



Trends in International Mathematics and Science Study

TIMSS 2006/07

3

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.

Question 1	Item Label:	Content Domain:	Cognitive Domain:
	Children share sweets equally	Number	Reasoning
Code	Response	Item: M03_01	
Correct Response			
10	6 or any number other than 6 that added to 74 gives a multiple of 8 (e.g., 14, 22)		
Incorrect Response			
70	9.25, 9¼, or 9 with 2 remainder		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	65	Scotland	37
Russian Federation	65	<i>International Mean</i>	35
England	46	Australia	30
Singapore	43	United States	29
New Zealand	41		

Question 2	Item Label:	Content Domain:	Cognitive Domain:
	Zak and Alan went running	Number	Reasoning
Code	Response	Item: M03_02	
Correct Response			
10	9		
Incorrect Response			
70	7		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	54	New Zealand	33
Hong Kong SAR	53	United States	33
Netherlands	42	Scotland	28
England	41	<i>International Mean</i>	27
Australia	40		

Question 3	Item Label:	Content Domain:	Cognitive Domain:
	Ken measured length of a blackboard	Number	Applying
Code	Response	Item: M03_03	
Correct Response			
10	A		
Incorrect Response			
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	77	United States	50
Japan	68	Australia	47
Kazakhstan	65	Scotland	46
Singapore	60	<i>International Mean</i>	45
England	57	New Zealand	45

Question 4	Item Label:	Content Domain:	Cognitive Domain:
	The rule Ann uses to get her number	Number	Reasoning
Code	Response	Item: M03_04	
Correct Response			
10	"Multiply by 3" or other fully correct		
Incorrect Response			
70	Multiply without specifying by what		
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	54	Australia	29
Japan	49	England	29
Chinese Taipei	48	Scotland	26
Singapore	45	<i>International Mean</i>	26
United States	40	New Zealand	23

Question 5	Item Label:	Content Domain:	Cognitive Domain:
	The rule for 2, 5, 11, 13	Number	Applying
Code	Response	Item: M03_05	
Correct Response			
10	C		
Incorrect Response			
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	69	United States	48
Russian Federation	61	Australia	45
Hong Kong SAR	59	<i>International Mean</i>	40
Singapore	57	New Zealand	38
England	49	Scotland	33

Question 6	Item Label:	Content Domain:	Cognitive Domain:
	64 divided by box equals box	Number	Applying
Code	Response	Item: M03_06	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	88	<i>International Mean</i>	54
Hong Kong SAR	82	England	50
Japan	82	Scotland	47
Singapore	81	Australia	44
United States	69	New Zealand	41

Question 7	Item Label:	Content Domain:	Cognitive Domain:
	Triangular tiles to cover the figure	Geometric Shapes and Measures	Applying
Code	Response	Item: M03_07	
Correct Response			
10	5		
Incorrect Response			
70	6		
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	77	Australia	52
Singapore	69	United States	50
Chinese Taipei	68	Scotland	41
Japan	68	<i>International Mean</i>	40
England	54	New Zealand	39

Question 8A	Item Label:	Content Domain:	Cognitive Domain:
	Marytown park	Geometric Shapes and Measures	Applying
Code	Response	Item: M03_08A	
Correct Response			
10	Park 2.0cm from lake, measured from X to X (+/- 2mm)		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Japan	69	New Zealand	35
Chinese Taipei	65	<i>International Mean</i>	32
Singapore	46	Scotland	27
England	41	United States	24
Australia	40		

Question 8B	Item Label:	Content Domain:	Cognitive Domain:
	Marytown library	Geometric Shapes and Measures	Reasoning
Code	Response	Item: M03_08B	
Note:	Park and library need not to be in a straight line.		
Correct Response			
10	Library between 2.8cm and 4.2cm from town hall, measured from X to X		
Incorrect Response			
70	Library less than 2.8cm from town hall, measured from X to X		
71	Library more than 4.2cm from town hall, measured from X to X		
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	74	Singapore	53
Chinese Taipei	74	New Zealand	49
Japan	70	United States	45
Australia	59	<i>International Mean</i>	42
England	58	Scotland	41

Question 8C	Item Label:	Content Domain:	Cognitive Domain:
	Marytown school	Geometric Shapes and Measures	Applying
Code	Response	Item: M03_08C	
Note:	Park and library need not to be in a straight line.		
Correct Response			
10	School equidistant from park and library, X to X, measures to differ no more than 4mm		
Incorrect Response			
70	School is not equidistant (+/- 2mm) from park and library		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Denmark	45	Singapore	36
Hong Kong SAR	44	New Zealand	34
Japan	43	<i>International Mean</i>	26
Australia	43	United States	26
England	37	Scotland	23

Question 9	Item Label:	Content Domain:	Cognitive Domain:
	Draw the reflection of the shape	Geometric Shapes and Measures	Applying
Code	Response	Item: M03_09	
Correct Response			
10	Image correctly drawn		
Incorrect Response			
70	One or more of image lines drawn correctly, but image not completely correct		
71	Attempt to sketch an image under a transformation other than reflection (e.g., translation of image)		
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	95	Australia	62
Singapore	86	New Zealand	62
Denmark	78	<i>International Mean</i>	51
Latvia	77	United States	50
England	63	Scotland	46

Question 10	Item Label:	Content Domain:	Cognitive Domain:
	Complete table by gender with hats	Data Display	Applying
Code	Response	Item: M03_10	
Correct Response			
10	Boys: 1 hat, 1 no hat } or equivalent tallies Girls: 1 hat, 2 no hat }		
11	Names of boys and girls correctly placed in table		
Incorrect Response			
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	84	England	65
Japan	82	New Zealand	63
Singapore	80	Scotland	53
Australia	70	<i>International Mean</i>	48
United States	69		

Question 11	Item Label: Representing number from word	Content Domain: Number	Cognitive Domain: Knowing
Code	Response	Item: M04_01	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Chinese Taipei	89	Scotland	73
Netherlands	88	<i>International Mean</i>	71
Singapore	86	New Zealand	70
England	84	Australia	67
United States	79		

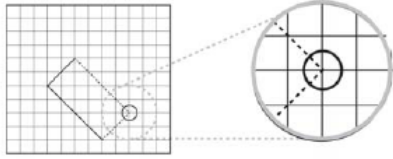
Question 12	Item Label: Draw a circle around the biscuits	Content Domain: Number	Cognitive Domain: Knowing
Code	Response	Item: M04_02	
Correct Response			
10	Draws a circle around any 4 biscuits or draws separate biscuits around 4 biscuits or draws 3 circles, each circle enclosing 4 biscuits		
Incorrect Response			
70	Draws a circle around 3 biscuits		
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	85	United States	40
Singapore	75	Australia	39
Kazakhstan	70	Scotland	38
England	47	New Zealand	38
<i>International Mean</i>	40		

Question 13		Item Label:	Content Domain:	Cognitive Domain:
		Fraction equal to 2/3	Number	Knowing
Code	Response	Item: M04_03		
Correct Response				
10	C			
Incorrect Response				
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)			
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)	
Singapore	84	United States	45	
Hong Kong SAR	77	<i>International Mean</i>	25	
Netherlands	55	New Zealand	21	
Kazakhstan	53	Australia	21	
England	47	Scotland	13	

Question 14		Item Label:	Content Domain:	Cognitive Domain:
		Fraction of money Joe spent	Number	Knowing
Code	Response	Item: M04_04		
Correct Response				
10	$\frac{8}{10}$ or equivalent			
Incorrect Response				
70	$\frac{8}{20}$ or equivalent			
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)			
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)	
Chinese Taipei	92	Australia	51	
Hong Kong SAR	88	New Zealand	42	
Singapore	82	Scotland	38	
United States	69	<i>International Mean</i>	37	
England	53			

Question 15	Item Label:	Content Domain:	Cognitive Domain:
	Number sentence for pencils in a box	Number	Applying
Code	Response	Item: M04_05	
Correct Response			
10	D		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Chinese Taipei	93	United States	66
Russian Federation	87	Australia	60
Singapore	86	<i>International Mean</i>	59
Hong Kong SAR	84	Scotland	56
Kazakhstan	82	New Zealand	54
England	69		

Question 16	Item Label:	Content Domain:	Cognitive Domain:
	Line of symmetry	Geometric shapes and measures	Knowing
Code	Response	Item: M04_06	
Correct Response			
10	A		
Incorrect Response			
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	97	Scotland	86
Singapore	97	Australia	79
Slovenia	92	New Zealand	72
England	92	<i>International Mean</i>	65
United States	90		

Question 17	Item Label:	Content Domain:	Cognitive Domain:
	Draw other 2 sides of a rectangle	Geometric Shapes and Measures	Applying
Code	Response	Item: M04_07	
Correct Response			
10	Correct rectangle drawn with the fourth vertex lying within the circle, as shown below.		
	Note: The centre of the circle is the correct position for the vertex. The radius of the circle is half the length of a square on the grid.		
			
Incorrect Response			
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	90	Australia	68
Japan	78	New Zealand	61
Chinese Taipei	77	United States	55
England	70	Scotland	55
Singapore	69	<i>International Mean</i>	54
Question 18	Item Label:	Content Domain:	Cognitive Domain:
	Area of the fence to be painted	Geometric Shapes and Measures	Applying
Code	Response	Item: M04_08	
Correct Response			
10	C		
Incorrect Response			
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	92	England	44
Kazakhstan	87	<i>International Mean</i>	42
Singapore	84	Australia	28
Chinese Taipei	82	Scotland	17
Russian Federation	80	New Zealand	15
United States	48		

Question 19A	Item Label:	Content Domain:	Cognitive Domain:
	Similarity in the two given shapes	Geometric Shapes and Measures	Reasoning
Code	Response	Item: M04_09	
Correct Response			
10	Both are triangles/ both have 3 sides/ both have same number of sides/ both have 3 angles/ both have 3 corners or equivalent statements		
11	Both have straight sides		
Incorrect Response			
70	They are the same shape		
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	83	Australia	68
Singapore	80	Scotland	61
Latvia	78	New Zealand	57
England	73	<i>International Mean</i>	49
United States	70		

Question 19B	Item Label:	Content Domain:	Cognitive Domain:
	Difference in the two given shapes	Geometric Shapes and Measures	Reasoning
Code	Response	Item: M04_09	
Correct Response			
10	One has a right angle, one does not		
11	One has 2 sides/ angles the same size/ is isosceles/ has a line of symmetry (the other does not)		
12	One is bigger/ longer/ wider/ has a larger area than the other or equivalent statement about size		
Incorrect Response			
70	They are different shapes/ they are not the same shape		
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	82	<i>International Mean</i>	36
Chinese Taipei	67	New Zealand	36
Singapore	67	Scotland	34
England	52	Australia	31
United States	50		

Question 20	Item Label:	Content Domain:	Cognitive Domain:
	Estimate the height of the tree	Geometric Shapes and Measures	Knowing
Code	Response	Item: M04_10	
Correct Response			
10	C		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	46	Scotland	33
Hong Kong SAR	45	United States	32
England	40	New Zealand	32
Singapore	38	<i>International Mean</i>	31
Australia	34		

Question 21	Item Label:	Content Domain:	Cognitive Domain:
	Complete the bar graph	Data Display	Applying
Code	Response	Item: M04_11	
Correct Response			
20	Both bars correctly drawn. Bar for fast is between 4 and 6 (inclusive). Bar for medium is taller than bar for fast but less than 7.5 (exclusive).		
Partially Correct Response			
10	Only 1 bar correctly drawn		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	87	Australia	77
Japan	86	New Zealand	76
England	84	United States	75
Chinese Taipei	80	Scotland	74
Slovenia	78	<i>International Mean</i>	51

Question 22	Item Label:	Content Domain:	Cognitive Domain:
	On which day did John pick 5 apples	Data Display	Knowing
Code	Response	Item: M04_12	
Correct Response			
10	D		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Netherlands	78	Australia	61
Singapore	73	New Zealand	58
Germany	73	Scotland	56
United States	71	<i>International Mean</i>	50
England	71		

Question 23	Item Label:	Content Domain:	Cognitive Domain:
	How many more girls in class	Data Display	Reasoning
Code	Response	Item: M04_13	
Correct Response			
10	A		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	63	Australia	36
Hong Kong SAR	63	Scotland	34
Kazakhstan	51	<i>International Mean</i>	32
England	40	New Zealand	32
United States	38		

Question 24	Item Label:	Content Domain:	Cognitive Domain:
	Which group of animals are mammals	Life Science	Knowing
Code	Response	Item: S03_01	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	76	Australia	54
Slovak Republic	72	Scotland	50
Denmark	67	<i>International Mean</i>	48
Czech Republic	65	England	45
United States	59	New Zealand	41

Question 25	Item Label:	Content Domain:	Cognitive Domain:
	Can oak tree and sunflower reproduce	Life Science	Reasoning
Code	Response	Item: S03_02	
Correct Response			
10	NO with a correct explanation based on two different species (types, kinds, etc.) not being able to reproduce (explicitly or implicitly)		
	<p>Examples:</p> <p>The oak tree and sunflower are different so they cannot reproduce together.</p> <p>They can't reproduce because they aren't the same kind of plant.</p> <p>Only the same kind of plants can reproduce.</p> <p>They are not the same type.</p> <p>Because they are different plants.</p> <p>The oak tree doesn't have the right kind of pollen.</p>		
19	Other correct		
Incorrect Response			
70	NO with no explanation or an incorrect explanation (may include a true statement that does not answer the question)		
	<p>Examples:</p> <p>The tree is too big.</p> <p>There are no flowers on the tree.</p> <p>Because it would not be natural.</p> <p>Because they do not match.</p> <p>The oak tree has acorns.</p> <p>Sunflowers do not grow on trees.</p> <p>The oak tree already has flowers.</p> <p>You cannot mix them.</p>		
71	YES with no explanation or an incorrect explanation		
	<p>Examples:</p> <p>Because they both have seeds.</p> <p>Plants can crossbreed.</p>		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Chinese Taipei	45	England	20
Singapore	39	United States	19
Japan	28	New Zealand	17
Hong Kong	27	<i>International Mean</i>	17
Australia	20	Scotland	16

Question 26	Item Label: Skulls of plant-eater	Content Domain: Life Science	Cognitive Domain: Reasoning
Code	Response	Item: S03_03	
Note:	For full credit, responses must identify the correct skulls and give an explanation based on a structure of teeth that enables Skull 1 to eat animals or Skull 2 to eat plants. Partial credit is given for responses with a minimal explanation that merely repeats the identification or gives an inadequate description of tooth structure (Code 10). Responses that give a correct identification but with NO explanation are scored as incorrect (Code 70). If one skull number is entered twice, neither is considered correct. For example, a response of 2, 2 should be given a Code 79.		
Correct Response			
20	Correct skull identification AND correct explanation Animal that ate plants = SKULL 2 Animal that ate other animals = SKULL 1 Explanation refers to at least one tooth structure in either Skull 1 or 2 that enables it to eat meat or plants. Examples: Sharp teeth are used for ripping meat and crushing bones. Flat teeth are needed for chomping on leaves. Skull 1 has the sharpest teeth for biting through muscles. The teeth in Skull 2 don't need to be as big or sharp to bite off grass. The flat teeth in Skull 2 are good for grinding. Because the teeth on #1 are sharp and the teeth on #2 are dull. The animal that ate meat has the sharp teeth.		
29	Other fully correct		
Partial Response			
10	Correct skull identification but with an explanation that does not give an adequate description of tooth structure Examples: Skull 1 ate meat and Skull 2 ate plants. Skull 1 is a meat eater. Skull 1 has big teeth.		
19	Other partially correct		
Incorrect Response			
70	Correct skull identification with NO explanation		
71	Reverses skull identification with NO explanation Animal that ate plants = SKULL 1 Animal that ate other animals = SKULL 2		
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Chinese Taipei	72	Germany	61
Singapore	69	Austria	58

Australia	68	Hong Kong	58
United States	66	Scotland	54
England	63	<i>International Mean</i>	41
New Zealand	61		

Question 27	Item Label: Energy to heal a cut	Content Domain: Life Science	Cognitive Domain: Knowing
Code	Response	Item: S03_04	
Correct Response			
10	C		
Incorrect Response			
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	63	England	34
Japan	63	<i>International Mean</i>	33
Netherlands	53	Australia	32
Italy	49	New Zealand	31
United States	35	Scotland	21

Question 28A	Item Label: Uses of water as ice	Content Domain: Physical Science	Cognitive Domain: Knowing
Code	Response	Item: S03_05	
Correct Response			
10	Names a correct use of ice Examples: Cooling/freezing, adding to drinks, preserving food, treating injuries/burns, etc.		
19	Other correct		
Incorrect Response			
70	Refers only to a property of ice with no specific use provided Examples: Water is ice but a lot colder. You can melt it. Ice is cold, solid, it melts, etc. When you put water into the freezer it becomes ice.		
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	83	Russian Federation	75

Slovenia	82	Australia	74
England	80	Scotland	70
Singapore	78	New Zealand	66
United States	77	<i>International Mean</i>	55

Question 28B	Item Label: Uses of water as liquid	Content Domain: Physical Science	Cognitive Domain: Knowing
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Code	Response	Item: S03_05
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Correct Response

10	Names a correct use of liquid water Examples: Drinking, bathing, swimming, watering plants/crops, cooking, use as a solvent (tea, lemonade, etc.), use in cleaning/washing clothes, putting out fires, etc.
19	Other correct

Incorrect Response

70	Refers only to a property of water with no specific use provided Examples: Water is a liquid. When ice melts it forms water. You can pour it.
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task) Examples: To keep us alive.

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Latvia	86	England	75
Hong Kong	82	Australia	68
Slovenia	81	New Zealand	63
United States	77	Scotland	63
Singapore	76	<i>International Mean</i>	56

Question 29	Item Label:	Content Domain:	Cognitive Domain:
	Beans and heated metal ruler	Physical Science	Reasoning
Code	Response	Item: S03_06	
Correct Response			
10	A		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Japan	92	United States	66
Singapore	88	Australia	59
Hong Kong	75	New Zealand	58
Slovenia	70	Scotland	58
England	67	<i>International Mean</i>	<i>57</i>

Question 30	Item Label: Bubbles rise in water	Content Domain: Physical Science	Cognitive Domain: Applying
Code	Response	Item: S03_07	
Note:	Priority should be given to Code 10. If responses mention bubbles being “lighter” or “less dense” than water (or similar), then Code 10 should be given if other correct codes also apply.		
Correct Response			
10	Refers to bubbles (gas, air, etc.) being “lighter” or less dense than water (or similar) Examples: They are very light. Bubbles are less dense than the water. They rise because they are made from air which is lighter than water. They are not heavy so they go to the top. Bubbles can float in water.		
11	Refers to gas (air, oxygen, carbon dioxide) being inside bubbles (No explicit reference to bubbles being lighter, less dense, etc.) Examples: He is blowing oxygen. He blows air and air pushes the bubbles up to the top. Air bubbles want to get out. Water pushes the air up. Because air rises. Bubbles have air in them. The gas wants to get free.		
19	Other correct		
Incorrect Response			
70	Repeats information given in the stem (No explicit reference to air (gas) or bubbles being lighter) Examples: He blows so hard. Bubbles always go up. Because you are breathing into the straw.		
71	Refers only to pressure (or similar) but with inadequate connection to the problem. Examples: Bubbles rise because of pressure. Because they cannot get anymore pressure at the bottom.		
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task) Examples: There is nothing in the straw. There isn't anything to weigh them down.		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)

Russian Federation	79	England	66
Chinese Taipei	77	New Zealand	64
Denmark	74	United States	61
Singapore	72	Scotland	54
Australia	67	<i>International Mean</i>	52

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Question 31	Item Label: Main reason we see the Moon	Content Domain: Earth Science	Cognitive Domain: Applying
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Code	Response	Item: S03_08	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	81	Australia	52
Chinese Taipei	81	United States	52
Hong Kong	73	Scotland	48
Slovak Republic	71	<i>International Mean</i>	46
England	67	New Zealand	45

Question 32A	Item Label: Two seasons/name	Content Domain: Earth Science	Cognitive Domain: Knowing
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Code	Response	Item: S03_09	
Correct Response			
10	Identifies two correct seasons (Adapted for country-specific seasons)		
	Examples: Summer and winter Spring and autumn Autumn and summer		
19	Other correct		
Incorrect Response			
70	Identifies only one correct season		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Latvia	96	Australia	89
Chinese Taipei	93	New Zealand	89
Hong Kong	93	Scotland	85

England	91	<i>International Mean</i>	75
United States	90	Singapore	73

Question 32B	Item Label: Two seasons/difference	Content Domain: Earth Science	Cognitive Domain: Applying
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Code	Response	Item: S03_09
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Correct Response

10	Describes temperature differences Examples: In winter it is cold, in summer it is warm. Summer is more pleasant because of the heat. It's hot and dry in summer.
11	Describes precipitation differences Examples: In the dry season there is very little rain; there is a lot in the rainy season. In winter it snows, in summer it rains. It is humid in the summer.
19	Other correct Examples: It is more sunny in the summer. There are more storms in winter.

Incorrect Response

70	Difference provided does not explicitly mention a difference in weather condition Examples: Weather is good in summer and bad in winter. You have to wear more clothes in winter. The leaves fall in autumn, and the flowers blossom in the spring.
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Latvia	85	United States	69
Chinese Taipei	81	Australia	68
Japan	81	Scotland	68
England	76	Singapore	66
New Zealand	70	<i>International Mean</i>	59

Question 33	Item Label:	Content Domain:	Cognitive Domain:
	Animal with an external skeleton	Life Science	Knowing
Code	Response	Item: S04_01	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Australia	72	England	67
United States	70	Netherlands	65
Russian Federation	70	Scotland	64
Singapore	69	New Zealand	56
Latvia	68	<i>International Mean</i>	47

Question 34	Item Label:	Content Domain:	Cognitive Domain:
	One way seeds are dispersed	Life Science	Knowing
Code	Response	Item: S04_02	
Correct Response			
10	Refers to wind OR water carrying the seeds away from the plant Examples: The seeds can be blown away by the wind. They are dispersed by wind. The wind. Seeds can drop into water and be carried to another place. The seeds can be carried by water. Water.		
11	Refers to organisms such as birds and mammals carrying the seeds away from the plant Examples: Animals eat the fruit and the seed is dropped far from the plant. Seeds can be dispersed by animals which catch the seeds in their fur. Animals such as birds. Grass seeds attach to humans and are carried away.		
19	Other correct Examples: Fruits explode scattering their seeds. Pods dry out and explode. The fruits bursts open. The fruit blows up. Explosive action. Explosion. The seeds pop out.		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task) Examples: They fall off the plant.		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Slovenia	67	Singapore	44
Netherlands	66	<i>International Mean</i>	40
Kazakhstan	65	New Zealand	39
United States	60	Australia	37
England	54	Scotland	35

Question 35	Item Label:	Content Domain:	Cognitive Domain:
	Source of vitamins and minerals	Life Science	Applying
Code	Response	Item: S04_03	
Correct Response			
10	A		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Czech Republic	92	Australia	75
Italy	91	England	74
Austria	88	Scotland	72
Singapore	86	<i>International Mean</i>	70
New Zealand	81	United States	68

Question 36	Item Label:	Content Domain:	Cognitive Domain:
	Bird living and cloud nonliving	Life Science	Applying
Code	Response	Item: S04_04	
Note:	Accepted responses refer to: Growth/development Reproduction Respiration Intrinsic movement Nutrition Excretion Responding to stimuli		
Correct Response			
20	Refers to two accepted reasons indicated in the note above Examples: A bird can lay eggs and breathes. A bird can move on its own. A bird eats. A cloud cannot move on its own. Clouds cannot eat. A bird fluffs up its feathers. A bird gets rid of its waste. A bird can hatch from an egg and a bird can die.		
Partial Response			
10	Refers to one accepted reason indicated in the note above.		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task) Examples: Because a cloud is made of water vapour. A bird has a brain. A bird is on the ground, a cloud is in the sky. Because a cloud is not alive. A cloud cannot move.		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	57	<i>International Mean</i>	25
Kazakhstan	56	Australia	17
Italy	53	England	16
Russian Federation	45	Scotland	14
United States	30	New Zealand	13

Question 37	Item Label: Sunflower seed experiment	Content Domain: Life Science	Cognitive Domain: Reasoning
Code	Response	Item: S04_05	
Correct Response			
10	Refers to Carl watering his plant and/or placing his plant in the sun (and/or Jan not doing so)		
	<p>Examples:</p> <p>Carl might have given it more light and water.</p> <p>Carl made sure the soil did not dry up.</p> <p>Maybe Carl gave more water to his plant while Jan gave less to her plant.</p> <p>Carl put his plant on a windowsill in the light.</p> <p>Jan did not give her plant enough sun or water.</p>		
11	Refers to Carl adding fertilizer/nutrients/plant food to his plant (and/or Jan not doing so)		
	<p>Examples:</p> <p>Carl may have used fertilizer.</p> <p>He added some nutrients to the plant.</p> <p>He might have given his sunflower plant food.</p> <p>He might have fed his plant every week and Jan may not have.</p> <p>Jan did not give her plant as much fertilizer.</p>		
19	Other correct		
	<p>Examples:</p> <p>He placed the plant in a warm place.</p>		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
	<p>Examples:</p> <p>Carl may have used better soil in his pot. (They used the same soil)</p>		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	85	Slovenia	81
Lithuania	85	United States	78
Netherlands	84	New Zealand	77
Australia	83	Scotland	74
England	81	<i>International Mean</i>	64
Hong Kong	81		

Question 38	Item Label:	Content Domain:	Cognitive Domain:
	Three objects of same size and shape	Physical Science	Applying
Code	Response	Item: S04_06	
Correct Response			
10	B		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Russian Federation	92	Singapore	88
Chinese Taipei	91	Scotland	82
Germany	90	United States	80
Hong Kong	90	<i>International Mean</i>	80
Slovenia	90	Australia	68
England	89	New Zealand	67

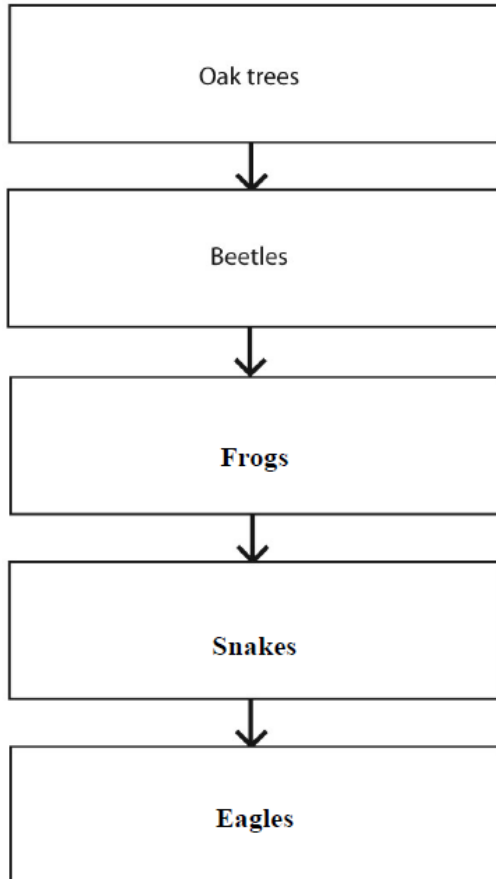
Question 39	Item Label:	Content Domain:	Cognitive Domain:
	Which object moves due to gravity	Physical Science	Knowing
Code	Response	Item: S04_07	
Correct Response			
10	D		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Hong Kong	73	Australia	57
Slovak Republic	71	New Zealand	56
Russian Federation	67	Singapore	55
England	62	Scotland	49
United States	61	<i>International Mean</i>	49

Question 40	Item Label: Complete the food chain	Content Domain: Life Science	Cognitive Domain: Reasoning
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Code	Response	Item: S04_08
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Correct Response

10 Correctly fills in the food chain based on information given in the table

**Incorrect Response**

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

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	72	England	45
Hong Kong	55	Australia	40
Russian Federation	54	Scotland	35
Japan	53	New Zealand	33
United States	49	<i>International Mean</i>	31

Question 41	Item Label:	Content Domain:	Cognitive Domain:
	Proportions of land-water on Earth type	Earth Science	Applying
Code	Response	Item: S04_09	
Correct Response			
10	A		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Hong Kong	74	<i>International Mean</i>	45
Kazakhstan	74	Australia	44
Lithuania	72	England	43
Singapore	61	Scotland	41
United States	55	New Zealand	35

Question 42	Item Label:	Content Domain:	Cognitive Domain:
	Fossils of shellfish	Earth Science	Applying
Code	Response	Item: S04_10	
Correct Response			
10	D		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Japan	77	United States	64
Chinese Taipei	74	New Zealand	62
Netherlands	71	Singapore	61
Australia	64	Scotland	58
England	64	<i>International Mean</i>	52

Question 43	Item Label: One property to separate balls	Content Domain: Physical Science	Cognitive Domain: Applying
Code	Response	Item: S04_11	
Correct Response			
10	Refers to colour and/or magnetism and/or weight/mass Examples: The balls look different colours. Colour. She could use a magnet. Some balls might be magnetic. The black balls may be attracted to a magnet. Magnetic/non-magnetic. Weigh them. They may have different masses. By weight.		
19	Other correct Examples: Shiny/non-shiny. Soft/hard.		
Incorrect Response			
70	Refers to volume or shape or size Examples: Same volume. She could use their shape. She could use size.		
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task) Examples: By using a scale.		
Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	68	England	44
Czech Republic	67	<i>International Mean</i>	40
Russian Federation	65	Australia	37
Singapore	58	New Zealand	35
United States	52	Scotland	33

Question 44	Item Label: State of each group	Content Domain: Physical Science	Cognitive Domain: Applying
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Code	Response	Item: S04_12
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Correct Response

10 The table is filled in correctly

Group	Matter	State
1	Water and juice	Liquid
2	Air and oxygen	Gas
3	Rock and gold	Solid

Incorrect Response

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

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Singapore	93	United States	66
Hong Kong	91	Scotland	63
Japan	77	Australia	57
England	76	New Zealand	53
Italy	72	<i>International Mean</i>	52

Question 45	Item Label:	Content Domain:	Cognitive Domain:
	A natural resource and its use	Earth Science	Knowing
Code	Response	Item: S04_13	
Note	<p>i) Accepted natural resources and their uses include:</p> <ol style="list-style-type: none"> 1) Resource: Air (oxygen, carbon dioxide). Use: Breathing. 2) Resource: Soil, plants, seeds, animals. Use: Growing plants, providing food. 3) Resource: Energy resources (e.g., wood, oil/crude oil, natural gas, solar energy/sun, wind/wind energy, coal). Use: Heating, providing electricity, light. 4) Resource: Manufacturing resources such as wood, rocks, minerals. Use: Making/building houses, roads, paper etc. <p>ii) If responses mention gasoline, petrol, or diesel with a correct use give code 20.</p>		
Correct Response			
20	<p>Names one of the natural resources indicated in the note above and describes its use</p> <p>Examples:</p> <p>Air. We breath it in.</p> <p>Plants are used in everyday life to give oxygen.</p> <p>Seeds. If you plant a seed of an orange it will produce a tree and give us oranges.</p> <p>Grass is eaten by cows who produce milk.</p> <p>Animals are used in every day life because we eat them.</p> <p>Wood. It is used for heating and cooking.</p> <p>Wind. It is used for drying clothes.</p> <p>Rocks. They are crushed and used to make roads.</p> <p>Minerals. They are used for making jewellery.</p> <p>Salt. It is used in cooking.</p> <p>Gasoline keeps a car running.</p>		
Partial Correct Response			
10	<p>Names one of the natural resources indicated in the note above but the description of its use is either nonspecific, incorrect or absent</p> <p>Examples:</p> <p>The wind blows in the daytime.</p> <p>The trees are a natural resource because seeds blow off trees and start to grow.</p> <p>Soil is made from decaying matter.</p> <p>Land for walking on.</p> <p>Air. We need it to live.</p>		
Incorrect Response			
70	<p>Names water with or without a correct use</p> <p>Examples:</p> <p>A river is used for drinking, bathing, and washing clothes.</p>		
79	<p>Other incorrect (including crossed out/erased, stray marks, illegible, or off task)</p> <p>Examples:</p> <p>Milk for drinking.</p> <p>One other resource that is used in everyday life is electricity.</p>		

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
United States	47	New Zealand	28
Kazakhstan	41	Australia	26
Czech Republic	40	<i>International Mean</i>	26
Hong Kong	40	Scotland	22
England	30	Singapore	22

Question 46	Item Label:	Content Domain:	Cognitive Domain:
	Common characteristics of deserts	Earth Science	Applying
Code	Response	Item: S04_14	
Correct Response			
10	C		
Incorrect Response			
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)		

Country	Percent Full Credit (weighted)	Country	Percent Full Credit (weighted)
Kazakhstan	64	<i>International Average</i>	37
Netherlands	64	Singapore	36
Austria	63	England	32
United States	47	New Zealand	27
Australia	44	Scotland	26