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Coverage
Northern Ireland
Theme
Education

International Student Assessment

Results for Northern Ireland 2000

Key results from a major international survey of student achievement published today by the Office for National Statistics (ONS) show that the proficiency in reading, mathematical and scientific literacy of 15 year olds in Northern Ireland compares well with that of young people of the same age in other countries, and is similar to that of students in both England and the Republic of Ireland.

Students in Northern Ireland scored an average of 519 points on the reading literacy scale, significantly higher than students in OECD countries as a whole, where the mean score was set at 500. Northern Irish students were at a similar level of achievement as those in, for example, Australia, New Zealand, Japan and Sweden. In only two countries, Finland and Canada, did 15 year olds do significantly better than in Northern Ireland. Students in Northern Ireland did significantly better than students in many European countries, including France and Germany.

Northern Irish students also did significantly better than the OECD average in both mathematical and scientific literacy. Only Japan and Korea did significantly better in mathematical literacy, and only Japan, Korea and Finland in scientific literacy.

The overall score in mathematical literacy in Northern Ireland was 524 points, similar to that in England, and significantly better than in the Republic of Ireland. In scientific literacy the score of 523 points was ten points higher than that of students in the Republic of Ireland, but ten points lower than that of students in England. However, neither of these differences was large enough to be statistically significant.

Figure 1 shows that there was a high level of correlation between the achievement levels of a country's students in the three domains of literacy. Of the twelve countries that scored significantly higher than the OECD average in reading literacy, eleven were also significantly above average in mathematical literacy, and ten in scientific literacy. Similarly, nearly all the countries that were significantly below average in reading literacy were also significantly below average in mathematical and in scientific literacy. Figure 1, Tables 1-3

The survey in Northern Ireland was commissioned by the Department of Education as part of the Programme for International Student Assessment (PISA), which is a collaborative study among the member countries of the

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OECD. It was carried out in 32 countries in 2000 using standardised methodology to give internationally comparable results. An OECD report is published today which gives more detailed first results for all countries taking part in PISA 2000. The main report on the survey in Northern Ireland will be published in 2002 and will include analysis of the relationship between student performance and socio-economic and other background factors.

PISA's main purpose is to assess the ability of 15 year olds to apply knowledge and skills in three broad areas of literacy: reading, mathematics and science. The assessments measure how well young people can use basic knowledge and concepts learned at school and elsewhere in order to function in their adult lives.

PISA's three domains of literacy are defined in terms of the ability to complete a range of tasks that reflect real-life situations:

- reading: the ability to understand, use, and reflect on written texts to participate effectively in life (it does not seek to measure the extent to which students are fluent readers or their ability in spelling or word recognition);
- mathematical: the ability to formulate and solve mathematical problems in situations encountered in life;
- scientific: the capacity to acquire and use scientific knowledge, and to draw evidence-based conclusions.

Other key findings are as follows.

Reading literacy: levels of achievement

The main focus of PISA 2000 was on reading literacy, and the scoring for this was more complex and detailed than for each of the other two domains. The summary scale referred to above was derived from three component scales which relate to the type of task: retrieving information, interpreting text, and reflecting on and evaluating a text. Achievement in Northern Ireland was significantly higher than the OECD average in each of the three components of reading literacy, and Northern Irish students were particularly proficient on the 'reflecting and evaluating' scale.

Students were also categorised into five levels on each of these three scales and on the summary scale, Level 5 indicating the most proficient students. Most students had neither very good nor very poor reading skills: as many as 68 per cent of students in Northern Ireland were at Levels 2, 3 or 4, a slightly smaller proportion than in OECD countries as a whole.

In Northern Ireland, however, the proportion of students demonstrating the highest level of proficiency in reading literacy was, at 16 per cent, similar to the proportions in England (16 per cent) and the Republic of Ireland (14 per cent), but significantly higher than the figure for the OECD as a whole, which was 10 per cent. Students at this level are capable of completing sophisticated reading tasks such as managing information that is difficult to find in unfamiliar texts, comprehending such texts and inferring which information is relevant, accommodating concepts that may be contrary to expectations, and being able to evaluate the material critically and form hypotheses.

At the lower end of the proficiency scale, 10 per cent of students in Northern Ireland were classified as being at Level 1: they were able to complete tasks such as locating a single piece of information, identifying the main theme of a text, or making a simple connection with everyday knowledge. The proportion of students at Level 1 in Northern Ireland was significantly higher than in the Republic of Ireland, where it was 8 per cent, but not significantly different from the proportion in England (9 per cent).

A small proportion of 15 year olds were not able to demonstrate the lowest level of proficiency: in Northern Ireland, 5 per cent of students were in this category, similar to the proportion in the OECD as a whole (6 per cent), but significantly greater than the proportions in the Republic of Ireland (3 per cent) and in England (4 per cent). Students whose proficiency in reading literacy is below Level 1 are not necessarily unable to read, but they do have serious difficulty in using reading literacy as an effective tool for extending their knowledge and skills in other areas. Table 4

Gender differences

In Northern Ireland, girls scored significantly higher than boys in reading literacy, both on the summary scale and also on each of the three component scales. This finding was repeated in all the participating countries. The average difference in scores between girls and boys on the summary scale was 33 points which was almost exactly the same in Northern Ireland as the average over all

OECD countries. Gender differences in scores on the summary scale and the three component scales were not significantly different from those in England or the Republic of Ireland.

The greatest difference between girls and boys was in their skills in reflecting on and evaluating text (girls scored on average 555 points, compared with 511 for boys). Gender differences were not indicative of either good or poor performance overall: the two countries with the smallest differences between boys and girls were Korea and Mexico: the former had a higher than average literacy score, whereas the latter had the lowest score of all the participating countries. Tables 1,5

In both mathematical and scientific literacy, gender differences were much less marked, and in Northern Ireland, the small differences between boys and girls were not statistically significant. Interestingly, the international patterns of gender difference in these two domains of literacy were not the same. Boys scored higher in mathematical literacy than girls in all but two countries (Iceland and New Zealand), but in scientific literacy, girls scored higher than boys in just over half the participating countries, including Northern Ireland. Tables 2,3

Range and dispersion of scores

The average score is a useful summary measure of student achievement in a country, but it throws no light on the range and distribution of the scores of individual students. Figure 2 illustrates the distribution of reading literacy skills in each OECD country. The mean score for each country is at the midpoint of the central band, and the length of the bar shows the range of scores obtained by all but the best 5 per cent and poorest 5 per cent of students - thus it shows the range within which the scores of 90 per cent of students fell.

The range of skills was wider in some countries than others: the country with the least variation in student scores was Korea, where 90% of students had scores falling in a range of 227 points. Northern Ireland, however, was one of the countries with the greatest variation - the equivalent figure for Northern Ireland was 355 points. There was no clear relationship between average achievement and the degree of dispersion in student scores. In some countries with high average scores, like Korea, variation was relatively little, but in others, such as Australia and

New Zealand, it was not. However, Germany was unusual in having a low average score but a comparatively high level of variation between students: the width of the range containing 90% of students in Germany was 366 points. Figure 2

Variation in the distribution of skills was slightly different for mathematical literacy - several high achieving countries, such as Japan, Korea, Finland and Canada, showed relatively little variation in student scores, but in Northern Ireland, New Zealand, Switzerland and Belgium the level of variation was relatively high. The two countries with the least variation in scientific literacy were Mexico, which had the lowest average score, and Korea, which had the highest. For scientific literacy, Northern Ireland was one of the countries with the greatest variation: the range within which the scores of 90 per cent of Northern Irish students fell was 344 points, compared with 321 for England, and only 299 for the Republic of Ireland. Figures 3,4

BACKGROUND NOTES

1. *Knowledge and skills for life - first results from PISA 2000* can be obtained from the OECD and results are also available via www.pisa.oecd.org.

Introduction

2. The Programme for International Student Assessment (PISA) is a collaborative study among the member countries of the Organisation for Economic Co-operation and Development (OECD). Its main purpose is to assess the knowledge and skills of 15 year olds in three broad areas of literacy: reading, mathematics and science. It does not provide information about the extent to which students have mastered particular school subjects (which is already available from examination results, although the content of the curriculum differs from country to country), but rather aims to assess the extent to which young people can use their knowledge and skills to meet the challenges they are likely to encounter in adult life.
3. PISA was carried out in 32 countries in 2000 when the main focus was on reading literacy, and will be repeated in 2003 and 2006, when the main focuses will be mathematical literacy and scientific literacy respectively. This First Release presents results for Northern Ireland and England, and 27 member countries of the OECD that participated in PISA, including the United Kingdom. The sample size in each participating OECD country is shown in Table B1.
4. In Northern Ireland, co-operation was obtained from a representative sample of 115 schools throughout the region and then from 2,849 young people born in 1984 who were enrolled in them. Each student took a written assessment lasting about two hours, which was administered in his or her own school, using standardised methodology and in test conditions. All students were assessed in reading literacy, which was the main focus of this survey. In addition, random subsamples of students were assessed in mathematical and scientific literacy. The number of students in Northern Ireland from whom information was obtained for each literacy domain is shown in Table B2.
5. As well as the survey in Northern Ireland, which was conducted in collaboration with the Northern Ireland Statistics and Research Agency, ONS carried out the survey in England and is also publishing key results for England today. A separate study was conducted in Scotland which contributed to the United Kingdom figures, although there were some differences in the implementation of the survey which mean that any comparisons with Scotland should be made with caution. Wales did not participate in PISA.

What PISA measures

6. In PISA, literacy is measured on a continuum, not as an attribute that a person either does or does not have.
7. PISA's three domains of literacy are defined in terms of the ability to complete a range of tasks in a range of real-life situations, in order to be able to participate effectively in society.
 - Reading literacy is understanding, using and reflecting on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.
 - Mathematical literacy is the capacity to identify and understand the role that mathematics plays in the world, to make well-founded mathematical judgements, and to engage in mathematics, in ways that meet the needs of that individual's current and future life as a constructive, concerned and reflective citizen.
 - Scientific literacy is the capacity to use scientific knowledge, to identify questions, and to draw evidence-based conclusions in order to understand and make decisions about the natural world and the changes made to it through human activity.
8. In each domain of literacy, a student's score is expressed as a number of points on a scale, and shows the highest difficulty of task that the student is likely to be able to complete. The scales are constructed so that the average score for students from all OECD countries participating in PISA 2000 is 500 and its standard deviation is 100 - that is, about two-thirds of students internationally score between 400 and 600. Each country contributes equally to this average irrespective of its size.
9. Examples of tasks at different levels of difficulty are described in Figures B1 and B2, together with their associated scores. Examples of test items used in PISA 2000 can be found at:
www.statistics.gov.uk/ssd/surveys/survey_student_achievement.asp

International comparisons

10. In the tables and figures, countries are ordered according to their mean achievement score in each area of literacy. This is convenient for displaying results, but the actual rankings are not meaningful in themselves. This is because the data presented in this report are obtained from samples, and sampling error must be taken into account when considering the results: differences between countries may be very small, and even if apparently larger, may not be statistically significant.

11. Although great care was taken to ensure the use of standardised instruments, methods of sample selection, data collection, and test scoring, in practice it is extremely difficult to conduct exactly comparable studies in different countries, and there were also differences in response rate between countries. These factors, also, should be borne in mind when making international comparisons.
12. Differences in PISA scores between countries should not be taken to result solely from differences in schooling, but rather from differences in the cumulative effect of learning experiences, because learning starts before school and occurs in different institutional and out-of-school settings.
13. The response rate among schools in the Netherlands was too low to give confidence that the results would reflect the national population to the level of accuracy required by PISA. Therefore results for the Netherlands are not presented and do not contribute to the calculation of an average for all OECD countries.
14. Details of the policy governing the release of new data are available from the press office. Also available is a list of those given pre-publication access to the contents of this release.
15. The publication of these statistics represents an extension of the scope of National Statistics for the Department of Education since the launch of National Statistics in June 2000.
16. **National Statistics** are produced to high professional standards set out in the National Statistics Code of Practice. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference. The statistics in this release have been issued under embargo through a special dispensation by the National Statistician to allow them to coincide with the international release procedures of the OECD, © Crown copyright 2001.

Figure 1 Mean scores in each domain that were significantly different from those for the OECD as a whole

<i>Countries in descending order of their mean score in reading literacy</i>	Reading literacy	Mathematical literacy	Scientific literacy
Finland	+	+	+
Canada	+	+	+
New Zealand	+	+	+
Australia	+	+	+
Republic of Ireland	+		+
Korea	+	+	+
United Kingdom	+	+	+
<i>England</i>	+	+	+
Japan	+	+	+
<i>Northern Ireland</i>	+	+	+
Sweden	+	+	+
Austria	+	+	+
Belgium	+	+	
Iceland	+	+	
Norway			
France		+	
United States			
Denmark		+	-
Switzerland		+	
Spain	-	-	-
Czech Republic	-		+
Italy	-	-	-
Germany	-	-	-
Hungary	-	-	
Poland	-	-	-
Greece	-	-	-
Portugal	-	-	-
Luxembourg	-	-	-
Mexico	-	-	-

+ Denotes a country mean score significantly above that for the OECD as a whole.

- Denotes a country mean score significantly below that for the OECD as a whole.

Table 1 Mean scores in reading literacy by country for all students and by gender

<i>Countries in descending order of their mean score in reading literacy</i>	All students	Girls	Boys	
Finland	546 (+)	571	520	Mean score for all students significantly higher than for the OECD as a whole
Canada	534 (+)	551	519	
New Zealand	529	553	507	
Australia	528	546	513	
Republic of Ireland	527	542	513	
Korea	525	533	519	
United Kingdom	523	537	512	
<i>England</i>	523	537	512	
Japan	522	537	507	
Northern Ireland	519	537	504	
Sweden	516	536	499	
Austria	507 (-)	520	495	
Belgium	507	525	492	
Iceland	507 (-)	528	488	Mean score for all students not significantly different from the OECD as a whole
Norway	505 (-)	529	486	
France	505 (-)	519	490	
United States	504	518	490	
Denmark	497 (-)	510	485	
Switzerland	494 (-)	510	480	
Spain	493 (-)	505	481	Mean score for all students significantly lower than the OECD as a whole
Czech Republic	492 (-)	510	473	
Italy	487 (-)	507	469	
Germany	484 (-)	502	468	
Hungary	480 (-)	496	465	
Poland	479 (-)	498	461	
Greece	474 (-)	493	456	
Portugal	470 (-)	482	458	
Luxembourg	441 (-)	456	429	
Mexico	422 (-)	432	411	
OECD country average	500 (-)	517	485	

(+) Denotes a country mean score that is significantly higher than Northern Ireland's.

(-) Denotes a country mean score that is significantly lower than Northern Ireland's.

Table 2 Mean scores in mathematical literacy by country for all students and by gender

<i>Countries in descending order of their mean score in mathematical literacy</i>	All students	Girls	Boys	
Japan	557 (+)	553	561	Mean score for all students significantly higher than the OECD as a whole
Korea	547 (+)	532	559	
New Zealand	537	539	536	
Finland	536	536	537	
Australia	533	527	539	
Canada	533	529	539	
Switzerland	529	523	537	
United Kingdom	529	526	534	
<i>England</i>	529	526	534	
<i>Northern Ireland</i>	524	524	526	
Belgium	520	518	524	
France	517	511	525	
Austria	515	503	530	
Denmark	514	507	522	
Iceland	514	518	513	Mean score for all students not significantly different from the OECD as a whole
Sweden	510 (-)	507	514	
Republic of Ireland	503 (-)	497	510	
Norway	499 (-)	495	506	
Czech Republic	498 (-)	492	504	Mean score for all students significantly lower than the OECD as a whole
United States	493 (-)	490	497	
Germany	490 (-)	483	498	
Hungary	488 (-)	485	492	
Spain	476 (-)	469	487	
Poland	470 (-)	468	472	
Italy	457 (-)	454	462	
Portugal	454 (-)	446	464	
Greece	447 (-)	444	451	
Luxembourg	446 (-)	439	454	
Mexico	387 (-)	382	393	
OECD country average	500 (-)	495	506	

(+) Denotes a country mean score that is significantly higher than Northern Ireland's.

(-) Denotes a country mean score that is significantly lower than Northern Ireland's.

Table 3 Mean scores in scientific literacy by country for all students and by gender

<i>Countries in descending order of their mean score in scientific literacy</i>	All students	Girls	Boys	
Korea	552 (+)	541	561	Mean score for all students significantly higher than the OECD as a whole
Japan	550 (+)	554	547	
Finland	538 (+)	541	534	
England	533	533	537	
United Kingdom	532	531	535	
Canada	529	531	529	
New Zealand	528	535	523	
Australia	528	529	526	
Northern Ireland	523	525	522	
Austria	519	514	526	
Republic of Ireland	513	517	511	Mean score for all students not significantly different from the OECD as a whole
Sweden	512	513	512	
Czech Republic	511	511	512	
France	500 (-)	498	504	
Norway	500 (-)	505	499	
United States	499	502	497	
Hungary	496 (-)	497	496	
Iceland	496 (-)	499	495	Mean score for all students significantly lower than the OECD as a whole
Belgium	496 (-)	498	496	
Switzerland	496 (-)	493	500	
Spain	491 (-)	491	492	
Germany	487 (-)	487	489	
Poland	483 (-)	480	486	
Denmark	481 (-)	476	488	
Italy	478 (-)	483	474	
Greece	461 (-)	464	457	
Portugal	459 (-)	462	456	
Luxembourg	443 (-)	448	441	
Mexico	422 (-)	419	423	
OECD country average	500 (-)	501	501	

(+) Denotes a country mean score that is significantly higher than Northern Ireland's.

(-) Denotes a country mean score that is significantly lower than Northern Ireland's.

Table 4 Reading literacy: the proportion of students at each level of proficiency

<i>Countries in descending order of their mean score in reading literacy</i>	Proficiency level						
		Below					
		Level 1	Level 1	Level 2	Level 3	Level 4	Level 5
Finland	%	2	5	14	29	32	18
Canada	%	2	7	18	28	28	17
New Zealand	%	5	9	17	25	26	19
Australia	%	3	9	19	26	25	18
Republic of Ireland	%	3	8	18	30	27	14
Korea	%	1	5	19	39	31	6
United Kingdom	%	4	9	20	27	24	16
<i>England</i>	%	4	9	20	28	24	16
Japan	%	3	7	18	33	29	10
<i>Northern Ireland</i>	%	5	10	19	25	24	16
Sweden	%	3	9	20	30	26	11
Austria	%	4	10	22	30	25	9
Belgium	%	8	11	17	26	26	12
Iceland	%	4	11	22	31	24	9
Norway	%	6	11	19	28	24	11
France	%	4	11	22	31	24	8
United States	%	6	12	21	27	21	12
Denmark	%	6	12	23	29	22	8
Switzerland	%	7	13	21	28	21	9
Spain	%	4	12	26	33	21	4
Czech Republic	%	6	11	25	31	20	7
Italy	%	5	14	26	31	19	5
Germany	%	10	13	22	27	19	9
Hungary	%	7	16	25	29	18	5
Poland	%	9	15	24	28	19	6
Greece	%	9	16	26	28	17	5
Portugal	%	10	17	25	27	17	4
Luxembourg	%	14	21	27	25	11	2
Mexico	%	16	28	30	19	6	1
OECD country average	%	6	12	22	29	22	10

Table 5 The components of reading literacy: mean scores by country for all students and by gender

<i>Countries in descending order of their mean score in reading literacy</i>	Retrieving			Interpreting			Reflecting and evaluation		
	All students	Girls	Boys	All students	Girls	Boys	All students	Girls	Boys
Finland	556 (+)	578	534	555 (+)	579	529	533	564	501
Canada	530 (+)	543	519	532 (+)	547	518	542	566	521
New Zealand	535 (+)	555	516	526 (+)	549	506	529	559	502
Australia	536 (+)	551	523	527 (+)	545	511	526	548	507
Republic of Ireland	524	536	514	526 (+)	541	513	533	552	515
Korea	530	533	527	525 (+)	530	521	526	541	514
United Kingdom	523	534	515	514	527	503	539	557	522
<i>England</i>	523	533	515	513	526	503	539	558	523
Japan	526	539	512	518	530	505	530	551	508
<i>Northern Ireland</i>	517	532	505	512	528	498	532	555	511
Sweden	516	532	501	522	540	505	510 (-)	536	486
Austria	502 (-)	510	495	508	520	497	512 (-)	532	493
Belgium	515	529	504	512	529	498	497 (-)	522	475
Iceland	500 (-)	517	485	514	535	497	501 (-)	529	476
Norway	505	523	490	505	527	487	506 (-)	539	479
France	515	527	503	506	519	492	496 (-)	515	477
United States	499	512	486	505	518	491	507 (-)	524	488
Denmark	498 (-)	506	491	494 (-)	506	485	500 (-)	523	480
Switzerland	498 (-)	510	487	496 (-)	510	484	488 (-)	511	465
Spain	483 (-)	493	477	491 (-)	502	481	506 (-)	526	487
Czech Republic	481 (-)	495	467	500	517	483	485 (-)	511	457
Italy	488 (-)	504	474	489 (-)	509	470	483 (-)	507	460
Germany	483 (-)	497	471	488 (-)	505	472	478 (-)	503	455
Hungary	478 (-)	491	465	480 (-)	494	466	481 (-)	503	460
Poland	475 (-)	489	461	482 (-)	500	465	477 (-)	504	451
Greece	450 (-)	466	435	475 (-)	492	459	495 (-)	522	468
Portugal	455 (-)	464	447	473 (-)	485	461	480 (-)	497	461
Luxembourg	433 (-)	444	424	446 (-)	460	433	442 (-)	464	423
Mexico	402 (-)	408	396	419 (-)	427	410	446 (-)	463	428
OECD country average	498	510	486	501	516	487	502	525	480

(+) Denotes a country mean score that is significantly higher than Northern Ireland's.

(-) Denotes a country mean score that is significantly lower than Northern Ireland's.

Figure 2: Distribution of student proficiency in reading literacy by country

95% confidence interval of the mean score and the range of scores of the middle-90% of students

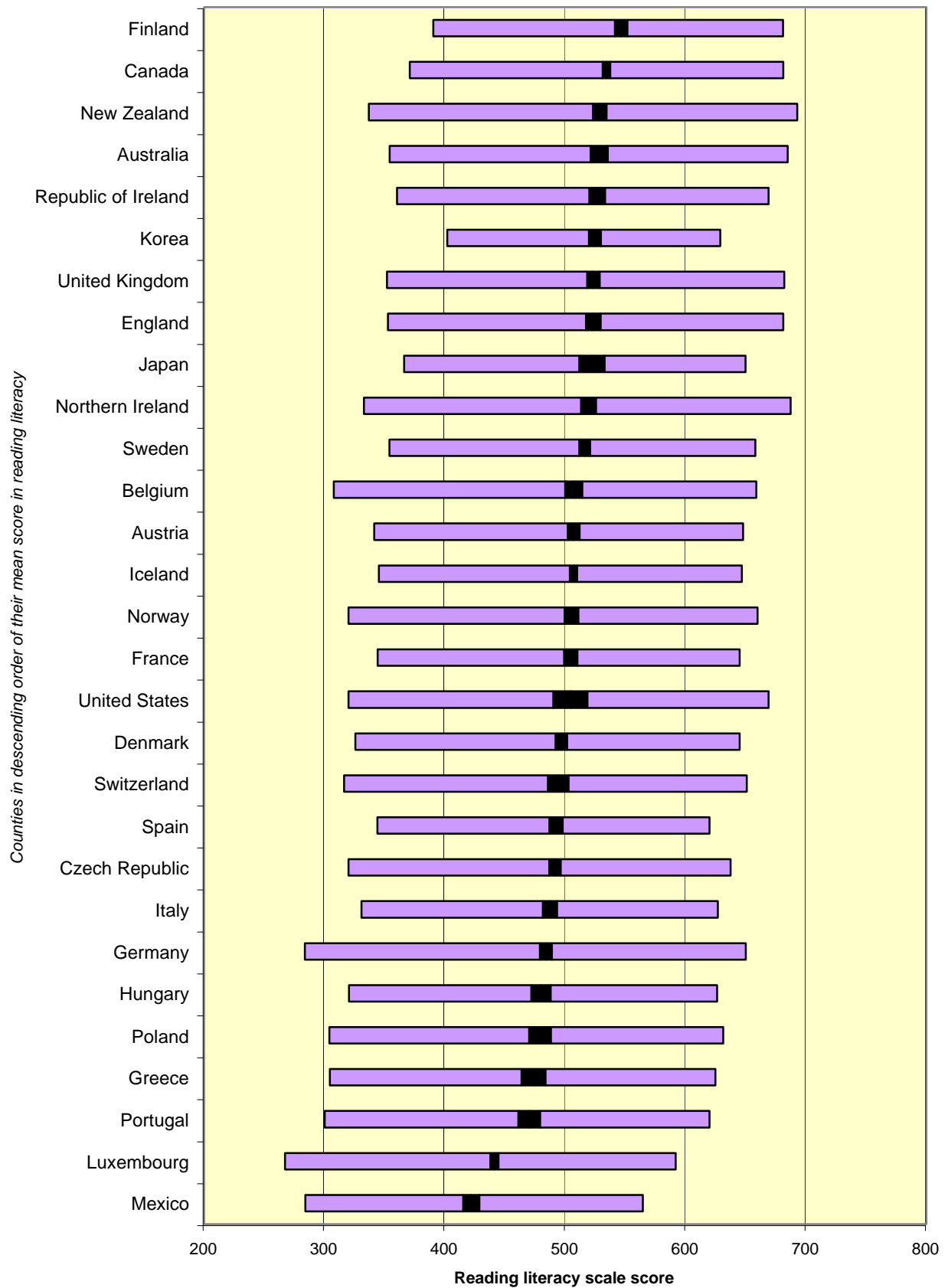


Figure 3: Distribution of student proficiency in mathematical literacy by country
 95% confidence interval of the mean score and the range of scores of the middle-90% of students

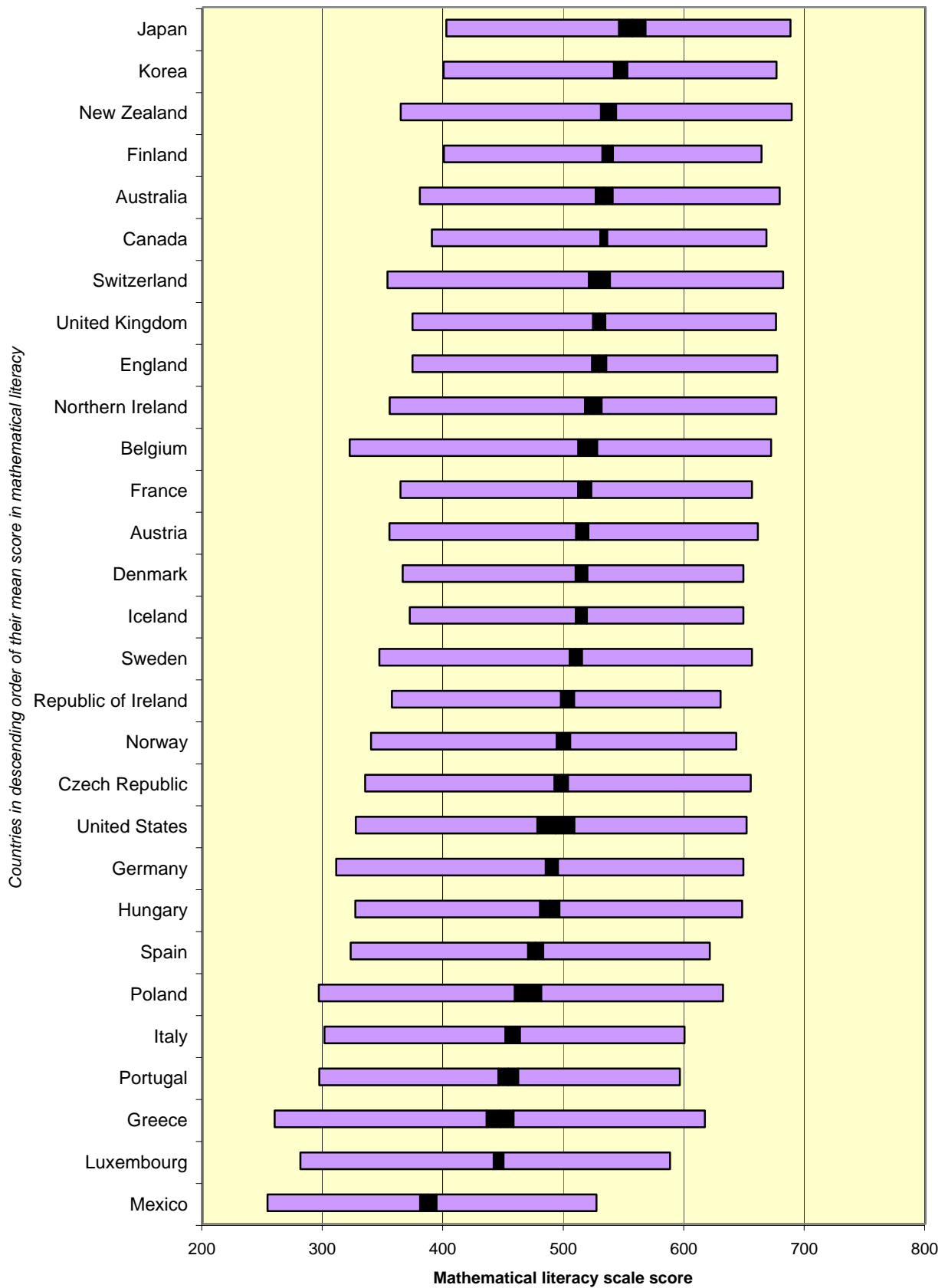


Figure 4: Distribution of student proficiency in scientific literacy by country

95% confidence interval of the mean score and the range of scores of the middle-90% of students

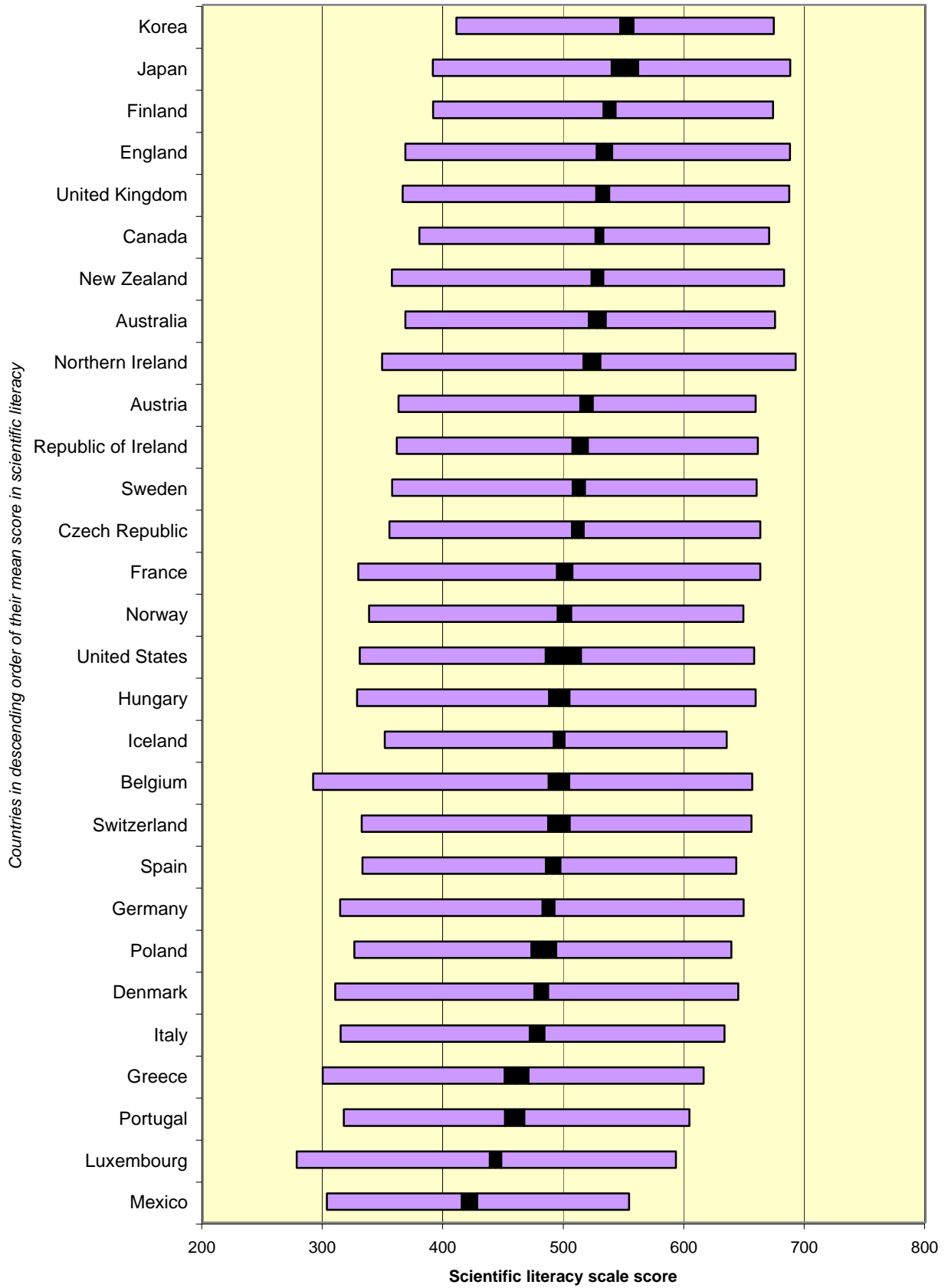


Table B1 Sample size by country

Country	Sample size (=100%)	Country	Sample size (=100%)
Australia	5,176	Korea	4,982
Austria	4,745	Luxembourg	3,528
Belgium	6,670	Mexico	4,600
Canada	29,687	New Zealand	3,667
Czech Republic	5,365	<i>Northern Ireland</i>	2,849
Denmark	4,235	Norway	4,147
<i>England</i>	4,120	Poland	3,654
Finland	4,864	Portugal	4,585
France	4,673	Republic of Ireland	3,854
Germany	5,073	Spain	6,214
Greece	3,644	Sweden	4,416
Hungary	4,887	Switzerland	6,100
Iceland	3,372	United Kingdom	9,340
Italy	4,984	United States	3,846
Japan	5,256		

Table B2 **Sample sizes in Northern Ireland for each literacy domain**

	Girls	Boys	Total *
Reading literacy	1,361	1,468	2,849
Mathematical literacy	757	816	1,586
Scientific literacy	765	793	1,566

* *The total includes 1% of students who did not give information on their gender.*

Figure B1: Examples of reading literacy assessment tasks

Level	Retrieving	Interpreting	Reflecting and evaluating
5	Students were shown a notice from a personnel department about a service that would help with job mobility. They had to work out the two ways in which this service could help people who lost their jobs – information that was stated indirectly and had to be distinguished from competing information that could easily be mistaken for the information required. <i>Associated score: 655 points on the retrieving information scale.</i>	Students were shown a tree diagram of a country's working-age population, and descriptions of the labour force status of individual workers. They had to decide in which category of the diagram each worker belonged. They had to work out what criteria to use to classify workers from the structure and content of the diagram, drawing on information in footnotes and therefore not prominent. <i>Associated score: 727 points on the interpreting scale.</i>	After reading a three-page story about a woman's adventure, students were asked to say whether they thought it had an appropriate ending, explaining why. To obtain full credit, they had to evaluate the ending in terms of its thematic completeness, by relating the last sentence to central relationships, issues or metaphors in the story. <i>Associated score: 652 points on the reflection and evaluation scale.</i>
2-4	Students were shown a leaflet describing an office-based flu immunisation programme. They were then asked a multiple-choice question requiring them to identify one feature of the programme which was stated in the text, disregarding competing information which was not given in the text. <i>Associated score: 443 points on the retrieving information scale.</i>	After reading a short extract from a play by Jean Anouilh, students had to work out what the play is about: one character is playing a trick on another. A multiple-choice task asked about the purpose of the trick. This required a low level of inference to work out the main idea in the text. <i>Associated score: 423 points on the interpreting scale.</i>	Students had to look at two letters posted on the Internet giving conflicting opinions about graffiti. They had to comment on which was written better, analysing writing style and structure of argument rather than just what the letters said. To do this, they had to draw on their understanding of what constitutes good writing. <i>Associated score: 581 points on the reflection and evaluation scale.</i>
1	After reading a short adventure story, students were asked in a multiple-choice task what happened next after a brief quoted extract. The answer was stated explicitly in the narrative and was easy to locate from the information given in the task. <i>Associated score: 367 points on the retrieving information scale.</i>	Students were shown a magazine article, written for young people, explaining the process and purpose of DNA testing. A multiple-choice task required them simply to recognise that the writer's main purpose was to inform, rather than to warn, amuse or convince. <i>Associated score: 406 points on the interpreting scale.</i>	Students were asked about a sentence in an article about sports shoes, discussing aspects of the shoe that can avoid damage to feet. A multiple-choice task required students to recognise the relationship between the two parts of the sentence: that the second part provided the solution to the problem stated in the first part (rather than illustrating, repeating or contradicting it). <i>Associated score: 402 points on the reflection and evaluation scale.</i>

Figure B2: Examples of mathematical and scientific literacy assessment tasks

	Mathematical	Scientific
Difficult	Students were presented with a diagram showing the pattern in which different trees may be planted in an orchard in order that conifers provide sufficient protection to apple trees. They had to work out which type of tree would increase faster in number as the orchard was enlarged – and explain why. This required them to compare the growth of a linear function and a quadratic function. The task required students to think mathematically and recognise a general principle. <i>Associated score: 723 points</i>	Students were shown extracts from a 19 th century scientist's diary, a table with his observations and a commentary, discussing the post-natal death from a particular fever of a large proportion of mothers in two wards of a hospital maternity clinic. Students had to indicate why the evidence did not support a contemporary belief that earthquakes caused the fever. This required them to explain the significance of different death rates in the two wards. <i>Associated score: 666 points.</i>
Medium	From a mathematical representation of the dimensions of a farmhouse roof in the shape of a pyramid, students had to calculate the area of its base. This required students to identify and perform a straightforward calculation, understanding the concepts of space and shape. <i>Associated score: 492 points.</i>	After reading a text on the risks to the ozone layer and their implications, students were asked whether each of two questions could be answered by scientific research. To answer correctly, they needed, in particular, to recognise the difference between a question that requires a political choice and one that can be answered directly by science. <i>Associated score: 529 points.</i>
Easy	From a graph showing the speed of a racing car as it travelled round a track, students had to answer a multiple-choice task about where on the track the car went the slowest. This required only a simple observation and sufficient understanding of the concept of change to realise that the slowest speed would be shown at the lowest point of the speed graph. <i>Associated score: 403 points.</i>	Students were asked why washing hospital sheets in high temperatures helps reduce the risk that patients will contract a fever. In their answer they needed to apply their scientific knowledge to this real-world problem by referring, for example, to the killing of bacteria. <i>Associated score: 467 points.</i>