

Appendix 14B: TIMSS 2015 Fourth Grade Science Item Descriptions Developed During the TIMSS 2015 Benchmarking

Items at Low International Benchmark (400)

Life Science

S02_01	Identifies examples of animals that lay eggs
S03_01	Recognizes the mammal from among four pictures of animals
S05_05	States one thing necessary to maintain good physical health (1 of 2 points)
S07_01	Completes a table by matching diagrams of animals to their ecosystems
S08_03	Recognizes a living thing that produces its own food (1 of 2 points)
S10_01	Recognizes an animal that has a backbone
S14_02	States one way to avoid catching illness in a crowded space (1 of 2 points)
S14_03	Analyzes a diagram to explain which flower will grow better

Physical Science

S04_08	Classifies materials as solids, liquids, or gases
S07_06	Recognizes ice as the solid form of water
S08_06	Identifies a way to sort objects containing metals
S10_06	Recognizes the states of matter of three different materials

Items at Intermediate International Benchmark (475)

Life Science

S01_01	Recognizes the function of seeds
S01_02	Recognizes that the body needs more oxygen during exercise
S01_06	For four out of five human activities, identifies which have positive and which have negative effects on the environment (1 of 2 points)
S01_11	States one effect the Sun can have on unprotected skin
S02_04	Recognizes a transportation method that produces the least air pollution
S04_01	Recognizes why milk is important in a balanced diet

S04_02	States two things that plants need from their environment to make their own food
S06_04	Uses a list of living things in a desert ecosystem to complete a food chain
S06_05	Identifies a benefit of washing hands before eating
S07_02	Describes one way people can protect their teeth from decay, in addition to brushing
S08_05	Describes how human heart rate changes during exercise
S10_04	States two reasons why a plant will not survive by analyzing given conditions
S12_03	Completes a diagram describing the stages in the life cycle of a flowering plant
S12_06	Describes one way a polar bear’s fur helps it survive (1 of 2 points)
S14_04	Evaluates two diagrams to explain which environment is better for sharks

Physical Science

S01_07	Identifies the direction of the force of Earth’s gravity in a diagram
S02_08	Identifies the source of heat that causes ice cubes to melt
S04_09	Explains why one object requires more force to start its motion than another
S06_07	Identifies a property of steel that makes it a better building material than wood
S12_10	Identifies why a bulb will not light in a model of an electric circuit
S14_08	Identifies the best material to complete a circuit

Earth Science

S03_10	Recognizes what happens to water on a sidewalk when it disappears
S05_11	States one planet other than Earth that orbits the Sun (1 of 2 points)
S05_11	States two planets other than Earth that orbit the Sun (2 of 2 points)
S06_12	Provides evidence for the existence of air inside a balloon
S09_10	Matches each item in a list of Earth’s landscape features to its description

Items at High International Benchmark (550)

Life Science

S01_06	For five human activities, identifies which have positive and which have negative effects on the environment (2 of 2 points)
S02_02	States two things that both plants and animals need to live
S03_02	States two changes which occur in the body during running in addition to feeling hot
S03_04	Identifies how having coloring similar to their surroundings helps birds stay alive
S04_04	Identifies a difference in the life cycles of a grasshopper and a butterfly
S04_06	Recognizes a way to avoid spreading the flu
S05_01	Recognizes the organ where digestion takes place
S05_03	Recognizes the body covering that protects a reptile
S05_04	From a list of plants and animals, identifies some of those that make their own food (1 of 2 points)
S06_01	Recognizes why standing water provides an environment beneficial for mosquitos
S06_02	Describes one way pollen is spread from flower to flower (1 of 2 points)
S06_06	Explains one reason why it is important to have spiders in a garden
S07_05	States one characteristic that a plant and an animal share, other than a need for water (1 of 2 points)
S08_01	Recognizes the plant part that produces seeds
S08_02	Uses a list of living things in an Arctic ecosystem to complete a food chain
S08_04	Recognizes a feature of how snakes eat
S09_01	States one difference between living things and nonliving things
S09_03	Recognizes an advantage of thin, pointed leaves compared to broad, flat leaves
S09_04	States one reason why plastic objects in the ocean are dangerous for sea animals
S09_05	Provides a possible reason why some trees in a group do not grow as well as others
S10_02	Describes two ways that a mammal helps its young survive
S10_03A	Uses a food web to identify what a predator eats
S11_03	Recognizes whether labeled features of a bird are inherited

S12_04A	Interprets data from an investigation to recognize the best condition for growing plants
S12_05	Relates factory pollution to its effect on farm fields
S13_01	Recognizes that in mammals, a male and female of the same kind are needed to reproduce
S13_02	Explains that germs can be transmitted even when people do not appear to be sick
S13_05	Identifies a function of a plant's stalk by interpreting an observation from an investigation

Physical Science

S01_12	Names a source of energy other than coal, oil, or natural gas that is used to produce electricity
S02_07	Explains the function of a battery in an electric circuit
S02_10A	Recognizes which direction to apply a force to reverse the direction of a moving object
S03_08	Given a list of five everyday objects, recognizes which ones conduct electricity
S05_09B	Evaluates between two methods which would dissolve a piece of candy faster
S06_08	Recognizes from a list which are sources of energy and which are not
S06_10	Explains how a sweater can keep a bottle of water cold
S07_04	Identifies the cause of a shadow forming
S07_11	From a diagram, identifies the orientation of the poles on two repelling magnets
S08_08	Recognizes what happens to the water when a puddle of water on a metal tray becomes smaller
S08_10	Explains why pressing a guitar string stops the sound
S09_07	Describes a difference between ice and water in addition to their physical states
S09_09A	Identifies from a diagram how a shadow is formed
S11_06	States a reason for the color change and surface roughening of a metal object over time
S11_08	Gives a reason why two objects of the same shape and size travel different distances after a push
S11_09	Using a model of a flashlight, identifies an object that can be used to complete an electrical connection
S12_09A	Explains why boiling decreases the amount of water in a container
S12_09B	Predicts the effect on a cold window glass of boiling water nearby
S13_07	Observes that two metal bars repel and determines whether they are magnets



S13_08	Explains that heat in a metal object reaches the nearest point soonest
S13_09	Using a diagram, identifies which hidden object could complete an electric circuit
Earth Science	
S01_08	Recognizes evidence that there were many kinds of animals on Earth that no longer exist today
S03_11	Identifies a conclusion scientists draw from fossils of shellfish found on land
S03_12	Identifies a pictorial representation of a shadow at midday
S04_11	Recognizes a diagram showing the correct relative positions of the Earth, Moon, and Sun
S04_12	From pictures of rock formations, identifies how a given rock may have looked long ago
S05_12	From a diagram showing a shadow at different times of the day, explains why the shadow changed
S06_11	Recognizes that water flows from mountains to oceans via rivers
S07_13	States one thing that makes up Earth's crust (1 of 2 points)
S07_14	From a table showing temperature and cloud cover at different locations, identifies the place where is it most likely to snow
S08_11	Using two pictures of the same location, explains that the Moon can look different at different times
S08_12	Recognizes which step in a diagram of a water cycle shows evaporation
S10_10A	Interprets information from a graph to recognize which crops will grow best in an area with given precipitation
S11_11	Recognizes a feature of the Moon from observations over a month
S12_02	Recognizes seasons north and south of the Equator
S13_11	Recognizes that the solar system is made up of the Sun and its planets
S14_12	Interprets information from temperature graphs to identify which of two places has certain climate properties

Items at Advanced International Benchmark (625)

Life Science

S01_03	Identifies examples of animals that take care of their young
S01_04	Identifies how being poisonous to birds is an advantage for monarch butterflies
S02_03	Recognizes a food with a high protein content

S02_05	Explains how a flu-like disease can be transmitted through the air
S03_05	Analyzes statements to identify possible characteristics of predators and prey
S04_03	Identifies a reason that some mammals pant on hot days
S04_05	Predicts the consequences of removing a predator from an animal's habitat
S05_02	Recognizes the function of the flowering part of a plant
S05_06	Recognizes an animal that is classified as a mammal
S06_02	Describes two ways pollen is spread from flower to flower (2 of 2 points)
S07_07	Explains why people should drink a lot of liquid every day
S07_09	Identifies one physical change that can take place in a mammal as the weather gets colder
S10_03B	Uses a food web to determine which animals are competitors
S11_01	Recognizes the function of muscles attached to bones
S11_04	Evaluates three experimental designs and explains which is best to test if plants need light to grow
S11_05	Draws a conclusion by relating one function of feathers to keeping a body warm in the case of dinosaurs
S12_04B	Identifies a conclusion about plant growth using data from an investigation
S12_06	Describes two ways a polar bear's fur helps it survive (2 of 2 points)
S13_03A	Explains that to test the survival of plants, they should be compared under different conditions
S13_03B	Identifies a desert plant and describes one feature that helps it survive in the desert
S13_04	States two things in addition to water that animals need to survive
S14_02	States two ways to avoid catching an illness in a crowded space (2 of 2 points)
S14_05	Describes how boiling water makes it safe to drink
Physical Science	
S01_13	Recognizes that burning results in new substances
S02_06	Explains how the poles of two magnets should be oriented to cause repulsion
S02_09	Recognizes a property of metals that makes them good electrical wires
S02_10B	Recognizes which direction to apply a force to change the direction of a moving object

S03_07	Recognizes a property used to classify everyday objects into two groups
S03_09	Names the force that moves an object down a sloping track
S04_07	Predicts which of two objects is a better conductor of heat with supporting explanation
S04_10	States one form of energy present in a model of an electric circuit (1 of 2 points)
S05_09A	Evaluates between two methods which would dissolve a piece of candy faster
S05_09C	Evaluates a list of methods and predicts which method produces a less sweet drink
S05_10	Recognizes the best conductor of heat in a list of materials
S07_03	Using information in a table, identifies another item whose physical properties match those of one of the items in the table
S08_07	Analyzes a diagram to identify one way to make a shadow bigger
S09_08	Identifies that the temperature at which an object melts depends on the material from which it is made
S09_09B	Recognizes that a shadow produced in colored light is black
S10_07	Explains the process by which wet objects become dry
S10_08	Explains how to separate a mixture of two types of solids of different sizes
S10_09A	Recognizes set-ups that will more quickly dissolve a solid in water
S10_09B	Explains the importance of controlling a variable in an experiment
S12_07	Identifies a physical property of metal pot that makes it good for boiling water
S12_08A	Evaluates the best way to separate a mixture of solids of similar size
S12_08B	Evaluates the best way to separate a mixture of things that dissolve and things that do not dissolve
S13_06	Identifies that two objects of the same size and shape have the same volume and, from a diagram, that they have different masses
S14_06	Recognizes one property of a liquid
S14_07	Evaluates the best set-up to investigate whether temperature affects the rate at which a solid dissolves in water
S14_09	Recognizes a diagram that demonstrates motion due to gravity
Earth Science	
S01_10	Draws a conclusion from an investigation to explain why water does not fill a glass inverted in water, (referring to air in the glass) OR to explain why water does fill a glass when it is tilted (referring to air escaping) (1 of 2 points)

S07_12	Recognizes how long it takes for Earth to orbit the Sun
S07_13	States two things that make up Earth's crust (2 of 2 points)
S09_11	Identifies how fish fossils are formed
S10_10B	Synthesizes precipitation information from a graph and diagram to recognize the best area to plant a crop in a given climate
S11_10	Identifies that clouds are made of water droplets
S11_12	Interprets a diagram of the Earth and the Sun to describe how Earth turning on its axis causes day and night in a particular location
S12_01	Recognizes which place is likely to have weather that is hot and wet
S13_10	Identifies the diagram that shows relative amounts of water and land on the Earth's surface
S14_10	Relates two different environments and weathering effects on rocks

Items Above the Advanced International Benchmark (625)

Life Science

S03_03	Explains that the same type of plants should be compared when investigating plant growth with or without fertilizer
S05_04	From a list of plants and animals, identifies all of those that make their own food (2 of 2 points)
S05_05	States one thing necessary to maintain good physical health with a supporting explanation (2 of 2 points)
S06_03	Explains why laying a large number of eggs helps frogs survive in their environment
S07_05	States two characteristics that a plant and an animal share, other than a need for water (2 of 2 points)
S08_03	Recognizes a living thing that produces its own food and describes the process (2 of 2 points)
S09_06	Identifies that more use of public transportation will decrease air pollution in a large city
S11_02	Recognizes the main function of leaves on a plant

Physical Science

S01_05	Labels the freezing point of water on a diagram of a thermometer
S03_06	Explains that cooking causes a change that cannot be reversed
S04_10	States two forms of energy present in a model of an electric circuit (2 of 2 points)
S05_08	Explains which orientation of two batteries in series, depicted in two circuit diagrams, allows a bulb to light
S11_07	Explains why a metal spoon in hot soup feels hotter than a wooden spoon in hot soup

Earth Science

S01_10	In the context of an investigation, explains why water does not fill a glass inverted in water, (referring to air in the glass) AND explains why water does fill a glass when it is tilted (referring to air escaping) (2 of 2 points)
S02_11	Recognizes how wind can cause weathering of rocks
S02_12	Explains why stars are not visible during the day
S08_09	States one source of energy other than sunlight that can be changed into electricity
S14_11	Recognizes four true statements about recycling metals
