



Trends in International Mathematics and Science Study

# TIMSS 2006/07

# 1

## Year 5 - BOOKLET

# MARKING GUIDE

Also contains proportions of students who gave correct answers for selected countries.

Compiled by the Research Division.



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This document is a companion to the test booklet and contains the guide used to code each of the questions along with the percentage of students who correctly answered for English-speaking and high-performing countries. It is arranged by question in the same order as the test booklet, with an indication of the question number and a brief description of the question.

## **Classification of items**

The TIMSS 2007 Assessment Frameworks (Mullis, Martin, Ruddock, O’Sullivan, Arora, & Erberber, 2005) provided a template for the assessment of mathematics and science in TIMSS 2006/07. The mathematics framework for Year 5 students (grade 4) had 3 content domains: number, geometric shapes and measures, and data display. Similarly, the science framework had 3 content domains at this school level: life science, physical science, and earth science. These domains were used to classify questions and quantify content coverage of the test items. As well as the content classification, the framework also included the cognitive behaviours expected of students when they answer questions. For both mathematics and science, the cognitive domains were: knowing, applying, and reasoning.

## **Coding**

TIMSS allows for more than one type of correctness code, with the first digit, either 1 or 2, indicating the number of points and the second digit indicating the category the answer fell into. For example if a student’s response is coded 11, it was awarded a score of 1 and the response fell mainly into category 11. Incorrect codes, starting with a 7, were given to answers that were wrong.

## **Percent correct**

Thirty-seven countries participated in TIMSS 2006/07 at the Year 5 level. The results for selected countries are presented in each table. The table shows the percentage of students who correctly answered the question, and achieved the maximum number of points.

## **How this document can be used**

This document needs to be read in reference to the test booklet. The test booklet may be given to students and can be coded in relation to the coding information presented in this booklet. Teachers can choose to use a selection of the items from the test booklet based on the item classification contained within this companion.

## **References:**

Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O’Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

<b>Question 1</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	762 cars parked in 6 equal rows	Number	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M01_01</b>	
<b>Correct Response</b>			
10	127		
<b>Incorrect Response</b>			
70	4572		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	87	United States	36
Hong Kong SAR	86	England	23
Singapore	81	Scotland	22
Russian Federation	75	Australia	12
<i>International Mean</i>	39	<b>New Zealand</b>	<b>8</b>

<b>Question 2</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Mano's missing digit	Number	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_02</b>	
<b>Correct Response</b>			
10	2		
11	527		
<b>Incorrect Response</b>			
70	3 OR 537		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	88	United States	41
Hong Kong SAR	85	England	28
Singapore	85	Scotland	25
Russian Federation	84	Australia	22
<i>International Mean</i>	42	<b>New Zealand</b>	<b>18</b>

<b>Question 3</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Number of boys and girls in a school	Number	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_03</b>	
<b>Correct Response</b>			
20	30 with work shown		
<b>Partial Response</b>			
10	30 with no work shown		
11	Correct method with computational error		
<b>Incorrect Response</b>			
70	113		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	69	England	21
Singapore	63	<i>International Mean</i>	18
Hong Kong SAR	44	Scotland	12
Japan	36	Australia	9
United States	25	<b>New Zealand</b>	<b>8</b>

<b>Question 4</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Sean's rule to transform numbers	Number	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_04</b>	
<b>Correct Response</b>			
10	Double the number in the triangle and add 1 (e.g., double and add 1; multiply by 2 and add 1)		
19	Other correct, including adding the next highest number to the given number in the triangle (e.g., $4 + 5 = 9$ )		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	39	United States	23
Japan	39	Australia	20
Singapore	36	Scotland	17
Chinese Taipei	33	<b>New Zealand</b>	<b>17</b>
England	28	<i>International Mean</i>	16

<b>Question 5</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Temperature increase at 9am	Number	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_05</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	83	Australia	64
Chinese Taipei	82	United States	64
Japan	81	Scotland	62
Singapore	79	<b>New Zealand</b>	<b>58</b>
England	67	<i>International Mean</i>	<i>57</i>

<b>Question 6</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Time Dan, Rob, Lynn to leave school	Number	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_06</b>	
<b>Correct Response</b>			
10	3:10		
<b>Incorrect Response</b>			
70	3:00		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	65	Scotland	49
Singapore	63	Australia	45
Chinese Taipei	62	United States	45
Germany	59	<b>New Zealand</b>	<b>43</b>
England	53	<i>International Mean</i>	<i>37</i>

<b>Question 7</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Water in bottle after pouring 250ml	Number	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M01_07</b>	
<b>Correct Response</b>			
10	750		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	86	Scotland	47
Singapore	82	<i>International Mean</i>	46
Lithuania	78	<b>New Zealand</b>	<b>37</b>
England	58	United States	17
Australia	48		

<b>Question 8</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Al wanted to weigh his cat	Number	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M01_08</b>	
<b>Correct Response</b>			
10	5		
<b>Incorrect Response</b>			
70	15		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	95	England	63
Singapore	87	Australia	61
Hong Kong SAR	86	<i>International Mean</i>	60
Kazakhstan	85	United States	60
Netherlands	85	<b>New Zealand</b>	<b>53</b>
Scotland	64		

<b>Question 9</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	The square is cut into 7 pieces	Geometric Shapes and Measures	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M01_09</b>	
<b>Correct Response</b>			
10	The two congruent triangles below the diagonal marked		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	91	Singapore	88
Slovenia	91	Australia	85
Lithuania	89	United States	85
Denmark	88	<b>New Zealand</b>	<b>81</b>
England	88	<i>International Mean</i>	72
Scotland	88		

<b>Question 10</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Jasmin's tally	Data Display	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M01_10</b>	
<b>Correct Response</b>			
10	Number of tally marks in table as listed below		
	Number	Number of Tally Marks	
	1	5 tally marks	
	2	4 tally marks	
	3	3 tally marks	
	4	2 tally marks	
<b>Incorrect Response</b>			
70	One tally incorrect		
71	Two or more tallies incorrect		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	62	Australia	34
Japan	60	Scotland	33
United States	52	<b>New Zealand</b>	<b>30</b>
England	44	<i>International Mean</i>	28
Singapore	41		

<b>Question 11</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Types of trees in pie charts	Data Display	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M01_11</b>	
<b>Correct Response</b>			
10	A		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	92	England	76
Japan	92	Australia	76
Singapore	90	Scotland	73
Chinese Taipei	88	<b>New Zealand</b>	<b>72</b>
United States	85	<i>International Mean</i>	61

<b>Question 12</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Arranging numbers in order	Number	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M02_01</b>	
<b>Correct Response</b>			
10	D		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	95	Australia	81
Singapore	94	Scotland	78
Chinese Taipei	93	<b>New Zealand</b>	<b>72</b>
United States	85	<i>International Mean</i>	70
England	82		

<b>Question 13</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Number of tables needed	Number	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M02_02</b>		
<b>Correct Response</b>				
10	B			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Chinese Taipei	82	England	63	
Hong Kong SAR	80	Scotland	60	
Netherlands	80	<i>International Mean</i>	57	
Russian Federation	78	Australia	54	
Singapore	78	<b>New Zealand</b>	<b>50</b>	
United States	65			


<b>Question 14</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Multiply 53 and 26	Number	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M02_03</b>		
<b>Correct Response</b>				
10	1378			
<b>Incorrect Response</b>				
70	118			
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Chinese Taipei	88	<i>International Mean</i>	41	
Singapore	80	England	28	
Kazakhstan	78	Australia	9	
Hong Kong SAR	76	<b>New Zealand</b>	<b>6</b>	
Austria	75	Scotland	4	
United States	50			

<b>Question 15</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Fraction of the rectangle shaded	Number	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M02_04</b>	
<b>Correct Response</b>			
10	B		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	82	England	55
Singapore	76	Scotland	49
Kazakhstan	66	United States	49
Netherlands	63	<b>New Zealand</b>	<b>47</b>
Russian Federation	62	<i>International Mean</i>	41
Australia	56		

<b>Question 16</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Subtract 5.3 – 3.8	Number	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: M02_05</b>	
<b>Correct Response</b>			
10	1.5		
<b>Incorrect Response</b>			
70	2.5		
71	15		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	95	<i>International Mean</i>	44
Singapore	94	Australia	38
Japan	90	Scotland	35
United States	68	<b>New Zealand</b>	<b>23</b>
England	52		

<b>Question 17</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		How much money is Rob left with	Number	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M02_06</b>		
<b>Correct Response</b>				
10	A			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Singapore	79	<i>International Mean</i>	38	
Chinese Taipei	68	Scotland	38	
Kazakhstan	67	Australia	35	
United States	48	<b>New Zealand</b>	<b>30</b>	
England	45			

<b>Question 18</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Perimeter of the rectangle	Geometry and Measures	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M02_07</b>		
<b>Correct Response</b>				
10	C			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Singapore	92	Denmark	60	
Hong Kong SAR	76	<i>International Mean</i>	51	
Russian Federation	71	Japan	34	
United States	68	Scotland	33	
Australia	63	<b>New Zealand</b>	<b>30</b>	
England	62			

<b>Question 19A</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Make a 4-sided figure	Geometric Shapes and Measures	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M02_08</b>	
<b>Correct Response</b>			
10	Correct 4 sided figure turned in any position		
			
<b>Incorrect Response</b>			
70	Makes a larger triangle		
71	Makes a 4-sided figure, but not using the specified tiles, e.g., a larger parallelogram		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	78	England	59
Singapore	69	United States	51
Japan	65	Scotland	51
Australia	64	<b>New Zealand</b>	<b>47</b>
Russian Federation	63	<i>International Mean</i>	<i>40</i>
Denmark	62		

<b>Question 19B</b>	<b>Item Label:</b> Make a 6-sided figure	<b>Content Domain:</b> Geometric Shapes and Measures	<b>Cognitive Domain:</b> Applying
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Code	Response	Item: M02_08
<b>Correct Response</b>		
10	Makes a correct 6-sided figure, e.g., one of those shown below (in any orientation)	

<b>Incorrect Response</b>	
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Hong Kong SAR	86	Australia	61
Japan	67	United States	54
Kazakhstan	67	Scotland	52
Denmark	66	<b>New Zealand</b>	<b>44</b>
England	64	<i>International Mean</i>	41
Singapore	64		

<b>Question 19C</b>	<b>Item Label:</b> Another 6-sided figure	<b>Content Domain:</b> Geometric Shapes and Measures	<b>Cognitive Domain:</b> Reasoning
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Code	Response	Item: M02_08
<b>Correct Response</b>		
10	Any of four figures (6-sided) that was not used in part B	
<b>Incorrect Response</b>		
70	Repeats a correct figure already given in part B	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Hong Kong SAR	59	Australia	52
Japan	59	United States	45
Denmark	57	Scotland	40
Singapore	55	<b>New Zealand</b>	<b>39</b>
England	53	<i>International Mean</i>	31

<b>Question 19D</b>	<b>Item Label:</b> Make a 7-sided figure	<b>Content Domain:</b> Geometric Shapes and Measures	<b>Cognitive Domain:</b> Reasoning
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<b>Code</b>	<b>Response</b>	<b>Item: M02_08</b>
<b>Correct Response</b>		
10	Makes a correct 7-sided figure, e.g., one of those shown below (in any orientation)	

<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	60	Australia	36
Japan	52	United States	31
Kazakhstan	51	Scotland	27
Russian Federation	50	<b>New Zealand</b>	<b>26</b>
Singapore	44	<i>International Mean</i>	26
England	44		

<b>Question 20</b>	<b>Item Label:</b> Shape after 90 degree rotation	<b>Content Domain:</b> Geometric Shapes and Measures	<b>Cognitive Domain:</b> Knowing
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<b>Code</b>	<b>Response</b>	<b>Item: m02_09</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Kazakhstan	51	<b>New Zealand</b>	<b>30</b>
Japan	49	<i>International Mean</i>	30
England	49	United States	29
Singapore	46	Scotland	28
Australia	37		

<b>Question 21</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Put the correct number on the scale	Data Display	Applying
<b>Code</b>	<b>Response</b>	<b>Item: M02_10</b>	
<b>Correct Response</b>			
10	All correct numbers shown: 50 40 30 20 10		
<b>Incorrect Response</b>			
70	Only 20, 30, 50 correctly entered on the scale		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	96	Chinese Taipei	70
Japan	87	Australia	66
Singapore	84	Scotland	65
England	78	<b>New Zealand</b>	<b>59</b>
United States	72	<i>International Mean</i>	45

<b>Question 22</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Draw a bar to show Alonso's points	Data Display	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: M02_11</b>	
<b>Correct Response</b>			
10	Bar at 86		
11	Bar between 85-87 exclusive but not at 86		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong SAR	77	England	52
Chinese Taipei	72	United States	51
Japan	71	Scotland	44
Singapore	70	<b>New Zealand</b>	<b>42</b>
Australia	52	<i>International Mean</i>	38

<b>Question 23A</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	New shirt	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_01</b>	
<b>Correct Response</b>			
10	Describes that the colour of the shirt changed (under the different coloured lightbulbs)  Examples: Because of the changes in the light source the colour of the shirt changed. They saw the shirt as different colours as the lightbulb changed. The colour of the shirt changed under the different bulbs. The colour of the shirt depends on the light source. The shirt looked red in white and red light, it looked orange in yellow light, and black in green light.		
11	Draws a correct conclusion based on the results of the investigation  Examples: The sun must be white light because the shirt looks red under the white lightbulb. The reason the shirt looked orange is because the store light is yellow.		
19	Other correct		
<b>Incorrect Response</b>			
70	States a change in the shirt or its appearance but does NOT explicitly mention colour  Examples: It looked different as the lightbulb changed. Different colours make different results. It is dark under the green bulb and light under the yellow bulb.		
71	Draws an incorrect conclusion not directly connected to the results of the investigation  Examples: The shirt must be orange. I think the shirt is supposed to be red. They got an orange shirt but it was really red.		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)  Examples: The shirt looked red under both white and red light. Under the yellow light it was an orange shirt.		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	63	United States	39
Hong Kong	49	<b>New Zealand</b>	<b>37</b>
England	46	Scotland	36
Singapore	45	<i>International Mean</i>	28
Australia	41		

<b>Question 23B</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	New shirt/wrong shirt or not	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_01</b>	
<b>Correct Response</b>			
10	NO with an explanation based on the effect of the light source  Examples: No. The shirt looks different under different lights. It is red in white light and sunlight. It looks orange in yellow light. No. The colour of the shirt changed because of the light. The sunlight made it look a different colour.		
19	Other correct		
<b>Incorrect Response</b>			
70	NO with no explanation or an incorrect explanation (May include a true statement based on information given elsewhere in the task but is not adequately connected to the effect of the light source)  Examples: No. It just looked different. No. It is the same shirt only darker. No. When they were outside it was red.		
71	YES with or without explanation  Examples: Yes. It looked red. Yes. Because it was a yellow lightbulb.		
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	51	United States	36
England	42	Australia	33
Chinese Taipei	40	Scotland	32
Singapore	38	<i>International Mean</i>	25
<b>New Zealand</b>	<b>36</b>		

<b>Question 23C</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	New shirt/colour of lightbulb	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_01</b>	
<b>Correct Response</b>			
10	Yellow		
<b>Incorrect Response</b>			
70	White		
71	Orange		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Hong Kong	73	Australia	54
Chinese Taipei	67	<b>New Zealand</b>	<b>54</b>
Netherlands	67	Scotland	52
Singapore	63	United States	51
England	58	<i>International Mean</i>	<i>48</i>

<b>Question 24A</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	White shirt	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_02</b>	
<b>Correct Response</b>			
10	Describes that the colour of the shirt changed (under the different coloured lightbulbs)		
	<p>Examples:</p> <p>Since it was a white shirt it showed the colour of the lightbulb.</p> <p>They saw it change colour to what the lightbulb was coloured.</p> <p>The shirt looked white in white light, red in red, yellow in yellow, and green in green light.</p> <p>When the light changed the colour of the shirt changed.</p> <p>They saw the shirt change colour each time.</p>		
19	Other correct		
<b>Incorrect Response</b>			
70	States a change in the shirt or its appearance but does NOT explicitly mention colour		
	<p>Examples:</p> <p>They saw it change again.</p> <p>It got darker.</p> <p>It looked different each time.</p>		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
	<p>Examples:</p> <p>The shirt looked yellow under the yellow light.</p>		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	70	Latvia	53
Chinese Taipei	58	United States	47
Singapore	57	<b>New Zealand</b>	<b>45</b>
Australia	54	Scotland	40
England	53	<i>International Mean</i>	34

<b>Question 24B</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	White shirt colour under blue light	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_02</b>	
<b>Correct Response</b>			
10	Blue		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	92	Australia	82
Singapore	91	United States	79
Chinese Taipei	90	Scotland	77
Hong Kong	88	<b>New Zealand</b>	<b>74</b>
England	85	<i>International Mean</i>	65

<b>Question 25</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Colour of blue shirt under blue light	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_03</b>	
<b>Correct Response</b>			
20	<p>BLUE with an explanation based on the results of the investigations. Includes a correct comparison of the shirt colour under white versus blue light or refers to the light source being the same colour as the shirt (or similar)</p> <p>Examples:</p> <p>Blue. If the shirt looks blue in white light, it will also look blue in blue light because that is the same colour of light as the shirt.</p> <p>Blue. Like with the red shirt under the red light.</p> <p>Blue. Under white light it looked blue, so that is the true colour of the shirt. Under blue light it will still look blue.</p> <p>Blue. A blue shirt under a blue light would be blue.</p>		
29	Other fully correct		
<b>Partial Response</b>			
10	BLUE with no explanation		
11	<p>Blue with an inadequate explanation (Inadequate/incorrect comparison of the results under white/blue lights or reference to the light being the same colour as the shirt)</p> <p>Examples:</p> <p>Blue. The white light is always the right colour.</p> <p>Blue. Because the shirt is blue.</p> <p>Blue. If you mix blue and blue you get blue.</p> <p>Blue. It depends on what the light is.</p>		
19	Other partially correct		
<b>Incorrect Response</b>			
70	<p>WHITE with or without explanation</p> <p>Examples:</p> <p>White. The light changes the colour of the shirt.</p> <p>White. Because of the sun.</p>		
79	<p>Other incorrect (including crossed out/erased, stray marks, illegible or off task)</p> <p>Examples:</p> <p>Whitish blue.</p>		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Singapore	30	<b>New Zealand</b>	<b>18</b>
Chinese Taipei	23	Australia	17
United States	21	England	17
Hong Kong	21	<i>International Mean</i>	13
Hungary	21	Scotland	10

<b>Question 26</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Animal with teeth most like humans	Life Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S01_04</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	85	<i>International Mean</i>	62
Kazakhstan	85	<b>New Zealand</b>	<b>61</b>
Russian Federation	76	England	60
Singapore	69	Scotland	52
Australia	64	United States	47

<b>Question 27</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Curly hair or straight hair	Life Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: 01_05</b>	
<b>Correct Response</b>			
10	A		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Singapore	91	England	76
Chinese Taipei	90	Australia	74
Lithuania	85	<b>New Zealand</b>	<b>69</b>
United States	81	<i>International Mean</i>	67
Russian Federation	80	Scotland	66

<b>Question 28</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	True statement about food chain	Life Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S01_06</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Latvia	89	United States	81
Singapore	86	<b>New Zealand</b>	<b>76</b>
Kazakhstan	86	England	72
Russian Federation	83	<i>International Mean</i>	70
Australia	81	Scotland	62

<b>Question 29</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Nutrients from fruit	Life Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S01_07</b>	
<b>Correct Response</b>			
10	SOPHIA with an explanation that identifies other specific foods (or food groups) that Greg needs to eat  Examples: Vegetables, meat, fish, eggs, beans, rice, grains, dairy products, etc.		
11	SOPHIA with an explanation that identifies specific nutrients that are lacking in a diet of only fruit  Examples: You need to eat different foods to get all your vitamins. You need some protein to keep healthy.		
12	GREG with a correct explanation  Examples: He needs to eat foods from all four food groups for a healthy diet.		
19	Other correct		
<b>Incorrect Response</b>			
70	SOPHIA with no explanation or an incorrect explanation (Includes responses that only repeat information in the stem or make a true statement that does not answer the question)  Examples: Other types of food are also needed for good health. Too much fruit is bad for you. I just think Sophia is right. He needs other food for nutrients.		
71	GREG with no explanation or an incorrect explanation (includes responses that only repeat information in the stem or make a true statement that does not answer the question)  Examples: Fruit contains lots of vitamins.		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Latvia	47	Australia	27
England	32	United States	27
Singapore	31	<b>New Zealand</b>	<b>22</b>
Japan	31	Scotland	19
Germany	30	<i>International Mean</i>	19

<b>Question 30</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Ribbon tied to pole	Earth Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S01_08</b>	
<b>Correct Response</b>			
10	3, 4, 1, 2		
<b>Incorrect Response</b>			
70	2, 1, 4, 3 (reverse order)		
79	Other Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	90	Scotland	77
Singapore	88	Latvia	77
Japan	88	United States	75
Australia	80	<b>New Zealand</b>	<b>70</b>
England	78	<i>International Mean</i>	58

<b>Question 31</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Living and nonliving things	Life Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S02_01</b>	
<b>Correct Response</b>			
10	B		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Singapore	91	United States	73
Japan	89	Scotland	69
Kazakhstan	88	Australia	67
Hong Kong	87	<b>New Zealand</b>	<b>61</b>
England	73	<i>International Mean</i>	61

<b>Question 32</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Classification of six-legged animal	Life Science	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: S02_02</b>	
<b>Correct Response</b>			
10	B		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	83	Netherlands	53
Singapore	76	Scotland	50
Australia	64	United States	48
Japan	57	<b>New Zealand</b>	<b>45</b>
England	53	<i>International Mean</i>	<i>40</i>
Hungary	53		

Question 33	Item Label: Life cycle of a moth	Content Domain: Life Science	Cognitive Domain: Knowing
<b>Code</b>	<b>Response</b>	<b>Item: S02_03</b>	
<b>Correct Response</b>			
20	Names three stages correctly:		
<b>Partial Response</b>			
10	Name one or two stages correctly		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out, erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Slovak Republic	66	<b>New Zealand</b>	<b>52</b>
Singapore	64	United States	48
Chinese Taipei	61	England	36
Australia	56	Scotland	33
Hungary	56	<i>International Mean</i>	33

<b>Question 34</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Where plants get their energy from	Life Science	Knowing
<b>Code</b>	<b>Response</b>		<b>Item: S02_04</b>	
<b>Correct Response</b>				
10	D			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>		<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Singapore	91		Australia	39
United States	49		England	39
Lithuania	48		<i>International Mean</i>	33
Italy	45		<b>New Zealand</b>	<b>29</b>
Denmark	41		Scotland	29

<b>Question 35</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Smoking is harmful to which organ	Life Science	Knowing
<b>Code</b>	<b>Response</b>		<b>Item: S02_05</b>	
<b>Correct Response</b>				
10	A			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>		<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Netherlands	95		England	88
Czech Republic	93		Australia	87
Slovenia	93		<b>New Zealand</b>	<b>84</b>
Scotland	90		Singapore	82
United States	89		<i>International Mean</i>	78

<b>Question 36</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Weight of object X compared to Y-Z	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S02_06</b>	
<b>Correct Response</b>			
10	A		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Russian Federation	93	Australia	86
Latvia	91	Scotland	85
Kazakhstan	90	United States	85
England	89	<b>New Zealand</b>	<b>81</b>
Singapore	89	<i>International Mean</i>	<i>74</i>

<b>Question 37</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Reason for bulb not lighting	Physical Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S02_07</b>	
<b>Correct Response</b>			
10	Mentions that the battery may not be working  Examples: The battery has no energy left. There is not enough volts in the battery. The battery is flat. The battery may be dead. The battery might be weak. The battery is not working. It needs more batteries. It needs a second battery. Maybe the power is not strong enough.		
11	Mentions that the circuit is not complete  Examples: One of the wires may be loose. There is a cut in the wire. The battery may not be connected properly. The bulb may be loose. The bulb wasn't screwed in right.		
<b>Incorrect Response</b>			
70	Mentions that the battery is put in the wrong way round  Examples: I think that the + side of the battery was put on the – side of the battery causing the bulb not to get energy.		
79	Other Incorrect (including crossed out/erased, stray marks, illegible, or off task)  Examples: There wires are not good. The bulb is bad. The battery is not in all the way. The battery is not put in properly.		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	79	United States	62
Singapore	72	Australia	60
Netherlands	68	Scotland	59
Hungary	64	<b>New Zealand</b>	<b>56</b>
England	63	<i>International Mean</i>	<i>47</i>

<b>Question 38</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Separation of a mixture	Physical Science	Reasoning
<b>Code</b>	<b>Response</b>	<b>Item: S02_08</b>	
<b>Correct Response</b>			
10	D		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Japan	93	United States	51
Kazakhstan	75	<i>International Mean</i>	51
Singapore	74	Australia	49
Chinese Taipei	72	Scotland	45
England	52	<b>New Zealand</b>	<b>43</b>

<b>Question 39</b>	<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
	Which one runs only on electricity	Physical Science	Knowing
<b>Code</b>	<b>Response</b>	<b>Item: S02_09</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Russian Federation	88	<b>New Zealand</b>	<b>75</b>
Australia	85	England	74
Czech Republic	85	United States	74
Latvia	82	<i>International Mean</i>	65
Singapore	76	Scotland	62

Question 40	Item Label:	Content Domain:	Cognitive Domain:
	Water disappearing from a dish	Physical Science	Applying
Code	Response	Item: S02_10	
Correct Response			
10	Refers specifically to evaporation and/or water vapour forming		
	Examples: The water evaporates into water vapour. The sun made the water evaporate. Because the heat made it evaporated. The water evaporated. The water has become water vapour. The water became a gas.		
19	Other Correct		
	Examples: The water absorbs into the sky.		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
	Examples: The water dried up. The sun heated the water. The water heated up. The sun absorbs water. It has soaked up. The sun dried it up.		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	86	United States	60
Japan	78	<i>International Mean</i>	50
Kazakhstan	77	Australia	47
Russian Federation	74	Scotland	37
England	65	<b>New Zealand</b>	<b>33</b>

<b>Question 41</b>	<b>Item Label:</b> Three ice cubes placed in water	<b>Content Domain:</b> Physical Science	<b>Cognitive Domain:</b> Applying
<b>Code</b>	<b>Response</b>	<b>Item: S2_11</b>	
<b>Correct Response</b>			
10	B		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Chinese Taipei	60	<b>New Zealand</b>	<b>44</b>
Japan	58	United States	44
Singapore	57	<i>International Mean</i>	39
Australia	56	England	37
Austria	56	Scotland	36

<b>Question 42</b>	<b>Item Label:</b> What covers most of Earth's surface	<b>Content Domain:</b> Earth Science	<b>Cognitive Domain:</b> Knowing
<b>Code</b>	<b>Response</b>	<b>Item: S2_12</b>	
<b>Correct Response</b>			
10	C		
<b>Incorrect Response</b>			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>
Kazakhstan	87	Russian Federation	74
Lithuania	80	Scotland	71
United States	75	Australia	67
England	74	<b>New Zealand</b>	<b>62</b>
Singapore	74	<i>International Mean</i>	56

<b>Question 43A</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Planet closest to the sun	Earth Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S2_13A</b>		
<b>Correct Response</b>				
10	C			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Australia	79	Hong Kong	75	
England	79	United States	74	
Russian Federation	77	Scotland	70	
Slovak Republic	77	<b>New Zealand</b>	<b>69</b>	
Singapore	76	<i>International Mean</i>	61	

<b>Question 43B</b>		<b>Item Label:</b>	<b>Content Domain:</b>	<b>Cognitive Domain:</b>
		Planet with lowest temperature	Earth Science	Applying
<b>Code</b>	<b>Response</b>	<b>Item: S02_13</b>		
<b>Correct Response</b>				
10	Identifies Saturn			
<b>Incorrect Response</b>				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
<b>Country</b>	<b>Percent Full Credit (weighted)</b>	<b>Country</b>	<b>Percent Full Credit (weighted)</b>	
Singapore	68	United States	58	
Australia	67	Netherlands	57	
England	66	Germany	55	
Scotland	59	Lithuania	55	
<b>New Zealand</b>	<b>58</b>	<i>International Mean</i>	41	