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# Programme for International Student Assessment (PISA) 2015: Highlights from Scotland's Results



CHILDREN, EDUCATION AND SKILLS



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# Main Messages

## Overall performance

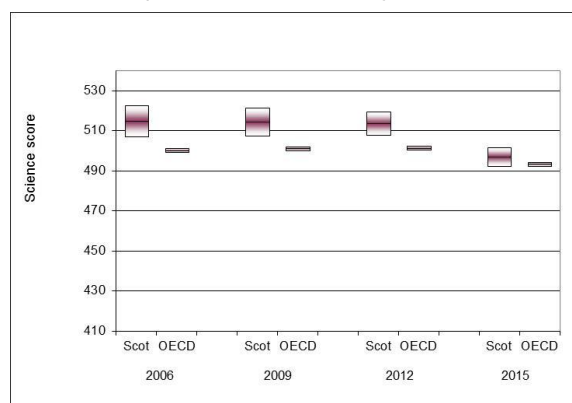
- Scotland's scores in the PISA assessments were similar to the OECD average in science, maths and reading. In the previous survey in 2012, Scotland was above the OECD average in reading and science, and at the average in maths.
- Scotland's own overall performance compared to 2012 declined in science and reading, but was similar in maths.
- Scotland's relative performance compared to other countries, including UK administrations, declined when measured by the number of comparator countries that were significantly above and below Scotland, in maths, reading and science.
- The proportion of pupils performing at highest levels of achievement ("Level 5 and above") and performing at the lowest levels ("below Level 2") were similar in Scotland to the OECD average in science. In both maths and reading, both the proportions of low and high performers were lower than the OECD average.
- The gradient and strength of relationship between performance and social background was similar to 2012. However, reductions in the gradient between 2009 and 2012 were sustained into 2015. In addition, in reading, the gradient and strength of relationship are now both weaker than across the OECD.

## Scotland's performance in science

- In science, **Scotland's performance was similar to the OECD average**. Scotland had been above the OECD average in each PISA round from 2006 to 2012. Scores for previous rounds (2000 and 2003) were not comparable.

- Scotland's performance **declined compared to 2012**.

- With respect to Scotland's relative position in 2015 (compared to OECD countries and UK administrations) there were three additional countries outperforming Scotland and seven fewer countries performing below Scotland compared to 2012.



- The **proportion of low performers (below Level 2) increased to 19.5 per cent, and was similar to the OECD average.**

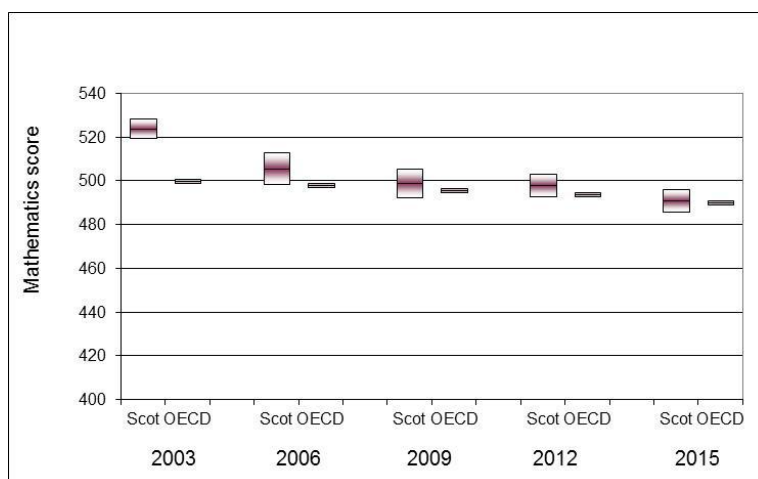
- The **strength of relationship between social disadvantage and a pupil’s score in Scotland was similar to the OECD average.** About 11 per cent of the variation in Scotland could be explained by socio-economic factors. This was similar to 2012, but an improvement compared to the position for science in 2009 (16 per cent).

**The extent to which disadvantage was related to performance (or “gradient”) in Scotland was also similar to the average across OECD countries and amounts to around 37 points. This is similar to 2012 (36 points) but still represents an improvement on 2009 when the effect of deprivation was larger (47 points).**

## Scotland’s performance in maths

- **In maths, Scotland’s performance was similar to the OECD average.** This has been the case in each PISA round since 2006. Scores in 2000 were not comparable.

- While Scotland’s performance was similar to 2012, it has declined compared to 2006 and previous waves.



- The proportion of low performers in Scotland was similar to 2012, but was **less than the OECD average.** The proportion of high performers **declined compared to 2012, and was smaller than the OECD average.**

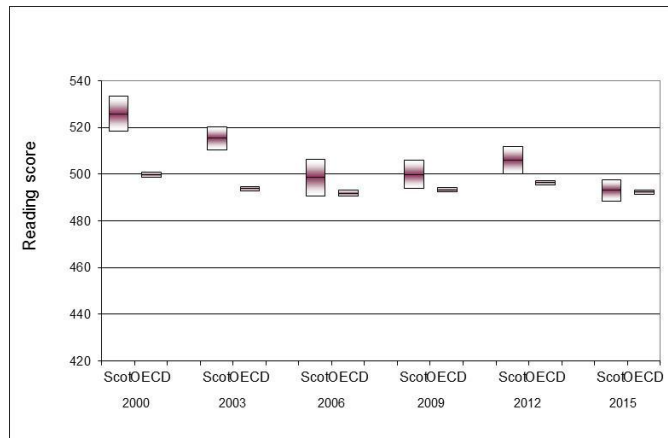
- **Scotland’s relative position** compared to OECD countries and UK administrations **declined since 2012**, with more countries outperforming Scotland and a smaller number performing significantly below Scotland.

- The **strength of relationship between social disadvantage and a pupil’s score in Scotland was similar to the OECD average.** About 11 per cent of the variation in Scotland could be explained by socio-economic factors. This was also similar to the position for maths in 2012, but represents an improvement on 2009.

- The **extent** to which disadvantage was related to performance (or “gradient”) in Scotland was also similar to the average across OECD countries and amounted to around 33 points. This is similar to 2012, but **still represents an improvement on 2009** when the effect of deprivation was larger (45 points).

## Scotland’s performance in reading

- In reading, Scotland’s performance in 2015 was at the OECD average. Scotland’s performance was previously above the OECD average in 2009 and 2012.



- Scotland’s own performance declined between 2012 and 2015 and is now level with 2006 and 2009. There was an earlier fall in performance between 2003 and 2006.

- The proportion of low performers **increased compared to 2012**, but was lower than the OECD average. The share of high performers was similar to 2012, but less than the OECD average.

- Scotland’s relative position compared to OECD countries and UK administrations **declined since 2012**, with more countries outperforming Scotland and a smaller number performing significantly below Scotland.

- The **strength** of relationship between social disadvantage and a pupil’s score was lower in Scotland than the OECD average. About 9 per cent of the variation in Scotland could be explained by socio-economic factors. This was similar to the position for reading in 2012 (11 per cent), but less than 2009 (14 per cent).

- The **extent** of the relationship between deprivation and reading performance (or “gradient”) in Scotland was lower than the OECD average at around 32 points. This is similar to the 2012 position (35 points) but better than 2009 (44 points).

# 1. Introduction and Methodology

## What is PISA?

1. The Programme for International Student Assessment (PISA) is an assessment of 15 year-olds' skills carried out under the auspices of the Organisation for Economic Co-operation and Development (OECD). The programme runs every three years across all OECD members and a variety of partner countries. Scotland has participated in all six surveys since the first wave of testing in 2000.
2. Each survey cycle focusses on one of three domains: reading, mathematics and science. In 2015 the main domain was science, with maths and reading as subsidiary domains. Further data on student wellbeing and collaborative problem solving (the “innovative domain” in PISA 2015) will be published during 2017.

## Who participates?

3. Around 540,000 students participated in the study worldwide. This includes the 35 member states of the OECD and 37 “partner countries and economies”.

Fig. 1.1: Global coverage of PISA 2012





Table 1.1: OECD states and partner countries and “economies” participating in PISA 2015<sup>1</sup>

OECD countries (in grey)		Partner countries and economies (in blue)	
Australia	Korea	Albania	Kosovo
Austria	Latvia	Algeria	Lebanon
Belgium	Luxembourg	Argentina	Lithuania
Canada	Mexico	Brazil	Macao (China)
Chile	Netherlands	B-S-J-G (China) <sup>2</sup>	Malaysia
Czech Republic	New Zealand	Bulgaria	Malta
Denmark	Norway	Chinese Taipei	Moldova
Estonia	Poland	Colombia	Montenegro
Finland	Portugal	Costa Rica	Peru
France	Slovak Republic	Croatia	Qatar
Germany	Slovenia	Cyprus	Romania
Greece	Spain	Dominican Republic	Russian Federation
Hungary	Sweden	Former Yugoslav	Singapore
Iceland	Switzerland	Republic of Macedonia	Thailand
Ireland	Turkey	Georgia	Trinidad and Tobago
Israel	United Kingdom	Hong Kong (China)	Tunisia
Italy	United States	Indonesia	United Arab Emirates
Japan		Jordan	Uruguay
		Kazakhstan	Viet Nam

4. The United Kingdom is a member state of the OECD and its results are published in the main OECD publication. Scotland participates as an “adjudicated region”, meaning that its results have full quality assurance from the survey contractors appointed by the OECD, and can publish its results separately. Within the UK, England, Wales and Northern Ireland have boosted samples as “non-adjudicated regions” which means they are able to produce country-level analysis within their reports. Regional results are published as annexes to the main OECD volumes.

5. Survey fieldwork is carried out separately in each participating state by “National Centres” according to strict quality standards set by the OECD.

## What does PISA measure?

6. PISA seeks to measure skills which are necessary for participation in society. Accordingly, it assesses how students apply the skills they have gained to the types of problem they may encounter in work or elsewhere. Pupils are assessed at the age of 15 as this is regarded as a reasonable point at which to test the impact of compulsory education throughout the developed world (most PISA 2012 participants in Scotland were attending S4). After this point students

<sup>1</sup> Additional participants in previous cycles were Azerbaijan, Himlichal Pradesh-India, Kyrgyzstan, Liechtenstein, Mauritius, Miranda-Venezuela, Panama, Serbia, Tamil Nadu-India

<sup>2</sup> In PISA 2015, the People’s Republic of China fielded four provinces compared to one (Shanghai) in previous rounds. The four provinces are Beijing, Shanghai, Jiangsu and Guangdong

will typically move onto more specialised studies or enter the labour market. Box 1.1 contains the definitions of the domains tested by PISA.

#### Box 1.1: The PISA domains and their definition

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

**\* Reading literacy is defined as students' ability to understand, use, reflect on and engage with written texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society.**

**\* Mathematical literacy is defined as students' capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals in recognising the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective citizens.**

7. We have included some details on how science, the main focus of the 2015 PISA survey, was assessed in Chapter 2. Further details of how each domain was assessed can be found in the OECD volumes published on the PISA website, [www.oecd.org/pisa](http://www.oecd.org/pisa).

8. The assessments are also supplemented by background questionnaires. Pupils are asked about their motivations for study, attitudes to school, beliefs about science, studying and their socio-economic background. Headteachers are asked about the challenges facing their schools, organisation and factors that they believe affect their students' performance.

### The survey in Scotland

9. The survey was carried out in Scotland between 3 and 28 March 2015. The pupils tested are generally described as "15 year-olds" although the actual age range was 15 years and 2 months to 16 years and 2 months as of 1 March 2015. Students were mostly (87.5 per cent) in the S4 year group.

10. The PISA survey was managed by an international consortium led by ETS. The Consortium developed the tests, questionnaires and survey documentation and ensured that all participating countries met quality standards. In Scotland, the National Foundation for Educational Research (NFER) was the "National Centre", responsible for local adaptations to the surveys, and administering the test in schools.

11. The school sample was randomly selected by NFER following submission of sampling forms to the consortium. The sample was stratified on the basis of previous exam performance (split into five categories), whether schools were publicly funded or independent, urban/rural location and school size, and whether schools were single-sex or mixed.

12. In total, 109 secondary schools participated in the survey. One hundred and two of these were from the main sample (87 per cent response rate), and seven from the back-up samples (resulting in 93 per cent participation rate after replacements were added in). This exceeded the OECD's minimum standard of 85 per cent participation.

13. Within each school 40 students were randomly sampled by NFER using software supplied by the Consortium. In total 4,283 students were drawn in the sample. Schools were able to withdraw a certain number of students where it was deemed that participation would be difficult due to additional support needs or language issues. Similarly students that had left the school in the interim were not considered part of the target sample. In total 3,610 students were deemed eligible participants. Of these a total of 3,123 students took part, with the balance being those who did not wish to take part (both students and their parents were given the opportunity to opt out of the survey), those who were absent on the day of the test or were withdrawn by the school because of their additional support needs.

14. The OECD had strict criteria for the level of exclusion that was acceptable, and the total exclusion rate of 6.52 per cent was deemed to be consistent with a robust sample. Similarly, the final weighted participation rate, calculated by the consortium, was 79.9 per cent, which was held to meet the OECD requirement of 80 per cent.

15. For the first time the assessment was administered in Scotland by computer. This was achieved using the existing facilities in schools with the support of school and Local Authority ICT services.

16. The software delivery system was provided by the international consortium and rotated the assessment items in six clusters so that approximately half were science, with the remainder split between reading, maths and collaborative problem solving – the innovative domain in 2015.

17. The assessment was administered in two one-hour sessions, with a further 30 minutes for the background questionnaire.

18. As in all previous cycles, there was a survey of headteachers within schools, which asked about their views on school organisation, teaching staff and resources. Eighty-six headteachers responded - a rate of 78.9 per cent.

19. In 2015, Scotland also participated in the Parents' Questionnaire, sent to all parents of students who sat the PISA assessment, which asked additional questions about student background, the support that students' received at

home, career expectations and their engagement with the school. The response rate for this survey was 36.4 per cent.

## Interpreting the results

20. It should be understood that PISA is a sample survey. Like all surveys of this type, it is subject to sampling error. The necessity of surveying only a sample of students, even when chosen at random, runs the risk that such a group will not necessarily reflect the larger population of students. We must therefore be cautious in assuming that the values found in the survey would be the same as those in the population.

21. This means that being confident that there is a difference between Scotland and the OECD average, or between groups and countries, will depend on both the size of the observed difference and the standard error associated with the sample sizes used. Significance tests are used to assess the statistical significance of comparisons made.

22. Therefore, it is not possible to produce individual country rankings based on the absolute (mean) score. Accordingly this report shows results divided into those countries whose scores are statistically significantly higher than, similar to or lower than Scotland. By “significant” we mean that we are 95 per cent certain that there is a difference (or similarity).

## Change over time

23. This report covers, as in previous publications, the position of Scotland relative to other countries, and how this has changed over time. The mathematics assessment changed radically in 2003 and for science in 2006, as they became “full domains” for the first time, so we are unable to make comparisons before those waves. The OECD average for science was normalised at 500 in the 2006 survey – the first survey when it was the main domain.

24. One complication is that membership of the OECD has changed at various points. In 2010, Chile, Estonia, Israel and Slovenia were admitted to membership. This affected comparison of reading scores in 2009.<sup>3</sup> Scotland was above the OECD average when those four countries were included, but similar to the average of the pre-2010 membership. In 2016, Latvia also acceded to the OECD. When making comparisons with the OECD average, this report defines this as the average of member nations of the OECD at the time.

25. Further, the measurement of performance can be affected by new test items, the change of administration from paper- to computer-based assessment and the statistical treatment of data. While the scales have been equated to allow for expression on the same basis between cycles, the OECD provide a “link error” to quantify the uncertainty when comparing scores over different waves of

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<sup>3</sup> Although the four countries joined the OECD in 2010, they were included as OECD members in the PISA reports for the 2009 round. Latvia was also included for 2015.

data. All estimates in this report have taken this into account. A small number of countries were affected beyond this and this is noted in the OECD volumes. We are unable to report if this also applied to Scotland as rescaled means have not been possible at regional level.

## **Further analysis of PISA**

26. Much of this report focusses on changes to Scotland's headline score and the relative position internationally. However, PISA is not just a snapshot of student attainment, but a comprehensive data-gathering exercise which enables analysis, not only of how well school systems around the world perform, but the factors that are behind this. The OECD publications present international analysis of students' abilities, motivations, attitudes, background, support at home and confidence. In addition, information is gathered on school structure and management, and the OECD analyse how various aspects of school organisation may be related to attainment.

27. The OECD will also publish further volumes of PISA 2015 data on Student Wellbeing and Collaborative Problem Solving during 2017.

28. Periodically, the OECD also publish short reports in their "PISA in Focus" series at the following link: [www.oecd.org/pisa/pisainfocus/](http://www.oecd.org/pisa/pisainfocus/)

## **Other surveys of performance in Scotland**

29. The Scottish Government, in partnership with Education Scotland, the Scottish Qualifications Agency (SQA) and the Association of Directors of Education in Scotland (ADES) also conducts the Scottish Survey of Literacy and Numeracy (SSLN), an annual survey which assesses student performance in numeracy and literacy in alternate years. The first numeracy survey was conducted in 2011 and the first literacy survey in 2012.

30. The SSLN provides Scotland-level performance data for pupils in primary stages 4 and 7 and in secondary stage 2. SSLN results can be found on the Scottish Government website using the following link: [www.gov.scot/ssltn](http://www.gov.scot/ssltn). The 2016 survey of literacy represents the final wave of SSLN prior to the introduction of standardised assessments that support Teacher Professional Judgement.

## 2. How Science is Assessed

31. PISA is designed to measure what students know, but also the application of science in the real-life situations. Below, we summarise key features of the OECD's framework for measuring science literacy.

### The PISA science framework

32. The PISA science framework is set out below in Figure 2.1. Broadly, the cognitive items in the assessment measure “competencies” (skills) and types of knowledge, and then specific scientific content. In addition the background questionnaire measures attitudes towards science expressed by the student.

33. The **competencies** are the foundation that allows an individual to approach and explain scientific problems in today's world. Each of the science items could be categorised by its main task under one of the competencies, which were as follows:

- **Explain phenomena scientifically** – recognise, offer and evaluate explanations for a range of natural and technological phenomena.
- **Evaluate and design scientific enquiry** – describe and appraise scientific investigations and propose ways of addressing questions scientifically.
- **Interpret data and evidence scientifically** – analyse and evaluate data, claims and arguments in a variety of representations and draw appropriate scientific conclusions

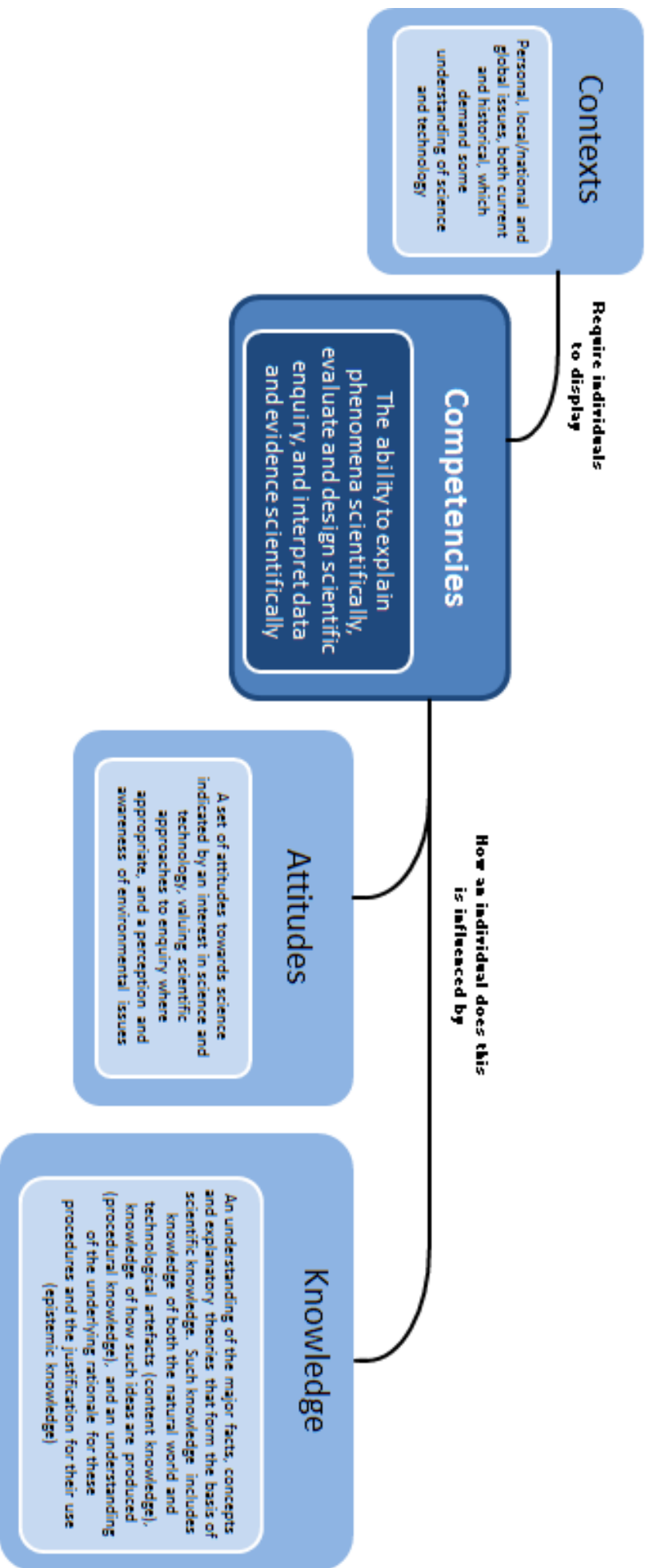
34. Next, exercising these competencies requires different types of knowledge:

- **Content knowledge** of theories, explanatory ideas, information and facts
- **Procedural knowledge** is the understanding of how content knowledge is derived, through the mechanisms of collection, analysis and interpretation of data
- Finally **epistemic knowledge** refers to the nature of knowledge – understanding the difference between facts, observations, hypotheses, models and theories, and why procedures, such as experiments are key to creating knowledge

35. Knowledge is also categorised by major scientific fields, with three content areas:

- **Physical systems**
- **Living systems** and
- **Earth and space systems**

Figure 2.1 : Main features of the PISA 2015 science framework



Source: OECD

36. Questions are constructed to test each of these categories, and at varying levels of difficulty, in order to identify a student's ability. Their score corresponds to levels of ability, which are summarised in Table 2.1 below.

37. Example questions and how they were adapted for computer-based assessment are provided in Annex C of Volume I of the OECD report.



Table 2.1: Proficiency levels in science, and what they mean

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

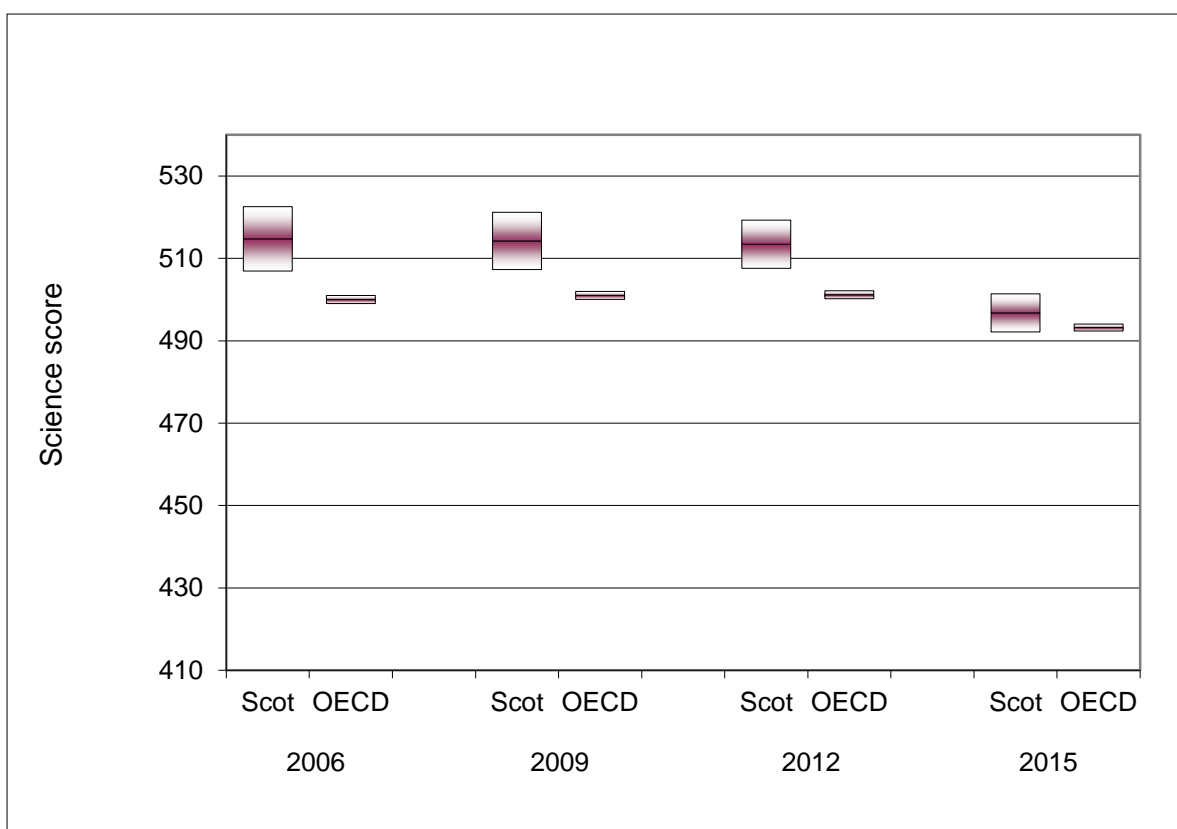
Source: OECD

### 3. Performance in Science

#### Average scores

38. In science, Scotland’s score of **497** in PISA 2015 was statistically lower than in the 2006 (515), 2009 (514) and 2012 (513) cycles, (Table A.1). Comparisons are not possible with the 2000 and 2003 science scores. Chart 3.1 illustrates Scotland’s scores since 2006 with the 95-per-cent confidence intervals<sup>4</sup> next to the scores for the OECD average. Note that Scotland, with a smaller sample, has larger confidence intervals than does the OECD average, where the combined sample makes for more certainty.

Chart 3.1: Comparison of Scotland and OECD science scores over time



39. Scotland’s score was similar to the OECD average in 2015, having previously been above the OECD average since 2006. The OECD average itself fell significantly, from 501 points in 2012 to 493 points in 2015. The OECD average in 2015 was similar to 2006, when science was previously a main domain.

<sup>4</sup>These are confidence intervals where we can be 95 per cent certain the “true” value lies. Where the intervals overlap, for example between Scotland and the OECD average, we cannot be sure that the true values are different.

## Comparisons with other countries

40. Compared to the 34 OECD countries<sup>5</sup>, plus the three other UK administrations, Scotland performed similarly to 13 countries, including Northern Ireland and the United States, and above 12 countries including Wales and Italy. Twelve countries performed above Scotland, including Canada, Germany, Korea and England. Table 3.1 below shows which countries were statistically significantly above, similar to and below Scotland in 2015. Table A.2a, located in the annex, shows each country's score.

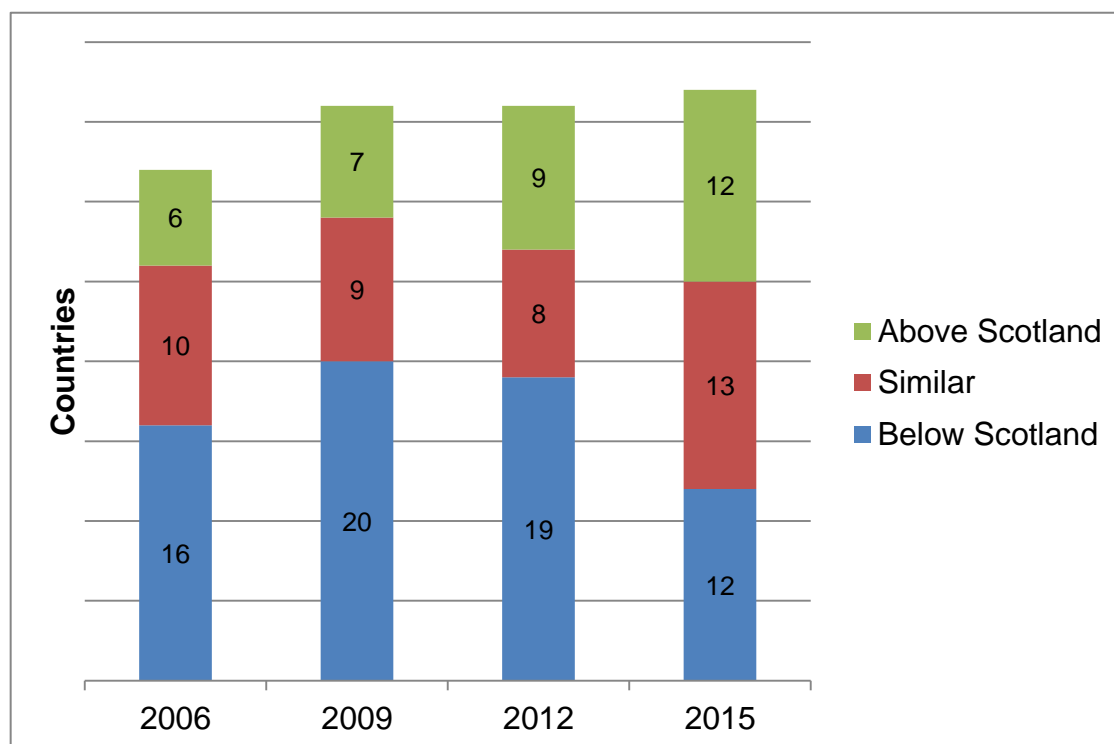
Table 3.1: OECD countries and UK administrations, higher than, similar to and lower than Scotland in science

Higher score than Scotland	Similar score to Scotland	Lower score than Scotland
Australia	Austria	Chile
Canada	Belgium	Greece
England	Czech Republic	Hungary
Estonia	Denmark	Iceland
Finland	France	Israel
Germany	Ireland	Italy
Japan	Norway	Latvia
Korea	Northern Ireland	Luxembourg
Netherlands	<b>OECD average</b>	Mexico
New Zealand	Poland	Slovak Republic
Slovenia	Portugal	Turkey
Switzerland	Spain	Wales
United Kingdom	Sweden	
	United States	

41. This was a measure of *relative* performance. Broadly, a comparable number of countries perform significantly below Scotland in science as above. Chart 3.2 below illustrates the numbers of countries (OECD members plus the UK administrations) that have been found to be significantly above, similar to and below Scotland in the comparable science assessments since 2006

<sup>5</sup> Those OECD member states other than the United Kingdom

Chart 3.2: Numbers of OECD countries and UK administrations scoring above, below or similar to Scotland in science in PISA since 2006



42. Although the OECD<sup>6</sup> average has declined since 2012, Scotland's relative position against the member states and UK administrations has also declined, with more countries outperforming Scotland and a smaller number performing significantly below. The number of countries who performed above Scotland in science has increased in each PISA cycle since 2006, whilst fewer countries performed less well than Scotland since 2009, also suggesting a decline in Scotland's relative performance.

43. The countries that have changed their relative position to Scotland since 2012 can be categorised as follows:

- **Countries which have maintained their performance, but moved ahead of Scotland as its score declined.** This includes England, New Zealand, Slovenia and Switzerland
- **Countries whose performance declined, but not as much as Scotland's, and have thus moved ahead.** This applies to the Netherlands

<sup>6</sup> One state, Latvia, has joined the OECD since the previous PISA round in 2012. Although they experienced a decline in their science score between 2012 and 2015, this is not likely to have had a material effect on the overall average.

- **Countries who maintained their performance and moved from below to alongside Scotland.** This applies to France, Norway, Spain, Sweden and the United States.
- **Countries who improved their performance and moved from below to alongside Scotland.** This applies to Portugal
- **Countries, whose performance declined, and moved from above to alongside Scotland.** This applies to Ireland and Poland

44. Among the participating non-OECD countries and economies, Singapore (the highest scoring participant), Hong Kong-China, Chinese Taipei, Viet Nam, Macao-China and the four participating provinces of the Peoples' Republic of China ("B-S-J-G") were above Scotland. No country was similar to Scotland. Thirty-one countries and economies performed significantly below Scotland.

45. The countries recorded as above Scotland were unchanged, with the exception of B-S-J-G replacing Shanghai-China, and Liechtenstein not participating in PISA 2015 (Table A.2b). The OECD reports published at the same time as this report have full details on all countries' scores, and also those for which data has been collected on a "regional" basis (including Scotland).

## Performance by type of science

46. Tables A.4, A.5 and A.6 set out Scotland's and the OECD countries' performance in the subscales of science explained in Chapter 2. Scotland's performance in each of these was similar to the OECD average, except in "Living systems" where Scotland was significantly higher than the OECD.

47. Although the subscales do not map directly onto those used in 2006, there appeared to be significant declines in Scotland's performance for "Explaining phenomena scientifically" and in content knowledge for "Physical systems" and "Living systems". There appeared to be no decline in "Earth and Space systems".

## Distribution of scores

48. As well as comparison between countries' mean scores, it is important to look at how these are distributed within a country. It is likely that there is much more variation within than between countries. Scotland's spread of science performance in 2015, as measured by standard deviation of the scores (95 points), was similar to the OECD average (94 points). Twelve countries had a narrower distribution, 14 similar and 11 greater. Between 2012 and 2015, Scotland's spread of attainment has increased (2012 = 89 points) and reverted to similarity with 2009 levels (96 points).

## High and low achievers

### Low performance (below Level 2)

49. As set out in Chapter 2, the OECD categorise students into Levels according to their ability to undertake certain tasks. However the group below

Level 2 merits particular attention, as the OECD consider that Level 2 is the baseline of ability to participate effectively in society.

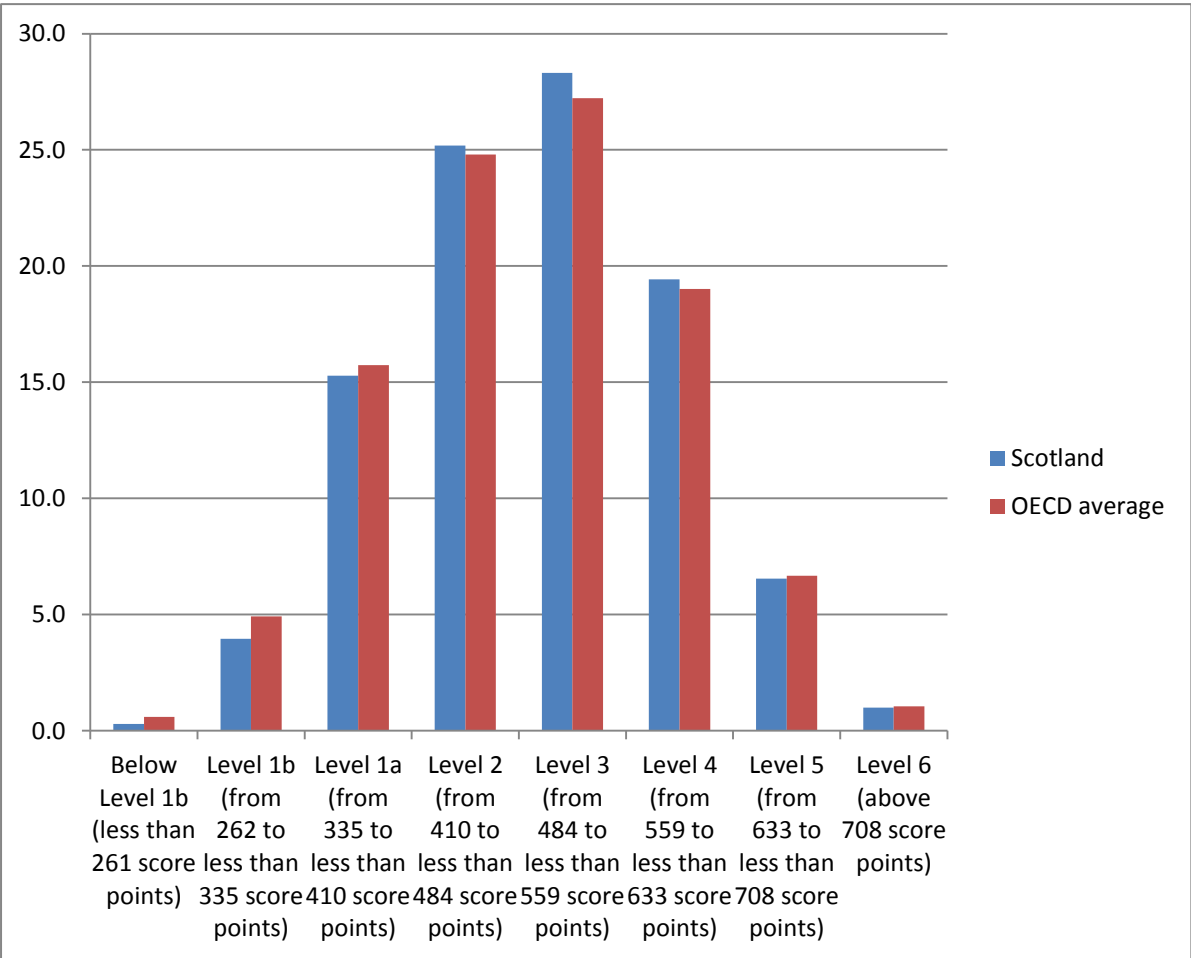
- 19.5 per cent of 15 year-olds in Scotland performed below Level 2 in 2015 – statistically similar to the OECD average of 21.3 per cent.
- This was a significant increase on the 2012 figure of 12.1 per cent. The OECD figure also increased significantly from 17.8 per cent in 2012.

**High performance (Levels 5 and 6)**

50. At the other end of the distribution, the proportion of students who were “higher” achievers (Level 5 and above) was 7.5 per cent, similar to the OECD average of 7.7 per cent, and similar to our performance in 2012 (8.8 per cent).

51. Chart 3.3 below shows the distribution of scores in Scotland compared to the OECD average. Table A.3 shows each OECD country and UK administration’s distribution of scores by proficiency level.

Chart 3.3: Percentage of Scottish students by proficiency level in science performance (per cent)



## Gender

### Mean score

52. Boys' and girls' performance was statistically similar. The average score in science was 496 for female students, and 497 for male students. The gap (one point) was statistically similar to the OECD average (four points).

### Change over time

53. The gap in performance in science by gender was statistically significant in 2012, but this was no longer the case in 2015. However, performance for both boys and girls was significantly lower than in 2012, with a 20-point fall for boys and a 14-point fall for girls.

### High and low achievers

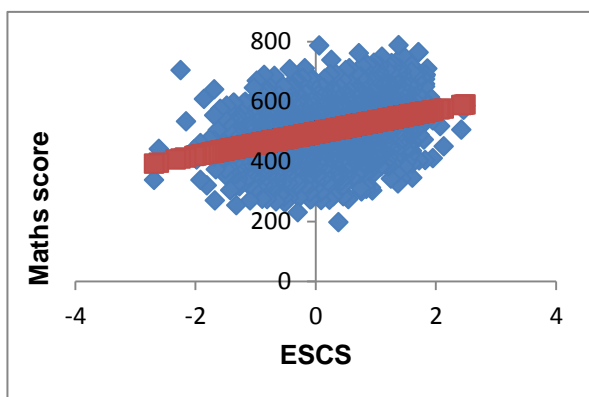
54. In terms of the gender share of higher and lower achievers, 6.6 per cent of girls and 8.4 per cent of boys achieved Level 5 and above (no significant difference) and 20.1 per cent of boys and 19.0 per cent of girls were below Level 2 (no significant difference). The share of high and low performers was similar to the OECD for both boys and girls.

## Social background

### Box 3.1 The OECD's measurement of the impact of social background

The OECD analyse social background using the *Index of Economic, Social and Cultural Status (ESCS)*. It is constructed from the responses given by students in their background questionnaire and collects information on parental education and occupation, learning resources in the home and cultural possessions. This index is not comparable to the measure commonly used in Scotland – the *Scottish Index of Multiple Deprivation (SIMD)* - however it does have the advantage of being generated directly from information provided by the student on their own background, rather than being based on their home address, so avoiding issues of more affluent students being resident in areas which are disadvantaged, and vice versa. It is also consistent across all countries who participate in PISA, enabling comparable analysis.

The index is used to derive a number of measures, each of which tell us something different about the impact of social background on performance.



First of all, the *percentage share* of the variation in performance explained by social background tells us how *strong* the relationship is. For example, we can see an illustration of Scotland's students' scores in maths for 2012 plotted against the ESCS on the bottom. In 2012, 12.9 per cent of the variation in

maths score was explained by social background, and in fact it is possible to see that many students from less affluent backgrounds (towards the left of the graph) achieved high marks – outperforming the average for their circumstances, and vice versa.

The second indicator, the *gradient*, shows simply how much score varies on average with each step (one point) in social background<sup>7</sup> and can be seen by the slope of the line on the graph. Despite many students “bucking the trend”, there is still a positive relationship between affluence and performance in PISA overall. For maths in 2012, this was a gradient of 37 score points. A higher score would indicate a steeper gradient, and greater increases in score with background prosperity.

The final indicator, and the one which perhaps best explains “the gap” in performance by social background, is the *length of the gradient*. Looking at the students on the 5<sup>th</sup> and 95<sup>th</sup> percentiles means that the very extremes of wealth and poverty won’t distort the comparison. In Scotland these two notional students were 2.6 points apart by social background measured by ESCS in 2012.

With a gradient of 37 score points, this implies a difference in their maths performance of 96 score points. Although translating this gap into school years of education is not straightforward, the OECD calculate that this could imply as much as three years’ difference in learning achievement (with 30 points being equivalent to a year<sup>8</sup>).

55. The **share of variation** in science test scores that was explained by students’ background was 10.7 per cent. This was similar to the OECD average (12.9 per cent) and similar to 2012, but less than the 2009 figure of 16.3 per cent. This means that Scotland remained about average in terms of how much pupils break away from the pattern of background affecting performance. Although there was still a clear link between background and performance, there are other things that affect performance, and many pupils do not follow the pattern.

56. The **gradient** was 37 points in the science assessment for Scotland. This was statistically similar to the 2012 figure (36 points), and the OECD average of 38 points. This still represents a reduction on the estimated impact in the 2009 survey (47 points), and was greater than in seven countries, similar to 22, and less than eight others.

57. The difference between the 5<sup>th</sup> and 95<sup>th</sup> percentiles by ESCS was 2.63 points. Combined with a 37-point gradient, this implies that their average scores

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<sup>7</sup> The OECD average for ESCS is roughly zero – with one point in ESCS representing a standard deviation away from the average.

<sup>8</sup> Note this is a revision compared to previous reports (which estimated 40 points being equivalent to a year’s schooling), as a result of more recent research. Further details are set in Chapter 2 of Volume I of the international OECD report



in science are apart by nearly 97 points which implies a difference of around three years' schooling.

58. Table A.7 has each OECD country and UK administration's scores on these measures, as well as estimates of the "adjusted mean score" if a country's students were assumed to have a social background similar to the OECD average.

### **Students and immigration background**

59. The survey also asks about students' background in terms of whether they or their parents were born outside the country of the test (for these purposes, the UK). In 2015, students without an immigrant-background performed similarly (a one point difference) to those with an immigrant-background (defined as both parents being born outside the UK). This contrasted with the OECD, with a larger, significant, gap of 43 points in favour of non-immigrant-background students. This indicator is also reported in Table A.7.

## 4. Performance in Mathematics

### Average scores

60. Maths was assessed as a main domain in PISA in 2003 and 2012 with the 2006, 2009 and 2015 PISA cycles providing a briefer update.

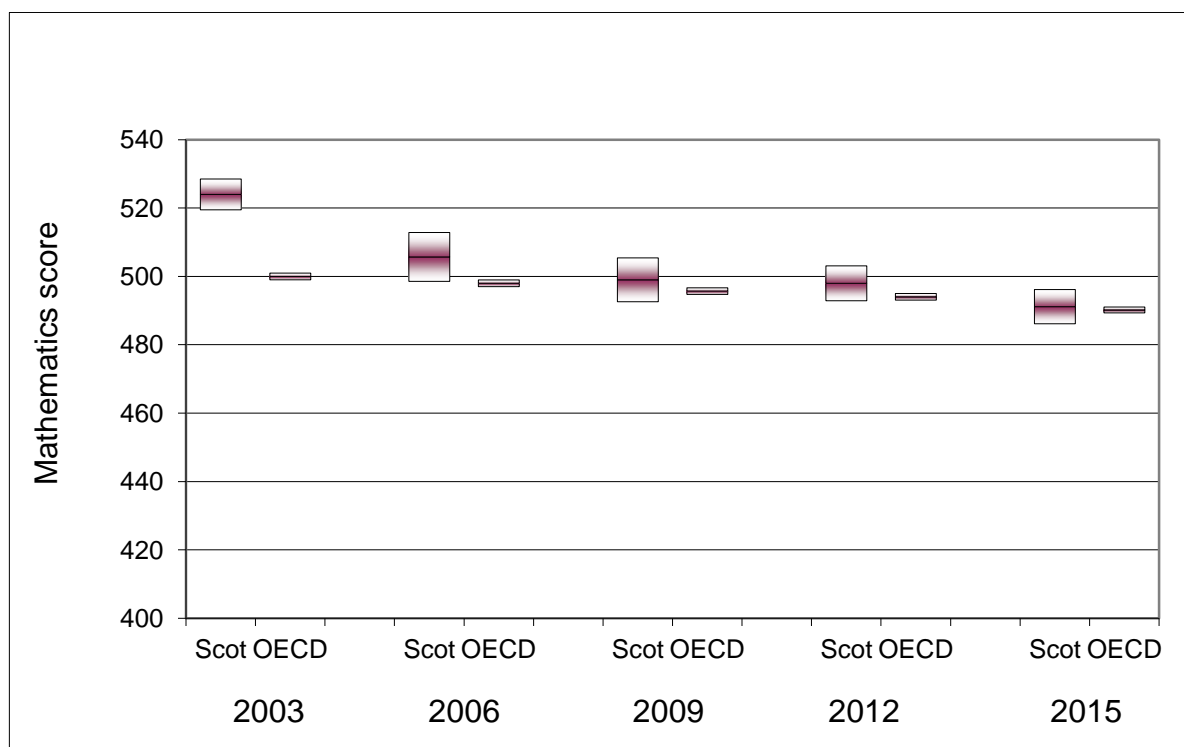
61. Scotland's mean score in 2015 in the maths assessment of **491** was similar to the 2012 (498) figure.

62. Over time, Scotland's performance in maths fell significantly between 2003 and 2006, before stabilising. Nonetheless Scotland's performance in 2015 is statistically lower than in 2003 and 2006 (Table A.8).

63. In 2015, the mean score for maths in Scotland was similar to the OECD average (490), as it has been since 2006.

64. Chart 4.1 below shows Scotland's score compared to the OECD average over the five waves of assessment since 2003 with 95-per-cent confidence intervals included.

Chart 4.1: Comparison of Scotland and OECD maths scores over time



### Comparisons with other countries

65. Of the 34 other OECD countries, and three UK administrations, 14 were statistically above Scotland, 13 similar and 10 below. Of the UK administrations, England and Northern Ireland were similar to Scotland and Wales below. Table

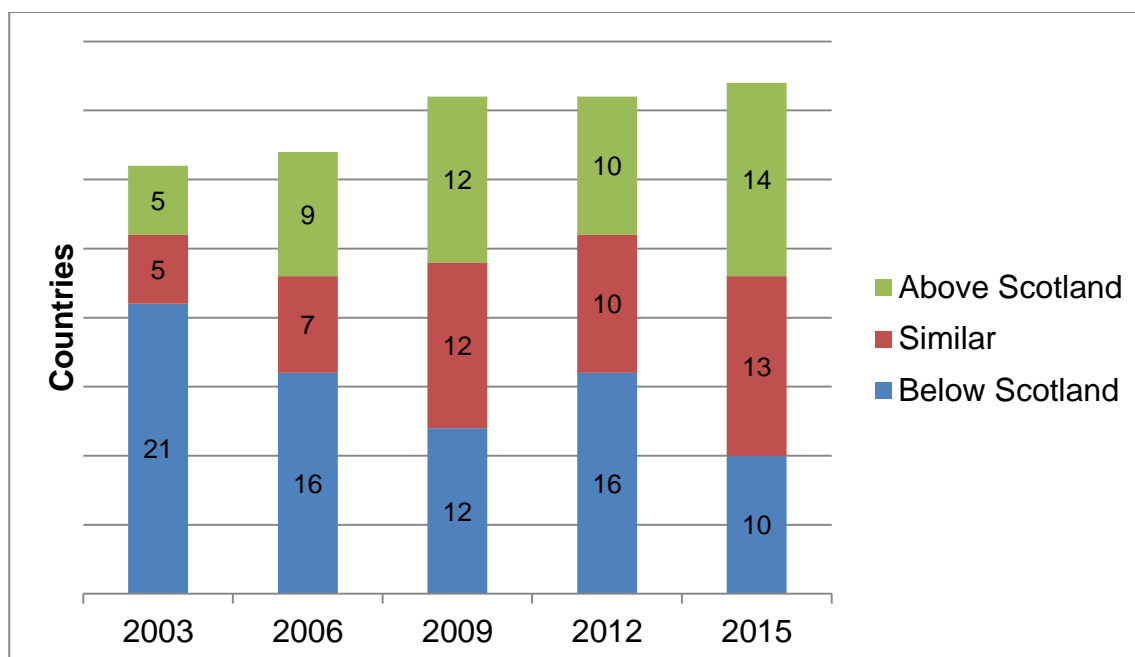
4.1 below shows which countries performed above, similar to and below Scotland in 2015. Table A.9a, located in the annex, shows each country's score.

Table 4.1: OECD countries and UK administrations, higher than, similar to and lower than Scotland in maths

Higher score than Scotland	Similar score to Scotland	Lower score than Scotland
Belgium	Australia	Chile
Canada	Austria	Greece
Denmark	Czech Republic	Hungary
Estonia	England	Israel
Finland	France	Latvia
Germany	Iceland	Mexico
Ireland	Italy	Slovak Republic
Japan	Luxembourg	Turkey
Korea	Northern Ireland	United States
Netherlands	New Zealand	Wales
Norway	<b>OECD average</b>	
Poland	Portugal	
Slovenia	Spain	
Switzerland	Sweden	

66. The number of countries statistically above Scotland is the highest it has been since 2003 when comparisons became possible in maths. The number of countries statistically below Scotland is the smallest since 2003. The number of countries placed higher, below or similar to Scotland in the five waves since 2003 are shown in Chart 4.2 below.

Chart 4.2: Numbers of OECD countries and UK administrations scoring above or below Scotland in maths in PISA since 2003<sup>9</sup>



67. Although Scotland's performance in 2015 was similar to 2012, a number of changes in the relative position of other countries took place since the 2012 survey with countries in the following categories:

- **Countries who improved their performance and moved ahead of Scotland.** This applies to Denmark, Norway (previously behind Scotland) and Slovenia
- **Countries which have maintained their performance, but moved ahead of Scotland as its observed (mean) score declined<sup>10</sup>.** This applies to Ireland
- **Countries who maintained their performance and moved from below to alongside Scotland.** This applies to Italy, Luxembourg, Northern Ireland, Portugal and Spain
- **Countries who improved their performance and moved from below to alongside Scotland.** This applies to Sweden

68. Above Scotland, Korea experienced a significant decline in performance, while Australia declined in performance, but remained statistically similar to Scotland.

69. Among the participating non-OECD states, five were above Scotland: Singapore; Hong Kong-China; Macao-China; Chinese Taipei and B-S-J-G (China).

<sup>9</sup> The chart is not adjusted for constant OECD membership

<sup>10</sup> Not significantly

70. Two states were similar to Scotland: Viet Nam, (who moved from above Scotland following a decline in score – however the OECD believe that had the 2015 approach to scaling been applied to 2012, the apparent change for this country would have been smaller); and the Russian Federation (who improved score to move from below Scotland). Thirty countries were below Scotland.

71. Singapore achieved the highest score of all participating countries (as in science) (Table A.9b). However, above Scotland, Singapore, Chinese Taipei and Hong Kong-China all experienced significant declines in their score. In the case of Singapore and Chinese Taipei, the OECD believe that the change between 2012 and 2015 would not have been as great if 2015 scaling had been applied to 2012. Further details on the countries affected by this are provided in the Annex to Volume I of the OECD report.

## **Distribution of scores**

72. Scotland's spread of attainment, measured by the standard deviation (84 points) was similar to 2012, but continued to be less than the OECD average (89 points). Five countries had a narrower distribution, eight similar and 24 greater. Scotland's spread of attainment in 2015 was similar to 2012 (86 points) but was less than 2009 (93 points).

## **High and low achievers**

### **Low performance (below Level 2)**

73. The proportion of Scotland's students below Level 2, the OECD's baseline of ability to participate effectively in society, was 20.5 per cent, statistically smaller than the OECD average of 23.4 per cent. The proportion in Scotland in 2015 was similar to the proportion in 2012 (18.5 per cent).

### **High performance (Levels 5 and 6)**

74. At the other end of the distribution, the proportion of Scotland's students who were higher achievers (Level 5 and above) was 8.6 per cent, lower than the OECD average of 10.6 per cent, and also lower than Scotland's proportion in 2012 (10.6 per cent).

75. Table A.10 shows each OECD country and UK administration's distribution of scores by proficiency level in maths.

## **Gender**

### **Mean score**

76. Boys' and girls' performances in maths were statistically similar. The average score in maths was 488 for female students, and 495 for male students. The gap (seven points) was similar to the OECD average (eight points).

## Change over time

77. The gap between boys and girls in maths was statistically significant in 2012, but this was no longer the case in 2015. Performance for boys fell 11 points compared to 2012. The three-point fall for girls was not significant.

## High and low performers

78. In terms of the gender share of higher and lower achievers, 7.5 per cent of girls and 9.6 per cent of boys achieved Level 5 and above (no significant difference) and 19.6 per cent of boys and 21.4 per cent of girls were below Level 2 (no significant difference).

79. The share of higher performers among boys in Scotland was larger than the OECD (6.8 per cent), but girls had a smaller share than the OECD (9.9 per cent)

80. The share of lower performers among boys in Scotland was smaller than the OECD (24.4 per cent). However, for girls, lower performers had a significantly larger share than across the OECD (15.5 per cent).

## Social background

81. The share of variation in test scores that was explained by students' background was 11.1 per cent. This was similar to the OECD average and 2012 (12.9 per cent), but was less than the 2009 figure of 16.3 per cent.

82. For maths, the OECD calculated the impact of a one-point improvement (the gradient) in the Index of Economic, Social & Cultural Status (ESCS) to have been around 33 score points. This was similar to the OECD average (mean = 37 points). Scotland's figure was similar to 2012 but remained a reduction on the estimated impact in the 2009 survey (45 points) suggesting a sustained reduction in the gap between disadvantaged and more affluent pupils.

83. The average score gap between the 5<sup>th</sup> and 95<sup>th</sup> percentile by ESCS was 87 points – again equivalent to around three years of schooling.

## 5. Performance in Reading

### Average scores

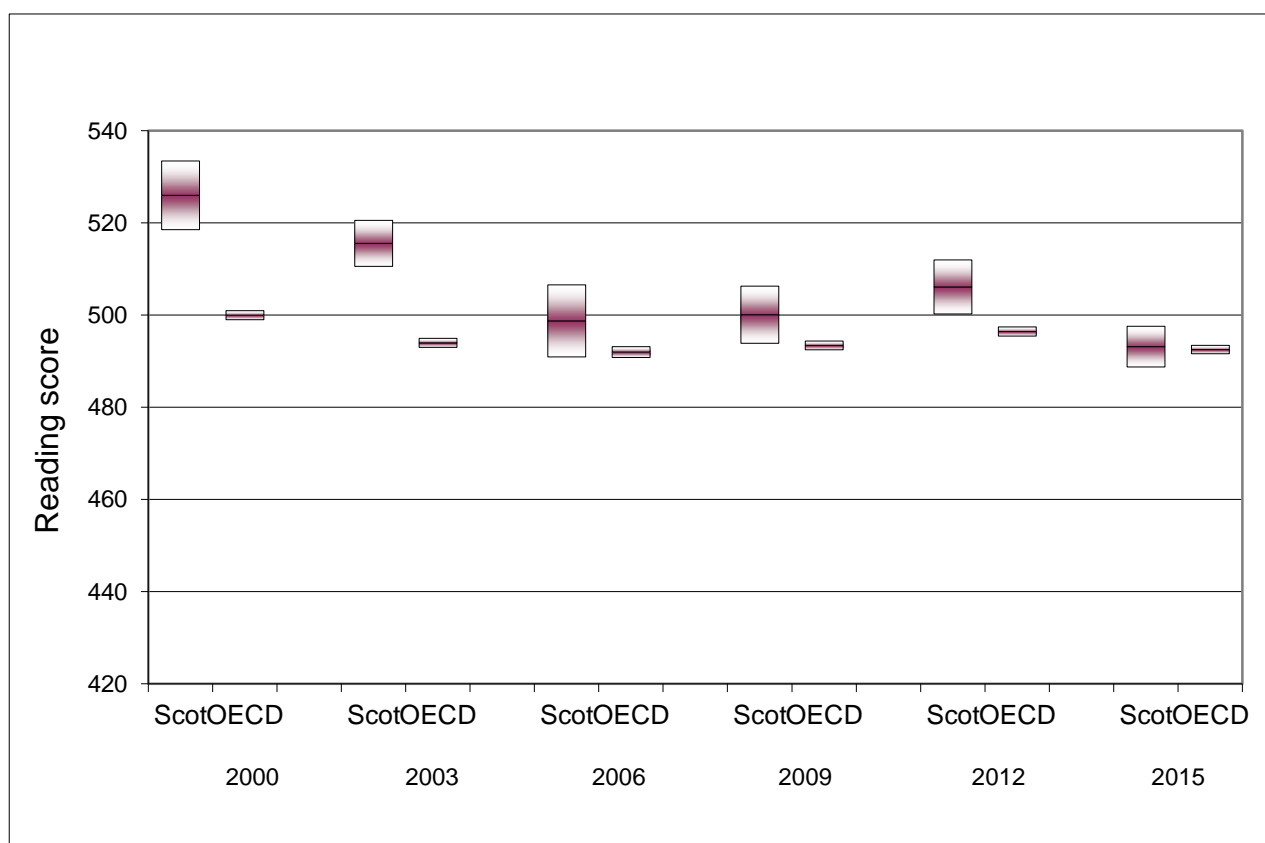
84. Reading was assessed as the main domain in 2000 and 2009, with the 2003, 2006, 2012 and 2015 PISA cycles providing a briefer update.

85. Scotland's mean score in 2015 (**493**) was statistically lower than in 2012 (506).

86. Over time, Scotland's performance fell significantly between 2003 and 2006 before stabilising in 2009 and 2012. Although significantly lower than 2012, Scotland's 2015 performance was similar to 2006 (499) and 2009 (500) (Table A.11).

87. In 2015, the mean score for reading in Scotland was similar to the OECD having been above it 2009 and 2012. Chart 5.1 below shows Scotland's score compared to the OECD average over the six waves of PISA since 2000. The 95-per-cent confidence intervals are included.

Chart 5.1: Comparison of Scotland and OECD reading scores over time



### Comparisons with other countries

88. Of the 34 other OECD countries, and three UK administrations, 13 were statistically above Scotland, 12 similar and 12 below. Of the UK administrations, England and Northern Ireland were similar to Scotland, with Wales below

Scotland. Table 5.1 below shows which countries performed above, similar to and below Scotland in 2015. Table A.12a, located in the annex, shows each country's score.

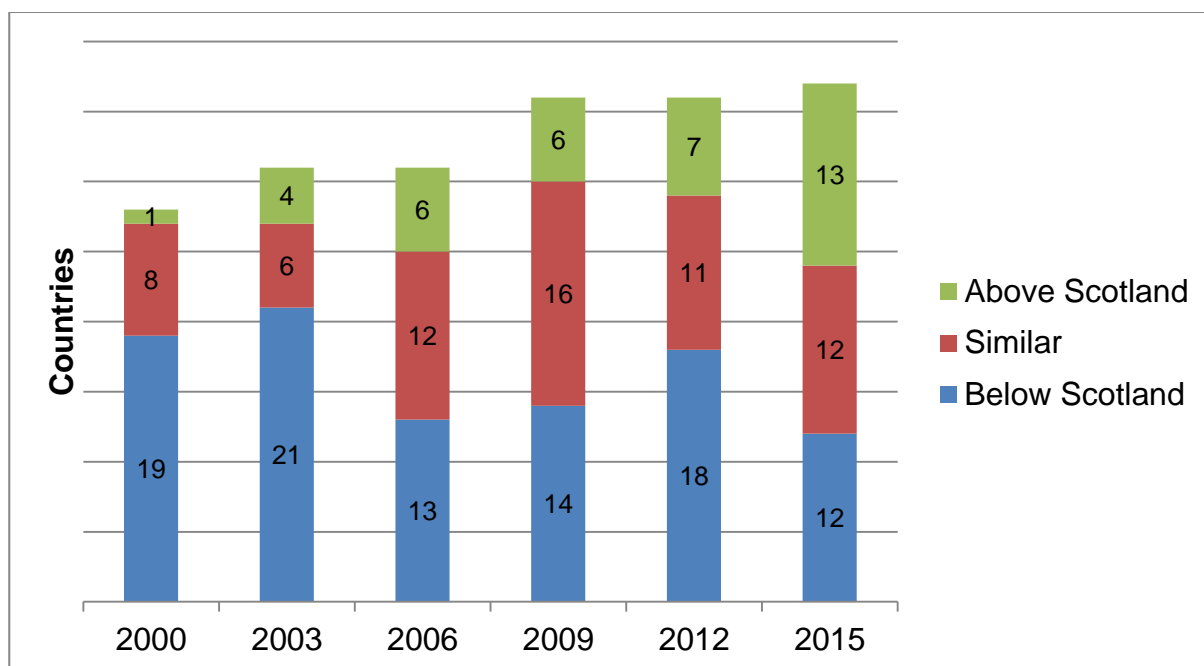
Table 5.1: OECD countries and UK administrations, statistically higher than, similar to and lower than Scotland in reading

Higher score than Scotland	Similar score to Scotland	Lower score than Scotland
Australia	Belgium	Austria
Canada	Czech Republic	Chile
Estonia	Denmark	Greece
Finland	England	Hungary
Germany	France	Iceland
Ireland	Latvia	Israel
Japan	Northern Ireland	Italy
Korea	<b>OECD average</b>	Luxembourg
Netherlands	Portugal	Mexico
New Zealand	Spain	Slovak Republic
Norway	Sweden	Turkey
Poland	Switzerland	Wales
Slovenia	United States	

89. Compared to 2012, a greater number of countries performed significantly higher than Scotland, there was a small increase in the number of countries similar to Scotland, and a decrease in the number of countries below Scotland. The numbers of countries placed higher, below or similar to Scotland in the six waves since 2000 are shown in the chart below.



Chart 5.2: Numbers of OECD countries and UK administrations- scoring above below or similar to Scotland in reading in PISA since 2000<sup>11</sup>



90. As might be expected given our decline relative to the OECD average, there have been changes in the relative positions of OECD countries. The changes can be categorised as follows:

91. **Countries which have maintained their performance, but moved ahead of Scotland as its score declined.** This includes Australia, Germany, the Netherlands, New Zealand and Norway

92. **Countries who improved their performance and moved from below to above Scotland.** This applies to Slovenia with a 24-point improvement

93. **Countries who maintained their performance and moved from below to alongside Scotland.** This applies to the Czech Republic, Denmark, Latvia, Spain, the United States.

94. **Countries who improved their performance and moved from below to alongside Scotland.** This applies to Sweden

95. Switzerland saw a decline in its score and remained alongside Scotland. While still above Scotland, Japan and Korea saw significant declines in their Reading performance in 2015.

96. Among the participating non-OECD states (Table A.12b), three were above Scotland: Hong Kong-China; Macao-China; and Singapore (the top scorer, as in science and maths).

<sup>11</sup> The chart is not adjusted for constant OECD membership.

97. Five countries were similar to Scotland, including Chinese Taipei (previously above Scotland), B-S-J-G (China) and Viet Nam. The Russian Federation improved their performance to move from below to alongside Scotland. Croatia maintained their score as Scotland declined in order to move from below to alongside Scotland.

98. Twenty-nine countries were below Scotland.

## **Distribution of scores**

99. Scotland's spread of attainment, measured by the standard deviation (91 points) was below the OECD average (96 points). Six countries had a narrower distribution, 11 were similar and 20 had a wider distribution. Scotland's spread of attainment was similar to the previous PISA cycle (2012 = 87 points).

## **High and low achievers**

### **Low performance (below Level 2)**

100. The proportion of students in Scotland below Level 2, was 17.9 per cent, a significant increase on the 2012 figure of 12.5 per cent, but similar to the 2009 average of 16.3 per cent. However it was lower than the OECD average of 20.0 per cent.

### **High performance (Levels 5 and 6)**

101. At the other end of the distribution, the proportion of Scotland's students who were higher achievers (Level 5 and above) was 6.4 per cent, statistically lower than the OECD average of 8.4 per cent. Table A.13 shows each OECD country and UK administration's distribution of scores by proficiency level.

## **Gender**

### **Mean score**

102. Girls statistically outperformed boys in reading. The average score for males was 483 and for females was 504, a gap of 21 points (2012 = 27). This gap was statistically similar to the OECD average of 27 points (2012 = 38). The difference with the OECD is no longer significant, as it was in 2012, largely because the OECD gap has declined.

### **Change over time**

103. The gap between girls and boys did not change significantly between 2012 and 2015. The 10-point fall in boys' performance was not significant. Girls, however, saw a 14-point fall that was significant.

### **High and low performers**

104. In terms of the gender share of higher and lower achievers, 7.6 per cent of girls and 5.2 per cent of boys achieved Level 5 and above (no significant difference). Boys were significantly more likely than girls to perform below Level 2 (21.4 per cent vs 14.4 per cent).

105. The share of higher performers among boys in Scotland was smaller than the OECD (12.4 per cent), but girls had a similar share to the OECD (8.9 per cent)

106. The share of lower performers among boys in Scotland was similar to the OECD (23.0) per cent). However, for girls, lower performers had a significantly lower share than across the OECD (23.7 per cent).

## **Social background**

107. The share of variation in test scores that was explained by students' background was 8.6 per cent. This was significantly smaller than the OECD average (11.9 per cent), and similar to Scotland's figure in 2012 (11.0 per cent), but less than Scotland's figure in 2009 (14.4 per cent).

108. In 2015 the OECD calculated the impact of a one-point improvement (the gradient) in the Index of Economic, Social & Cultural Status (ESCS) to have been around 32 score points in the reading assessment for Scotland. This was significantly smaller than the OECD average of 37 points. Scotland's figure was similar to 2012 (35 points) but still less than the estimated impact in the 2009 survey (44 points) suggesting a sustained reduction in the gap between more and less disadvantaged pupils.

109. The average score gap between the 5<sup>th</sup> and 95<sup>th</sup> percentile by ESCS was 83 points – again equivalent to around three years of schooling.

## 6. School, Student and Parent Questionnaire Responses

### Students' views

#### Students' views on studying science and careers

111. Scottish students were significantly more likely than the OECD to “strongly agree” to the statements that “Making an effort in science is worth it because it will help me in the work that I want to do later on” (33.1 per cent vs. 25.4 per cent), “Studying science is worthwhile for me because what I learn will improve my career prospects” (31.5 per cent vs. 22.5 per cent), and “Many things I learn in science will help me get a job” (29.1 per cent vs. 19.8 per cent). When asked if they were “Expecting to work in science-related occupations at age 30”, 22.8 per cent agreed.

#### Classroom behaviour in science lessons

112. When asked if certain behaviours happened in their science lessons, Scottish students appeared to identify less classroom disruption than was the case across the OECD. In Scotland, students were more likely to say “Never or hardly ever” than their counterparts across the OECD for “Students don’t listen to what the teacher says (22.9 per cent vs. 18.4 per cent). They were also less likely to say this was the case in “Some lessons” (47.3 per cent vs. 49.5 per cent) or “Most lessons” (18.9 per cent vs. 21.2 per cent).

113. Scottish students were also more likely to say “Never or hardly ever” to “There is noise and disorder” (21.5 per cent to 18.7 per cent).

114. This was also the case for “The teacher has to wait a long time for students to quiet down” (32.9 per cent vs 26.9 per cent) and they were less likely to say this was true in “Most lessons” compared to the OECD average (14.8 per cent vs. 19.1 per cent).

115. A similar pattern can be found for “Students cannot work well” where Scottish students were more likely to say “Never or hardly ever” (40.5 per cent vs. 33.9 per cent), and less likely say this was the case in “Most lessons” (10.6 per cent vs. 14.7 per cent).

116. Finally, students were more likely to say “Never, or hardly ever” to the statement “Students don’t start working for a long time after the lesson begins” (39.1 per cent vs. 32.3 per cent) and less likely to say this was true in “Most lessons” (12.5 per cent vs. 17.0 per cent).

#### Relations with teachers

117. Scottish students were more likely to report high levels of support from their teachers, than across the OECD. The teacher was more likely to be reported as “shows an interest in every student’s learning” in “Every lesson” (44.8 per cent

vs. 34.3 per cent), and less likely to be the case in “Some lessons” (16.2 per cent vs. 22.6 per cent ) or “Never or hardly ever” (5.1 per cent vs. 8.7 per cent).

118. A similar pattern was seen for “The teacher gives extra help when we need it”. This was reported as true in “Every lesson” by 54.3 per cent of students (vs. 39.7 per cent for the OECD), and significantly lower in each other category (“Most lessons”, “Some lessons” and “Never or hardly ever”) than the OECD.

119. Teachers were more likely to reported to be persistent than across the OECD. Scottish students said “the teacher continues teaching until the students understand” in “Every lesson” (45.7 per cent vs. 37.5 per cent), and again lower than the OECD in all other categories.

120. However, students were more similar to the OECD on the question of whether “The teacher gives students an opportunity to express opinions”, being similar in “Every lesson” or “Most lessons” and “Never or hardly ever” and below the OECD for “Some lessons” (20.6 per cent vs. 22.5 per cent).

### **Teacher feedback**

121. Scottish students were generally more likely to report that teachers would give them feedback than students across the OECD. They were significantly less likely to say that teachers “Never or almost never” told them “...how I am performing in this course” (12.1 per cent vs. 27.1 per cent), and more likely to say this would happen in “Some lessons” or “Many lessons”.

122. This pattern was similar for “The teacher gives me feedback on my strengths in this class” with Scottish students less likely to say “Never or almost never” than OECD students (18.5 per cent vs. 38.2 per cent) and more likely to say this would happen in “Some lessons”, “Many lessons” and “Every or almost every lesson”.

123. This was also the case for “The teacher tells me in which areas I can still improve” with Scottish students less likely to say “Never or almost never” (12.9 per cent vs. 31.9 per cent) and more likely to say this would happen for “Some lessons”, “Many lessons” and “Every or almost every lesson”.

124. For “The teacher tells me how I can improve my performance”, Scottish students were also less likely to say “Never or almost never” (15.1 per cent compared to 28.0 per cent) and more likely to say “Some lessons” and “Many lessons” than the OECD.

125. Finally, Scottish students were more likely than OECD students to report that “The teacher advises me on how to reach my learning goals” with less saying “Never or hardly ever” (18.4 per cent vs. 31.7 per cent) and being more likely to choose “Some lessons”, “Many lessons” and “Every or almost every lesson”.

### **Attendance**

126. Scottish students were more likely than OECD students to say that they had “Never” skipped classes in the two weeks prior to the PISA test (80.3 per cent vs. 73.9 per cent) and less likely to report that they had done this “Once or twice”, “Three or four times” or “Five or more times”.

127. However, they were less likely to report that they had “Never” arrived late for school in the two weeks prior to the assessment (53.1 per cent vs. 55.5 per cent) and similar to the OECD in the other categories.

## **Headteachers’ views**

128. Although the estimates of headteachers’ responses have more uncertainty because of the smaller sample, we are still able to report significant differences against the OECD. Estimates are shown as the proportion of pupils in a school where headteachers’ respond in a particular way.

## **Organisation of classes**

129. A significantly greater proportion of Scottish students than OECD students were in schools where their headteachers reported that students were “grouped by ability into different classes” for “some subjects” (91.9 per cent vs. 38.0 per cent), and less likely to be in schools where students were not grouped by ability for “any subject” (2.5 per cent vs. 54.2 per cent).

130. Grouping by ability within classes was also more likely to take place for “some subjects” (85.7 per cent vs. 50.5 per cent), and students were less likely than the OECD to be in schools where this was not true for “any subject” (11.4 per cent vs. 45.0 per cent).

## **Views on student behaviour**

131. Scottish students were more likely than the OECD to be in schools where the headteacher said that “Student truancy” hindered learning “Very little” (66.3 per cent vs. 51.9 per cent) and they were less likely to be in schools where the headteacher reported this to be true “To some extent” or “A lot”. This pattern was also true for “Students skipping classes”.

132. Scottish and OECD students were similarly likely to be in schools where heads responded “Students lacking respect for teachers” hindered learning (for example, 69.3 per cent were in schools where the headteachers said “Very little” compared to 61.1 per cent for the OECD). However, Scottish students were more likely to be in schools where the head said “Students intimidating or bullying other students” hindered learning “Very little” (86.8 per cent vs. 64.4 per cent), but also less likely to be in schools where the head said “Not at all” (9.3 per cent vs. 24.7 per cent).

## **School leadership**

133. Scottish students were more likely than the OECD’s to be in schools where the headteacher reported “at least once a month” to the statements “I praise teachers whose students are actively participating” (80.9 per cent vs. 64.5 per cent), “I pay attention to disruptive behaviour in classrooms (88.3 per cent vs.

80.9 per cent) and “When a teacher brings up a classroom problem, we solve the problem together” (84.7 per cent vs. 75.4 per cent).

## Parent-school relationships

134. One hundred per cent of Scottish pupils, where headteachers responded, were in schools where the headteacher reported “Our school provides a welcoming and accepting atmosphere for parents to get involved”. At the same time, 86.0 per cent of parents said “My child’s school provides an inviting atmosphere for parents to get involved”.

135. One hundred per cent of Scottish pupils, where headteachers responded, were also in schools where the headteacher stated: “Our school designs effective forms of school-to-home and home-to-school communications about school programmes and children’s progress”. In response to the statement “My child’s school provides effective communication between the school and families”, 86.2 per cent of Scottish parents agreed.

136. Scottish students were significantly more likely than the OECD’s to be in schools where the head teacher reported “Our school includes parents in school decisions” (94.0 per cent vs. 76.8 per cent). For parents, 73.9 per cent agreed with the statement “My child’s school involves parents in the school’s decision-making process”.

137. Scottish students were also more likely to be in a school where the head stated “Our school provides information and ideas for families about how to help students at home with homework and other curriculum-related activities, decisions, and planning” (98.7 per cent vs. 87.4 per cent). For parents, 72.8 per cent agreed with the statement “My child’s school informs families about how to help students with homework/other school related activities”.

138. Parents of PISA participants in Scotland were less likely than the OECD average to report that in the previous academic year they: “Discussed my child’s behaviour with a teacher” “on my own initiative” (14.3 per cent vs. 50.2 per cent) or the “initiative of one of his/her teachers” (11.2 per cent vs. 40.3 per cent); “Discussed my child’s progress with a teacher” “on my own initiative” (25.5 per cent vs. 51.4 per cent) or the “initiative of one of his/her teachers” (26.4 per cent vs. 43.6 per cent).

139. Scottish parents were also less likely to report that they had “Participated in local school government, e.g. parent council or school management committee” (6.8 per cent vs. 15.7 per cent), “Volunteered in physical or extra-curricular activities” (6.2 per cent vs. 11.6 per cent) or “Volunteered to support school activities” (6.0 per cent vs. 7.9 per cent) or “Exchanged ideas on parenting, family support, or the child’s development with my child’s teachers” (19.4 per cent vs. 35.1 per cent).

140. However they were more likely to report that they “Attended a scheduled meeting or conferences for parents” (86.5 per cent vs. 75.9 per cent) and “Talked

about how to support learning at home and homework with my child's teachers” (68.3 per cent vs. 51.8 per cent).



# Annex: Detailed results

## Science

**Table A.1: Scotland's score in previous PISA surveys, together with comparison with 2015**

	Science		
	Mean	S.E.	comparison to 2015
<b>2000</b>	522		n/a
<b>2003</b>	514	2.7	n/a
<b>2006</b>	515	4.0	<b>H</b>
<b>2009</b>	514	3.5	<b>H</b>
<b>2012</b>	513	3.0	<b>H</b>
<b>2015</b>	497	2.4	

H: higher than 2015, S: similar to 2015, L: lower than 2015

Comparisons in science are possible from 2006 (the first survey when science was a full domain and the scale was fully developed).

“s.e.” = “standard error”, “s.d.” = standard deviation

### Note for all tables

For all references to Argentina, Kazakhstan and Malaysia, the OECD consider that the coverage is too small to ensure comparability. See Annex A4 of Volume I of the OECD report for further details.

**Table A.2a: Mean scores in science, by gender, and comparison with Scotland: OECD and UK administrations**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	s.d.	s.e.	mean	s.e.	mean	s.e.
<b>Significantly above Scotland</b>								
Australia	510	(1.5)	102	(0.9)	511	(2.1)	509	(1.7)
Canada	528	(2.1)	92	(0.9)	528	(2.5)	527	(2.3)
England	512	(3.0)	101	(1.2)	512	(3.5)	512	(3.8)
Estonia	534	(2.1)	89	(1.1)	536	(2.7)	533	(2.3)
Finland	531	(2.4)	96	(1.3)	521	(2.7)	541	(2.6)
Germany	509	(2.7)	99	(1.5)	514	(3.2)	504	(2.8)
Japan	538	(3.0)	93	(1.6)	545	(4.1)	532	(2.9)
Korea	516	(3.1)	95	(1.5)	511	(4.6)	521	(3.3)
Netherlands	509	(2.3)	101	(1.5)	511	(2.9)	507	(2.5)
New Zealand	513	(2.4)	104	(1.4)	516	(3.2)	511	(2.7)
Slovenia	513	(1.3)	95	(1.1)	510	(1.9)	516	(1.9)
Switzerland	506	(2.9)	100	(1.5)	508	(3.1)	502	(3.5)
United Kingdom	509	(2.6)	100	(1.0)	510	(2.9)	509	(3.3)
<b>Similar to Scotland</b>								
Austria	495	(2.4)	97	(1.3)	504	(3.6)	486	(3.1)
Belgium	502	(2.3)	100	(1.2)	508	(3.1)	496	(2.7)
Czech Republic	493	(2.3)	95	(1.4)	497	(3.3)	488	(2.5)
Denmark	502	(2.4)	90	(1.1)	505	(2.6)	499	(3.2)
France	495	(2.1)	102	(1.4)	496	(2.7)	494	(2.7)
Ireland	503	(2.4)	89	(1.3)	508	(3.2)	497	(2.6)
Northern Ireland	497	(2.4)	95	(1.6)	497	(3.2)	496	(2.9)
Norway	498	(2.3)	96	(1.3)	500	(2.7)	497	(2.7)
<b>OECD Average</b>	<b>493</b>	<b>(0.4)</b>	<b>94</b>	<b>(0.2)</b>	<b>495</b>	<b>(0.5)</b>	<b>491</b>	<b>(0.5)</b>
Poland	501	(2.5)	91	(1.3)	504	(2.9)	498	(2.8)
Portugal	501	(2.4)	92	(1.1)	506	(2.9)	496	(2.6)
<b>Scotland</b>	<b>497</b>	<b>(2.4)</b>	<b>95</b>	<b>(1.6)</b>	<b>497</b>	<b>(3.2)</b>	<b>496</b>	<b>(2.9)</b>
Spain	493	(2.1)	88	(1.1)	496	(2.5)	489	(2.5)
Sweden	493	(3.6)	102	(1.4)	491	(4.1)	496	(3.7)
United States	496	(3.2)	99	(1.4)	500	(3.7)	493	(3.4)
<b>Significantly below Scotland</b>								
Chile	447	(2.4)	86	(1.3)	454	(3.1)	440	(2.7)
Greece	455	(3.9)	92	(1.8)	451	(4.6)	459	(3.9)
Hungary	477	(2.4)	96	(1.6)	478	(3.4)	475	(2.9)
Iceland	473	(1.7)	91	(1.2)	472	(2.6)	475	(2.1)
Israel	467	(3.4)	106	(1.6)	469	(4.7)	464	(4.1)
Italy	481	(2.5)	91	(1.4)	489	(3.1)	472	(3.6)
Latvia	490	(1.6)	82	(1.1)	485	(2.0)	496	(2.2)
Luxembourg	483	(1.1)	100	(1.1)	487	(1.7)	479	(1.5)
Mexico	416	(2.1)	71	(1.1)	420	(2.6)	412	(2.3)
Slovak Republic	461	(2.6)	99	(1.5)	460	(3.0)	461	(3.3)
Turkey	425	(3.9)	79	(1.9)	422	(4.5)	429	(4.4)
Wales	485	(2.8)	89	(1.3)	487	(3.3)	482	(3.3)

**Table A.2b: Mean scores in science, by gender, and comparison with Scotland: non-OECD countries and economies**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	s.d.	s.e.	mean	s.e.	mean	s.e.
<b>Significantly above Scotland</b>								
B-S-J-G (China)	518	(4.6)	103	(2.5)	522	(4.5)	513	(5.3)
Chinese Taipei	532	(2.7)	100	(1.9)	535	(4.1)	530	(3.8)
Hong Kong (China)	523	(2.5)	81	(1.4)	523	(3.1)	524	(3.4)
Macao (China)	529	(1.1)	81	(1.0)	525	(1.5)	532	(1.5)
Singapore	556	(1.2)	104	(0.9)	559	(1.8)	552	(1.7)
Viet Nam	525	(3.9)	77	(2.3)	523	(4.0)	526	(4.2)
<b>Significantly below Scotland</b>								
Albania	427	(3.3)	78	(1.5)	415	(4.0)	439	(3.0)
Algeria	376	(2.6)	69	(1.5)	369	(3.0)	383	(3.1)
Argentina	432	(2.9)	81	(1.2)	440	(3.2)	425	(3.2)
Brazil	401	(2.3)	89	(1.3)	403	(2.5)	399	(2.4)
Bulgaria	446	(4.4)	102	(2.1)	438	(5.3)	454	(4.4)
Colombia	416	(2.4)	80	(1.3)	421	(3.1)	411	(2.4)
Costa Rica	420	(2.1)	70	(1.2)	429	(2.5)	411	(2.2)
Croatia	475	(2.5)	89	(1.2)	478	(3.2)	473	(2.8)
Cyprus	433	(1.4)	93	(1.2)	424	(1.7)	441	(1.9)
Dominican Republic	332	(2.6)	72	(1.8)	332	(3.2)	331	(2.6)
Former Yugoslav Republic of Macedonia	384	(1.2)	85	(1.3)	374	(1.6)	394	(1.8)
Georgia	411	(2.4)	91	(1.3)	403	(3.3)	420	(2.3)
Indonesia	403	(2.6)	68	(1.6)	401	(3.0)	405	(2.8)
Jordan	409	(2.7)	84	(1.6)	389	(3.9)	428	(3.6)
Kazakhstan	456	(3.7)	76	(2.6)	455	(4.1)	458	(3.8)
Kosovo	378	(1.7)	71	(1.1)	374	(2.0)	383	(2.1)
Lebanon	386	(3.4)	90	(1.8)	388	(4.0)	386	(3.7)
Lithuania	475	(2.7)	91	(1.4)	472	(3.3)	479	(2.8)
Malaysia	443	(3.0)	76	(1.4)	441	(3.3)	445	(3.1)
Malta	465	(1.6)	118	(1.5)	460	(2.5)	470	(2.2)
Moldova	428	(2.0)	86	(1.4)	425	(2.4)	431	(2.4)
Montenegro	411	(1.0)	85	(0.9)	409	(1.7)	414	(1.3)
Peru	397	(2.4)	77	(1.4)	402	(2.8)	392	(2.9)
Qatar	418	(1.0)	99	(0.7)	406	(1.4)	429	(1.3)
Romania	435	(3.2)	79	(1.7)	432	(3.7)	438	(3.4)
Russian Federation	487	(2.9)	82	(1.1)	489	(3.6)	485	(3.1)
Thailand	421	(2.8)	78	(1.6)	416	(3.6)	425	(2.9)
Trinidad and Tobago	425	(1.4)	94	(1.1)	414	(2.1)	435	(1.9)
Tunisia	386	(2.1)	65	(1.6)	388	(2.4)	385	(2.2)
United Arab Emirates	437	(2.4)	99	(1.1)	424	(3.4)	449	(3.0)
Uruguay	435	(2.2)	87	(1.3)	440	(3.1)	431	(2.2)

**Table A.3: 1 of 2: Estimates of proportion at each proficiency level (per cent), science: OECD and UK administrations (Below Level 1b to Level 2)**

	Below Level 1b		Level 1b		Level 1a		Level 2	
	%	s.e.	%	s.e.	%	s.e.	%	s.e.
Australia	0.6	(0.1)	4.3	(0.3)	12.8	(0.5)	21.6	(0.5)
Austria	0.5	(0.2)	4.5	(0.5)	15.8	(0.8)	23.9	(0.8)
Belgium	0.5	(0.1)	4.9	(0.4)	14.4	(0.6)	21.9	(0.6)
Canada	0.1	(0.1)	1.8	(0.2)	9.1	(0.4)	20.2	(0.6)
Chile	1.0	(0.2)	8.9	(0.6)	25.0	(0.9)	31.0	(1.0)
Czech Republic	0.3	(0.1)	4.3	(0.5)	16.1	(0.8)	25.9	(0.8)
Denmark	0.3	(0.1)	3.0	(0.3)	12.5	(0.7)	25.9	(0.9)
Estonia	0.0	(0.0)	1.2	(0.2)	7.5	(0.6)	20.1	(0.7)
Finland	0.3	(0.1)	2.3	(0.3)	8.9	(0.6)	19.1	(0.7)
France	0.9	(0.2)	5.8	(0.5)	15.3	(0.6)	22.0	(0.9)
Germany	0.4	(0.1)	3.8	(0.4)	12.8	(0.7)	22.7	(0.8)
Greece	1.2	(0.3)	9.1	(1.0)	22.4	(1.1)	28.4	(1.1)
Hungary	0.8	(0.2)	6.8	(0.6)	18.4	(0.9)	25.5	(0.8)
Iceland	0.8	(0.2)	5.8	(0.5)	18.7	(0.9)	29.0	(1.0)
Ireland	0.3	(0.1)	2.7	(0.4)	12.4	(0.8)	26.4	(0.9)
Israel	2.1	(0.4)	9.5	(0.8)	19.9	(0.9)	24.4	(0.8)
Italy	0.6	(0.2)	5.4	(0.5)	17.2	(0.8)	27.1	(0.9)
Japan	0.2	(0.1)	1.7	(0.3)	7.7	(0.6)	18.1	(0.8)
Korea	0.4	(0.1)	2.9	(0.4)	11.1	(0.7)	21.7	(0.9)
Latvia	0.1	(0.1)	2.6	(0.3)	14.5	(0.7)	29.8	(0.8)
Luxembourg	0.5	(0.1)	6.4	(0.5)	18.9	(0.6)	24.8	(0.7)
Mexico	1.1	(0.3)	11.7	(0.7)	35.0	(1.0)	34.7	(0.9)
Netherlands	0.3	(0.1)	4.0	(0.5)	14.3	(0.7)	21.8	(0.9)
New Zealand	0.4	(0.1)	4.0	(0.4)	13.0	(0.8)	21.6	(0.8)
Norway	0.6	(0.1)	4.1	(0.4)	14.0	(0.7)	24.6	(0.8)
Poland	0.3	(0.1)	2.6	(0.4)	13.3	(0.7)	26.6	(0.9)
Portugal	0.2	(0.1)	3.2	(0.4)	14.0	(0.9)	25.4	(0.8)
Slovak Republic	2.1	(0.3)	8.9	(0.7)	19.7	(0.8)	27.6	(0.8)
Slovenia	0.2	(0.1)	2.8	(0.3)	11.9	(0.5)	23.3	(0.7)
Spain	0.3	(0.1)	3.7	(0.4)	14.3	(0.7)	26.5	(0.7)
Sweden	0.9	(0.2)	5.7	(0.5)	15.0	(0.9)	24.0	(0.9)
Switzerland	0.5	(0.2)	4.0	(0.5)	13.9	(0.8)	22.8	(0.8)
Turkey	1.1	(0.2)	11.8	(1.0)	31.6	(1.5)	31.3	(1.3)
United Kingdom	0.4	(0.1)	3.4	(0.3)	13.6	(0.7)	22.6	(0.7)
United States	0.5	(0.1)	4.3	(0.5)	15.5	(0.8)	25.5	(0.8)
<b>Scotland</b>	<b>0.3</b>	<b>(0.1)</b>	<b>4.0</b>	<b>(0.4)</b>	<b>15.3</b>	<b>(0.8)</b>	<b>25.2</b>	<b>(1.1)</b>
Northern Ireland	0.1	(0.1)	2.8	(0.5)	14.9	(1.1)	24.8	(1.2)
Wales	0.2	(0.1)	4.0	(0.5)	17.3	(0.9)	28.7	(0.9)
England	0.4	(0.1)	3.3	(0.4)	13.2	(0.8)	21.9	(0.8)
<b>OECD average</b>	<b>0.6</b>	<b>(0.0)</b>	<b>4.9</b>	<b>(0.1)</b>	<b>15.7</b>	<b>(0.1)</b>	<b>24.8</b>	<b>(0.1)</b>

**Table A.3: 2 of 2: Estimates of proportion at each proficiency level (per cent), science: OECD and UK administrations (Levels 3 to 6)**

	Level 3		Level 4		Level 5		Level 6	
	%	s.e.	%	s.e.	%	s.e.	%	s.e.
Australia	27.3	(0.5)	22.3	(0.5)	9.2	(0.4)	2.0	(0.2)
Austria	28.1	(0.8)	19.5	(0.8)	6.8	(0.5)	0.9	(0.2)
Belgium	26.8	(0.7)	22.5	(0.7)	8.0	(0.4)	1.0	(0.1)
Canada	30.3	(0.5)	26.1	(0.7)	10.4	(0.5)	2.0	(0.2)
Chile	23.8	(0.9)	9.1	(0.7)	1.2	(0.2)	0.0	(0.0)
Czech Republic	27.7	(0.9)	18.4	(0.7)	6.3	(0.4)	0.9	(0.2)
Denmark	31.1	(1.1)	20.2	(0.8)	6.1	(0.5)	0.9	(0.2)
Estonia	30.7	(0.9)	26.9	(0.9)	11.6	(0.7)	1.9	(0.3)
Finland	29.2	(0.8)	26.0	(0.8)	11.9	(0.6)	2.4	(0.3)
France	26.5	(0.8)	21.4	(0.8)	7.2	(0.5)	0.8	(0.1)
Germany	27.7	(0.8)	22.0	(0.8)	8.8	(0.6)	1.8	(0.2)
Greece	25.2	(1.1)	11.6	(0.9)	2.0	(0.3)	0.1	(0.1)
Hungary	27.3	(0.9)	16.6	(0.8)	4.3	(0.4)	0.3	(0.1)
Iceland	27.3	(0.9)	14.6	(0.8)	3.5	(0.4)	0.3	(0.1)
Ireland	31.1	(0.9)	20.1	(0.8)	6.3	(0.4)	0.8	(0.2)
Israel	23.3	(1.0)	15.0	(0.8)	5.1	(0.5)	0.7	(0.1)
Italy	28.6	(1.0)	17.0	(0.7)	3.8	(0.4)	0.2	(0.1)
Japan	28.2	(0.9)	28.8	(0.9)	12.9	(0.8)	2.4	(0.4)
Korea	29.2	(0.9)	24.0	(1.0)	9.2	(0.7)	1.4	(0.2)
Latvia	31.7	(0.8)	17.4	(0.8)	3.5	(0.4)	0.3	(0.1)
Luxembourg	25.1	(0.7)	17.3	(0.6)	6.0	(0.4)	0.9	(0.2)
Mexico	15.1	(0.9)	2.3	(0.3)	0.1	(0.1)	0.0	c
Netherlands	26.1	(0.9)	22.4	(0.8)	9.5	(0.5)	1.6	(0.2)
New Zealand	26.3	(0.8)	21.8	(0.8)	10.1	(0.6)	2.7	(0.4)
Norway	29.1	(0.8)	19.6	(0.8)	6.9	(0.5)	1.1	(0.2)
Poland	29.9	(0.9)	19.9	(0.8)	6.3	(0.5)	1.0	(0.2)
Portugal	28.8	(0.8)	21.0	(0.8)	6.7	(0.5)	0.7	(0.1)
Slovak Republic	24.8	(0.7)	13.3	(0.6)	3.3	(0.3)	0.3	(0.1)
Slovenia	29.1	(0.9)	22.1	(0.8)	9.1	(0.6)	1.5	(0.3)
Spain	31.3	(0.7)	18.9	(0.7)	4.7	(0.4)	0.3	(0.1)
Sweden	26.8	(0.9)	19.0	(0.9)	7.2	(0.6)	1.3	(0.2)
Switzerland	26.3	(1.1)	22.7	(1.0)	8.6	(0.6)	1.1	(0.2)
Turkey	19.1	(1.4)	4.8	(0.9)	0.3	(0.1)	0.0	(0.0)
United Kingdom	27.5	(0.7)	21.6	(0.7)	9.1	(0.6)	1.8	(0.2)
United States	26.6	(0.9)	19.1	(0.9)	7.3	(0.6)	1.2	(0.2)
<b>Scotland</b>	<b>28.3</b>	<b>(1.0)</b>	<b>19.4</b>	<b>(0.8)</b>	<b>6.5</b>	<b>(0.6)</b>	<b>1.0</b>	<b>(0.3)</b>
Northern Ireland	30.1	(1.4)	20.6	(1.2)	6.3	(0.8)	0.5	(0.3)
Wales	27.8	(1.0)	17.3	(1.0)	4.3	(0.5)	0.3	(0.1)
England	27.3	(0.8)	22.1	(0.8)	9.7	(0.7)	2.0	(0.3)
<b>OECD average</b>	<b>27.2</b>	<b>(0.1)</b>	<b>19.0</b>	<b>(0.1)</b>	<b>6.7</b>	<b>(0.1)</b>	<b>1.1</b>	<b>(0.0)</b>

**Table A.4: Mean scores in science processes: OECD and UK administrations**

	Explaining phenomena scientifically		Evaluating and designing scientific inquiry		Interpreting data and evidence scientifically	
	Mean	s.e	Mean	s.e	Mean	s.e.
Australia	505	(1.6)	514	(2.0)	505	(1.8)
Austria	498	(2.6)	496	(2.6)	489	(2.5)
Belgium	493	(2.3)	509	(2.5)	501	(2.5)
Canada	526	(2.1)	534	(2.7)	523	(2.6)
Chile	450	(2.4)	442	(2.9)	445	(2.7)
Czech Republic	494	(2.4)	485	(2.8)	488	(2.7)
Denmark	499	(2.7)	503	(2.6)	494	(2.6)
Estonia	535	(2.0)	538	(2.6)	534	(2.7)
Finland	533	(2.3)	519	(2.8)	526	(2.8)
France	484	(2.2)	500	(2.5)	501	(2.5)
Germany	508	(2.7)	511	(2.8)	507	(3.0)
Greece	451	(3.9)	456	(4.2)	452	(3.9)
Hungary	478	(2.4)	478	(2.8)	476	(2.7)
Iceland	468	(2.0)	476	(2.4)	476	(2.1)
Ireland	502	(2.4)	507	(2.6)	500	(2.6)
Israel	460	(3.4)	479	(3.8)	466	(3.6)
Italy	479	(2.7)	480	(2.7)	481	(2.9)
Japan	534	(3.1)	538	(3.3)	538	(3.1)
Korea	501	(3.2)	515	(3.1)	522	(3.2)
Latvia	481	(1.7)	494	(2.0)	492	(1.6)
Luxembourg	479	(1.1)	480	(1.7)	484	(1.8)
Mexico	412	(2.2)	415	(2.9)	415	(2.3)
Netherlands	504	(2.5)	514	(2.5)	501	(2.5)
New Zealand	509	(2.6)	520	(3.2)	507	(2.4)
Norway	501	(2.3)	499	(2.6)	494	(2.7)
Poland	501	(2.7)	502	(3.0)	500	(2.6)
Portugal	495	(2.5)	503	(2.7)	503	(2.6)
Slovak Republic	462	(2.6)	458	(3.2)	456	(2.8)
Slovenia	516	(1.5)	515	(2.0)	506	(2.0)
Spain	494	(2.1)	495	(2.7)	491	(2.4)
Sweden	497	(3.6)	492	(4.0)	486	(3.6)
Switzerland	504	(3.1)	509	(3.5)	503	(3.0)
Turkey	428	(4.0)	434	(4.1)	419	(4.1)
United Kingdom	512	(2.7)	516	(2.8)	504	(2.8)
United States	492	(3.4)	503	(3.6)	497	(3.5)
<b>Scotland</b>	<b>495</b>	<b>(2.6)</b>	<b>500</b>	<b>(2.6)</b>	<b>494</b>	<b>(2.4)</b>
Northern Ireland	504	(3.3)	507	(4.7)	495	(3.4)
Wales	490	(2.9)	490	(4.7)	479	(3.1)
England	516	(3.2)	519	(3.3)	507	(3.3)
<b>OECD average</b>	<b>491</b>	<b>(0.4)</b>	<b>495</b>	<b>(0.5)</b>	<b>491</b>	<b>(0.5)</b>

**Table A.5: Mean scores in science knowledge categories: OECD and UK administrations**

	Content knowledge		Procedural and epistemic knowledge	
	Mean	s.e.	Mean	s.e.
Australia	505	(1.8)	508	(1.7)
Austria	504	(2.7)	488	(2.4)
Belgium	495	(2.3)	504	(2.4)
Canada	527	(2.1)	526	(2.4)
Chile	451	(2.5)	443	(2.5)
Czech Republic	500	(2.4)	481	(2.3)
Denmark	501	(2.6)	496	(2.4)
Estonia	539	(2.1)	532	(2.2)
Finland	537	(2.3)	519	(2.5)
France	488	(2.1)	497	(2.2)
Germany	513	(2.8)	504	(2.8)
Greece	454	(4.0)	452	(3.9)
Hungary	483	(2.5)	472	(2.7)
Iceland	471	(1.7)	473	(2.0)
Ireland	504	(2.3)	502	(2.4)
Israel	461	(3.5)	471	(3.5)
Italy	486	(2.7)	476	(2.6)
Japan	540	(3.1)	533	(3.0)
Korea	507	(3.1)	515	(3.0)
Latvia	487	(1.6)	490	(1.7)
Luxembourg	483	(1.3)	479	(1.0)
Mexico	415	(2.1)	414	(2.4)
Netherlands	503	(2.4)	507	(2.3)
New Zealand	512	(2.6)	510	(2.5)
Norway	504	(2.4)	494	(2.4)
Poland	504	(2.7)	498	(2.5)
Portugal	499	(2.5)	501	(2.6)
Slovak Republic	463	(2.6)	455	(2.7)
Slovenia	520	(1.5)	506	(1.5)
Spain	498	(2.2)	490	(2.2)
Sweden	498	(3.6)	487	(3.6)
Switzerland	508	(3.0)	502	(3.0)
Turkey	425	(4.0)	427	(4.0)
United Kingdom	513	(2.7)	508	(2.5)
United States	490	(3.4)	501	(3.3)
<b>Scotland</b>	<b>496</b>	<b>(2.8)</b>	<b>495</b>	<b>(2.4)</b>
Northern Ireland	504	(2.9)	500	(3.2)
Wales	491	(2.8)	483	(3.0)
England	516	(3.2)	511	(2.9)
<b>OECD average</b>	<b>494</b>	<b>(0.4)</b>	<b>490</b>	<b>(0.4)</b>

**Table A.6: Mean scores in science content categories: OECD and UK administrations**

	Physical systems		Living systems		Earth and Space	
	Mean	s.e.	Mean	s.e.	Mean	s.e.
Australia	507	(1.7)	509	(1.8)	504	(2.1)
Austria	497	(2.7)	495	(2.6)	491	(2.8)
Belgium	497	(2.3)	503	(2.3)	496	(2.5)
Canada	525	(2.3)	528	(2.4)	525	(2.4)
Chile	442	(2.9)	452	(2.7)	443	(2.4)
Czech Republic	493	(2.5)	488	(2.3)	488	(2.5)
Denmark	506	(2.7)	494	(2.6)	496	(2.6)
Estonia	536	(2.3)	537	(2.1)	534	(2.2)
Finland	533	(2.5)	522	(2.5)	529	(2.9)
France	490	(2.3)	497	(2.3)	492	(2.5)
Germany	505	(2.7)	510	(2.8)	507	(2.8)
Greece	450	(4.0)	457	(4.0)	448	(4.2)
Hungary	481	(2.8)	474	(2.6)	477	(2.8)
Iceland	470	(1.8)	478	(2.0)	465	(1.9)
Ireland	500	(2.7)	505	(2.5)	502	(2.5)
Israel	470	(3.7)	476	(3.5)	448	(3.6)
Italy	479	(2.8)	484	(2.7)	477	(2.7)
Japan	534	(3.2)	537	(3.0)	537	(3.3)
Korea	511	(3.6)	507	(3.0)	517	(3.2)
Latvia	488	(1.7)	491	(1.7)	483	(1.8)
Luxembourg	477	(1.3)	486	(1.2)	476	(1.6)
Mexico	411	(2.2)	415	(2.3)	417	(2.4)
Netherlands	511	(2.6)	501	(2.4)	505	(2.8)
New Zealand	513	(2.7)	513	(2.8)	505	(2.6)
Norway	500	(2.5)	495	(2.5)	498	(2.6)
Poland	503	(2.6)	502	(2.8)	496	(2.8)
Portugal	494	(2.7)	505	(2.5)	498	(2.9)
Slovak Republic	464	(2.8)	458	(2.8)	454	(2.7)
Slovenia	512	(1.5)	514	(1.6)	509	(1.8)
Spain	488	(2.3)	498	(2.3)	492	(2.3)
Sweden	496	(3.8)	489	(3.6)	494	(4.0)
Switzerland	504	(3.1)	507	(3.2)	502	(3.1)
Turkey	432	(4.3)	426	(3.8)	419	(4.1)
United Kingdom	507	(2.9)	516	(2.5)	507	(2.7)
United States	494	(3.5)	498	(3.4)	496	(3.4)
<b>Scotland</b>	<b>495</b>	<b>(2.4)</b>	<b>500</b>	<b>(2.5)</b>	<b>492</b>	<b>(2.5)</b>
Northern Ireland	500	(3.4)	505	(3.4)	495	(3.5)
Wales	485	(3.3)	489	(3.2)	483	(3.1)
England	510	(3.4)	519	(3.0)	510	(3.2)
<b>OECD average</b>	<b>492</b>	<b>(0.5)</b>	<b>493</b>	<b>(0.5)</b>	<b>489</b>	<b>(0.5)</b>



**Table A.7: Relationship between student performance in science and the PISA Index of Economic, Social and Cultural Status (ESCS) and immigration background: OECD and UK administrations**

	Unadjusted mean score <sup>1</sup>	Mean score if students were on the OECD mean for background <sup>2</sup>	Strength of relationship between performance and ESCS <sup>3</sup>	Slope of socio-economic gradient <sup>4</sup>	Differences in science performance by immigration background <sup>5</sup>
Australia	510	500	11.7	44	-2
Austria	495	492	15.9	45	70
Belgium	502	496	19.3	48	66
Canada	528	511	8.8	34	-2
Chile	447	463	16.9	32	31
Czech Republic	493	505	18.8	52	32
Denmark	502	483	10.4	34	69
Estonia	534	533	7.8	32	32
Finland	531	521	10.0	40	83
France	495	505	20.3	57	62
Germany	509	511	15.8	42	72
Greece	455	458	12.5	34	45
Hungary	477	487	21.4	47	-17
Iceland	473	454	4.9	28	80
Ireland	503	497	12.7	38	5
Israel	467	461	11.2	42	16
Italy	481	484	9.6	30	33
Japan	538	547	10.1	42	93
Korea	516	525	10.1	44	m
Latvia	490	502	8.7	26	13
Luxembourg	483	481	20.8	41	41
Mexico	416	440	10.9	19	77
Netherlands	509	502	12.5	47	60
New Zealand	513	508	13.6	49	6
Norway	498	482	8.2	37	52
Poland	501	518	13.4	40	m
Portugal	501	514	14.9	31	16
Slovak Republic	461	467	16.0	41	70
Slovenia	513	512	13.5	43	71
Spain	493	507	13.4	27	42
Sweden	493	481	12.2	44	70
Switzerland	506	500	15.6	43	63
Turkey	425	455	9.0	20	13
United Kingdom	509	504	10.5	37	23
United States	496	494	11.4	33	32
<b>Scotland</b>	<b>497</b>	<b>490</b>	<b>10.7</b>	<b>37</b>	<b>1</b>
Northern Ireland	500	496	11.5	36	40
Wales	485	483	5.6	25	13
England	512	507	10.8	38	26
<b>OECD average</b>	<b>493</b>	<b>494</b>	<b>12.9</b>	<b>38</b>	<b>43</b>

## Notes to Table A.7

1: The headline PISA score.

2: The headline score adjusted for social background, by comparing the scores between countries for students on the ESCS mean

3: The amount of variation in score explained by social background.

4: The amount that the average score changes with social background – a lower score implies less change as background changes.

5: The mean score for non-immigrant-background pupils (with both parents born in the country of the test) minus the minus score for immigrant-background pupils. A negative figure implies that immigrant-background pupils score better.

## Mathematics

**Table A.8: Scotland's score in previous PISA surveys, together with comparison with 2015**

	Mathematics		
	Mean	S.E.	comparison to 2015
<b>2000</b>	533		n/a
<b>2003</b>	524	2.3	<b>H</b>
<b>2006</b>	506	3.6	<b>H</b>
<b>2009</b>	499	3.3	<b>S</b>
<b>2012</b>	498	2.6	<b>S</b>
<b>2015</b>	491	2.6	

H: higher than 2015, S: similar to 2015, L: lower than 2015

Comparisons in mathematics are possible from 2003 (the first survey when mathematics was a full domain, and the scale was fully developed).

**Table A.9a: Mean scores in mathematics, by gender, and comparison with Scotland: OECD and UK administrations**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	mean	s.e.	mean	s.e.	mean	s.e.
<b>Significantly above Scotland</b>								
Belgium	507	(2.4)	97	(1.5)	514	(3.1)	500	(2.8)
Canada	516	(2.3)	88	(1.1)	520	(2.9)	511	(2.6)
Denmark	511	(2.2)	81	(1.2)	516	(2.5)	506	(2.8)
Estonia	520	(2.0)	80	(1.1)	522	(2.7)	517	(2.3)
Finland	511	(2.3)	82	(1.3)	507	(2.6)	515	(2.6)
Germany	506	(2.9)	89	(1.4)	514	(3.5)	498	(3.0)
Ireland	504	(2.1)	80	(1.4)	512	(3.0)	495	(2.4)
Japan	532	(3.0)	88	(1.7)	539	(3.8)	525	(3.1)
Korea	524	(3.7)	100	(1.8)	521	(5.2)	528	(3.9)
Netherlands	512	(2.2)	92	(1.5)	513	(2.6)	511	(2.5)
Norway	502	(2.2)	85	(1.1)	501	(2.9)	503	(2.3)
Poland	504	(2.4)	88	(1.7)	510	(2.8)	499	(2.8)
Slovenia	510	(1.3)	88	(1.3)	512	(1.9)	508	(2.2)
Switzerland	521	(2.9)	96	(1.6)	527	(3.2)	515	(3.5)
<b>Similar to Scotland</b>								
Australia	494	(1.6)	93	(1.2)	497	(2.1)	491	(2.5)
Austria	497	(2.9)	95	(1.8)	510	(3.8)	483	(3.6)
Czech Republic	492	(2.4)	91	(1.7)	496	(3.3)	489	(2.8)
England	493	(3.0)	95	(1.5)	500	(3.5)	487	(3.6)
France	493	(2.1)	95	(1.5)	496	(2.9)	490	(2.6)
Iceland	488	(2.0)	93	(1.3)	487	(2.9)	489	(2.4)
Italy	490	(2.8)	94	(1.7)	500	(3.5)	480	(3.4)
Luxembourg	486	(1.3)	94	(1.2)	491	(2.0)	480	(2.0)
Northern Ireland	493	(4.6)	78	(2.0)	496	(5.0)	489	(4.9)
New Zealand	495	(2.3)	92	(1.3)	499	(3.4)	491	(2.7)
<b>OECD average</b>	<b>490</b>	<b>(0.4)</b>	<b>89</b>	<b>(0.3)</b>	<b>494</b>	<b>(0.6)</b>	<b>486</b>	<b>(0.5)</b>
Portugal	492	(2.5)	96	(1.3)	497	(3.0)	487	(2.7)
<b>Scotland</b>	<b>491</b>	<b>(2.6)</b>	<b>84</b>	<b>(1.4)</b>	<b>495</b>	<b>(3.2)</b>	<b>488</b>	<b>(3.3)</b>
Spain	486	(2.2)	85	(1.3)	494	(2.4)	478	(2.8)
Sweden	494	(3.2)	90	(1.7)	493	(3.8)	495	(3.3)
United Kingdom	492	(2.5)	93	(1.4)	498	(2.9)	487	(3.1)
<b>Significantly below Scotland</b>								
Chile	423	(2.5)	85	(1.4)	432	(3.1)	413	(3.0)
Greece	454	(3.8)	89	(1.8)	454	(4.7)	454	(3.6)
Hungary	477	(2.5)	94	(1.7)	481	(3.6)	473	(3.0)
Israel	470	(3.6)	103	(2.2)	474	(5.4)	466	(4.0)
Latvia	482	(1.9)	78	(1.2)	481	(2.6)	483	(2.5)
Mexico	408	(2.2)	75	(1.3)	412	(2.7)	404	(2.4)
Slovak Republic	475	(2.7)	95	(1.6)	478	(3.0)	472	(3.6)
Turkey	420	(4.1)	82	(2.3)	423	(4.6)	418	(4.9)
United States	470	(3.2)	88	(1.5)	474	(3.6)	465	(3.4)
Wales	478	(3.7)	78	(1.7)	483	(3.9)	473	(4.1)

**Table A.9b: Mean scores in mathematics, by gender, and comparison with Scotland: non-OECD countries and economies**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	s.d.	s.e.	mean	s.e.	mean	s.e.
	<b>Significantly above Scotland</b>							
B-S-J-G (China)	531	(4.9)	106	(2.5)	534	(4.8)	528	(5.7)
Chinese Taipei	542	(3.0)	103	(1.9)	545	(4.7)	539	(4.1)
Hong Kong (China)	548	(3.0)	90	(1.5)	549	(3.6)	547	(4.3)
Macao (China)	544	(1.1)	80	(1.1)	540	(1.7)	548	(1.5)
Singapore	564	(1.5)	95	(0.8)	564	(2.1)	564	(1.7)
	<b>Similar to Scotland</b>							
Russian Federation	494	(3.1)	83	(1.3)	497	(4.0)	491	(3.2)
Viet Nam	495	(4.5)	84	(2.7)	493	(4.7)	496	(4.8)
	<b>Significantly below Scotland</b>							
Albania	413	(3.4)	86	(1.6)	409	(4.2)	418	(3.5)
Algeria	360	(3.0)	71	(1.5)	356	(3.1)	363	(3.6)
Argentina	409	(3.1)	81	(1.5)	418	(3.5)	400	(3.3)
Brazil	377	(2.9)	89	(1.7)	385	(3.2)	370	(3.0)
Bulgaria	441	(4.0)	97	(2.4)	440	(4.8)	442	(4.3)
Colombia	390	(2.3)	77	(1.3)	395	(3.3)	384	(2.4)
Costa Rica	400	(2.5)	68	(1.4)	408	(2.8)	392	(3.0)
Croatia	464	(2.8)	88	(1.6)	471	(3.7)	458	(3.4)
Cyprus	437	(1.7)	92	(1.1)	435	(2.1)	440	(2.2)
Dominican Republic	328	(2.7)	69	(2.0)	326	(3.2)	330	(2.8)
Former Yugoslav Republic of Macedonia	371	(1.3)	96	(1.6)	368	(2.2)	375	(1.8)
Georgia	404	(2.8)	94	(2.2)	398	(3.9)	411	(2.5)
Indonesia	386	(3.1)	80	(2.0)	385	(3.5)	387	(3.7)
Jordan	380	(2.7)	86	(2.1)	373	(4.0)	387	(3.6)
Kazakhstan	460	(4.3)	82	(2.4)	459	(4.7)	461	(4.6)
Kosovo	362	(1.6)	75	(1.4)	366	(2.2)	357	(2.1)
Lebanon	396	(3.7)	101	(2.0)	408	(4.4)	386	(3.9)
Lithuania	478	(2.3)	86	(1.4)	478	(2.8)	479	(2.5)
Malaysia	446	(3.3)	80	(1.7)	443	(3.9)	449	(3.2)
Malta	479	(1.7)	110	(1.4)	477	(2.4)	481	(2.4)
Moldova	420	(2.5)	90	(1.5)	419	(2.9)	421	(3.1)
Montenegro	418	(1.5)	87	(1.4)	418	(2.1)	418	(2.0)
Peru	387	(2.7)	83	(1.4)	391	(3.0)	382	(3.2)
Qatar	402	(1.3)	99	(1.0)	397	(1.8)	408	(1.8)
Romania	444	(3.8)	86	(2.1)	444	(4.2)	444	(4.1)
Thailand	415	(3.0)	82	(1.9)	414	(3.7)	417	(3.4)
Trinidad and Tobago	417	(1.4)	96	(1.2)	408	(2.1)	426	(2.0)
Tunisia	367	(3.0)	84	(2.3)	370	(3.4)	364	(3.2)
United Arab Emirates	427	(2.4)	97	(1.3)	424	(3.9)	431	(2.9)
Uruguay	418	(2.5)	87	(1.7)	425	(3.6)	412	(2.5)

**Table A.10: 1 of 2: Estimates of proportion at each proficiency level (per cent), mathematics: OECD and UK administrations (Below Level 1 to Level 3)**

	Below Level 1		Level 1		Level 2		Level 3	
	%	s.e.	%	s.e..	%	s.e.	%	s.e..
Australia	7.6	(0.4)	14.4	(0.4)	22.6	(0.7)	25.4	(0.6)
Austria	7.8	(0.7)	13.9	(0.7)	21.3	(0.8)	24.6	(0.9)
Belgium	7.2	(0.6)	12.9	(0.6)	18.8	(0.8)	23.4	(0.7)
Canada	3.8	(0.4)	10.5	(0.5)	20.4	(0.6)	27.1	(0.6)
Chile	23.0	(1.1)	26.3	(1.0)	25.5	(0.8)	17.4	(0.9)
Czech Republic	7.4	(0.7)	14.3	(0.8)	23.3	(0.9)	26.2	(0.8)
Denmark	3.1	(0.3)	10.5	(0.7)	21.9	(1.0)	29.5	(0.9)
Estonia	2.2	(0.3)	9.0	(0.7)	21.5	(0.9)	28.9	(0.8)
Finland	3.6	(0.5)	10.0	(0.7)	21.8	(0.8)	29.3	(0.8)
France	8.8	(0.7)	14.7	(0.7)	20.7	(0.9)	23.8	(0.8)
Germany	5.1	(0.6)	12.1	(0.8)	21.8	(0.9)	26.8	(0.7)
Greece	15.1	(1.3)	20.7	(1.0)	26.0	(0.9)	22.1	(1.0)
Hungary	11.3	(0.8)	16.6	(0.8)	23.1	(1.0)	24.5	(1.0)
Iceland	8.4	(0.6)	15.2	(0.9)	23.7	(1.1)	24.8	(1.1)
Ireland	3.5	(0.5)	11.5	(0.6)	24.1	(0.9)	30.0	(0.9)
Israel	15.0	(1.0)	17.1	(0.8)	21.1	(1.0)	21.7	(1.0)
Italy	8.3	(0.6)	14.9	(0.8)	23.3	(0.8)	24.7	(0.8)
Japan	2.9	(0.4)	7.8	(0.6)	17.2	(0.9)	25.8	(0.9)
Korea	5.4	(0.6)	10.0	(0.7)	17.2	(0.8)	23.7	(0.8)
Latvia	5.7	(0.6)	15.8	(0.8)	28.3	(0.9)	28.8	(1.0)
Luxembourg	8.8	(0.5)	17.0	(0.7)	22.5	(0.7)	23.6	(1.0)
Mexico	25.5	(1.1)	31.1	(0.9)	26.9	(0.9)	12.9	(0.8)
Netherlands	5.2	(0.5)	11.5	(0.7)	19.8	(0.7)	24.9	(0.9)
New Zealand	7.1	(0.5)	14.6	(0.8)	22.6	(1.0)	25.3	(1.0)
Norway	4.8	(0.5)	12.3	(0.7)	23.6	(0.9)	27.7	(0.8)
Poland	4.5	(0.5)	12.7	(0.8)	22.9	(1.0)	27.1	(0.8)
Portugal	8.7	(0.6)	15.1	(0.7)	21.6	(0.7)	23.9	(0.8)
Slovak Republic	11.6	(0.8)	16.1	(0.7)	23.5	(1.0)	24.3	(0.9)
Slovenia	4.4	(0.4)	11.7	(0.6)	21.4	(0.8)	26.8	(0.8)
Spain	7.2	(0.5)	15.0	(0.8)	24.9	(0.8)	27.5	(1.0)
Sweden	7.0	(0.7)	13.8	(0.8)	23.3	(1.0)	26.1	(1.1)
Switzerland	4.9	(0.5)	10.9	(0.8)	18.1	(0.8)	23.6	(0.9)
Turkey	22.9	(1.5)	28.4	(1.4)	25.3	(1.1)	16.3	(1.2)
United Kingdom	7.7	(0.6)	14.1	(0.7)	22.7	(0.8)	26.0	(0.8)
United States	10.6	(0.8)	18.8	(1.0)	26.2	(1.0)	23.8	(0.9)
<b>Scotland</b>	<b>5.7</b>	<b>(0.6)</b>	<b>14.8</b>	<b>(0.9)</b>	<b>25.3</b>	<b>(1.0)</b>	<b>27.6</b>	<b>(1.3)</b>
Northern Ireland	4.2	(0.8)	14.6	(1.3)	25.3	(1.4)	29.6	(1.4)
Wales	6.2	(0.9)	17.1	(1.2)	28.7	(1.2)	27.6	(1.0)
England	8.2	(0.7)	13.9	(0.8)	22.0	(0.9)	25.6	(0.9)
<b>OECD average</b>	<b>8.5</b>	<b>(0.1)</b>	<b>14.9</b>	<b>(0.1)</b>	<b>22.5</b>	<b>(0.1)</b>	<b>24.8</b>	<b>(0.1)</b>

**Table A.10: 2 of 2: Estimates of proportion at each proficiency level (per cent), mathematics: OECD and UK administrations (Levels 4 to 6)**

	Level 4		Level 5		Level 6	
	%	s.e.	%	s.e.	%	s.e.
Australia	18.7	(0.5)	8.6	(0.5)	2.7	(0.3)
Austria	19.9	(0.8)	9.7	(0.7)	2.7	(0.4)
Belgium	21.8	(0.7)	12.3	(0.5)	3.6	(0.4)
Canada	23.0	(0.7)	11.4	(0.6)	3.7	(0.3)
Chile	6.4	(0.5)	1.3	(0.2)	0.1	(0.1)
Czech Republic	18.4	(0.7)	8.1	(0.6)	2.2	(0.3)
Denmark	23.4	(0.9)	9.8	(0.7)	1.9	(0.3)
Estonia	24.2	(0.7)	11.3	(0.7)	2.9	(0.4)
Finland	23.7	(1.0)	9.5	(0.7)	2.2	(0.3)
France	20.6	(0.7)	9.5	(0.6)	1.9	(0.3)
Germany	21.2	(0.9)	10.1	(0.6)	2.9	(0.4)
Greece	12.3	(0.9)	3.4	(0.4)	0.5	(0.1)
Hungary	16.3	(0.8)	6.7	(0.5)	1.5	(0.3)
Iceland	17.5	(0.9)	8.1	(0.7)	2.2	(0.3)
Ireland	21.2	(0.7)	8.3	(0.5)	1.5	(0.2)
Israel	16.1	(0.8)	7.1	(0.6)	1.9	(0.3)
Italy	18.3	(0.9)	8.1	(0.6)	2.4	(0.3)
Japan	25.9	(0.9)	15.0	(0.9)	5.3	(0.7)
Korea	22.7	(0.9)	14.3	(0.9)	6.6	(0.7)
Latvia	16.3	(0.7)	4.5	(0.4)	0.6	(0.1)
Luxembourg	18.0	(0.7)	7.8	(0.4)	2.2	(0.3)
Mexico	3.2	(0.4)	0.3	(0.1)	0.0	(0.0)
Netherlands	23.0	(0.8)	12.3	(0.7)	3.2	(0.3)
New Zealand	19.0	(0.8)	8.6	(0.7)	2.8	(0.4)
Norway	21.0	(1.0)	8.7	(0.6)	1.9	(0.3)
Poland	20.6	(0.9)	9.3	(0.6)	2.9	(0.5)
Portugal	19.2	(0.8)	8.9	(0.6)	2.5	(0.3)
Slovak Republic	16.7	(0.7)	6.6	(0.5)	1.3	(0.3)
Slovenia	22.3	(0.8)	10.4	(0.6)	3.0	(0.4)
Spain	18.1	(0.7)	6.3	(0.5)	1.0	(0.2)
Sweden	19.4	(0.9)	8.4	(0.6)	2.0	(0.4)
Switzerland	23.3	(0.8)	14.0	(0.8)	5.3	(0.5)
Turkey	5.9	(0.9)	1.0	(0.3)	0.1	(0.1)
United Kingdom	18.8	(0.8)	8.3	(0.6)	2.3	(0.3)
United States	14.7	(0.8)	5.0	(0.6)	0.9	(0.2)
<b>Scotland</b>	<b>18.1</b>	<b>(1.0)</b>	<b>7.2</b>	<b>(0.8)</b>	<b>1.4</b>	<b>(0.3)</b>
Northern Ireland	19.7	(1.4)	6.0	(1.1)	0.7	(0.3)
Wales	15.8	(1.1)	4.1	(0.7)	0.5	(0.2)
England	19.0	(1.0)	8.7	(0.7)	2.6	(0.4)
<b>OECD average</b>	<b>18.6</b>	<b>(0.1)</b>	<b>8.4</b>	<b>(0.1)</b>	<b>2.3</b>	<b>(0.1)</b>

## Reading

**Table A.11: Scotland's score in previous PISA surveys, together with comparison with 2015**

	Reading		
	Mean	S.E.	comparison to 2015
<b>2000</b>	526	3.8	<b>H</b>
<b>2003</b>	516	2.5	<b>H</b>
<b>2006</b>	499	4.0	<b>S</b>
<b>2009</b>	500	3.2	<b>S</b>
<b>2012</b>	506	(3.0)	<b>H</b>
<b>2015</b>	493	(2.3)	

H: higher than 2015, S: similar to 2015, L: lower than 2015

Comparisons in reading are possible from 2000 (the first survey when reading was a full domain and the scale was fully developed).



**Table A.12a: Mean scores in reading, by gender, and comparison with Scotland: OECD and UK administrations**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	s.d.	s.e.	mean	s.e.	mean	s.e.
<b>Significantly above Scotland</b>								
Australia	503	(1.7)	103	(1.1)	487	(2.3)	519	(2.3)
Canada	527	(2.3)	93	(1.3)	514	(2.6)	540	(2.5)
Estonia	519	(2.2)	87	(1.2)	505	(2.9)	533	(2.3)
Finland	526	(2.5)	94	(1.5)	504	(3.0)	551	(2.8)
Germany	509	(3.0)	100	(1.6)	499	(3.7)	520	(3.1)
Ireland	521	(2.5)	86	(1.5)	515	(3.2)	527	(2.7)
Japan	516	(3.2)	92	(1.8)	509	(4.2)	523	(3.3)
Korea	517	(3.5)	97	(1.7)	498	(4.8)	539	(4.0)
Netherlands	503	(2.4)	101	(1.6)	491	(3.0)	515	(2.9)
New Zealand	509	(2.4)	105	(1.7)	493	(3.3)	526	(3.0)
Norway	513	(2.5)	99	(1.7)	494	(3.1)	533	(2.9)
Poland	506	(2.5)	90	(1.3)	491	(2.9)	521	(2.8)
Slovenia	505	(1.5)	92	(1.3)	484	(2.3)	528	(2.1)
<b>Similar to Scotland</b>								
Belgium	499	(2.4)	100	(1.5)	491	(3.1)	507	(2.9)
Czech Republic	487	(2.6)	100	(1.7)	475	(3.6)	501	(2.9)
Denmark	500	(2.5)	87	(1.2)	489	(2.8)	511	(3.4)
England	500	(3.2)	98	(1.3)	488	(3.4)	511	(4.0)
France	499	(2.5)	112	(2.0)	485	(3.3)	514	(3.3)
Latvia	488	(1.8)	85	(1.5)	467	(2.3)	509	(2.4)
Northern Ireland	497	(4.6)	84	(2.0)	490	(5.2)	504	(5.1)
<b>OECD average</b>	<b>493</b>	<b>(0.5)</b>	<b>96</b>	<b>(0.3)</b>	<b>479</b>	<b>(0.6)</b>	<b>506</b>	<b>(0.5)</b>
Portugal	498	(2.7)	92	(1.1)	490	(3.1)	507	(2.8)
Spain	496	(2.4)	87	(1.4)	485	(3.0)	506	(2.8)
<b>Scotland</b>	<b>493</b>	<b>(2.3)</b>	<b>91</b>	<b>(1.6)</b>	<b>483</b>	<b>(3.0)</b>	<b>504</b>	<b>(2.8)</b>
Sweden	500	(3.5)	102	(1.5)	481	(4.1)	520	(3.5)
Switzerland	492	(3.0)	98	(1.7)	480	(3.4)	505	(3.4)
United Kingdom	498	(2.8)	97	(1.1)	487	(2.9)	509	(3.5)
United States	497	(3.4)	100	(1.6)	487	(3.7)	507	(3.9)
<b>Significantly below Scotland</b>								
Austria	485	(2.8)	101	(1.5)	475	(4.3)	495	(3.7)
Chile	459	(2.6)	88	(1.7)	453	(3.4)	465	(2.9)
Greece	467	(4.3)	98	(2.4)	449	(5.1)	486	(4.2)
Hungary	470	(2.7)	97	(1.7)	457	(3.7)	482	(3.1)
Iceland	482	(2.0)	99	(1.7)	460	(2.8)	502	(2.6)
Israel	479	(3.8)	113	(2.0)	467	(5.4)	490	(4.6)
Italy	485	(2.7)	94	(1.6)	477	(3.5)	493	(3.6)
Luxembourg	481	(1.4)	107	(1.0)	471	(1.9)	492	(2.2)
Mexico	423	(2.6)	78	(1.5)	416	(2.9)	431	(2.9)
Slovak Republic	453	(2.8)	104	(1.8)	435	(3.3)	471	(3.5)
Turkey	428	(4.0)	82	(2.0)	414	(4.5)	442	(4.8)
Wales	477	(3.6)	85	(1.5)	472	(4.2)	483	(3.6)

**Table A.12b: Mean scores in reading, by gender, and comparison with Scotland: non-OECD countries and economies**

	Overall				Gender differences			
	Mean score		S.D.		Male		Female	
	mean	s.e.	s.d.	s.e.	mean	s.e.	mean	s.e.
	<b>Significantly above Scotland</b>							
Macao (China)	509	(1.3)	82	(1.1)	493	(1.9)	525	(1.6)
Hong Kong (China)	527	(2.7)	86	(1.5)	513	(3.4)	541	(3.6)
Singapore	535	(1.6)	99	(1.1)	525	(1.9)	546	(2.3)
	<b>Similar to Scotland</b>							
B-S-J-G (China)	494	(5.1)	109	(2.9)	486	(5.0)	503	(5.8)
Chinese Taipei	497	(2.5)	93	(1.7)	485	(3.7)	510	(3.4)
Croatia	487	(2.7)	91	(1.6)	473	(3.3)	500	(3.0)
Russian Federation	495	(3.1)	87	(1.4)	481	(3.4)	507	(3.5)
Viet Nam	487	(3.7)	73	(2.0)	474	(4.0)	499	(3.8)
	<b>Significantly below Scotland</b>							
Albania	405	(4.1)	97	(1.8)	376	(4.8)	435	(3.8)
Algeria	350	(3.0)	73	(1.6)	335	(2.9)	366	(3.5)
Argentina	425	(3.2)	89	(1.7)	417	(3.7)	433	(3.5)
Brazil	407	(2.8)	100	(1.5)	395	(3.1)	419	(3.0)
Bulgaria	432	(5.0)	115	(2.6)	409	(5.8)	457	(5.0)
Colombia	425	(2.9)	90	(1.5)	417	(3.6)	432	(3.2)
Costa Rica	427	(2.6)	79	(1.6)	420	(3.1)	435	(2.9)
Cyprus1	443	(1.7)	102	(1.3)	417	(2.0)	469	(2.1)
Dominican Republic	358	(3.1)	85	(1.9)	342	(3.5)	373	(3.1)
Former Yugoslav Republic of Macedonia	352	(1.4)	99	(1.2)	330	(2.3)	376	(1.8)
Georgia	401	(3.0)	104	(1.8)	374	(4.1)	432	(2.8)
Indonesia	397	(2.9)	76	(1.8)	386	(3.4)	409	(3.3)
Jordan	408	(2.9)	94	(1.8)	372	(4.3)	444	(3.4)
Kazakhstan	427	(3.4)	80	(2.3)	419	(3.9)	435	(3.7)
Kosovo	347	(1.6)	78	(1.1)	329	(2.2)	365	(2.0)
Lebanon	347	(4.4)	115	(2.6)	339	(5.4)	353	(4.7)
Lithuania	472	(2.7)	94	(1.5)	453	(3.1)	492	(3.0)
Malaysia	431	(3.5)	81	(1.9)	414	(3.8)	445	(3.6)
Malta	447	(1.8)	121	(1.5)	426	(2.7)	468	(2.2)
Moldova	416	(2.5)	98	(1.5)	390	(2.7)	442	(3.0)
Montenegro	427	(1.6)	94	(1.2)	410	(2.0)	444	(2.3)
Peru	398	(2.9)	89	(1.6)	394	(3.4)	401	(3.6)
Qatar	402	(1.0)	111	(1.0)	376	(1.3)	429	(1.4)
Romania	434	(4.1)	95	(2.1)	425	(4.4)	442	(4.4)
Thailand	409	(3.3)	80	(1.7)	392	(4.3)	423	(3.2)
Trinidad and Tobago	427	(1.5)	104	(1.3)	401	(2.1)	452	(2.2)
Tunisia	361	(3.1)	82	(1.9)	348	(3.9)	373	(3.0)
United Arab Emirates	434	(2.9)	106	(1.4)	408	(3.9)	458	(3.3)
Uruguay	437	(2.5)	97	(1.6)	424	(3.4)	448	(2.7)

**Table A.13: 1 of 2: Estimates of proportion at each proficiency level (per cent), reading: OECD and UK administrations (Below Level 1b to Level 2)**

	Below Level 1b		Level 1b		Level 1a		Level 2	
	%	s.e.	%	s.e.	%	s.e.	%	s.e.
Australia	1.2	(0.2)	4.8	(0.2)	12.0	(0.5)	21.4	(0.6)
Austria	1.7	(0.3)	6.5	(0.7)	14.3	(0.8)	23.5	(0.9)
Belgium	1.0	(0.2)	5.3	(0.4)	13.2	(0.6)	21.1	(0.7)
Canada	0.4	(0.1)	2.1	(0.3)	8.2	(0.5)	19.0	(0.6)
Chile	1.3	(0.3)	7.4	(0.6)	19.8	(0.9)	29.9	(1.2)
Czech Republic	1.3	(0.3)	6.0	(0.6)	14.7	(0.7)	23.3	(0.8)
Denmark	0.5	(0.1)	3.3	(0.3)	11.2	(0.6)	24.1	(0.8)
Estonia	0.2	(0.1)	2.1	(0.3)	8.4	(0.7)	21.6	(0.7)
Finland	0.6	(0.1)	2.6	(0.3)	7.8	(0.5)	17.6	(0.8)
France	2.3	(0.4)	6.5	(0.6)	12.7	(0.5)	19.0	(0.8)
Germany	0.9	(0.2)	4.1	(0.5)	11.2	(0.7)	21.0	(1.0)
Greece	2.3	(0.5)	7.8	(1.0)	17.2	(1.0)	25.3	(1.0)
Hungary	1.4	(0.3)	8.1	(0.8)	18.0	(0.9)	24.5	(0.8)
Iceland	1.8	(0.3)	6.0	(0.5)	14.3	(0.9)	26.0	(1.1)
Ireland	0.2	(0.1)	1.7	(0.3)	8.3	(0.7)	21.0	(0.9)
Israel	3.3	(0.5)	8.1	(0.7)	15.2	(0.8)	21.7	(1.0)
Italy	1.0	(0.2)	5.4	(0.4)	14.5	(0.8)	25.4	(1.0)
Japan	0.6	(0.2)	3.0	(0.4)	9.2	(0.7)	19.8	(0.9)
Korea	0.7	(0.2)	3.4	(0.5)	9.5	(0.7)	19.3	(1.0)
Latvia	0.4	(0.2)	3.8	(0.4)	13.4	(0.8)	27.2	(0.8)
Luxembourg	1.9	(0.3)	7.8	(0.5)	15.9	(0.7)	22.0	(0.8)
Mexico	2.0	(0.3)	11.4	(0.8)	28.4	(0.9)	34.2	(1.0)
Netherlands	1.1	(0.2)	4.4	(0.4)	12.6	(0.8)	21.8	(0.9)
New Zealand	1.0	(0.2)	4.8	(0.5)	11.5	(0.7)	20.6	(0.7)
Norway	0.8	(0.2)	3.6	(0.4)	10.6	(0.6)	20.4	(0.7)
Poland	0.5	(0.2)	3.2	(0.4)	10.8	(0.6)	22.5	(0.8)
Portugal	0.6	(0.1)	3.9	(0.4)	12.7	(0.7)	23.2	(0.8)
Slovak Republic	4.4	(0.5)	9.4	(0.6)	18.3	(0.8)	25.7	(0.8)
Slovenia	0.5	(0.1)	3.4	(0.3)	11.2	(0.5)	22.5	(0.9)
Spain	0.7	(0.2)	3.5	(0.4)	12.0	(0.7)	24.4	(0.8)
Sweden	1.5	(0.3)	4.8	(0.5)	12.2	(0.8)	21.7	(0.8)
Switzerland	1.2	(0.3)	5.2	(0.6)	13.5	(0.7)	23.2	(0.9)
Turkey	2.3	(0.3)	10.9	(1.0)	26.8	(1.4)	32.6	(1.5)
United Kingdom	0.8	(0.2)	4.0	(0.4)	13.1	(0.7)	24.3	(0.9)
United States	1.1	(0.2)	4.8	(0.5)	13.0	(0.8)	22.9	(0.9)
<b>Scotland</b>	<b>0.7</b>	<b>(0.2)</b>	<b>3.7</b>	<b>(0.6)</b>	<b>13.5</b>	<b>(0.8)</b>	<b>25.3</b>	<b>(1.1)</b>
Northern Ireland	0.2	(0.1)	2.7	(0.6)	12.5	(1.1)	26.5	(1.7)
Wales	0.5	(0.2)	4.2	(0.6)	16.1	(1.0)	30.6	(1.1)
England	0.9	(0.2)	4.1	(0.4)	12.9	(0.8)	23.7	(1.0)
<b>OECD average</b>	<b>1.3</b>	<b>(0.0)</b>	<b>5.2</b>	<b>(0.1)</b>	<b>13.6</b>	<b>(0.1)</b>	<b>23.2</b>	<b>(0.2)</b>

**Table A.13: 2 of 2: Estimates of proportion at each proficiency level (per cent), reading: OECD and UK administrations (Levels 3 to 6)**

	Level 3		Level 4		Level 5		Level 6	
	%	s.e.	%	s.e.	%	s.e.	%	s.e.
Australia	27.5	(0.6)	22.0	(0.6)	9.0	(0.5)	2.0	(0.2)
Austria	27.0	(1.1)	19.7	(0.7)	6.4	(0.5)	0.8	(0.2)
Belgium	26.8	(0.8)	23.2	(0.7)	8.4	(0.5)	1.0	(0.2)
Canada	29.7	(0.7)	26.6	(0.7)	11.6	(0.6)	2.4	(0.3)
Chile	27.0	(0.9)	12.4	(0.8)	2.2	(0.3)	0.1	(0.0)
Czech Republic	27.5	(1.0)	19.3	(0.9)	6.9	(0.5)	1.0	(0.2)
Denmark	32.4	(0.8)	22.0	(0.8)	5.9	(0.6)	0.6	(0.2)
Estonia	31.4	(0.9)	25.4	(0.9)	9.7	(0.6)	1.4	(0.2)
Finland	29.7	(0.9)	27.9	(1.0)	11.7	(0.6)	2.0	(0.3)
France	24.5	(0.9)	22.5	(0.8)	10.5	(0.7)	2.0	(0.2)
Germany	27.6	(0.9)	23.5	(0.9)	9.7	(0.7)	1.9	(0.3)
Greece	27.2	(1.1)	16.1	(0.9)	3.8	(0.4)	0.3	(0.1)
Hungary	27.0	(1.0)	16.8	(0.8)	3.9	(0.4)	0.4	(0.1)
Iceland	27.3	(0.9)	18.0	(0.7)	5.8	(0.5)	0.8	(0.2)
Ireland	31.8	(1.1)	26.4	(0.8)	9.4	(0.6)	1.3	(0.2)
Israel	24.0	(0.9)	18.5	(0.9)	7.7	(0.6)	1.4	(0.3)
Italy	28.8	(0.8)	19.2	(0.9)	5.1	(0.4)	0.6	(0.1)
Japan	30.5	(0.9)	26.0	(1.0)	9.5	(0.8)	1.3	(0.3)
Korea	28.9	(1.0)	25.5	(1.2)	10.8	(0.8)	1.9	(0.3)
Latvia	32.1	(0.9)	18.7	(0.8)	4.0	(0.4)	0.3	(0.1)
Luxembourg	24.7	(0.7)	19.4	(0.7)	7.0	(0.4)	1.2	(0.2)
Mexico	19.5	(0.9)	4.2	(0.5)	0.3	(0.1)	0.0	(0.0)
Netherlands	26.6	(1.1)	22.7	(0.8)	9.5	(0.6)	1.4	(0.3)
New Zealand	26.5	(0.9)	22.0	(0.9)	11.0	(0.7)	2.6	(0.4)
Norway	28.5	(0.8)	23.9	(0.8)	10.1	(0.6)	2.1	(0.4)
Poland	31.4	(0.8)	23.5	(0.9)	7.5	(0.6)	0.7	(0.2)
Portugal	30.2	(0.9)	21.9	(1.0)	6.9	(0.6)	0.6	(0.2)
Slovak Republic	24.8	(0.9)	14.0	(0.7)	3.2	(0.4)	0.2	(0.1)
Slovenia	30.3	(0.9)	23.1	(0.8)	8.0	(0.7)	1.0	(0.4)
Spain	32.3	(1.0)	21.6	(0.8)	5.1	(0.5)	0.4	(0.1)
Sweden	27.5	(0.8)	22.5	(1.0)	8.5	(0.7)	1.5	(0.3)
Switzerland	28.1	(1.0)	20.9	(0.9)	6.9	(0.6)	0.9	(0.2)
Turkey	21.1	(1.4)	5.7	(0.9)	0.6	(0.2)	0.0	(0.0)
United Kingdom	28.4	(0.7)	20.3	(0.8)	7.7	(0.5)	1.5	(0.2)
United States	28.0	(0.9)	20.5	(0.9)	8.2	(0.6)	1.4	(0.2)
<b>Scotland</b>	<b>30.1</b>	<b>(1.3)</b>	<b>20.2</b>	<b>(0.9)</b>	<b>5.7</b>	<b>(0.7)</b>	<b>0.7</b>	<b>(0.2)</b>
Northern Ireland	31.6	(1.4)	20.7	(1.6)	5.6	(1.0)	0.3	(0.2)
Wales	29.2	(1.0)	15.6	(1.1)	3.5	(0.6)	0.3	(0.1)
England	28.1	(0.9)	20.5	(0.9)	8.2	(0.6)	1.7	(0.3)
<b>OECD average</b>	<b>27.9</b>	<b>(0.2)</b>	<b>20.5</b>	<b>(0.1)</b>	<b>7.2</b>	<b>(0.1)</b>	<b>1.1</b>	<b>(0.0)</b>

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