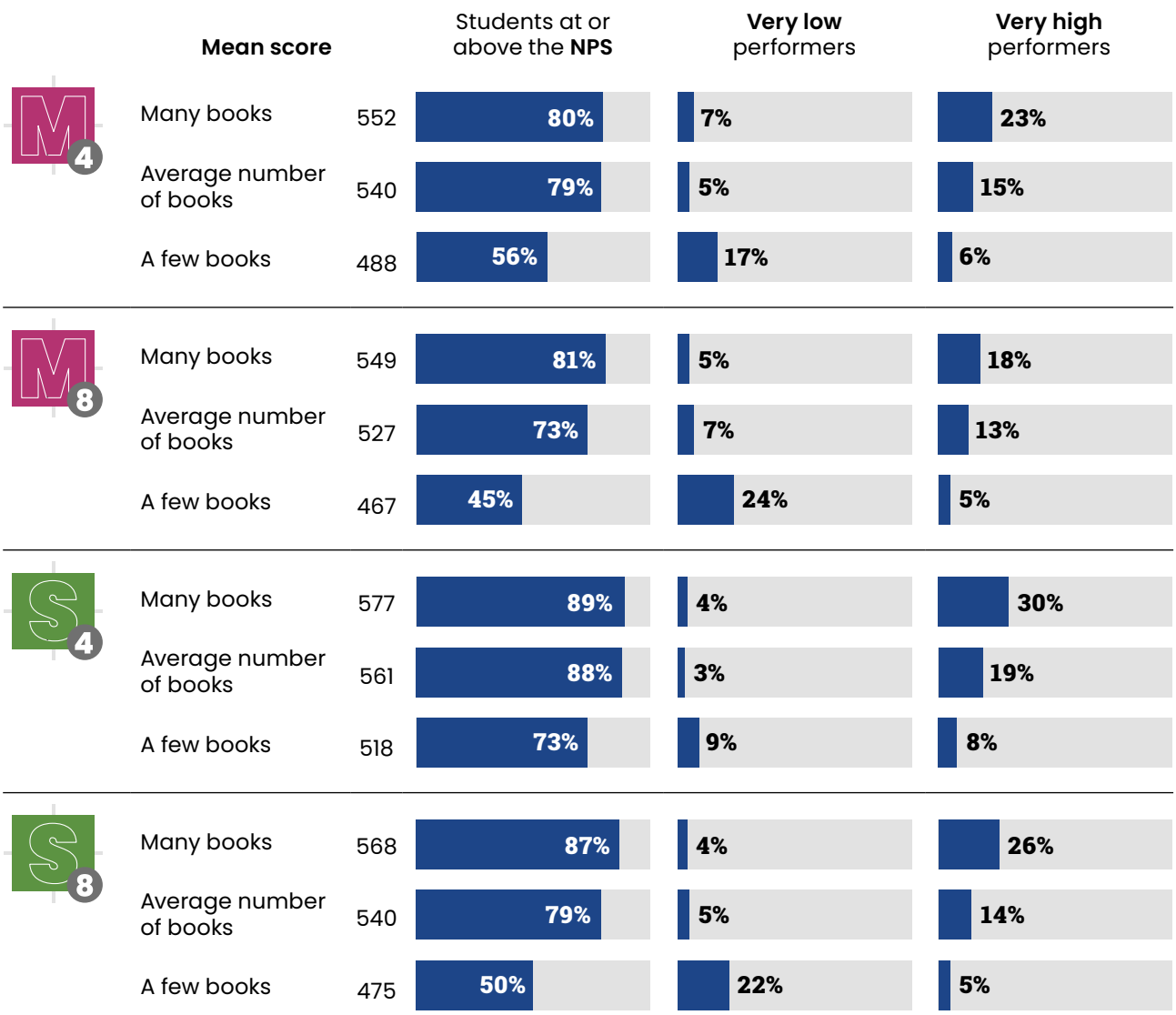
4 For more information about the Language spoken at home indicator, refer to the Reader's guide in *TIMSS 2023 Australia. Volume I: Student performance.*

BOOKS IN THE HOME

The number of books in the home is used as an indicator of socioeconomic status.[5]

At both year levels and across both mathematics and science:

- Students with many books in the home performed at a higher level than students with an average number of books in the home, who also performed higher than students with only a few books in the home.
- The proportion of students with many books in the home and who attained the NPS was significantly higher than the proportion for students with only a few books in the home.
- The percentage of students with many books in the home who were very high performers was higher (and the percentage of very low performers was lower) than the percentage of students with only a few books in the home.

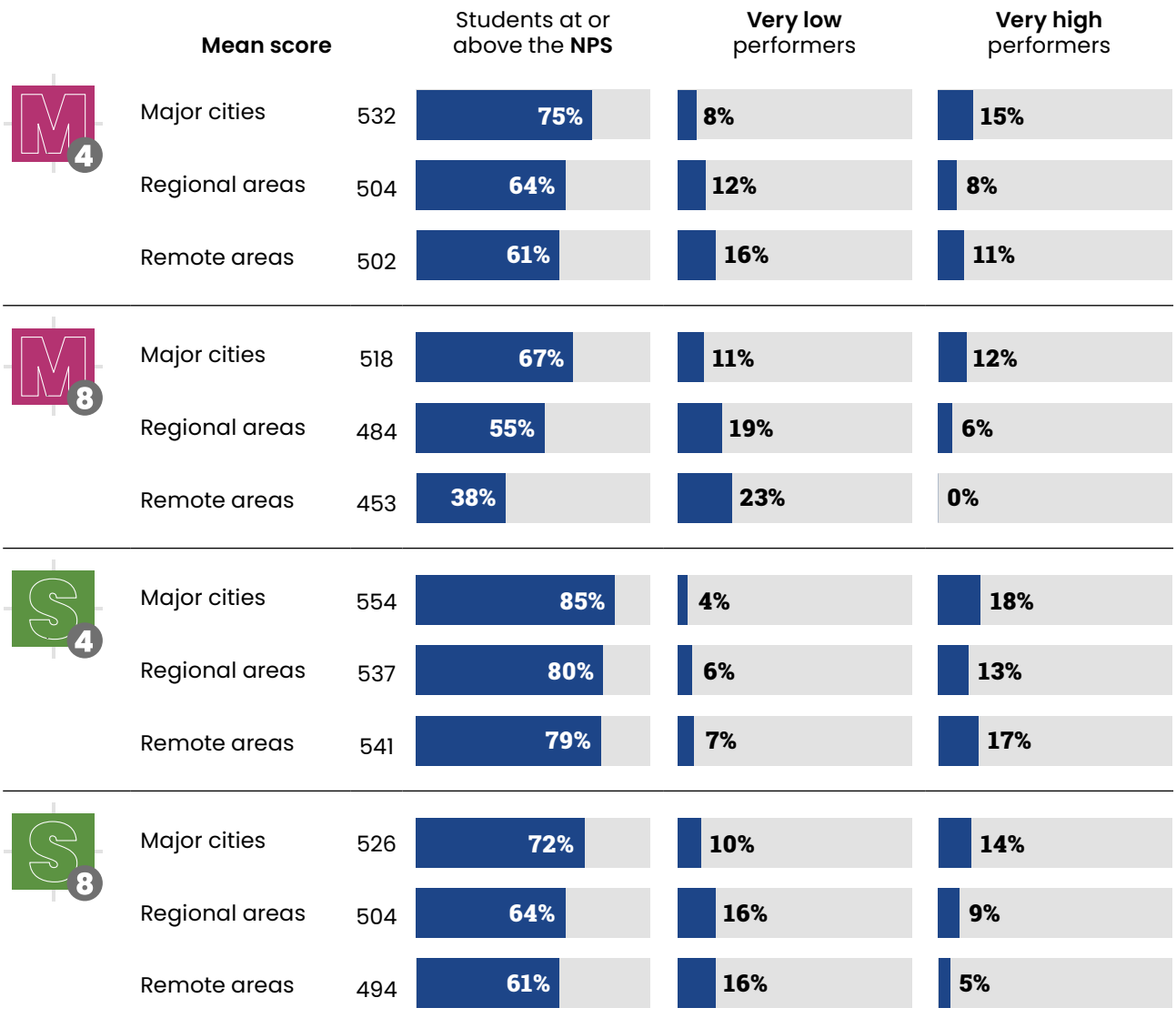


5 For more information about the Books in the home indicator, refer to the Reader's guide in *TIMSS 2023 Australia. Volume I: Student performance.*

GEOGRAPHIC LOCATION OF SCHOOLS

Student performance based upon the geographic location of schools uses the broad categories of major cities, regional areas and remote areas as defined in the *Australian statistical geography standard* (ASGS).[6]

- At both year levels and across both mathematics and science, students who attended schools in major cities performed at a higher level than students in regional and remote areas. This difference is not always significant due to large confidence intervals around the mean for students in remote areas.
- For Year 4 mathematics, the proportions of students who attained the NPS and very high performers were greater in schools in major cities than in schools in regional areas.
- For Year 8 mathematics, the proportions of very high performers and students who attained the NPS were greater in schools in major cities than in schools in regional and remote areas. The percentage of very low performers was lower in major cities than in regional areas.
- For Year 4 science, the proportion of very high performers was significantly higher for students in major cities than for students who attended schools in regional areas.
- For Year 8 science, the proportions of very high performers and students who attained the NPS were greater in schools in major cities than in schools in regional areas.



6 For more information about ASGS, refer to the Reader's guide in *TIMSS 2023 Australia. Volume I: Student performance.*

6 Australia's performance in the content and cognitive domains

CONTENT DOMAINS

By comparing the mean achievement across the content domains (comparing the domain score against the overall score), it is possible to see the relative strengths and weaknesses of Australian Year 4 and Year 8 students.

The following charts show these strengths and weaknesses, and the changes in the average achievement in each content domain since TIMSS 2019.

Students were:

- ▲ **stronger** in **Data**
- ▼ **weaker** in **Number**

Changes between TIMSS 2019 and TIMSS 2023:

Number	**▲ 14 pts**
Measurement and geometry	●
Data	●

Students were:

- ▲ **stronger** in **Data and probability**
- ▼ **weaker** in **Number**
- ▼ **weaker** in **Algebra**

Changes between TIMSS 2019 and TIMSS 2023:

Number	**▼ 17 pts**
Algebra	●
Geometry and measurement	●
Data and probability	●

Students were:

- ▼ **weaker** in **Physical science**

Changes between TIMSS 2019 and TIMSS 2023:

Life science	**▲ 15 pts**
Physical science	**▲ 19 pts**
Earth science	**▲ 22 pts**

Students were:

- ▲ **stronger** in **Physics**
- ▲ **stronger** in **Earth science**
- ▼ **weaker** in **Biology**
- ▼ **weaker** in **Chemistry**

Changes between TIMSS 2019 and TIMSS 2023:

Biology	**▼ 18 pts**
Chemistry	●
Physics	●
Earth science	●

COGNITIVE DOMAINS

By comparing the mean achievement across the cognitive domains (comparing the domain score against the overall score) it is possible to see the relative strengths and weaknesses of Australian Year 4 and Year 8 students.

The relative strengths and weaknesses of Australian Year 4 and Year 8 students in the cognitive domains are shown below, along with changes in the average achievement in each cognitive domain since TIMSS 2019.

Students were:

- ▲ **stronger** in **Knowing**
- ▼ **weaker** in **Applying**

Changes between TIMSS 2019 and TIMSS 2023:

Knowing	**▲ 20 pts**
Applying	●
Reasoning	●

Students were:

- ▼ **weaker** in **Reasoning**

Changes between TIMSS 2019 and TIMSS 2023:

Knowing	●
Applying	**▼ 11 pts**
Reasoning	**▼ 11 pts**

There were no relative differences between the cognitive domains.

Changes between TIMSS 2019 and TIMSS 2023:

Knowing	**▲ 14 pts**
Applying	**▲ 25 pts**
Reasoning	**▲ 10 pts**

Students were:

- ▲ **stronger** in **Reasoning**
- ▼ **weaker** in **Knowing**

Changes between TIMSS 2019 and TIMSS 2023:

Knowing	●
Applying	**▼ 12 pts**
Reasoning	**▼ 9 pts**

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