


**Exhibit 4.11: Description of the TIMSS 2019 Intermediate International Benchmark (475) of Science Achievement** Intermediate International Benchmark**475****Summary**

*Students show and apply some knowledge of biology and the physical sciences.* Students demonstrate some knowledge of characteristics of animals and apply knowledge of ecosystems. They show some knowledge of the properties of matter, chemical changes, and a few physics concepts.

Students demonstrate limited knowledge of characteristics of animals and of animals' adaptations to their environment. They can apply knowledge of ecosystems and the interaction of living things with their environment.

Students show some knowledge of the structure and properties of matter and chemical changes.

Students can separate conductors from insulators based on differences in electric current, recognize energy change in an everyday object moving downhill, and recognize that the gravity on Earth is different than on another planet.

Students can interpret information from graphs and pictorial diagrams.

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Exhibit 4.11.1: Intermediate International Benchmark of Science Achievement – Example Item 1

**Content Domain:** Biology  
**Cognitive Domain:** Reasoning  
**Description:** Reasons how a crocodile's angle of vision helps it to survive in the environment

Country	Percent Full Credit
Japan	85 (1.6) ▲
<sup>2</sup> Singapore	84 (1.5) ▲
Portugal	79 (1.9) ▲
Ireland	76 (2.2) ▲
Korea, Rep. of	75 (2.1) ▲
Turkey	75 (2.0) ▲
<sup>3</sup> Israel	72 (1.9) ▲
Finland	72 (1.8) ▲
France	69 (2.2) ▲
Australia	68 (1.9) ▲
Lithuania	68 (2.4) ▲
<sup>2</sup> Sweden	68 (2.2) ▲
England	67 (2.7) ▲
† United States	66 (1.5) ▲
<sup>2</sup> Russian Federation	65 (2.3) ▲
Hungary	63 (2.4) ▲
Chinese Taipei	63 (1.8) ▲
† New Zealand	62 (2.5) ▲
Italy	62 (2.1) ▲
† Norway (9)	62 (2.7) ▲
Cyprus	56 (2.3)
<b>International Average</b>	<b>55 (0.3)</b>
<sup>2</sup> Kazakhstan	54 (2.9)
Bahrain	54 (1.6)
Romania	49 (2.8) ▼
Chile	48 (2.5) ▼
Qatar	44 (1.8) ▼
Jordan	44 (2.3) ▼
United Arab Emirates	44 (1.0) ▼
Iran, Islamic Rep. of	44 (2.1) ▼
† Hong Kong SAR	40 (2.7) ▼
Oman	38 (2.0) ▼
Kuwait	36 (2.0) ▼
<sup>1</sup> Georgia	35 (3.1) ▼
<sup>2</sup> Saudi Arabia	35 (1.9) ▼
Malaysia	27 (1.5) ▼
Morocco	24 (1.5) ▼
Lebanon	22 (2.2) ▼
<sup>2</sup> Egypt	18 (1.5) ▼
South Africa (9)	14 (0.8) ▼
<b>Benchmarking Participants</b>	
Moscow City, Russian Fed.	80 (2.2) ▲
Ontario, Canada	73 (2.0) ▲
‡ Quebec, Canada	73 (2.6) ▲
<sup>2</sup> Dubai, UAE	65 (1.6) ▲
Western Cape, RSA (9)	36 (2.3) ▼
Abu Dhabi, UAE	34 (1.8) ▼
Gauteng, RSA (9)	24 (1.8) ▼

▲ Percent significantly higher than international average  
 ▼ Percent significantly lower than international average


See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ≡.  
 ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Dixon read a fact sheet about crocodiles.

**Crocodile Facts**

- Crocodiles have a lifespan of up to 75 years.
- Crocodiles today look like ancient crocodiles found in fossils.
- Crocodiles have an angle of vision of 290° as shown in the diagram.



How can a crocodile's angle of vision help it to survive in its environment?

Give one reason.

The crocodile can see predators and prey almost all of the way around its body without moving its head.

The answer shown illustrates the type of response that would receive full credit (1 point).

Exhibit 4.11.2: Intermediate International Benchmark of Science Achievement – Example Item 2

Content Domain: Chemistry

Cognitive Domain: Applying

Description: From a list of symbols and formulas, recognizes which are elements and which are compounds

Country	Percent Full Credit
Finland	89 (1.6) ▲
Lithuania	88 (1.7) ▲
<sup>2</sup> Russian Federation	83 (1.9) ▲
<sup>2</sup> Singapore	78 (1.8) ▲
Chinese Taipei	78 (1.5) ▲
Japan	77 (1.9) ▲
<sup>2</sup> Kazakhstan	75 (2.1) ▲
<sup>1</sup> Georgia	74 (2.9) ▲
England	74 (2.5) ▲
Korea, Rep. of	73 (2.2) ▲
<sup>3</sup> Israel	73 (2.2) ▲
Hungary	72 (1.8) ▲
Portugal	71 (2.2) ▲
† Norway (9)	71 (2.9) ▲
Cyprus	70 (2.3) ▲
Romania	67 (2.3) ▲
Turkey	65 (2.1)
Italy	64 (3.0)
Qatar	64 (2.6)
† United States	63 (2.0)
<b>International Average</b>	<b>61 (0.4)</b>
Australia	61 (2.3)
Lebanon	61 (2.8)
Jordan	60 (2.5)
<sup>2</sup> Sweden	59 (2.1)
Ireland	58 (2.6)
United Arab Emirates	58 (1.0) ▼
Bahrain	56 (2.0) ▼
Oman	54 (1.8) ▼
Chile	49 (2.5) ▼
† New Zealand	48 (3.0) ▼
Kuwait	47 (2.4) ▼
Morocco	45 (1.9) ▼
France	45 (2.6) ▼
<sup>2</sup> Egypt	42 (2.3) ▼
South Africa (9)	41 (1.2) ▼
Malaysia	40 (1.7) ▼
† Hong Kong SAR	39 (2.9) ▼
<sup>2</sup> Saudi Arabia	31 (1.6) ▼
Iran, Islamic Rep. of	29 (1.8) ▼
<b>Benchmarking Participants</b>	
Moscow City, Russian Fed.	90 (1.5) ▲
‡ Quebec, Canada	79 (2.1) ▲
<sup>2</sup> Dubai, UAE	73 (1.7) ▲
Western Cape, RSA (9)	56 (2.5) ▼
Gauteng, RSA (9)	50 (1.8) ▼
Abu Dhabi, UAE	47 (1.7) ▼
Ontario, Canada	32 (2.6) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

See Appendix B.7 for target population coverage notes 1, 2, and 3. See Appendix B.10 for sampling guidelines and sampling participation notes †, ‡, and ⋈. ( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Click the circle to show whether each symbol or formula represents an element or compound.

	Element	Compound
O .....	<input checked="" type="radio"/> A	<input type="radio"/> B
K .....	<input checked="" type="radio"/> A	<input type="radio"/> B
H <sub>2</sub> SO <sub>4</sub> .....	<input type="radio"/> A	<input checked="" type="radio"/> B
NH <sub>3</sub> .....	<input type="radio"/> A	<input checked="" type="radio"/> B
CH <sub>4</sub> .....	<input type="radio"/> A	<input checked="" type="radio"/> B
Mg .....	<input checked="" type="radio"/> A	<input type="radio"/> B

The answer shown illustrates the type of response that would receive full credit (1 point).



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Exhibit 4.11.3: Intermediate International Benchmark of Science Achievement – Example Item 3

**Content Domain:** Physics  
**Cognitive Domain:** Knowing  
**Description:** Recognizes why a vehicle has a different weight on Mars than it does on Earth

Country	Percent Correct
<sup>2</sup> Singapore	90 (1.2) ▲
Korea, Rep. of	86 (1.5) ▲
Hungary	84 (1.4) ▲
Ireland	84 (1.7) ▲
<sup>2</sup> Russian Federation	81 (2.1) ▲
Australia	80 (1.6) ▲
Italy	80 (2.0) ▲
England	80 (2.0) ▲
† Norway (9)	79 (1.9) ▲
Cyprus	77 (1.9) ▲
Lithuania	77 (2.1) ▲
† New Zealand	76 (1.8) ▲
† United States	74 (2.4) ▲
Chinese Taipei	74 (1.7) ▲
Finland	73 (1.8) ▲
Portugal	73 (2.6)
<sup>2</sup> Sweden	72 (2.1)
Malaysia	72 (1.9)
<sup>3</sup> Israel	71 (2.1)
Oman	71 (1.9)
Bahrain	70 (1.9)
Romania	69 (2.2)
<b>International Average</b>	<b>69 (0.3)</b>
Japan	68 (1.7)
Iran, Islamic Rep. of	67 (1.9)
Chile	67 (2.6)
France	67 (2.3)
Turkey	67 (2.1)
Qatar	66 (2.2)
Jordan	65 (2.1)
Kuwait	65 (2.5)
United Arab Emirates	65 (1.1) ▼
† Hong Kong SAR	61 (2.7) ▼
<sup>2</sup> Saudi Arabia	59 (1.8) ▼
<sup>2</sup> Egypt	54 (1.8) ▼
South Africa (9)	53 (1.5) ▼
<sup>2</sup> Kazakhstan	48 (2.2) ▼
Morocco	47 (1.9) ▼
<sup>1</sup> Georgia	46 (2.7) ▼
Lebanon	39 (2.6) ▼
<b>Benchmarking Participants</b>	
‡ Quebec, Canada	85 (2.1) ▲
Moscow City, Russian Fed.	84 (2.0) ▲
Ontario, Canada	84 (1.8) ▲
<sup>2</sup> Dubai, UAE	81 (1.7) ▲
Western Cape, RSA (9)	69 (1.6)
Gauteng, RSA (9)	68 (1.5)
Abu Dhabi, UAE	53 (1.8) ▼

▲ Percent significantly higher than international average  
 ▼ Percent significantly lower than international average

Scientists sent a special vehicle to Mars to make a map of the surface of the planet. A diagram of the vehicle is shown.



The vehicle has a different weight on Mars than it has on the Earth. Why does the vehicle have different weights on the two planets?

- A** The vehicle lost mass when it was transported from Earth to Mars.
- B** The vehicle gained mass when it began moving on Mars.
- C** The magnetic attraction on Earth is different from Mars.
- D** The gravitational attraction on Earth is different from Mars.

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