



# Mathematics achievement: primary schooling

There has been a significant improvement in New Zealand Year 5 students' mathematics performance over the period 1994 to 2006

## Indicator Description

Mathematics scores for Year 5 students.

using technology, interpreting information, thinking systematically and creatively, making things and solving problems.

## Why This Is Important

A strong foundation in mathematics is particularly important as it allows children to better learn new and advanced knowledge in mathematics, which contributes to successful participation in tertiary education and an increasingly knowledge-based society. For young children learning mathematics is integral to a great many aspects of their lives. These aspects include time, money and budgeting, being fair to others, claiming rights, recognising and generalising from symbols and patterns,

The mathematics indicator draws on the Trends in International Mathematics and Science Study (TIMSS) assessments which included questions on whole numbers, decimal and common fractions, two- and three-dimensional shapes, estimation, data representation, and patterns and relationships.

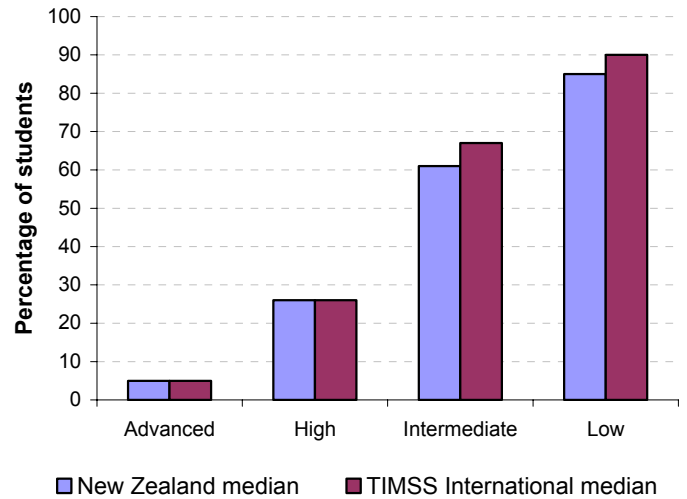
## How We Are Going

There has been a significant improvement in New Zealand Year 5 students' mathematics performance over the period 1994 to 2006. The overall mean mathematics score for New Zealand Year 5 students in 2006 was 492, up from 469 in 1994. This is significantly lower than the TIMSS Scale Average (500).

The spread of scores, from the 5th to the 95th percentiles, reduced between 1994 and 2006. Most of this reduction results from an improvement in the scores of the lowest performing students, with the 5th percentile increasing from 297 to 341.

The international mathematics benchmarks are four points on the mathematics scale; the advanced benchmark (625), the high benchmark (550), the intermediate benchmark (475), and the low benchmark (400). The performance of students reaching each benchmark is described in relation to the types of questions they answered correctly. The proportion of students reaching the high, intermediate and low benchmarks, which peaked in 2002 (27%, 62%, and 86% respectively), has been maintained in the 2006 results. Note that the proportion shown for the low benchmark also includes students who performed at the advanced, high, and intermediate benchmarks. This is because, by definition, students who could do the more complex questions associated with, for example, the high

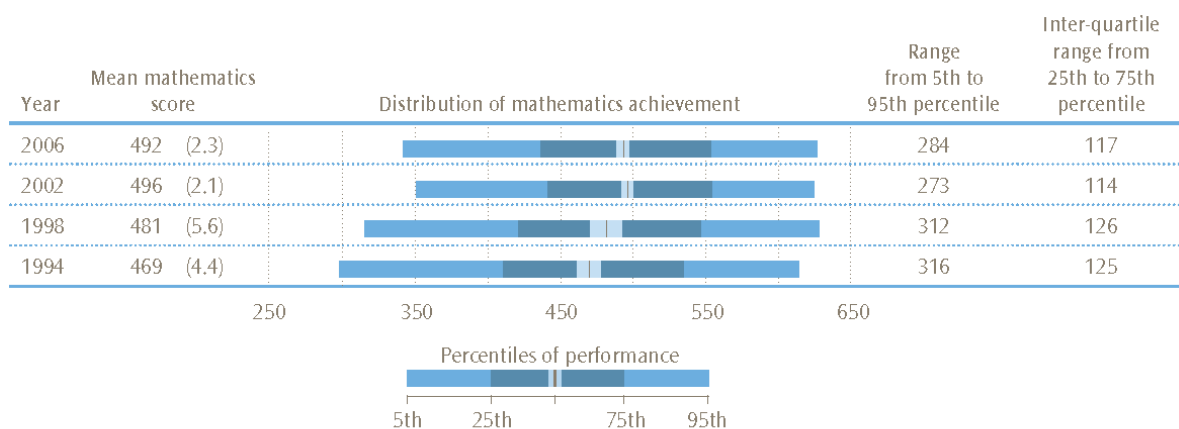
Percentage of New Zealand Year 5 students reaching the TIMSS mathematics benchmarks (2006)



benchmark, would also be able to complete the easier questions associated with the intermediate and low benchmarks.

Five percent of students reached the advanced benchmark in 2006. The differences between the benchmarks in 2006 compared with 2002 are not of statistical significance. Fifteen percent of New Zealand Year 5 students did not reach the lowest TIMSS benchmark. In terms of the benchmark definitions, these were students who did not demonstrate some basic mathematical knowledge.

## Distribution of New Zealand Year 5 mathematics achievement in TIMSS from 1994 to 2006



Mean and 95% confidence interval ( $\pm 1.96$  se)

Note: For trend purposes, only students tested in English are included in the results for 2002. Standard errors are presented in parentheses.

New Zealand Year 5 students' mean performance in mathematics was significantly higher than 12 of the 36 countries that also tested at Year 5 level but was significantly lower than 19 countries including Singapore, England, the United States and Australia. New Zealand's mean mathematics achievement was not significantly different from that of students in four other countries including Scotland.

The TIMSS mathematics content area scores were calculated separately from the overall mathematics score. These were: Number; Geometric Shapes and Measures; and Data Display. New Zealand Year 5 students achieved significantly above the TIMSS Scale Average in Data Display, at the average for Geometric Shapes and Measures and significantly lower than the average in Number.

Significant increases in mean achievement were observed for both girls and boys over the 12-year period. As was the case in the previous assessments, there was no significant difference between Year 5 girls' and boys' mean performance. In terms of the content areas in TIMSS 2006, boys scored significantly higher than girls in Number while girls scored significantly higher than boys in Data Display.

All ethnic groups demonstrated significant gains in mathematics achievement, on average, between 1994 and 2006, although the average performance of Māori and Pasifika students decreased between 2002 and 2006. While students in the Other ethnic grouping also demonstrated a decrease from 2002 to 2006, this was not statistically significant.

### New Zealand Year 5 students' mean mathematics scores in TIMSS by gender (1994 - 2006)

Year	Mean (Standard Error)		
	Girls	Boys	Overall
1994	474 (4.3)	465 (6.1)	469 (4.4)
1998	480 (6.0)	482 (5.8)	481 (5.6)
2002	495 (2.8)	496 (2.4)	496 (2.1)
2006	492 (2.4)	493 (3.1)	492 (2.3)

*Note: Data for the small proportion of students assessed in Māori in 2002 (~2%) are excluded from this table to ensure comparability with data reported for 1994, 1998 and 2006.*

### Where To Find Out More

For information on other national assessment programmes for mathematics, as well as achievement indicators for primary school students, see the indicators on:

- Mathematics achievement: middle schooling
- Mathematics literacy achievement: senior secondary school
- Reading literacy achievement: primary schooling
- Science achievement: primary schooling.

The Ministry of Education has established an Iterative Best Evidence Synthesis Programme to systematically identify, evaluate, analyse, synthesise and make accessible, relevant evidence linked to a range of learner outcomes. Evidence about what works for this indicator can be found in:

- Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis.

### New Zealand Year 5 students' mean mathematics scores in TIMSS by ethnicity (1994 - 2006)

Year	Mean (Standard Error)					Overall
	European/ Pākehā	Māori	Pasifika	Asian	Other	
1994	493 (3.9)	427 (8.2)	412 (11.0)	483 (16.9)	475 (15.1)	469 (4.4)
1998	502 (5.0)	445 (7.3)	416 (15.1)	516 (9.9)	481 (14.8)	481 (5.6)
2002	506 (2.7)	479 (4.8)	464 (6.3)	500 (6.0)	504 (9.8)	496 (2.1)
2006	510 (2.1)	453 (4.4)	427 (5.1)	546 (4.9)	491 (6.0)	492 (2.3)

*Note: Data for the small proportion of students assessed in Māori in 2002 (~2%) are excluded from this table to ensure comparability with data reported for 1994, 1998 and 2006.*

## References

- Alton-Lee, A. (2003). *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington: Ministry of Education.
- Caygill, R., & Kirkham, S. A. (2008). *Trends in Year 5 mathematics achievement 1994 to 2006: results from the Trends in International Mathematics and Science Study (TIMSS)*. Wellington: Ministry of Education.
- Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *PIRLS 2006 International Report: IEA's Progress in International Reading Literacy Study in Primary Schools in 40 Countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.