Chapter 2 Distribution of attainment in TIMSS 2011

Chapter outline

This chapter outlines the distribution of attainment in mathematics and science in England in Year 5 (Y5, ages 9 –10) and Year 9 (Y9, ages 13 –14) in 2011 and over time. It describes the TIMSS 'benchmarks' of achievement and the proportions reaching each benchmark. It is accompanied by an appendix containing sample test items illustrating questions at each benchmark level.

Key findings

- For mathematics and science at Y5 and Y9 in England, the difference in attainment between the highest and lowest performing pupils was just under 300 TIMSS scale points.
- The highest performing countries tended to have narrower or similar ranges of attainment compared with England, although there were exceptions (e.g. Chinese Taipei had a wider range of attainment for Y9 mathematics, and Singapore had a wider range of attainment in science for both age groups).
- For both subjects at both ages, the distributions of attainment tended to show a wider range of attainment for pupils below a country's average score than for those above it.
- For Y5 mathematics and science and for Y9 science, England had between 40 and 50 per cent of pupils at the top two international benchmarks. For Y9 mathematics, the figure was lower at 32 per cent. The comparable figures for the highest performing Pacific Rim countries in each case were between about 60 and 80 per cent.
- At Y5, England's proportions of pupils at the top two benchmarks were similar for mathematics and science. In contrast, the countries performing significantly[17] better than England typically had more pupils in the top two benchmarks for mathematics than for science.
- At Y9, England had more pupils at the top two benchmarks for science than for mathematics. Some of those performing significantly better than England had a similar pattern, while the other highest performers again had more high attaining pupils in mathematics than science.
- In England, 7 per cent failed to reach the Low benchmark for either subject at Y5 and for science at Y9. A larger proportion of 12 per cent failed to reach the Low benchmark for mathematics at Y9. The equivalent figures for the highest performing participants were typically at or lower than 4 per cent for each subject at each age range.
- England's proportions of Y9 pupils at the top two benchmarks for mathematics and science have not changed significantly since 2007. There was also no significant change for Y5 mathematics. The proportions at the top two benchmarks for Y5 science in England decreased significantly since TIMSS 2007.

17 Throughout this report, findings listed as 'significant' are statistically significant.

- Participants performing better than England tended to have increased their percentages at the top two benchmarks for mathematics. Most of the highest performing participants also improved their percentages at the top two benchmarks in science at both ages. Chinese Taipei and Hong Kong, like England, had fewer pupils at the top benchmarks for Y5 science in 2011 compared with 2007.

2.1 Distribution of mathematics attainment: Year 5

England's mean score at Y5 mathematics was 542, but there was relatively wide variation between the highest and lowest scoring pupils in England: a range of just under 300 TIMSS scale points (see Table 2.1). Northern Ireland had a similarly wide range of attainment but the range in the other countries performing significantly better than England was narrower: approximately 30 to 100 scale points narrower than the range in England (see Table 1.2 in Chapter 1). For most countries and benchmarking participants, the distribution of attainment shows a wider range of attainment for scores below the Y5 mathematics average than above it.

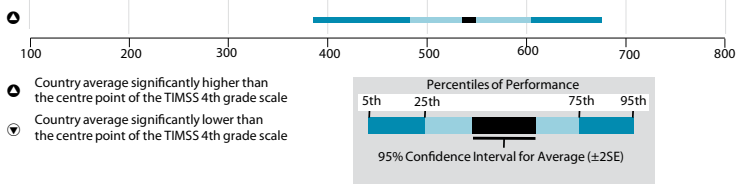
Interpreting the data: England's mean score and distribution

The TIMSS achievement scale summarises pupil performance on a scale with a centre point of 500 and a standard deviation of 100. The shaded line represents the range of scores achieved by 90 per cent of pupils in England. The scores of the top 5 per cent and bottom 5 per cent in each country are excluded from the international table as they represent outliers.

The dark bar towards the centre of the distribution for each country indicates the country's average score with 95 per cent confidence interval. The 5th and 95th percentiles indicate the range of performance for the majority of pupils in a country (i.e. the 5th percentile indicates that 5 per cent of the scores for that country will be less than or equal to the score at that point of the range, and the 95th percentile indicates that 95 per cent of the scores will be less than or equal to the score at that point of the range). The lighter shading on either side of the country average indicates the range of scores achieved by the middle 50 per cent of pupils.

Table 2.1 England's mean score and distribution, Y5 mathematics achievement

Country	Average Scale Score	Mathematics Achievement Distribution
England	542 (3.5)	



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.1, international mathematics report

The distribution of achievement can be explored further by looking at the percentages of the sample achieving each of the TIMSS benchmarks (see the 'Interpreting the data' box below for more information about benchmarks). Table 2.2 summarises the benchmarks for Y5 mathematics.

Interpreting the data: Y5 mathematics international benchmarks

TIMSS reports achievement at four points along the achievement scale as 'international benchmarks'. The Advanced International Benchmark is set at a scale score of 625, the High International Benchmark at 550, the Intermediate International Benchmark at 475, and the Low International Benchmark at 400. The benchmark descriptions summarise what pupils scoring at each TIMSS International Benchmark typically know and can do in the target subject.

Table 2.2 Y5 summary of mathematics international benchmarks

625	Advanced international benchmark	●
	Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. They can solve a variety of multi-step word problems involving whole numbers including proportions. Students at this level show an increasing understanding of fractions and decimals. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can draw a conclusion from data in a table and justify their	
550	High international benchmark	○
	Students can apply their knowledge and understanding to solve problems. Students can solve word problems involving operations with whole numbers. They can use division in a variety of problem situations. They can use their understanding of place value to solve problems. Students can extend patterns to find a later specified term. Students demonstrate understanding of line symmetry and geometric properties. Students can interpret and use data in tables and graphs to solve problems. They can use information in pictographs and tally charts to complete bar graphs.	
475	Intermediate international benchmark	●
	Students can apply basic mathematical knowledge in straightforward situations. Students at this level demonstrate an understanding of whole numbers and some understanding of fractions. Students can visualize three-dimensional shapes from two-dimensional representations. They can interpret bar graphs, pictographs, and tables to solve simple problems.	
400	Low international benchmark	○
	Students have some basic mathematical knowledge. Students can add and subtract whole numbers. They have some recognition of parallel and perpendicular lines, familiar geometric shapes, and coordinate maps. They can read and complete simple bar graphs and tables.	

Source: Exhibit 2.1, international mathematics report

In England, 49 per cent of Y5 pupils reached at least the High benchmark in mathematics (18 per cent of Y5 pupils reaching the Advanced international benchmark, with a further 31 per cent reaching the High benchmark). This compared with 59 per cent in Northern Ireland and 70 to 80 per cent reaching at least the High benchmark in the highest scoring Pacific Rim countries (see Table 2.3). In the highest scoring country, Singapore, 43 per cent of pupils reached the Advanced international benchmark in Y5 mathematics.[18] Generally, the highest scoring participants had a higher proportion of pupils at the Advanced benchmark.

In England, 93 per cent of pupils reached at least the Low international benchmark for Y5 mathematics. This indicates that 7 per cent achieved below this level. In the higher performing countries, the comparable figures varied from 4 per cent (Northern Ireland) to none (Korea).

Table 2.3 shows that, for Y5 mathematics, England forms the tail of a group of participants with generally higher percentages at the Advanced benchmark. All countries below England on the table have fewer than 15 per cent of their pupils at the Advanced benchmark. However, it is also noticeable from the table that England has fewer pupils reaching at least the High benchmark, compared with the highest achieving countries in Y5 mathematics. At the High benchmark, England's performance is more similar to the group of countries listed immediately below it in the table.

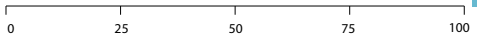
Interpreting the data: performance at the international benchmarks

The table indicates the percentage of pupils reaching each of the four benchmarks and this information is summarised in the series of dots on the chart. Percentages are cumulative (reading the chart from left to right). Thus, for each country the black dot shows the percentage reaching at least the Advanced benchmark. The clear dot then shows the percentage reaching at least the High benchmark and this figure includes those who reached the Advanced benchmark. The darker shaded dot indicates the percentage reaching at least the Intermediate benchmark, and this includes those in the two previous categories. The lighter shaded dot shows cumulatively how many reached at least the Low benchmark. The position of that dot also indicates the percentage that did not reach any of the listed benchmarks.

18 In the context of Singapore excluding a combined total of 6.3 per cent of 9 –10 year old pupils (5.9 per cent at school level and 0.4 per cent within-school exclusions); Hong Kong also had high exclusions at this age range (9.1 per cent at school level and 2.7 per cent within-school exclusions, making a total of 11.8 per cent), and Singapore excluded a similar proportion at school level at Y9. The comparable exclusion figures for England were 1.7 per cent and 0.4 per cent respectively (making a total, when rounding is taken into account, of 2.0 per cent; well within the international target limit of 5 per cent exclusions). See Appendix C of the international mathematics report for more information.

Table 2.3 Performance at the international benchmarks, Y5 mathematics

Country	Percentages of Students Reaching International Benchmarks (Advanced, High, Intermediate, Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore		43 (2.0)	78 (1.4)	94 (0.7)	99 (0.2)
Korea, Rep. of		39 (1.3)	80 (0.8)	97 (0.4)	100 (0.1)
[2] Hong Kong SAR		37 (1.8)	80 (1.6)	96 (1.0)	99 (0.5)
Chinese Taipei		34 (1.2)	74 (1.1)	93 (0.6)	99 (0.2)
Japan		30 (1.0)	70 (1.0)	93 (0.5)	99 (0.2)
† Northern Ireland		24 (1.3)	59 (1.4)	85 (1.2)	96 (0.5)
England		18 (1.3)	49 (1.7)	78 (1.4)	93 (0.7)
Russian Federation		13 (1.4)	47 (2.0)	82 (1.4)	97 (0.6)
[2] United States		13 (0.8)	47 (1.1)	81 (0.8)	96 (0.3)
Finland		12 (0.8)	49 (1.3)	85 (1.2)	98 (0.4)
[1 2] Lithuania		10 (0.8)	43 (1.5)	79 (1.2)	96 (0.6)
Belgium (Flemish)		10 (0.8)	50 (1.3)	89 (0.8)	99 (0.2)
Australia		10 (0.9)	35 (1.4)	70 (1.4)	90 (1.0)
[2] Denmark		10 (1.0)	44 (1.5)	82 (1.1)	97 (0.6)
Hungary		10 (0.8)	37 (1.4)	70 (1.5)	90 (1.0)
[2] Serbia		9 (0.8)	36 (1.5)	70 (1.4)	90 (1.0)
Ireland, Rep. of		9 (0.9)	41 (1.6)	77 (1.4)	94 (0.6)
Portugal		8 (1.2)	40 (1.9)	80 (1.7)	97 (0.6)
[2] Kazakhstan		7 (1.0)	29 (2.0)	62 (2.4)	88 (1.2)
Romania		7 (0.6)	28 (1.7)	57 (2.2)	79 (1.9)
Slovak Republic		5 (0.7)	30 (1.7)	69 (1.6)	90 (1.2)
Germany		5 (0.5)	37 (1.4)	81 (1.3)	97 (0.6)
[2] Azerbaijan		5 (1.0)	21 (2.3)	46 (2.3)	72 (1.9)
Italy		5 (0.6)	28 (1.4)	69 (1.3)	93 (0.8)
† Netherlands		5 (0.6)	44 (1.5)	88 (0.8)	99 (0.2)
Czech Republic		4 (0.5)	30 (1.5)	72 (1.3)	93 (0.8)
Turkey		4 (0.5)	21 (1.4)	51 (1.7)	77 (1.5)
Slovenia		4 (0.5)	31 (1.4)	72 (1.4)	94 (0.6)
New Zealand		4 (0.5)	23 (1.1)	58 (1.3)	85 (0.8)
Malta		4 (0.3)	25 (0.9)	63 (0.8)	88 (0.6)
Sweden		3 (0.4)	25 (1.2)	69 (1.4)	93 (0.7)
Austria		2 (0.3)	26 (1.5)	70 (1.9)	95 (0.8)
‡ Norway		2 (0.4)	21 (1.6)	63 (1.8)	91 (1.0)
United Arab Emirates		2 (0.2)	12 (0.5)	35 (0.8)	64 (1.0)
Armenia		2 (0.4)	14 (1.0)	41 (1.7)	72 (1.4)
[2] Qatar		2 (0.4)	10 (0.9)	29 (1.4)	55 (1.6)
[1] Georgia		2 (0.5)	12 (1.0)	41 (1.7)	72 (1.7)
Chile		2 (0.3)	14 (0.7)	44 (1.1)	77 (1.2)
Saudi Arabia		2 (0.7)	7 (1.3)	24 (1.9)	55 (1.8)
Poland		2 (0.3)	17 (1.1)	56 (1.3)	87 (0.9)
[2] Croatia		2 (0.3)	19 (1.0)	60 (1.2)	90 (0.9)
Bahrain		1 (0.3)	10 (0.9)	34 (1.4)	67 (1.4)
Spain		1 (0.3)	17 (1.1)	56 (1.9)	87 (1.3)
Thailand		1 (0.3)	12 (1.4)	43 (2.3)	77 (2.1)
Iran, Islamic Rep. of		1 (0.2)	9 (0.8)	33 (1.4)	64 (1.5)
Ψ Oman		1 (0.1)	5 (0.3)	20 (0.8)	46 (1.2)
Ж Morocco		0 (0.2)	2 (0.7)	10 (1.2)	26 (1.5)
[1] Ж Kuwait		0 (0.1)	1 (0.3)	9 (0.7)	30 (1.3)
Ж Yemen		0 (0.0)	0 (0.2)	2 (0.5)	9 (1.0)
Ψ Tunisia		0 (0.0)	2 (0.3)	11 (1.0)	35 (1.8)
International Median		4	28	69	90



Ж Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.
Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation is less than 25% but exceeds 15%.

See Appendix C.2 in international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Country	Percentages of Students Reaching International Benchmarks (Advanced, High, Intermediate, Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Benchmarking Participants					
[1 2] North Carolina, US		16 (1.8)	54 (2.6)	86 (1.7)	98 (0.6)
[1 3] Florida, US		14 (1.3)	47 (1.7)	83 (1.2)	97 (0.4)
Ontario, Canada		7 (0.8)	34 (1.7)	73 (1.6)	94 (0.7)
Quebec, Canada		6 (0.8)	40 (1.7)	83 (1.2)	99 (0.2)
Dubai, UAE		5 (0.5)	22 (0.8)	50 (0.8)	75 (0.9)
[2] Alberta, Canada		3 (0.5)	25 (1.6)	70 (1.4)	94 (0.9)
Abu Dhabi, UAE		1 (0.4)	8 (1.1)	29 (2.0)	58 (2.0)

Source: Exhibit 2.2, international mathematics report

Table 2.4 shows trends in the proportions achieving at each of the international benchmarks in England over time. It shows an improvement in the proportion at each of the Advanced and High benchmarks in 2011, compared with 2003 (although there was no significant change since 2007). The table also shows increases in the proportions reaching the Intermediate and Low benchmarks in 2011 compared with 1995 (although there were no significant increases in the intervening period).

Among the countries scoring more highly than England in Y5 mathematics, two (Japan and Chinese Taipei) have improved their percentage at the Advanced benchmark since TIMSS 2007. Singapore has remained stable across all years while Korea has improved since the 1995 cycle.[19]

Interpreting the data: trends in Y5 mathematics international benchmarks

The table shows the percentage reaching each benchmark in each of the TIMSS cycles at the target age range. The score threshold for each benchmark is given. The upward arrow indicates that the 2011 percentage is statistically significantly higher.

Table 2.4 Trends in Y5 mathematics international benchmarks

Country	Advanced International Benchmark (625) Per cent of Students				High International Benchmark (550) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	18	16	14 ▲	7 ▲	49	48	43 ▲	24 ▲

Country	Intermediate International Benchmark (475) Per cent of Students				Low International Benchmark (400) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	78	79	75	54 ▲	93	94	93	82 ▲

▲ 2011 per cent significantly higher

▼ 2011 per cent significantly lower

Source: Exhibit 2.3, international mathematics report

Examples A to D in Appendix C show Y5 mathematics test items exemplifying attainment at each of the benchmark levels. Further examples are available in the international mathematics report, along with a more detailed description of each benchmark.

19 See Exhibit 2.3 in the international mathematics report for more information.

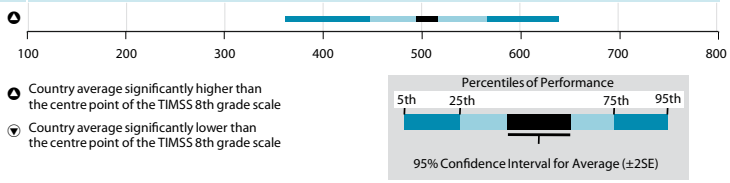
2.2 Distribution of mathematics attainment: Year 9

The mean score and distribution of TIMSS Y9 mathematics achievement in England is shown again in Table 2.5 below. England's mean score for Y9 mathematics was 507 and, as at Y5, there was relatively wide variation between the highest and lowest scoring pupils in England: again, a range of just under 300 TIMSS scale points.

> **Interpreting the data: England's mean score and distribution**
>
> See section 2.1 for a summary of how to interpret this table.

Table 2.5 England's mean score and distribution, Y9 mathematics achievement

Country	Average Scale Score	Mathematics Achievement Distribution
‡ England	507 (5.5)	



See Appendix C.9 for sampling guidelines and sampling participation notes ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.2, international mathematics report

England's range for Y9 mathematics is similar to the range for many participants, including some of the higher performing countries (see Table 1.4 in Chapter 1). This implies that, while the highest performers may succeed in minimising variation in mathematics attainment among their primary pupils, the gap between their higher and lower attainers widens at secondary school. The gap for Chinese Taipei is particularly wide, at just under 400 scale points. For most participants, the distribution of attainment shows a wider range of attainment for scores below the Y9 mathematics average than above it.

Table 2.6 summarises the benchmarks for Y9 mathematics.

> **Interpreting the data: Y9 mathematics international benchmarks**
>
> See section 2.1 for a summary of how to interpret this table.

Table 2.6 Y9 summary of mathematics international benchmarks

625	Advanced International Benchmark	●
	Students can reason with information, draw conclusions, make generalizations, and solve linear equations. Students can solve a variety of fraction, proportion, and percent problems and justify their conclusions. Students can express generalizations algebraically and model situations. They can solve a variety of problems involving equations, formulas, and functions. Students can reason with geometric figures to solve problems. Students can reason with data from several sources or unfamiliar representations to solve multi-step problems.	
550	High International Benchmark	○
	Students can apply their understanding and knowledge in a variety of relatively complex situations. Students can use information from several sources to solve problems involving different types of numbers and operations. Students can relate fractions, decimals, and percents to each other. Students at this level show basic procedural knowledge related to algebraic expressions. They can use properties of lines, angles, triangles, rectangles, and rectangular prisms to solve problems. They can analyze data in a variety of graphs.	
475	Intermediate International Benchmark	●
	Students can apply basic mathematical knowledge in a variety of situations. Students can solve problems involving decimals, fractions, proportions, and percentages. They understand simple algebraic relationships. Students can relate a two-dimensional drawing to a three-dimensional object. They can read, interpret, and construct graphs and tables. They recognize basic notions of likelihood.	
400	Low International Benchmark	○
	Students have some knowledge of whole numbers and decimals, operations, and basic graphs.	

Source: Exhibit 2.18, international mathematics report

In England, 32 per cent of Y9 pupils reached at least the High benchmark (8 per cent reaching the Advanced benchmark, fewer than at Y5, and a further 24 per cent reaching the High benchmark). This compared with 61 to 78 per cent reaching at least the High benchmark in the highest scoring Pacific Rim countries, despite their sometimes larger ranges of attainment for this age group. In the three highest scoring countries, Korea, Singapore and Chinese Taipei, 47, 48 and 49 per cent respectively reached the Advanced international benchmark (see Table 2.7).

In England, 88 per cent of pupils reached at least the Low international benchmark for Y9 mathematics, fewer than for the equivalent benchmark at Y5. This indicates that 12 per cent achieved below this level at Y9. Among the countries performing better than England in Y9 mathematics, the comparable figures varied from 5 per cent (Russian Federation) to 1 per cent (Korea and Singapore).

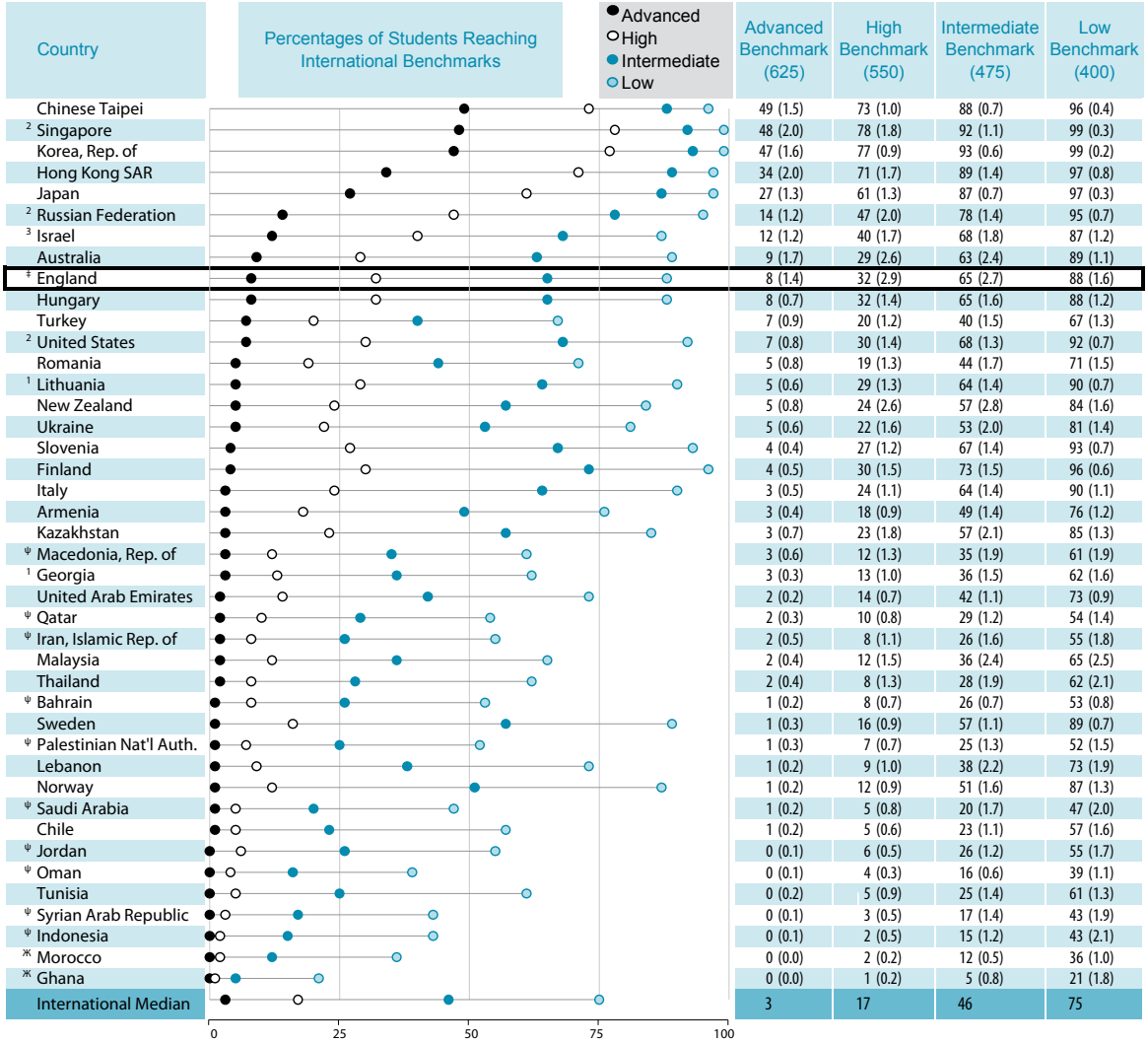
At Y9, the difference in profiles at the top of the performance table for mathematics is more stark than at Y5: England's percentage at the Advanced benchmark has more in common with the performance of the majority of countries than with the highest performing countries. England's percentage reaching at least the High benchmark is also noticeably lower than in the very highest achieving countries, and performance only begins to catch up at the Intermediate benchmark.

Interpreting the data: performance at the international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.7 Performance at the international benchmarks, Y9 mathematics

Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Chinese Taipei	49 (1.5)	73 (1.0)	88 (0.7)	96 (0.4)
[2] Singapore	48 (2.0)	78 (1.8)	92 (1.1)	99 (0.3)
Korea, Rep. of	47 (1.6)	77 (0.9)	93 (0.6)	99 (0.2)
Hong Kong SAR	34 (2.0)	71 (1.7)	89 (1.4)	97 (0.8)
Japan	27 (1.3)	61 (1.3)	87 (0.7)	97 (0.3)
[2] Russian Federation	14 (1.2)	47 (2.0)	78 (1.4)	95 (0.7)
[3] Israel	12 (1.2)	40 (1.7)	68 (1.8)	87 (1.2)
Australia	9 (1.7)	29 (2.6)	63 (2.4)	89 (1.1)
[‡] England	8 (1.4)	32 (2.9)	65 (2.7)	88 (1.6)
Hungary	8 (0.7)	32 (1.4)	65 (1.6)	88 (1.2)
Turkey	7 (0.9)	20 (1.2)	40 (1.5)	67 (1.3)
[2] United States	7 (0.8)	30 (1.4)	68 (1.3)	92 (0.7)
Romania	5 (0.8)	19 (1.3)	44 (1.7)	71 (1.5)
[1] Lithuania	5 (0.6)	29 (1.3)	64 (1.4)	90 (0.7)
New Zealand	5 (0.8)	24 (2.6)	57 (2.8)	84 (1.6)
Ukraine	5 (0.6)	22 (1.6)	53 (2.0)	81 (1.4)
Slovenia	4 (0.4)	27 (1.2)	67 (1.4)	93 (0.7)
Finland	4 (0.5)	30 (1.5)	73 (1.5)	96 (0.6)
Italy	3 (0.5)	24 (1.1)	64 (1.4)	90 (1.1)
Armenia	3 (0.4)	18 (0.9)	49 (1.4)	76 (1.2)
Kazakhstan	3 (0.7)	23 (1.8)	57 (2.1)	85 (1.3)
[Ψ] Macedonia, Rep. of	3 (0.6)	12 (1.3)	35 (1.9)	61 (1.9)
[1] Georgia	3 (0.3)	13 (1.0)	36 (1.5)	62 (1.6)
United Arab Emirates	2 (0.2)	14 (0.7)	42 (1.1)	73 (0.9)
[Ψ] Qatar	2 (0.3)	10 (0.8)	29 (1.2)	54 (1.4)
[Ψ] Iran, Islamic Rep. of	2 (0.5)	8 (1.1)	26 (1.6)	55 (1.8)
Malaysia	2 (0.4)	12 (1.5)	36 (2.4)	65 (2.5)
Thailand	2 (0.4)	8 (1.3)	28 (1.9)	62 (2.1)
[Ψ] Bahrain	1 (0.2)	8 (0.7)	26 (0.7)	53 (0.8)
Sweden	1 (0.3)	16 (0.9)	57 (1.1)	89 (0.7)
[Ψ] Palestinian Nat'l Auth.	1 (0.3)	7 (0.7)	25 (1.3)	52 (1.5)
Lebanon	1 (0.2)	9 (1.0)	38 (2.2)	73 (1.9)
Norway	1 (0.2)	12 (0.9)	51 (1.6)	87 (1.3)
[Ψ] Saudi Arabia	1 (0.2)	5 (0.8)	20 (1.7)	47 (2.0)
Chile	1 (0.2)	5 (0.6)	23 (1.1)	57 (1.6)
[Ψ] Jordan	0 (0.1)	6 (0.5)	26 (1.2)	55 (1.7)
[Ψ] Oman	0 (0.1)	4 (0.3)	16 (0.6)	39 (1.1)
Tunisia	0 (0.2)	5 (0.9)	25 (1.4)	61 (1.3)
[Ψ] Syrian Arab Republic	0 (0.1)	3 (0.5)	17 (1.4)	43 (1.9)
[Ψ] Indonesia	0 (0.1)	2 (0.5)	15 (1.2)	43 (2.1)
[Ж] Morocco	0 (0.0)	2 (0.2)	12 (0.5)	36 (1.0)
[Ж] Ghana	0 (0.0)	1 (0.2)	5 (0.8)	21 (1.8)
International Median	3	17	46	75



[Ж] Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

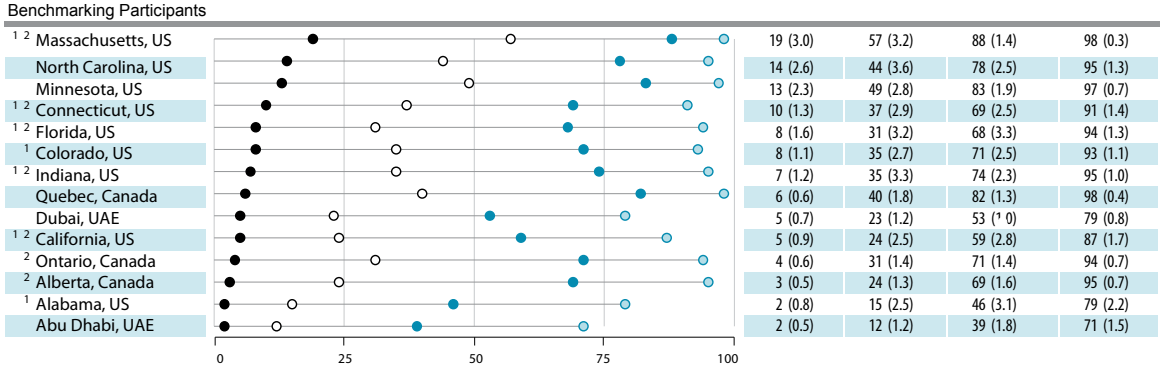
[Ψ] Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation is less than 25% but exceeds 15%.

See Appendix C.3 in international report for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes † and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Benchmarking Participants

[1] [2] Massachusetts, US	19 (3.0)	57 (3.2)	88 (1.4)	98 (0.3)
North Carolina, US	14 (2.6)	44 (3.6)	78 (2.5)	95 (1.3)
Minnesota, US	13 (2.3)	49 (2.8)	83 (1.9)	97 (0.7)
[1] [2] Connecticut, US	10 (1.3)	37 (2.9)	69 (2.5)	91 (1.4)
[1] [2] Florida, US	8 (1.6)	31 (3.2)	68 (3.3)	94 (1.3)
[1] Colorado, US	8 (1.1)	35 (2.7)	71 (2.5)	93 (1.1)
[1] [2] Indiana, US	7 (1.2)	35 (3.3)	74 (2.3)	95 (1.0)
Quebec, Canada	6 (0.6)	40 (1.8)	82 (1.3)	98 (0.4)
Dubai, UAE	5 (0.7)	23 (1.2)	53 (* 0)	79 (0.8)
[1] [2] California, US	5 (0.9)	24 (2.5)	59 (2.8)	87 (1.7)
[2] Ontario, Canada	4 (0.6)	31 (1.4)	71 (1.4)	94 (0.7)
[2] Alberta, Canada	3 (0.5)	24 (1.3)	69 (1.6)	95 (0.7)
[1] Alabama, US	2 (0.8)	15 (2.5)	46 (3.1)	79 (2.2)
Abu Dhabi, UAE	2 (0.5)	12 (1.2)	39 (1.8)	71 (1.5)



Source: Exhibit 2.19, international mathematics report

Table 2.8 shows trends over time in England. It shows that there has been no significant change in the percentages at each of the benchmarks over time. This is in contrast to many other participants, such as the countries performing better than England, which have generally increased the percentages of pupils at the higher two benchmarks over time. In contrast, other participants have declined at these benchmarks over time, including Hungary and the Canadian provinces of Alberta and Quebec.[20]

Interpreting the data: trends in Y9 mathematics international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.8 Trends in Y9 mathematics international benchmarks

Country	Advanced International Benchmark (625) Per cent of Students					High International Benchmark (550) Per cent of Students				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
England	8	8	5	6	6	32	35	26	25	27

Country	Intermediate International Benchmark (475) Per cent of Students					Low International Benchmark (400) Per cent of Students				
	2011	2007	2003	1999	1995	2011	2007	2003	1999	1995
England	65	69	61	60	61	88	90	90	88	87

▲ 2011 per cent significantly higher

▼ 2011 per cent significantly lower

Source: Exhibit 2.20, international mathematics report

Examples E to H in Appendix C show Y9 mathematics test items exemplifying attainment at each of the benchmark levels. Further examples are available in the international mathematics report, along with a more detailed description of each benchmark.

2.3 Distribution of science attainment: Year 5

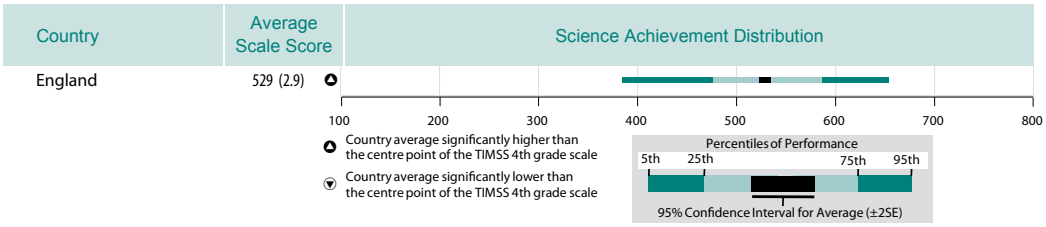
England's mean score at Y5 science was 529, and England's achievement band was just under 300 scale points wide (see Table 2.9), similar to the variation in attainment seen for mathematics at Y5. Again, this attainment band was similar in width to that of many other participants, but was a little narrower than the range for Singapore and a little wider than the range for the other high scoring countries (see Table 1.7 in Chapter 1). For most participants, the distribution of attainment shows a wider range of attainment below the Y5 science average than above it.

20 See Exhibit 2.20 in the international mathematics report for more information.

Interpreting the data: England's mean score and distribution

See section 2.1 for a summary of how to interpret this table.

Table 2.9 England's mean score and distribution, Y5 science achievement



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.1, international science report

The TIMSS benchmarks give more information about this range of attainment. Table 2.10 summarises the benchmarks for Y5 science.

Interpreting the data: Y5 science international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.10 Y5 summary of science international benchmarks

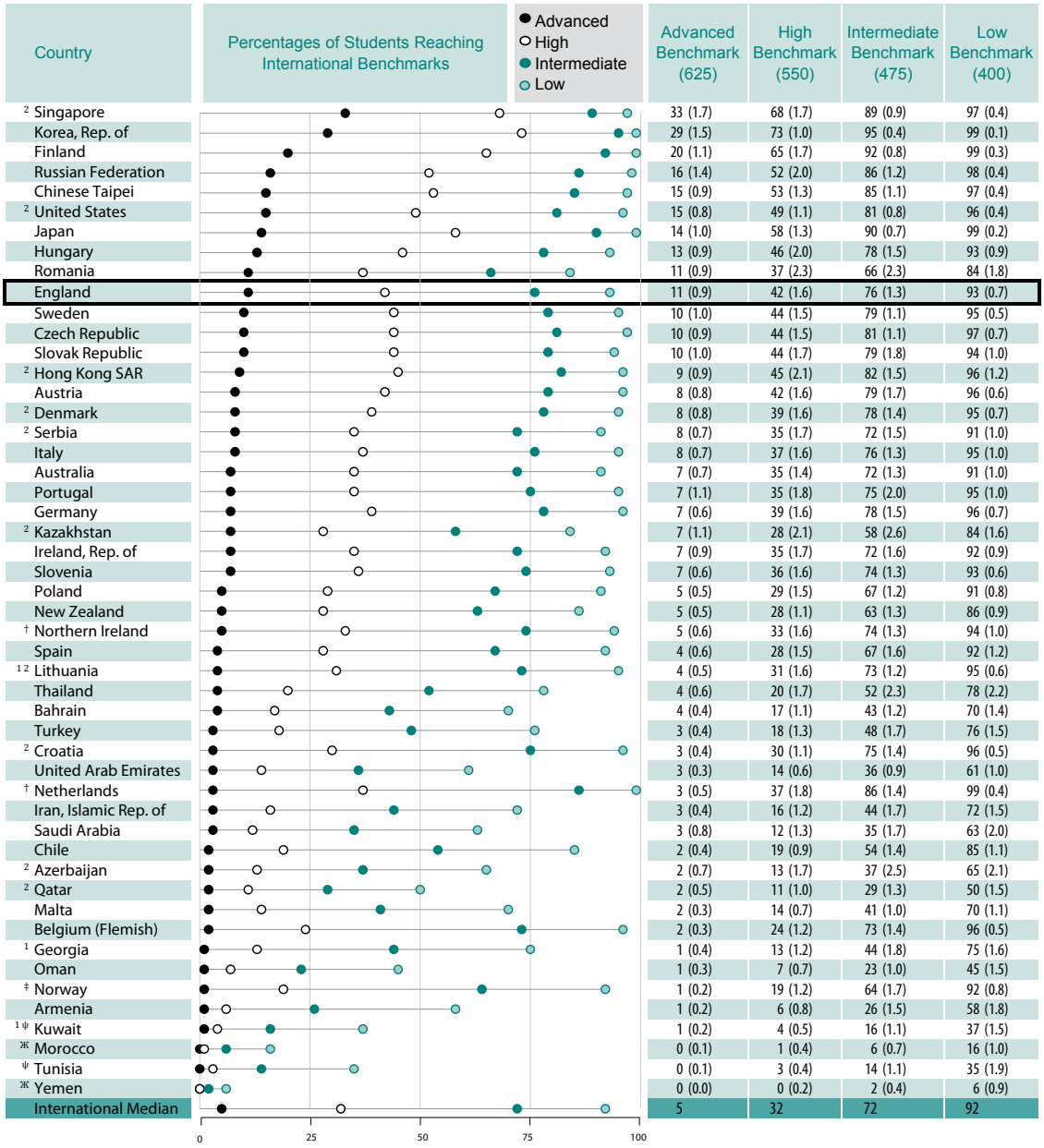
625	Advanced International Benchmark
	Students apply knowledge and understanding of scientific processes and relationships and show some knowledge of the process of scientific inquiry. Students communicate their understanding of characteristics and life processes of organisms, reproduction and development, ecosystems and organisms' interactions with the environment, and factors relating to human health. They demonstrate understanding of properties of light and relationships among physical properties of materials, apply and communicate their understanding of electricity and energy in practical contexts, and demonstrate an understanding of magnetic and gravitational forces and motion. Students communicate their understanding of the solar system and of Earth's structure, physical characteristics, resources, processes, cycles, and history. They have a beginning ability to interpret results in the context of a simple experiment, reason and draw conclusions from descriptions and diagrams, and evaluate and support an argument.
550	High International Benchmark
	Students apply their knowledge and understanding of the sciences to explain phenomena in everyday and abstract contexts. Students demonstrate some understanding of plant and animal structure, life processes, life cycles, and reproduction. They also demonstrate some understanding of ecosystems and organisms' interactions with their environment, including understanding of human responses to outside conditions and activities. Students demonstrate understanding of some properties of matter, electricity and energy, and magnetic and gravitational forces and motion. They show some knowledge of the solar system, and of Earth's physical characteristics, processes, and resources. Students demonstrate elementary knowledge and skills related to scientific inquiry. They compare, contrast, and make simple inferences, and provide brief descriptive responses combining knowledge of science concepts with information from both everyday and abstract contexts.
475	Intermediate International Benchmark
	Students have basic knowledge and understanding of practical situations in the sciences. Students recognize some basic information related to characteristics of living things, their reproduction and life cycles, and their interactions with the environment, and show some understanding of human biology and health. They also show some knowledge of properties of matter and light, electricity and energy, and forces and motion. Students know some basic facts about the solar system and show an initial understanding of Earth's physical characteristics and resources. They demonstrate ability to interpret information in pictorial diagrams and apply factual knowledge to practical situations.
400	Low International Benchmark
	Students show some elementary knowledge of life, physical, and earth sciences. Students demonstrate knowledge of some simple facts related to human health, ecosystems, and the behavioral and physical characteristics of animals. They also demonstrate some basic knowledge of energy and the physical properties of matter. Students interpret simple diagrams, complete simple tables, and provide short written responses to questions requiring factual information.

Source: Exhibit 2.1, international science report

Table 2.11 summarises international performance at the benchmarks for Y5 science. Again, it shows clearly the difference between England's profile and those of the highest scoring countries. England is in a group of countries with relatively low proportions of pupils at the Advanced benchmark in Y5 science and fewer than 50 per cent reaching at least the High benchmark.

England has 42 per cent of its pupils at the two highest benchmarks (11 per cent at the Advanced benchmark and 31 per cent at the High benchmark). This is only a little lower than the proportions for Y5 mathematics (18 and 31 per cent respectively, totalling 49 per cent).

Table 2.11 Performance at the international benchmarks, Y5 science



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore	33 (1.7)	68 (1.7)	89 (0.9)	97 (0.4)
Korea, Rep. of	29 (1.5)	73 (1.0)	95 (0.4)	99 (0.1)
Finland	20 (1.1)	65 (1.7)	92 (0.8)	99 (0.3)
Russian Federation	16 (1.4)	52 (2.0)	86 (1.2)	98 (0.4)
Chinese Taipei	15 (0.9)	53 (1.3)	85 (1.1)	97 (0.4)
[2] United States	15 (0.8)	49 (1.1)	81 (0.8)	96 (0.4)
Japan	14 (1.0)	58 (1.3)	90 (0.7)	99 (0.2)
Hungary	13 (0.9)	46 (2.0)	78 (1.5)	93 (0.9)
Romania	11 (0.9)	37 (2.3)	66 (2.3)	84 (1.8)
England	11 (0.9)	42 (1.6)	76 (1.3)	93 (0.7)
Sweden	10 (1.0)	44 (1.5)	79 (1.1)	95 (0.5)
Czech Republic	10 (0.9)	44 (1.5)	81 (1.1)	97 (0.7)
Slovak Republic	10 (1.0)	44 (1.7)	79 (1.8)	94 (1.0)
[2] Hong Kong SAR	9 (0.9)	45 (2.1)	82 (1.5)	96 (1.2)
Austria	8 (0.8)	42 (1.6)	79 (1.7)	96 (0.6)
[2] Denmark	8 (0.8)	39 (1.6)	78 (1.4)	95 (0.7)
[2] Serbia	8 (0.7)	35 (1.7)	72 (1.5)	91 (1.0)
Italy	8 (0.7)	37 (1.6)	76 (1.3)	95 (1.0)
Australia	7 (0.7)	35 (1.4)	72 (1.3)	91 (1.0)
Portugal	7 (1.1)	35 (1.8)	75 (2.0)	95 (1.0)
Germany	7 (0.6)	39 (1.6)	78 (1.5)	96 (0.7)
[2] Kazakhstan	7 (1.1)	28 (2.1)	58 (2.6)	84 (1.6)
Ireland, Rep. of	7 (0.9)	35 (1.7)	72 (1.6)	92 (0.9)
Slovenia	7 (0.6)	36 (1.6)	74 (1.3)	93 (0.6)
Poland	5 (0.5)	29 (1.5)	67 (1.2)	91 (0.8)
New Zealand	5 (0.5)	28 (1.1)	63 (1.3)	86 (0.9)
† Northern Ireland	5 (0.6)	33 (1.6)	74 (1.3)	94 (1.0)
Spain	4 (0.6)	28 (1.5)	67 (1.6)	92 (1.2)
[1 2] Lithuania	4 (0.5)	31 (1.6)	73 (1.2)	95 (0.6)
Thailand	4 (0.6)	20 (1.7)	52 (2.3)	78 (2.2)
Bahrain	4 (0.4)	17 (1.1)	43 (1.2)	70 (1.4)
Turkey	3 (0.4)	18 (1.3)	48 (1.7)	76 (1.5)
[2] Croatia	3 (0.4)	30 (1.1)	75 (1.4)	96 (0.5)
United Arab Emirates	3 (0.3)	14 (0.6)	36 (0.9)	61 (1.0)
† Netherlands	3 (0.5)	37 (1.8)	86 (1.4)	99 (0.4)
Iran, Islamic Rep. of	3 (0.4)	16 (1.2)	44 (1.7)	72 (1.5)
Saudi Arabia	3 (0.8)	12 (1.3)	35 (1.7)	63 (2.0)
Chile	2 (0.4)	19 (0.9)	54 (1.4)	85 (1.1)
[2] Azerbaijan	2 (0.7)	13 (1.7)	37 (2.5)	65 (2.1)
[2] Qatar	2 (0.5)	11 (1.0)	29 (1.3)	50 (1.5)
Malta	2 (0.3)	14 (0.7)	41 (1.0)	70 (1.1)
Belgium (Flemish)	2 (0.3)	24 (1.2)	73 (1.4)	96 (0.5)
[1] Georgia	1 (0.4)	13 (1.2)	44 (1.8)	75 (1.6)
Oman	1 (0.3)	7 (0.7)	23 (1.0)	45 (1.5)
‡ Norway	1 (0.2)	19 (1.2)	64 (1.7)	92 (0.8)
Armenia	1 (0.2)	6 (0.8)	26 (1.5)	58 (1.8)
[1 Ψ] Kuwait	1 (0.2)	4 (0.5)	16 (1.1)	37 (1.5)
※ Morocco	0 (0.1)	1 (0.4)	6 (0.7)	16 (1.0)
Ψ Tunisia	0 (0.1)	3 (0.4)	14 (1.1)	35 (1.9)
※ Yemen	0 (0.0)	0 (0.2)	2 (0.4)	6 (0.9)
International Median	5	32	72	92

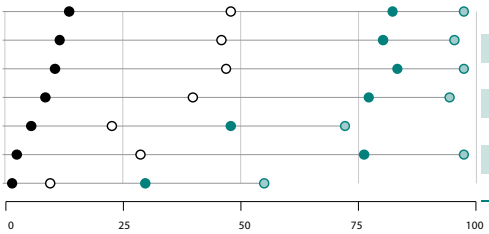
※ Average achievement not reliably measured because the percentage of students with achievement too low for estimation exceeds 25%.

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.

See Appendix C.2 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes † and ‡.

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Benchmarking Participants



[1 3] Florida, US	14 (1.5)	48 (2.3)	82 (1.3)	97 (0.5)
[1 2] North Carolina, US	12 (1.5)	46 (2.6)	80 (1.9)	95 (0.9)
[2] Alberta, Canada	11 (0.9)	47 (1.6)	83 (1.2)	97 (0.5)
Ontario, Canada	9 (0.9)	40 (1.6)	77 (1.6)	94 (0.6)
Dubai, UAE	6 (0.7)	23 (0.9)	48 (0.9)	72 (1.1)
Quebec, Canada	3 (0.5)	29 (1.5)	76 (1.6)	97 (0.4)
Abu Dhabi, UAE	2 (0.3)	10 (0.9)	30 (1.9)	55 (2.1)

Source: Exhibit 2.2, international science report

In contrast, the proportions at the top benchmarks for the highest performing countries for both subjects are, in some cases, considerably lower for science than mathematics. Table 2.12 summarises the differences. It shows that the highest performing countries have differences between 10 and 19 percentage points at the Advanced benchmark across the two subjects, compared with England's difference of 7 percentage points.

In England, 93 per cent of pupils reached at least the Low international benchmark for Y5 science (the same percentage as for Y5 mathematics). This indicates that 7 per cent achieved below this level. Among the higher performing countries in science at this age, the comparable figures varied from 4 per cent (United States) to 1 per cent (Japan, Korea and Finland).

Interpreting the data: performance at the international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.12 Percentages reaching the top benchmarks for participants performing significantly better than England in both subjects at Y5

Country	Percentage reaching at least Advanced benchmark, mathematics	Percentage reaching at least High benchmark, mathematics	Percentage reaching at least Advanced benchmark, science	Percentage reaching at least High benchmark, science
England	18	49	11	42
Singapore	43	78	33	68
Korea	39	80	29	73
Chinese Taipei	34	74	15	53
Japan	30	70	14	58

Source: derived from Exhibit 2.2, international mathematics and science reports

Table 2.13 shows trends in the proportions achieving at each of the international Y5 science benchmarks in England over time. Although it is positive that the percentages at the Advanced benchmark are reasonably similar for mathematics and science, it is notable that there have been significant decreases in the percentages across the Y5 science Advanced, High and Intermediate benchmarks (whereas, for mathematics, they have improved since 2003 and remained stable since 2007). Only the percentage at the Low benchmark for Y5 science has increased significantly: there are now 93 per cent reaching the Low benchmark in Y5 science, in place of 90 per cent in 1995 (although 95 per cent reached it in 2007). This indicates that, whereas 10 per cent failed to reach the Low benchmark in 1995, only 5 per cent did so in 2007 but that has now risen again to 7 per cent failing to reach the Low benchmark in 2011.

Interpreting the data: trends in Y5 science international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.13 Trends in Y5 science international benchmarks

Country	Advanced International Benchmark (625) Per cent of Students				High International Benchmark (550) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	11	14 ▼	15 ▼	15 ▼	42	48 ▼	47 ▼	42

Country	Intermediate International Benchmark (475) Per cent of Students				Low International Benchmark (400) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	76	81 ▼	79	72	93	95 ▼	94	90 ▲

▲ 2011 per cent significantly higher

▼ 2011 per cent significantly lower

Source: Exhibit 2.3, international science report

Many other countries maintained their 2007 levels of performance against the benchmarks in 2011. England was one of only a few which showed decreases at the top benchmarks in that period, including Chinese Taipei and Hong Kong. Those which have increased their percentages at the top benchmarks since 2007 included the Czech Republic, Japan, Sweden and Denmark.[21]

Examples I to L in Appendix C show Y5 science test items exemplifying attainment at each of the benchmark levels. Further examples are available in the international science report, along with a more detailed description of each benchmark.

2.4 Distribution of science attainment: Year 9

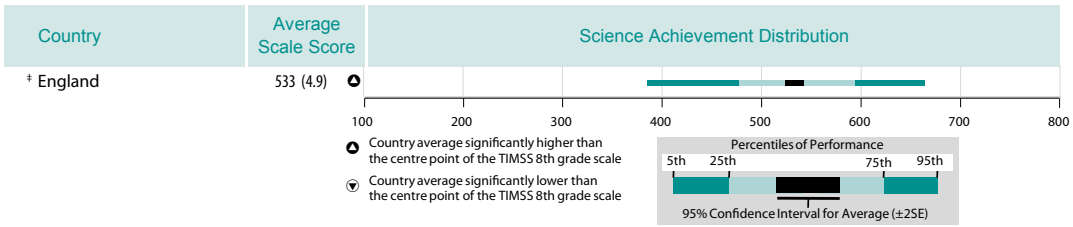
England's mean score at Y9 science was 533, and the science performance of most Y9 pupils in England remained, as at Y5, within a band just under 300 scale points wide (see Table 2.14).

21 See Exhibit 2.3 in the international science report for more information.

Interpreting the data: England's mean score and distribution

See section 2.1 for a summary of how to interpret this table.

Table 2.14 England's mean score and distribution, Y9 science achievement



See Appendix C.9 in international report for sampling guidelines and sampling participation notes † and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 1.2, international science report

Although England's range is, again, relatively wide, it is similar to the range for many participants at the 13 –14 year old age band, including some of the higher performing countries such as Chinese Taipei. It is a little larger than the range for Massachusetts, Minnesota and Alberta, and noticeably larger than the range for Finland. However, as was the case for Y5 science, it is smaller than the range for Singapore (see Table 1.9 in Chapter 1). For most participants, the distribution of attainment shows a wider range of attainment for scores below the Y9 science average than above it.

The benchmarks give more information about the range of performance within participating countries. Table 2.15 summarises the benchmarks for Y9 science.

Interpreting the data: Y9 science international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.15 Y9 summary of science international benchmarks

625	Advanced International Benchmark
	Students communicate an understanding of complex and abstract concepts in biology, chemistry, physics, and earth science. Students demonstrate some conceptual knowledge about cells and the characteristics, classification, and life processes of organisms. They communicate an understanding of the complexity of ecosystems and adaptations of organisms, and apply an understanding of life cycles and heredity. Students also communicate an understanding of the structure of matter and physical and chemical properties and changes and apply knowledge of forces, pressure, motion, sound, and light. They reason about electrical circuits and properties of magnets. Students apply knowledge and communicate understanding of the solar system and Earth's processes, structures, and physical features. They understand basic features of scientific investigation. They also combine information from several sources to solve problems and draw conclusions, and they provide written explanations to communicate scientific knowledge.
550	High International Benchmark
	Students demonstrate understanding of concepts related to science cycles, systems, and principles. They demonstrate understanding of aspects of human biology, and of the characteristics, classification, and life processes of organisms. Students communicate understanding of processes and relationships in ecosystems. They show an understanding of the classification and compositions of matter and chemical and physical properties and changes. They apply knowledge to situations related to light and sound and demonstrate basic knowledge of heat and temperature, forces and motion, and electrical circuits and magnets. Students demonstrate an understanding of the solar system and of Earth's processes, physical features, and resources. They demonstrate some scientific inquiry skills. They also combine and interpret information from various types of diagrams, contour maps, graphs, and tables; select relevant information, analyze, and draw conclusions; and provide short explanations conveying scientific knowledge.
475	Intermediate International Benchmark
	Students recognize and apply their understanding of basic scientific knowledge in various contexts. Students apply knowledge and communicate an understanding of human health, life cycles, adaptation, and heredity, and analyze information about ecosystems. They have some knowledge of chemistry in everyday life and elementary knowledge of properties of solutions and the concept of concentration. They are acquainted with some aspects of force, motion, and energy. They demonstrate an understanding of Earth's processes and physical features, including the water cycle and atmosphere. Students interpret information from tables, graphs, and pictorial diagrams and draw conclusions. They apply knowledge to practical situations and communicate their understanding through brief descriptive responses.
400	Low International Benchmark
	Students can recognize some basic facts from the life and physical sciences. They have some knowledge of biology, and demonstrate some familiarity with physical phenomena. Students interpret simple pictorial diagrams, complete simple tables, and apply basic knowledge to practical situations.

Source: Exhibit 2.17, international science report

Table 2.16 summarises international performance at the benchmarks for Y9 science. For Y9 science, England has 44 per cent of its pupils reaching at least the two highest benchmarks (14 per cent at the Advanced benchmark and 30 per cent at the High benchmark). This is very similar to the proportions for Y5 science (11 per cent and 31 per cent respectively, totalling 42 per cent).

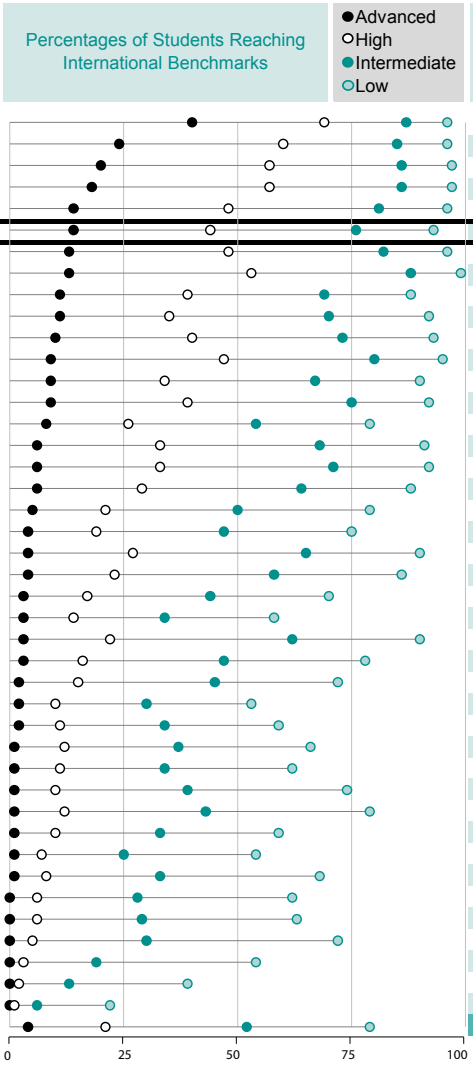
Again, the profile for England differs from those of the highest scoring countries. England is in a group of countries with percentages between 10 and 15 per cent at the Advanced benchmark and generally fewer than 50 per cent reaching at least the High benchmark. Once again, England only begins to catch up with the highest performers (see Table 2.16) at the level of the Intermediate benchmark.

Interpreting the data: performance at the international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.16 Performance at the international benchmarks, Y9 science

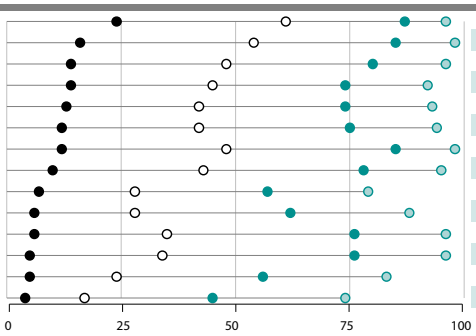
Exhibit 2.18: Performance at the International Benchmarks of Science Achievement



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[2] Singapore	40 (1.7)	69 (2.0)	87 (1.6)	96 (0.7)
Chinese Taipei	24 (1.4)	60 (1.2)	85 (0.8)	96 (0.4)
Korea, Rep. of	20 (0.9)	57 (1.1)	86 (0.7)	97 (0.4)
Japan	18 (1.1)	57 (1.3)	86 (0.9)	97 (0.4)
[2] Russian Federation	14 (1.1)	48 (1.8)	81 (1.2)	96 (0.7)
‡ England	14 (1.5)	44 (2.6)	76 (2.3)	93 (1.2)
Slovenia	13 (0.8)	48 (1.4)	82 (1.2)	96 (0.5)
Finland	13 (1.2)	53 (1.7)	88 (1.0)	99 (0.3)
[3] Israel	11 (1.1)	39 (1.7)	69 (1.7)	88 (1.1)
Australia	11 (1.6)	35 (2.5)	70 (2.0)	92 (0.8)
[2] United States	10 (0.7)	40 (1.3)	73 (1.1)	93 (0.7)
Hong Kong SAR	9 (1.1)	47 (1.8)	80 (1.7)	95 (1.0)
New Zealand	9 (1.0)	34 (2.2)	67 (2.2)	90 (1.2)
Hungary	9 (0.8)	39 (1.5)	75 (1.4)	92 (0.8)
Turkey	8 (0.9)	26 (1.4)	54 (1.4)	79 (1.0)
Sweden	6 (0.5)	33 (1.3)	68 (1.4)	91 (0.7)
[1] Lithuania	6 (0.7)	33 (1.4)	71 (1.3)	92 (0.6)
Ukraine	6 (0.8)	29 (1.7)	64 (1.6)	88 (1.1)
Iran, Islamic Rep. of	5 (0.7)	21 (1.3)	50 (2.0)	79 (1.5)
United Arab Emirates	4 (0.4)	19 (0.8)	47 (1.1)	75 (0.9)
Italy	4 (0.5)	27 (1.4)	65 (1.4)	90 (1.1)
Kazakhstan	4 (0.6)	23 (1.9)	58 (2.5)	86 (1.2)
Bahrain	3 (0.3)	17 (0.7)	44 (1.0)	70 (0.7)
Qatar	3 (0.5)	14 (1.1)	34 (1.4)	58 (1.2)
Norway	3 (0.4)	22 (1.2)	62 (1.4)	90 (1.1)
Romania	3 (0.5)	16 (1.3)	47 (1.5)	78 (1.5)
Jordan	2 (0.3)	15 (1.0)	45 (1.5)	72 (1.5)
Macedonia, Rep. of	2 (0.4)	10 (1.0)	30 (1.7)	53 (2.0)
Oman	2 (0.2)	11 (0.5)	34 (1.0)	59 (1.3)
Armenia	1 (0.2)	12 (0.8)	37 (1.5)	66 (1.3)
Malaysia	1 (0.4)	11 (1.4)	34 (2.4)	62 (2.6)
Thailand	1 (0.5)	10 (1.3)	39 (2.1)	74 (1.7)
Chile	1 (0.2)	12 (0.9)	43 (1.4)	79 (1.5)
Palestinian Nat'l Auth.	1 (0.2)	10 (0.8)	33 (1.3)	59 (1.3)
Lebanon	1 (0.2)	7 (0.8)	25 (2.0)	54 (2.3)
Saudi Arabia	1 (0.2)	8 (0.8)	33 (2.0)	68 (1.8)
[1] Georgia	0 (0.1)	6 (0.6)	28 (1.5)	62 (1.5)
Syrian Arab Republic	0 (0.1)	6 (0.8)	29 (1.8)	63 (1.9)
Tunisia	0 (0.1)	5 (0.7)	30 (1.4)	72 (1.3)
Indonesia	0 (0.1)	3 (0.4)	19 (1.4)	54 (2.3)
Morocco	0 (0.0)	2 (0.2)	13 (0.7)	39 (1.0)
Ψ Ghana	0 (0.1)	1 (0.2)	6 (0.8)	22 (1.7)
International Median	4	21	52	79

Ψ Reservations about reliability of average achievement because the percentage of students with achievement too low for estimation does not exceed 25% but exceeds 15%.
See Appendix C.3 in the international report for target population coverage notes 1, 2, and 3. See Appendix C.9 for sampling guidelines and sampling participation notes † and ‡.
( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Benchmarking Participants



[1 2] Massachusetts, US	24 (2.6)	61 (2.8)	87 (1.5)	96 (0.7)
[1] Minnesota, US	16 (1.9)	54 (2.6)	85 (2.0)	98 (0.7)
[1] Colorado, US	14 (1.6)	48 (2.6)	80 (2.0)	96 (0.7)
[1 2] Connecticut, US	14 (1.5)	45 (2.5)	74 (2.0)	92 (1.3)
[1 2] Florida, US	13 (2.0)	42 (3.5)	74 (3.6)	93 (1.5)
[1 3] North Carolina, US	12 (2.2)	42 (3.2)	75 (3.0)	94 (1.4)
[2] Alberta, Canada	12 (0.9)	48 (1.5)	85 (1.1)	98 (0.4)
[1 2] Indiana, US	10 (1.4)	43 (2.9)	78 (2.1)	95 (0.9)
Dubai, UAE	7 (0.7)	28 (1.0)	57 (1.3)	79 (1.0)
[1 2] California, US	6 (0.7)	28 (1.9)	62 (2.5)	88 (1.6)
[2] Ontario, Canada	6 (0.7)	35 (1.5)	76 (1.3)	96 (0.6)
Quebec, Canada	5 (0.6)	34 (1.6)	76 (1.4)	96 (0.7)
[1] Alabama, US	5 (1.0)	24 (2.7)	56 (3.5)	83 (1.9)
Abu Dhabi, UAE	4 (0.7)	17 (1.5)	45 (1.9)	74 (1.5)

Source: Exhibit 2.18, international science report

The benchmark pattern across subjects at Y9 is more mixed than the pattern across Y5. Table 2.17 summarises the differences for England and compares them with the differences for the participants who performed significantly better than England at Y9 for both subjects. For most of these participants, the percentage reaching the Advanced benchmark is higher for mathematics than science. However, England has more at the Advanced benchmark in science than mathematics (a six percentage point difference, favouring science), and that is similar to the size of the difference seen for Singapore and Japan (favouring mathematics). However, there is a much larger difference for Korea and Chinese Taipei (27 and 25 percentage points different respectively, favouring mathematics). Like England, the two US benchmarking states of Massachusetts and Minnesota have a greater percentage at the Advanced benchmarks for science than mathematics.

Table 2.17 Percentages reaching the top benchmarks for participants performing significantly better than England in both subjects at Y9

Country	Percentage reaching at least Advanced benchmark, mathematics	Percentage reaching at least High benchmark, mathematics	Percentage reaching at least Advanced benchmark, science	Percentage reaching at least High benchmark, science
England	8	32	14	44
Singapore	48	78	40	69
Korea	47	77	20	57
Chinese Taipei	49	73	24	60
Japan	27	61	18	57
[Massachusetts, US]	[19]	[57]	[24]	[61]
[Minnesota, US]	[13]	[49]	[16]	[54]

Data for benchmarking participants are given in square brackets.

Source: derived from Exhibit 2.19 international mathematics report and Exhibit 2.18 international science report.

Table 2.18 shows the data for England. It shows that there has been only one change over time in the profile for Y9 science in England: there were fewer pupils at the Low benchmark in 2011 than there were in 2003. However, the percentage at the Low benchmark has returned to the levels seen in the first TIMSS survey in 1995, with 7 per cent failing to reach the Low benchmark. This trend is very similar to the position for Y9 mathematics (see section 2.2), where there were no significant changes at all over time. In contrast, the position for both subjects at Y5 was more changeable, with some increases in benchmark categories over time for Y5 mathematics and some decreases for Y5 science.

As was the case for Y9 mathematics, England's general stability in the profile of attainment differed from that of many other TIMSS participants. Among the highest performers in Y9 science, the profile in Chinese Taipei over time was very similar to that for England, but both Singapore and Korea had more pupils reaching the Advanced benchmark in 2011 compared with 2007.[22]

22 See Exhibit 2.19 in the international science report for more information.

Interpreting the data: trends in Y9 science international benchmarks

See section 2.1 for a summary of how to interpret this table.

Table 2.18 Trends in Y9 science international benchmarks

Country	Advanced International Benchmark (625) Per cent of Students				High International Benchmark (550) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	11	14 ▼	15 ▼	15 ▼	42	48 ▼	47 ▼	42

Country	Intermediate International Benchmark (475) Per cent of Students				Low International Benchmark (400) Per cent of Students			
	2011	2007	2003	1995	2011	2007	2003	1995
England	76	81 ▼	79	72	93	95 ▼	94	90 ▲

▲ 2011 per cent significantly higher

▼ 2011 per cent significantly lower

Source: Exhibit 2.19, international science report

Examples M to P in Appendix C show Y9 science test items exemplifying attainment at each of the benchmark levels. Further examples are available in the international science report, along with a more detailed description of each benchmark.