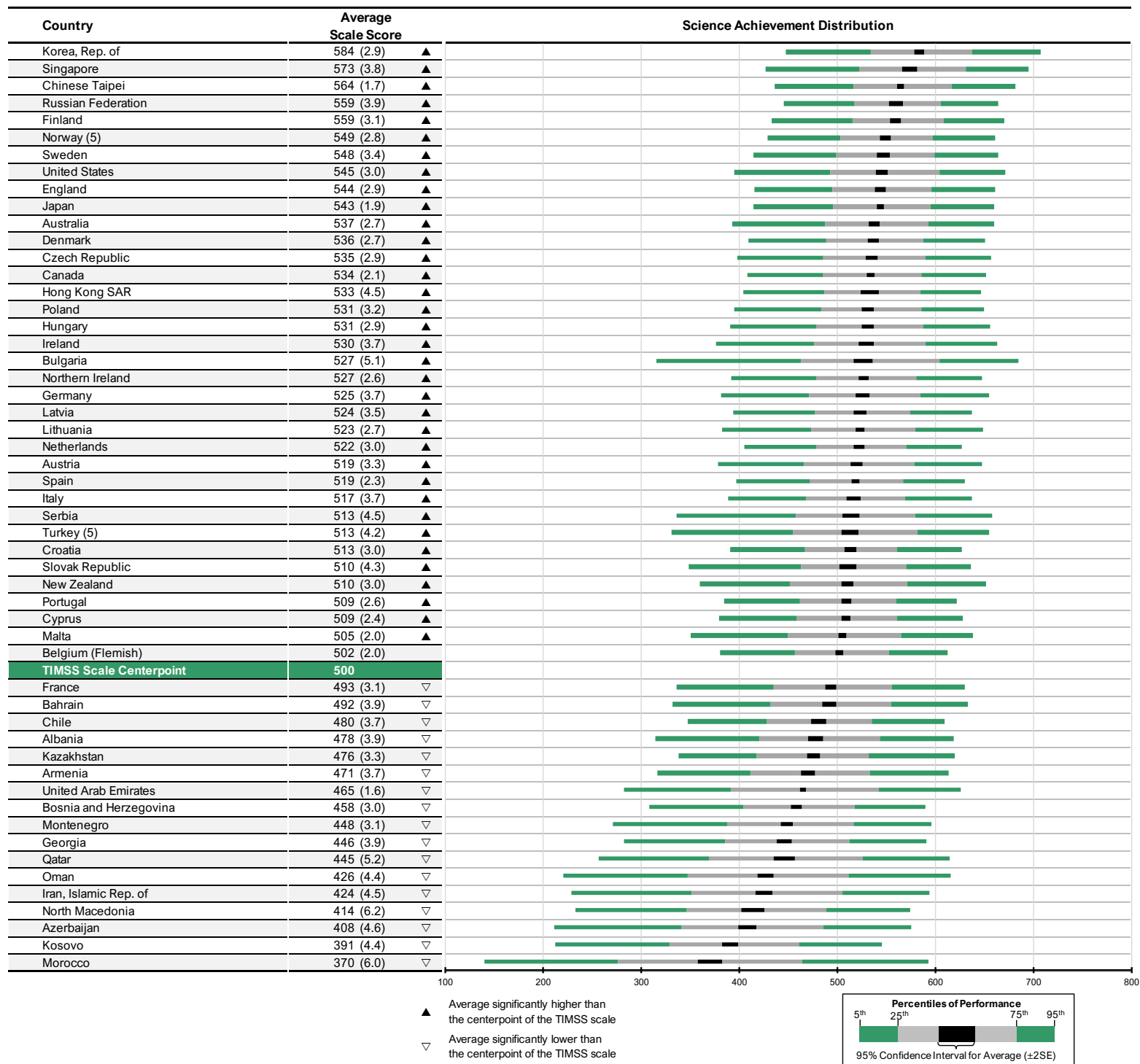


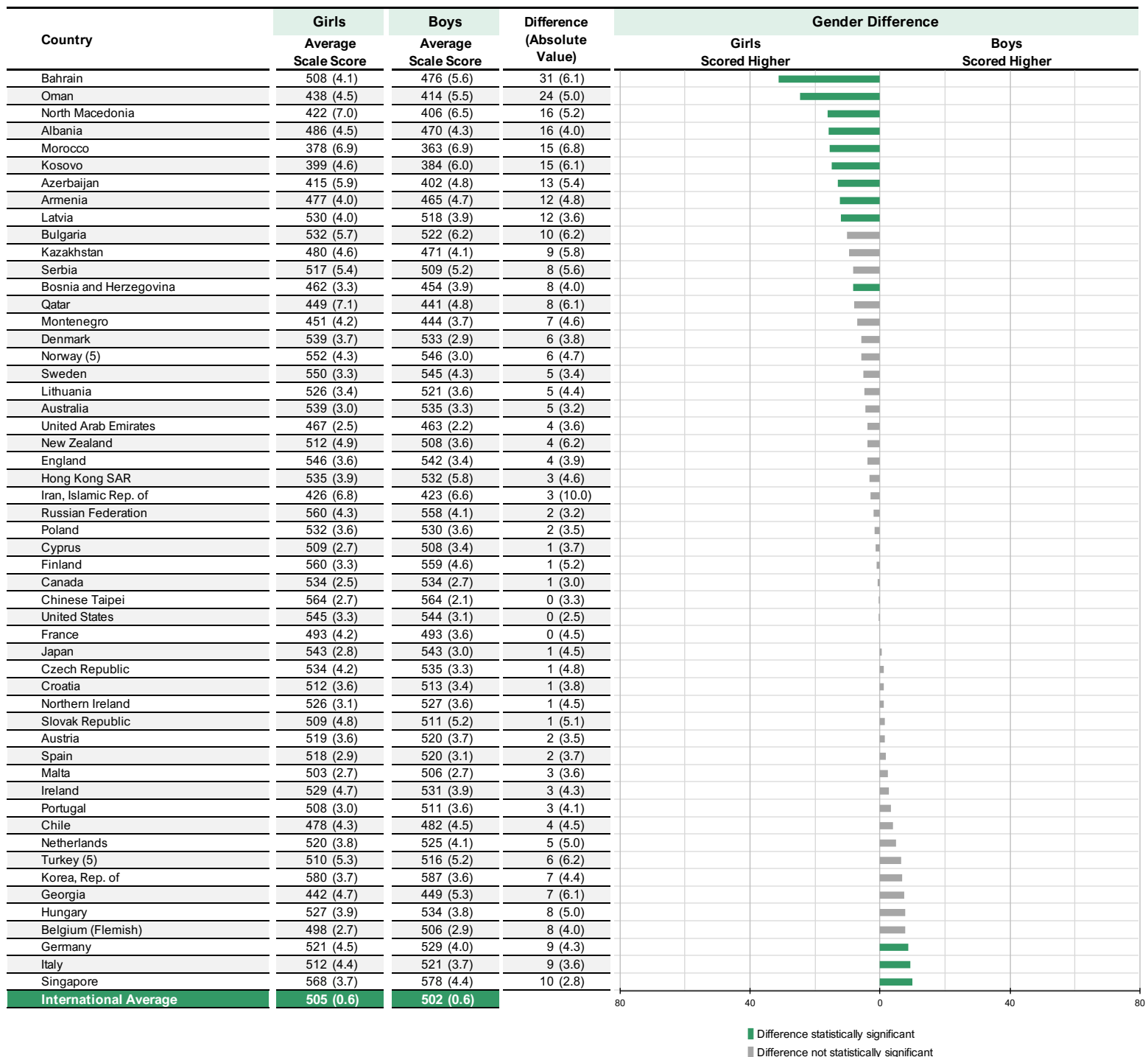
# TIMSS 2019 ENVIRONMENTAL AWARENESS RESULTS

### Exhibit 1: Average Environmental Awareness Achievement and Scale Score Distributions



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

### Exhibit 2: Average Environmental Awareness Achievement by Gender



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Exhibit 3: Effects of Plastic Pollution in Oceans – Example Item 1

Country	Percent Full Credit
Sweden	86 (1.8) ▲
Finland	85 (1.4) ▲
Norway (5)	85 (1.9) ▲
Australia	84 (1.6) ▲
Japan	83 (1.6) ▲
Netherlands	83 (1.8) ▲
Singapore	83 (1.2) ▲
Cyprus	83 (1.7) ▲
England	81 (2.1) ▲
Ireland	81 (1.9) ▲
United States	79 (1.2) ▲
Denmark	78 (2.2) ▲
Belgium (Flemish)	78 (2.1) ▲
Northern Ireland	76 (2.5) ▲
Malta	76 (1.8) ▲
Chinese Taipei	75 (2.2) ▲
Canada	75 (1.6) ▲
Russian Federation	74 (2.3) ▲
Czech Republic	73 (1.9) ▲
Germany	73 (2.1) ▲
Korea, Rep. of	73 (2.1) ▲
Lithuania	71 (1.9) ▲
Spain	70 (2.0) ▲
New Zealand	70 (1.7) ▲
Portugal	70 (2.2) ▲
Austria	70 (2.2) ▲
Hungary	68 (2.0) ▲
Poland	67 (1.9) ▲
Italy	65 (2.1) ▲
Slovak Republic	63 (2.4)
France	62 (2.6)
Hong Kong SAR	62 (3.0)
<b>International Average</b>	<b>61 (0.3)</b>
Chile	61 (2.1)
Latvia	60 (2.2)
Turkey (5)	58 (2.4)
Serbia	54 (2.7) ▼
Croatia	51 (2.3) ▼
Bahrain	48 (2.2) ▼
Armenia	45 (2.4) ▼
Qatar	45 (2.6) ▼
United Arab Emirates	44 (1.0) ▼
Bulgaria	42 (3.1) ▼
Albania	40 (2.9) ▼
Bosnia and Herzegovina	39 (2.5) ▼
Georgia	36 (2.8) ▼
Montenegro	35 (2.1) ▼
Oman	34 (2.1) ▼
Kazakhstan	33 (2.0) ▼
Iran, Islamic Rep. of	21 (1.8) ▼
Morocco	21 (1.9) ▼
Azerbaijan	20 (1.9) ▼
North Macedonia	19 (2.3) ▼
Kosovo	17 (1.9) ▼

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

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

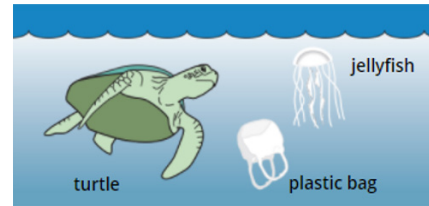
SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019  
Downloaded from <http://timss2019.org/download>

Content Domain: Life Science

Cognitive Domain: Knowing

Description: States one reason why plastic objects in the ocean are dangerous for sea animals

The picture shows a turtle and jellyfish swimming in the ocean. A plastic bag is floating nearby.



Write down one reason why plastic objects in the ocean are dangerous for animals such as turtles.

The turtle's flippers could get tangled up in the bag and make it hard for it to swim.

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

## Exhibit 4: Effects of Factory Pollution on Farm Fields – Example Item 2

Country	Percent Full Credit
Korea, Rep. of	75 (1.9) ▲
Turkey (5)	67 (2.1) ▲
Singapore	67 (1.9) ▲
Finland	64 (2.1) ▲
Serbia	60 (3.1) ▲
Canada	58 (1.5) ▲
Russian Federation	56 (2.3) ▲
Ireland	54 (2.7) ▲
Latvia	54 (2.9) ▲
New Zealand	54 (2.1) ▲
Hungary	54 (2.2) ▲
Bahrain	53 (2.1) ▲
Japan	51 (2.0) ▲
Montenegro	51 (1.9) ▲
Bulgaria	50 (2.9) ▲
Sweden	50 (2.8) ▲
Spain	49 (2.1) ▲
France	49 (2.4) ▲
Germany	48 (2.4)
Northern Ireland	47 (2.4)
England	46 (2.5)
Australia	46 (2.5)
United States	45 (1.8)
Malta	45 (2.1)
Chinese Taipei	45 (2.4)
Portugal	44 (2.1)
Italy	43 (2.6)
<b>International Average</b>	<b>43 (0.3)</b>
Bosnia and Herzegovina	42 (2.1)
Norway (5)	42 (2.4)
Poland	42 (2.3)
Kazakhstan	41 (2.2)
Qatar	40 (2.7)
Czech Republic	40 (2.0)
Slovak Republic	39 (2.6)
Albania	38 (2.1) ▼
Lithuania	38 (2.6)
Armenia	38 (2.5) ▼
Austria	37 (2.1) ▼
Netherlands	35 (2.3) ▼
United Arab Emirates	35 (0.9) ▼
Croatia	35 (2.5) ▼
Iran, Islamic Rep. of	34 (2.3) ▼
Hong Kong SAR	34 (2.4) ▼
Azerbaijan	32 (2.1) ▼
Denmark	32 (2.3) ▼
Belgium (Flemish)	31 (2.1) ▼
Cyprus	30 (2.1) ▼
Oman	29 (2.1) ▼
Georgia	28 (2.1) ▼
Chile	20 (1.6) ▼
North Macedonia	19 (2.3) ▼
Kosovo	18 (1.8) ▼
Morocco	10 (1.2) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Content Domain: Life Science

Cognitive Domain: Applying

Description: Provides a possible effect of releasing factory pollution into farm fields

A factory is located near farm fields. The factory releases pollution into the farm fields.

What effect can this have on the farm fields?

Pollution can make the soil in the fields a bad place for new crops to grow.

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

## Exhibit 5: Evaluating Resources Used to Produce Electricity – Example Item 3

Country	Percent Full Credit
Chinese Taipei	58 (2.5) ▲
Bulgaria	50 (2.1) ▲
Korea, Rep. of	46 (2.2) ▲
Albania	42 (3.0) ▲
Italy	41 (2.3) ▲
Finland	36 (2.2) ▲
Germany	35 (2.3) ▲
Portugal	35 (2.3) ▲
Serbia	34 (2.7) ▲
Lithuania	34 (2.4) ▲
Denmark	32 (2.4) ▲
Norway (5)	31 (2.5) ▲
Australia	30 (1.8) ▲
Croatia	29 (2.8) ▲
Austria	29 (1.6) ▲
Cyprus	28 (2.0) ▲
Turkey (5)	28 (2.2) ▲
Ireland	27 (2.3)
Montenegro	26 (1.8)
Canada	26 (1.4) ▲
Spain	26 (1.8)
Netherlands	24 (2.2)
Hong Kong SAR	23 (2.3)
United States	23 (1.3)
<b>International Average</b>	<b>23 (0.3)</b>
Armenia	23 (2.2)
France	22 (2.1)
Singapore	22 (1.4)
Hungary	22 (1.9)
Japan	22 (1.8)
Northern Ireland	20 (2.0)
Bahrain	20 (1.4) ▼
Oman	19 (1.6) ▼
Iran, Islamic Rep. of	18 (1.6) ▼
Belgium (Flemish)	18 (1.8) ▼
Latvia	17 (1.9) ▼
Kazakhstan	17 (2.0) ▼
United Arab Emirates	17 (0.6) ▼
Russian Federation	15 (1.5) ▼
Morocco	15 (2.1) ▼
Malta	14 (1.5) ▼
Kosovo	14 (1.6) ▼
New Zealand	14 (1.3) ▼
Sweden	13 (1.8) ▼
Czech Republic	12 (1.4) ▼
Qatar	12 (1.8) ▼
Chile	11 (1.5) ▼
Georgia	9 (1.7) ▼
Bosnia and Herzegovina	9 (1.5) ▼
England	9 (1.1) ▼
Poland	8 (1.3) ▼
Azerbaijan	8 (1.3) ▼
Slovak Republic	6 (1.1) ▼
North Macedonia	5 (1.3) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Content Domain: Earth Science

Cognitive Domain: Knowing

Description: Describes one benefit of using sunlight or wind to produce electricity

All of these resources can be used to produce electricity:

- sunlight
- wind
- oil
- natural gas

What is one way that using sunlight or wind to produce electricity is **better** for the environment than using oil or natural gas?

Sunlight and wind do not burn and give off fumes.

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

## Exhibit 6: Number of Mice Increase After Trees Are Cut Down – Example Item 4

Country	Percent Full Credit
Chinese Taipei	46 (1.9) ▲
Finland	37 (2.1) ▲
Bulgaria	36 (2.2) ▲
Australia	36 (2.3) ▲
United States	36 (1.8) ▲
Serbia	36 (2.8) ▲
Russian Federation	36 (2.5) ▲
Turkey (5)	35 (2.2) ▲
Singapore	35 (1.9) ▲
Japan	35 (2.3) ▲
Armenia	32 (2.4) ▲
Korea, Rep. of	32 (2.1) ▲
Canada	31 (1.7) ▲
Hungary	30 (2.0) ▲
Czech Republic	30 (2.4) ▲
Ireland	29 (2.3) ▲
Sweden	28 (2.7)
Northern Ireland	28 (2.3)
Latvia	27 (2.1)
Cyprus	27 (2.0)
Poland	27 (1.9)
Bosnia and Herzegovina	26 (1.9)
Kazakhstan	26 (1.9)
New Zealand	25 (1.7)
England	24 (2.3)
<b>International Average</b>	<b>23 (0.3)</b>
Chile	23 (2.4)
Spain	23 (1.7)
Slovak Republic	23 (1.9)
Portugal	22 (1.5)
Denmark	21 (2.3)
Iran, Islamic Rep. of	21 (1.9)
Lithuania	20 (1.9)
Croatia	20 (2.5)
Albania	20 (2.3)
Norway (5)	20 (2.0)
Italy	20 (2.2)
Austria	19 (2.0) ▼
Georgia	18 (2.0) ▼
Malta	16 (1.4) ▼
Germany	16 (1.9) ▼
Oman	15 (1.5) ▼
Belgium (Flemish)	15 (1.5) ▼
Netherlands	14 (1.7) ▼
Bahrain	14 (1.5) ▼
Azerbaijan	14 (1.5) ▼
France	14 (1.7) ▼
Morocco	13 (1.4) ▼
North Macedonia	12 (1.6) ▼
Montenegro	11 (1.4) ▼
Hong Kong SAR	9 (1.5) ▼
Kosovo	8 (1.3) ▼
Qatar	6 (1.2) ▼
United Arab Emirates	3 (0.3) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019  
Downloaded from <http://timss2019.org/download>

Content Domain: Life Science

Cognitive Domain: Reasoning

Description: Explains why mice increase after trees are cut down

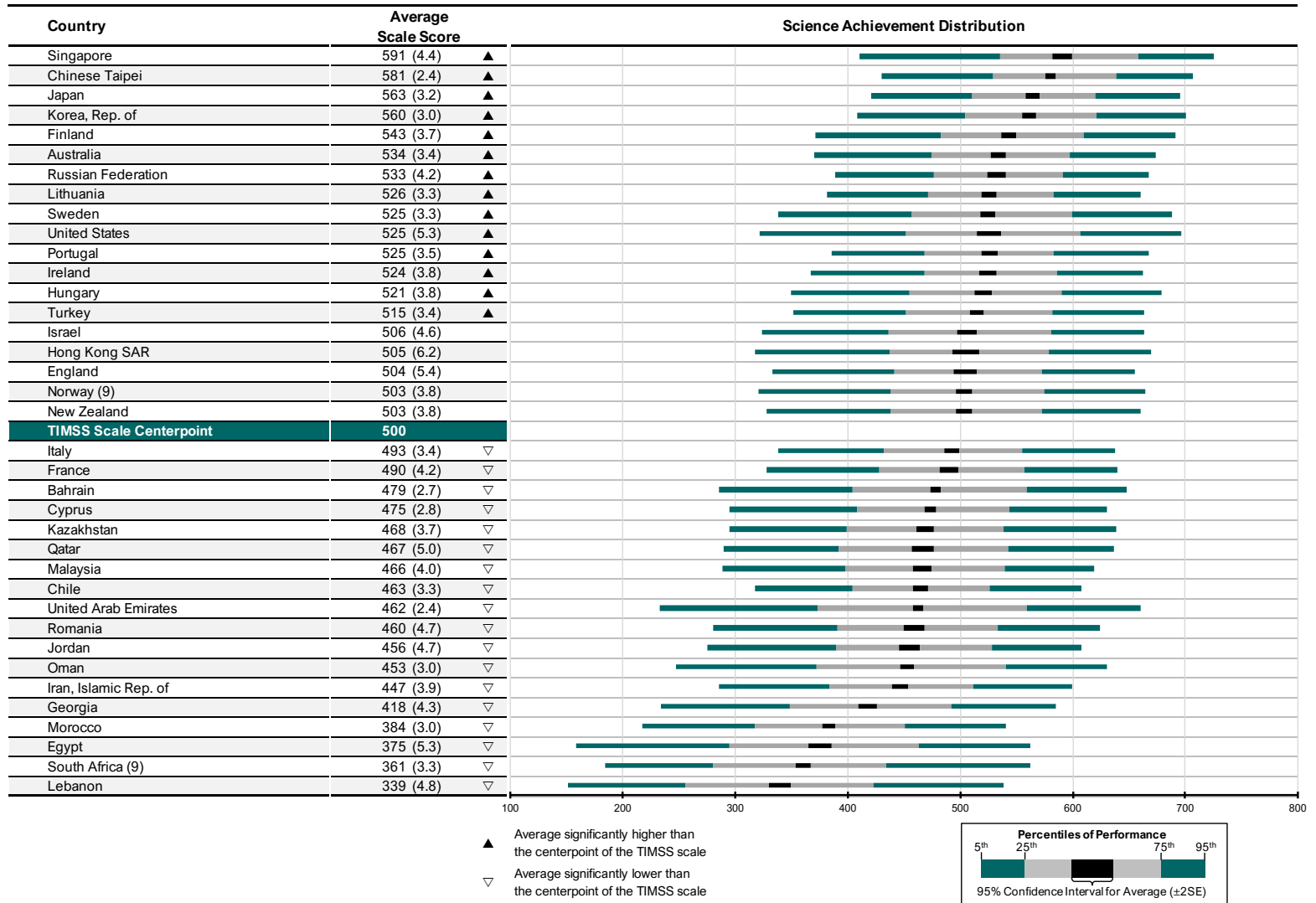
People in a town cut down trees to build more homes. Hawks left the area because they had nowhere to build nests. A few months later, the number of mice in the area increased.

Why did the number of mice increase after the trees were cut down?

Hawks eat mice. When the hawks went away, fewer mice were eaten and they made many more mice.

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

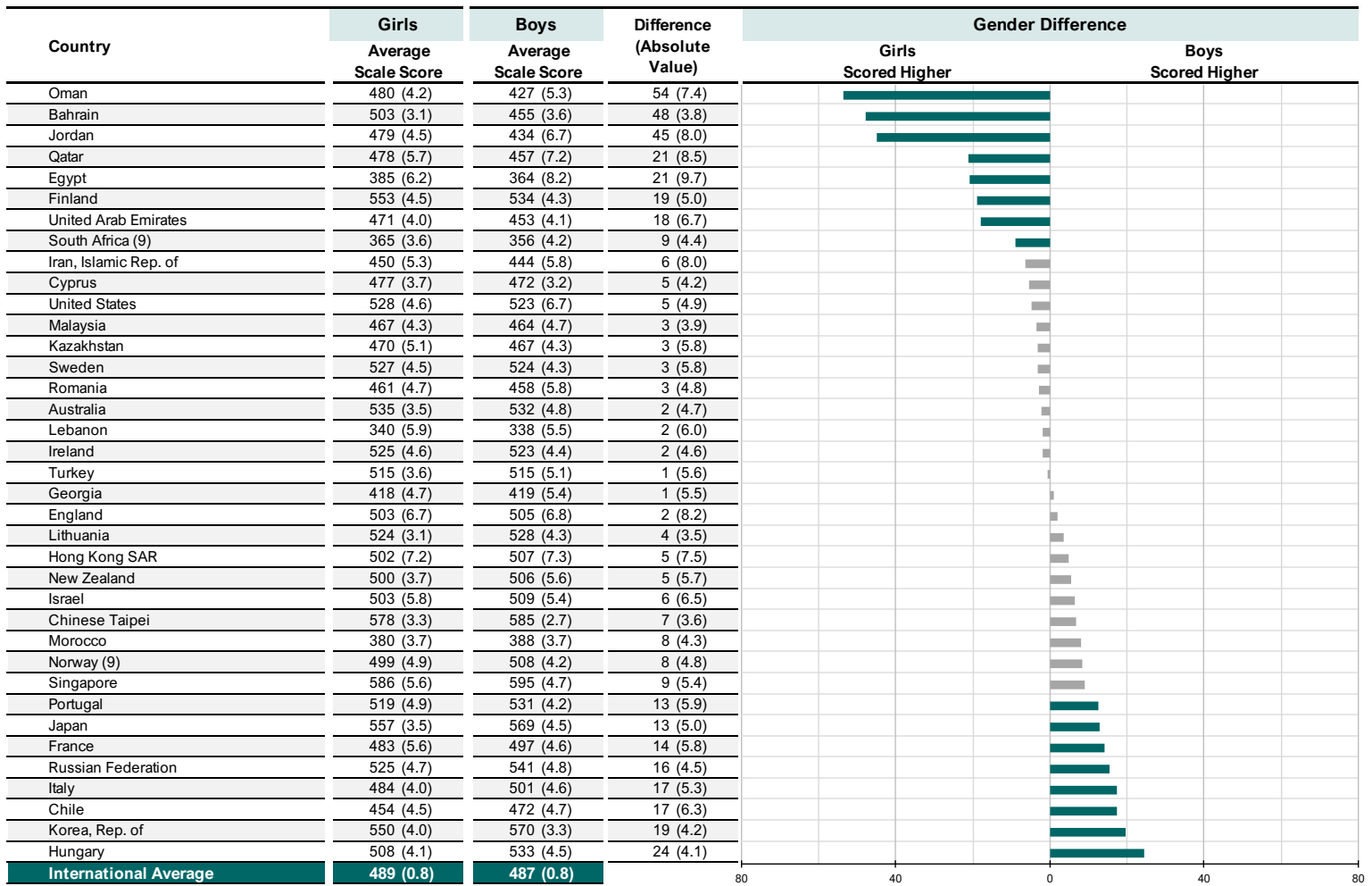
### Exhibit 7: Average Environmental Awareness Achievement and Scale Score Distributions



( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.



Exhibit 8: Average Environmental Awareness Achievement by Gender



■ Difference statistically significant  
 ■ Difference not statistically significant

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019  
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## Exhibit 9: Roof Gardens Reduce Carbon Dioxide Levels in the Air – Example Item 5

Country	Percent Full Credit
Singapore	85 (1.5) ▲
Chinese Taipei	69 (2.0) ▲
Kazakhstan	68 (2.3) ▲
Turkey	67 (2.4) ▲
Russian Federation	65 (2.5) ▲
Sweden	63 (2.6) ▲
Hong Kong SAR	60 (2.9) ▲
Korea, Rep. of	58 (2.5) ▲
Australia	57 (2.0) ▲
Qatar	57 (2.0) ▲
Israel	57 (2.2) ▲
Ireland	56 (2.3) ▲
Lithuania	53 (2.7)
Cyprus	52 (2.3)
United States	51 (2.5)
Bahrain	50 (2.1)
Romania	49 (2.5)
United Arab Emirates	49 (1.2)
Finland	49 (1.8)
<b>International Average</b>	<b>48 (0.4)</b>
Jordan	48 (2.6)
Portugal	47 (3.0)
Italy	44 (2.4)
England	44 (2.7)
Hungary	43 (3.0)
Oman	42 (2.2) ▼
Japan	42 (1.9) ▼
Iran, Islamic Rep. of	40 (2.1) ▼
France	39 (2.2) ▼
Egypt	37 (1.9) ▼
Norway (9)	37 (2.3) ▼
Georgia	36 (2.7) ▼
Morocco	34 (1.6) ▼
Malaysia	33 (1.7) ▼
New Zealand	30 (1.9) ▼
Lebanon	29 (2.0) ▼
Chile	24 (1.8) ▼
South Africa (9)	20 (1.1) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019  
Downloaded from <http://timss2019.org/download>

Content Domain: Biology

Cognitive Domain: Reasoning

Description: Explains how roof gardens in cities help reduce the amount of carbon dioxide in the air

In some large cities, owners of large buildings and houses have installed gardens on the roofs. Having more gardens helps reduce the amount of carbon dioxide in the air.

How does increasing the number of gardens help reduce the amount of carbon dioxide in the air?

There are more trees and plants taking carbon dioxide out of the air during photosynthesis.

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



## Exhibit 10: Planting Trees Benefits the Environment – Example Item 6

Country	Percent Full Credit
Singapore	74 (1.9) ▲
Korea, Rep. of	72 (1.9) ▲
Turkey	63 (2.3) ▲
Ireland	53 (2.5) ▲
Australia	52 (1.9) ▲
United States	51 (1.8) ▲
Japan	49 (2.1) ▲
Qatar	48 (1.6) ▲
Jordan	48 (2.2) ▲
England	47 (2.9) ▲
Sweden	45 (2.4) ▲
Egypt	41 (2.4)
New Zealand	41 (1.9)
Romania	39 (2.5)
Portugal	39 (2.6)
<b>International Average</b>	<b>38 (0.3)</b>
Chinese Taipei	37 (1.7)
Morocco	36 (1.5)
Kazakhstan	36 (2.4)
Hungary	36 (2.3)
Finland	35 (2.0)
Russian Federation	35 (2.5)
United Arab Emirates	35 (0.9) ▼
Hong Kong SAR	34 (2.6)
Italy	31 (2.2) ▼
Oman	31 (2.1) ▼
Cyprus	31 (2.1) ▼
Bahrain	31 (1.8) ▼
Israel	31 (2.4) ▼
Lithuania	30 (2.4) ▼
Norway (9)	28 (2.3) ▼
France	28 (2.0) ▼
Malaysia	24 (1.6) ▼
Georgia	23 (3.1) ▼
Chile	18 (1.6) ▼
Iran, Islamic Rep. of	18 (1.6) ▼
South Africa (9)	16 (1.0) ▼
Lebanon	16 (2.0) ▼

Content Domain: Biology

Cognitive Domain: Knowing

Description: Lists two ways planting trees benefits the environment

How is planting trees beneficial for the environment?

Write **two** ways planting trees benefits the environment.

1.

Tree roots help hold the soil in place and prevent erosion.

2.

Adds more oxygen to the air for people to breathe.

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

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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Exhibit 11: Algal Bloom in a Pond Caused by Human Activity – Example Item 7

Country	Percent Full Credit
Singapore	73 (1.6) ▲
Chinese Taipei	70 (1.9) ▲
Finland	67 (2.2) ▲
Russian Federation	66 (1.7) ▲
Portugal	65 (2.9) ▲
Italy	63 (2.4) ▲
Hungary	62 (2.3) ▲
Japan	62 (1.9) ▲
Korea, Rep. of	59 (2.0) ▲
Hong Kong SAR	59 (2.8) ▲
New Zealand	59 (2.0) ▲
Ireland	58 (2.5) ▲
United States	57 (1.8) ▲
Lithuania	56 (2.4)
Malaysia	54 (1.9)
Israel	53 (1.9)
Sweden	53 (2.5)
France	53 (2.3)
Kazakhstan	52 (2.4)
<b>International Average</b>	<b>52 (0.4)</b>
Turkey	51 (2.3)
Australia	51 (1.8)
United Arab Emirates	51 (1.2)
Qatar	50 (2.4)
Norway (9)	50 (2.5)
Chile	50 (2.5)
Georgia	47 (2.6) ▼
England	46 (3.1)
Oman	44 (2.0) ▼
Romania	44 (2.1) ▼
Iran, Islamic Rep. of	44 (1.8) ▼
Morocco	42 (2.0) ▼
Jordan	38 (1.9) ▼
Bahrain	38 (1.9) ▼
Cyprus	37 (2.1) ▼
Egypt	36 (1.9) ▼
Lebanon	31 (2.3) ▼
South Africa (9)	25 (0.8) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Content Domain: Biology

Cognitive Domain: Applying

Description: Identifies what human activity can cause algal blooms

Algal blooms can occur in freshwater ponds when there are too many nutrients in the water. These blooms can be harmful to other wildlife.

The picture shows an algal bloom in a pond.



What human activity can cause too many nutrients to enter a pond and cause an algal bloom?

- A farming with a lot of fertilizer
- B burning chemicals in factories
- C using aerosol spray cans
- D planting lots of trees around a pond

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



## Exhibit 12: Melting Permafrost Affects the Earth's Climate – Example Item 8

Country	Percent Full Credit
Singapore	81 (1.7) ▲
Chinese Taipei	77 (1.7) ▲
Japan	76 (1.9) ▲
Korea, Rep. of	72 (1.8) ▲
Ireland	71 (1.9) ▲
Finland	70 (2.0) ▲
Australia	67 (1.7) ▲
Lithuania	67 (2.2) ▲
New Zealand	66 (2.0) ▲
United States	66 (1.6) ▲
England	65 (2.6) ▲
Norway (9)	64 (2.2) ▲
Sweden	63 (2.6) ▲
Hong Kong SAR	63 (2.3) ▲
Turkey	62 (2.2) ▲
Portugal	61 (2.7) ▲
France	61 (2.3) ▲
Russian Federation	56 (2.2)
<b>International Average</b>	<b>54 (0.3)</b>
Hungary	54 (2.2)
Malaysia	53 (2.0)
Italy	52 (2.2)
Oman	51 (1.6) ▼
Israel	50 (2.6)
Qatar	50 (2.0) ▼
Romania	50 (2.5)
United Arab Emirates	50 (1.1) ▼
Chile	46 (2.9) ▼
Cyprus	46 (2.7) ▼
Bahrain	45 (1.6) ▼
Kazakhstan	41 (2.5) ▼
Georgia	39 (2.6) ▼
Jordan	38 (1.9) ▼
Egypt	33 (1.7) ▼
South Africa (9)	29 (1.1) ▼
Morocco	27 (1.6) ▼
Iran, Islamic Rep. of	22 (1.6) ▼
Lebanon	20 (1.4) ▼

▲ Percent significantly higher than international average

▼ Percent significantly lower than international average

( ) Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019  
Downloaded from <http://timss2019.org/download>

Content Domain: Earth Science

Cognitive Domain: Applying

Description: Recognizes how the melting of permafrost affects the Earth's climate

In the Arctic, we can find frozen soil called permafrost, which contains ice, rocks, and methane (a greenhouse gas).

How can the melting of permafrost affect the Earth's climate?

- A** Increased methane in the atmosphere can contribute to global warming.
- B** Increased water in the atmosphere can cause more rain in the Arctic.
- C** Areas of melted permafrost can be now used as farmland.
- D** Methane can react with oxygen in the air to produce smog.

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



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