

2019 STAAR Grade 5 Science Rationales

Item#	Rationale	
1	Option B is correct	Both frog and lacewing adults look very different from their young. This is the only answer choice that accurately compares the two life cycles.
	Option A is incorrect	Adult frogs and lacewings both lay eggs.
	Option C is incorrect	Frog larvae (tadpoles) do not have legs when they hatch from their eggs, and the legs of lacewing larvae are not used for jumping.
	Option D is incorrect	Lacewing larvae and adults have the same number of legs, but tadpoles begin with no legs and grow legs as they develop into adult frogs.

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2	Option F is correct	This is an accurate description of liquid water being heated by the sun and becoming a gas in the air above the ocean via evaporation.
	Option G is incorrect	Gaseous water sinks when cooled; it does not rise. If cooled to a low enough temperature, it condenses into liquid water and can fall out of the air as precipitation.
	Option H is incorrect	Liquid water evaporates when heated; it does not condense.
	Option J is incorrect	This describes condensation, when liquid drops of fog form from gaseous water vapor. This is the opposite of what is asked in the question.

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3	Option B is correct	All objects in column one are made of metal and will conduct electrical energy. All objects in column two will float on water and are therefore less dense than water. All objects in column three will dissolve (are soluble) in water.
	Option A is incorrect	The heading for column one is incorrect because metals readily transfer thermal energy and therefore are not good insulators. The heading for column two is incorrect because none of the objects are attracted by magnets.
	Option C is incorrect	The heading for column one is incorrect because none of the objects are soluble in water. The heading for column two is incorrect because the objects in the second column include a liquid (cooking oil) and a solid (wood chip), which are different physical states of matter. The heading for column three is incorrect because not all of the objects are less dense than water.
	Option D is incorrect	The objects in column two are not conductors of electrical energy. The objects in column three are not insulators.

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4	Option H is correct	The lemon juice is soluble in water and spreads through the water.
	Option F is incorrect	The mass of the lemon juice remains the same.
	Option G is incorrect	The water remains a liquid unless the mixture is frozen or heated.
	Option J is incorrect	The volume of the water remains the same.

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Item#	Rationale	
5	Option A is correct	Because the duckweed is a small plant that grows on the surface of many ponds and lakes, is free floating, and has a single root, the duckweed can best survive in a wetland ecosystem with slow-moving water.
	Option B is incorrect	Rough waves would interfere with the ability to float freely.
	Option C is incorrect	The duckweed grows on the surface of ponds and lakes, so it would not survive in an area with little water.
	Option D is incorrect	The duckweed is a plant that requires sunlight, so it would not survive in an underground river ecosystem.

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Item#	Rationale	
6	Option G is correct	These actions allow the cart to move with the least effort because the forces are added together by being in the same direction.
	Option F is incorrect	These actions make it difficult to move the cart because the forces are being applied in opposing directions.
	Option H is incorrect	This is not the easiest way to move the cart because the downward force does not contribute to the movement of the cart.
	Option J is incorrect	This is not the easiest way to move the cart because the forces are not being applied in the same direction.

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Item#	Rationale	
7	Option A is correct	The ingredients in mixtures 3 and 4 are all solids and will remain solids when they are combined. These are the only mixtures that contain only solids.
	Option B is incorrect	The salt in mixture 1 will dissolve in the hot water.
	Option C is incorrect	The salt, sugar, and powdered soap in mixtures 1, 2, and 5 will dissolve in the hot water.
	Option D is incorrect	The salt, sugar, and powdered soap in mixtures 2 and 5 will dissolve in the hot water.

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Item#	Rationale	
8	Option H is correct	The formation of the delta is correctly described.
	Option F is incorrect	A V-shaped valley, not a lake, is formed when running water carves canyons.
	Option G is incorrect	A mountain is broken down by glaciers, not formed by glaciers.
	Option J is incorrect	A U-shaped valley is formed by glaciers, not formed by wind.



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9	Option A is correct	The image shows light traveling in straight lines after reflecting off of a surface.
	Option B is incorrect	The image shows light reflecting from more than one surface.
	Option C is incorrect	The image shows light in the water traveling in straight lines.
	Option D is incorrect	The image shows light traveling in straight lines, not in circular paths.

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Item#	Rationale	
10	Option J is correct	A food web shows the transfer of energy among organisms in an ecosystem. Consumers are organisms that receive energy by eating other organisms rather than by producing their own food. In the food web, shrews eat caterpillars. Red foxes eat snowshoe hares, shrews, and caterpillars. Snowshoe hares, shrews, and caterpillars are all consumers.
	Option F is incorrect	In the food web snowshoe hares and caterpillars receive energy directly from willows and white spruces, which produce their own food.
	Option G is incorrect	In the food web, snowshoe hares and caterpillars receive energy directly from willows and white spruces, which produce their own food.
	Option H is incorrect	In the food web, snowshoe hares receive energy directly from willows and white spruces, which produce their own food.

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Item#	Rationale	
11	Option B is correct	The investigation is measuring how much force is needed to break the uncooked spaghetti noodle. As pennies are added to the paper cup, the weight of the cup increases. The more weight that is added to the cup, the more force is applied to the noodle. Eventually the noodle will break, and the force can be determined based on the number of pennies that were added to the cup.
	Option A is incorrect	The investigation only uses one spaghetti noodle.
	Option C is incorrect	The length of the string does not change.
	Option D is incorrect	The distance between the chairs does not change.

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Item#	Rationale	
12	Option F is correct	In order for a circuit to work, a complete path must exist from one end of the battery to the other. If Switches 1 and 3 are open, there is still a path through which the electricity can flow.
	Option G is incorrect	If Switch 4 is open, there will not be a complete path for the electricity to flow through Motor 2.
	Option H is incorrect	If Switch 2 is open, there will not be a complete path for the electricity to flow through Motor 1.
	Option J is incorrect	If Switch 4 is open, there will not be a complete path for the electricity to flow through Motor 2.

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Item#	Rationale	
13	Option B is correct	Sediments are small particles such as sand and dirt that can be transported by flowing water. The diagram shows that sediments were deposited, or sank to the bottom of the water, and built up the land over time.
	Option A is incorrect	The diagram shows deposition of sediments, not erosion, which is the removal of sediments.
	Option C is incorrect	The diagram shows the deposition of sediments, not weathering, which is the breaking of rocks into sediments.
	Option D is incorrect	The diagram shows that sediments filled the water, not the formation of a sea.

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Item#	Rationale	
14	Option J is correct	The types of energy are correctly paired with the examples.
	Option F is incorrect	The metal turning red is an example of thermal energy, not light energy. The light reflecting off the metal is an example of light energy, not thermal energy.
	Option G is incorrect	The laser producing sparks is an example of thermal energy, not mechanical energy.
	Option H is incorrect	The laser producing a beam of light is an example of light energy, not mechanical energy.

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Item#	Rationale	
15	Option B is correct	Water evaporates faster in warmer areas than in colder areas. The graph shows the volume of water in container 1 decreased only a small amount as expected in a cold refrigerator. More water evaporated from container 2 as expected on a warmer desk. The most water evaporated from container 3 as expected on a sunny windowsill. This is the only graph that represents the correct relationships between the containers and the remaining volumes of water after five days based on the locations of the containers.
	Option A is incorrect	The graph shows that more water evaporated from container 2 than from container 3. The opposite relationship is true, because more water is likely to evaporate from the container in a sunny location than from the container on the desk.
	Option C is incorrect	The graph shows the volume of water in containers 2 and 3 increased after five days. It is more likely that water evaporated from those containers based on their locations.
	Option D is incorrect	The graph shows that the volume of water in container 1 decreased and the volume of water in container 2 remained the same. More water is likely to evaporate from the container on the desk than from the container in the cold refrigerator.

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Item#	Rationale	
16	Option F is correct	When the switch is open, the bell and one light will still be on a complete circuit. There will be a complete path through which the electricity can flow.
	Option G is incorrect	When the switch is open three bulbs will light and the bell will ring.
	Option H is incorrect	When the switch is open two bulbs will light and the bell will ring.
	Option J is incorrect	When the switch is open none of the bulbs will light and the bell will not ring.



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Item#	Rationale	
17	Option D is correct	The light ray refracts, or bends, when it passes through Material 1. The light ray reflects, or bounces, off of Material 2.
	Option A is incorrect	The light ray is not scattered when it passes through Material 1. The light ray is not refracted, or bent, when it reaches Material 2.
	Option B is incorrect	The light ray is not absorbed, or taken in, when it passes through Material 1.
	Option C is incorrect	The light ray is not transmitted by, or does not go straight through, Material 1. The light ray is not refracted, or bent, when it reaches Material 2.

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Item#	Rationale	
18	Option H is correct	The photograph shows a swamp ecosystem that has enough plant material for the formation of coal.
	Option F is incorrect	The photograph shows a desert ecosystem that does not have enough plant material for the formation of coal.
	Option G is incorrect	The photograph shows a mountainous region that does not have enough plant material for the formation of coal.
	Option J is incorrect	The photograph shows a desert-like region that does not have enough plant material for the formation of coal.

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Item#	Rationale	
19	Option A is correct	The air and the rocky path are two nonliving parts of the rabbit's habitat.
	Option B is incorrect	The rabbit's young are a living part of the rabbit's habitat.
	Option C is incorrect	The plants are a living part of the rabbit's habitat.
	Option D is incorrect	The vegetation is a living part of the rabbit's habitat.

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Item#	Rationale	
20	Option H is correct	This picture shows the correct position of the sun and the shadow of the tree at 10:00 A.M. Because the sun will appear to rise in the east in the morning and will travel toward the west, the sun will not yet have reached the position shown at noon.
	Option F is incorrect	This picture shows the position of the sun and the shadow of the tree after noon as the sun sets in the west.
	Option G is incorrect	This picture shows the position of the sun and the shadow of the tree as the sun rises in the east before 10 A.M.
	Option J is incorrect	This picture shows the correct position of the sun and the shadow of the tree at a time later than noon. The sun has already passed the position shown at noon as the sun moves in the sky from east to west.

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Item#	Rationale	
21	Option A is correct	Organism X is an omnivore because X shows an organism that eats both plants and animals.
	Option B is incorrect	Organism X is not an herbivore because an herbivore eats only plants, and X shows an organism that eats both plants and animals.
	Option C is incorrect	Organism X is not a carnivore because a carnivore eats only animals, and X shows an organism that eats both plants and animals.
	Option D is incorrect	Organism X is not a producer because plants make energy from light, and X shows an organism that eats both plants and animals.

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Item#	Rationale	
22	Option H is correct	Iron filings, talcum powder, and vegetable oil remained visible in the water. Only papain disappeared in the water.
	Option F is incorrect	More than one substance was visible in the water.
	Option G is incorrect	More than two substances were visible in the water.
	Option J is incorrect	One of the substances disappeared in the water.

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Item#	Rationale	
23	Option D is correct	The fossil can give clues to the environment in which the plant lived because similar plants living today likely live in similar environments.
	Option A is incorrect	The fossil cannot give clues to the average monthly rainfall but can give clues as to whether the environment was rainy.
	Option B is incorrect	The fossil cannot help scientists to answer the question about how much water was absorbed by the roots of the plant but can tell scientists if the plant lived in a rainy environment.
	Option C is incorrect	The fossil cannot help scientists to answer how much oxygen was in the atmosphere surrounding the plants but can tell scientists that the plant produced oxygen based on similar plants living today.

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Item#	Rationale	
24	Option H is correct	The sun is made mostly of hydrogen and helium.
	Option F is incorrect	The sun is made mostly of gases and is not solid.
	Option G is incorrect	The sun rotates about once every 25 days at the equator and every 36 days at the poles. Earth rotates once every 24 hours.
	Option J is incorrect	The sun is about 100 times the diameter of Earth and has a greater gravitational pull than Earth.



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25	Option D is correct	A volcanic island can form in a matter of days.
	Option A is incorrect	U-shaped valleys are formed by glaciers and may take thousands of years to form.
	Option B is incorrect	The formation of caves takes hundreds or thousands of years.
	Option C is incorrect	Mountain ranges take millions of years to form.

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Item#	Rationale	
26	Option H is correct	The feature that the animals have in common that would most likely help them to survive is sharp claws to dig in sand and find food.
	Option F is incorrect	Small eyes would not help the animals see better at night and therefore would not help them to survive.
	Option G is incorrect	Tough skin to keep the animals warm would not help the organisms to survive in hot climates.
	Option J is incorrect	It is unlikely that the animals want to attract predators because attracting predators would not help them to survive.

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Item#	Rationale	
27	Option B is correct	Observation 3 describes an interaction between the fish and a plant which are both living parts of the environment.
	Option A is incorrect	Observation 2 describes an interaction between a snail (living) and a rock (nonliving).
	Option C is incorrect	Observation 5 describes an interaction between fish (living) and air bubbles (nonliving).
	Option D is incorrect	Observation 6 describes an interaction between a snail (living) and a wall of the aquarium (nonliving).

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Item#	Rationale	
28	Option J is correct	The resources are correctly classified as renewable (taking a short time to form) and nonrenewable (taking a very long time to form).
	Option F is incorrect	Coal takes a long time to form and is nonrenewable.
	Option G is incorrect	Coal, petroleum, and natural gas take a long time to form and are nonrenewable. Plants and animals are considered renewable because they do not take a long time to form.
	Option H is incorrect	Air and water are considered to be renewable as they do not take a long time to form.

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Item#	Rationale	
29	Option B is correct	The statements are correctly classified as weather and climate; weather describes short-term conditions, and climate describes long-term conditions of the atmosphere.
	Option A is incorrect	The high temperature for one day is a statement about weather.
	Option C is incorrect	The statements for weather and climate are reversed.
	Option D is incorrect	The statements for weather and climate are reversed.

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Item#	Rationale	
30	Option H is correct	Material 3 could be cardboard because it does not conduct electrical energy, but it does float in water and insulate thermal energy. Material 4 could be aluminum because it does conduct electrical energy but does not insulate thermal energy or float in water.
	Option F is incorrect	Material 2 could not be cardboard because cardboard cannot conduct electricity.
	Option G is incorrect	Material 3 cannot be copper because copper conducts electricity.
	Option J is incorrect	Material 4 cannot be a rubber ball because rubber does not conduct electricity.

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Item#	Rationale	
31	Option D is correct	Aquatic environments are water environments. The special flaps help otters survive in aquatic environments by stopping water from entering their nostrils and ears.
	Option A is incorrect	Terrestrial environments are land environments. The special flaps would not be as useful to an animal that lives on land because there is less water in terrestrial environments than in aquatic environments.
	Option B is incorrect	The special flaps would not be as useful to an animal that lives in the snow because the flaps will not keep the otter warm in cold weather.
	Option C is incorrect	The special flaps would not be as useful to an animal in the wind because wind is not a problem for survival.

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Item#	Rationale	
32	Option H is correct	The imitation of a dog barking is a learned behavior.
	Option F is incorrect	Flapping wings is an inherited trait.
	Option G is incorrect	The loud scream is an inherited trait.
	Option J is incorrect	Tucking its head under its wings to sleep is an inherited trait.



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Item#	Rationale	
33	Option B is correct	Mechanical energy comes from the motion of an object. All of the activities require mechanical energy.
	Option A is incorrect	Thermal energy is the energy that comes from heat. Thermal energy is not required for the activities.
	Option C is incorrect	Electrical energy is the flow of energy that comes from an electric charge. Electrical energy is not required for the activities.
	Option D is incorrect	Sound energy is the type of energy formed when an object vibrates. Sound energy is not required for the activities.

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Item#	Rationale	
34	Option F is correct	Sand dunes are shaped and moved by wind, which can move the sand over the road. The fence helps to stop the sand from covering the road.
	Option G is incorrect	Deltas are formed by rivers, so the fence cannot prevent the formation of a delta.
	Option H is incorrect	The fence will not prevent water from flowing onto the road.
	Option J is incorrect	The fence will not prevent marine animals, such as seagulls, from nesting in the dune.

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Item#	Rationale	
35	Option C is correct	Building a road would remove some of the habitat. Smaller habitats (less space to live) support fewer animals because there are not as many resources needed to support greater numbers of animals.
	Option A is incorrect	Building a road will most likely increase soil erosion because there will be fewer plants to hold the soil with their roots to prevent the soil from washing away (erosion).
	Option B is incorrect	Building a road is unlikely to have a great effect on precipitation because water can evaporate from other areas and form clouds.
	Option D is incorrect	Building a road will most likely reduce plant reproduction because there will be less soil in which the plants can grow.

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36	Option F is correct	Observations 1, 3, and 6 are inherited traits.
	Option G is incorrect	Observation 4 is most likely a learned behavior.
	Option H is incorrect	Observation 5 is most likely a learned behavior.
	Option J is incorrect	Observation 5 is most likely a learned behavior.