

STAAR Spring 2024 Grade 5 Science Rationales

Item Position	Rationale	
1	Option A is correct	The sun is much bigger than Earth, just as a beach ball is much bigger than a marble, and Earth is bigger than the moon, just as a marble is bigger than a pea.
	Option B is incorrect	Earth, the sun, and the moon are not the same size, so each should not be represented by a basketball.
	Option C is incorrect	The moon is neither larger than Earth nor the sun, so the moon should not be represented by a football, which is larger than both a golf ball and a grain of sand.
	Option D is incorrect	Earth and the moon are not the same size, and the moon should be represented by an object that is smaller than a baseball.

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2	Option D is correct	A pedestal or mushroom rock formation is caused by weathering and wind erosion. When the wind blows, sand particles, being heavy, travel along the surface, near the base of the formation, and remove small particles of rock from the base.
	Option A is incorrect	Glacial movement does not cause a pedestal or mushroom rock formation. Glacial movement usually creates U-shaped valleys.
	Option B is incorrect	Volcanic eruptions do not cause a pedestal or mushroom rock formation. Volcanoes usually create calderas and lava flows.
	Option C is incorrect	Coastal waves do not cause a pedestal or mushroom rock formation. Also, the item says this landform was found in the desert, not on a coast.

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Item Position	Rationale	
3	Part A	
	Option D is correct	The water in the cup made of Material 4 had the highest temperature at 4 minutes; therefore, Material 4 will keep a hot drink warm for the longest time.
	Option A is incorrect	Material 1 would not keep a hot drink warm as well as Material 4 would, since at 4 minutes the temperature of the water in the cup made of Material 1 was lower than the temperature of the water in the cup made of Material 4.
	Option B is incorrect	Material 2 would not keep a hot drink warm as well as Material 1 or 4 would.
	Option C is incorrect	Material 3 would keep a hot drink warm for the least amount of time because, at 4 minutes, the temperature of the water in the cup made of Material 3 was lower than the temperature of the water in all the other cups.
	Part B	
	Option A is correct	The better a material is at insulating thermal energy, the better it will retain heat.
	Option B is incorrect	A thermal conductor allows the flow of thermal energy and therefore does not retain heat.
	Option C is incorrect	A thermal conductor does not conduct thermal energy in only one direction. Even if it did, conducting thermal energy away from the cup would make the drink cool more quickly.
	Option D is incorrect	To keep the drink warm thermal energy must be prevented from leaving the cup. Preventing thermal energy from entering the cup is unrelated to how long the drink will stay warm.

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Item Position	Rationale	
4	Option A is correct	In Container 3 there are no roots in the soil to hold onto the soil. Therefore, the water in the cup is dark and the cup is full. This is evidence of soil erosion.
	Option B is incorrect	There is no evidence to suggest that the number of rocks in the soil might increase.
	Option C is incorrect	This investigation does not provide any data about the number of invasive species in the area.
	Option D is incorrect	This investigation does not provide any data about how construction affects runoff.

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Item Position	Rationale	
5	The student selects L1	When Switch 1 is closed, a complete circuit that includes Lightbulb 1 is formed, and therefore Lightbulb 1 will glow. Even though Switch 3 is closed, there is no connection to Lightbulb 2, Lightbulb 3, or Lightbulb 4, because Switch 2 remains open, so a complete circuit does not form for those lightbulbs.

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Item Position	Rationale	
6	Option C is correct	The fossils will likely reveal at least whether the area was covered with salt water, freshwater, or no water.
	Option A is incorrect	The fossils by themselves will likely not reveal the depth of the water that was present.
	Option B is incorrect	Fossils will likely not provide this type of information about the present.
	Option D is incorrect	Because fossils are evidence of species that lived long ago, they cannot necessarily be used to determine the present-day conditions in an area.

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Item Position	Rationale	
7	Option D is correct	Using energy from the sun, plants make their own food through photosynthesis. Light from the sun is the source of all the energy flowing through most food webs.
	Option A is incorrect	Only humans and bald eagles depend on the fish for energy.
	Option B is incorrect	Nutrients (fertilizer) can help with plant growth and development, but plants need sunlight to make their own food. All the animals in this food web get energy from other organisms, not from nutrients from the ground.
	Option C is incorrect	Energy is transferred from the water plants to the mayflies. The mayflies do not get energy from the water.

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Item Position	Rationale	
8	Option C is correct	The sun sets in the west; therefore, at Point Z, the sun is setting. So around midafternoon (3:00 p.m.), the sun will appear to be at Point Y.
	Option A is incorrect	The sun will appear to be at Point W around midmorning.
	Option B is incorrect	The sun will be near its highest point in the sky (Point X) around noon.
	Option D is incorrect	The sun will appear to be at Point Z around sunset or in the late afternoon, not in the midafternoon.

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Item Position	Rationale	
9	Option A is correct	The two wolves evolved different physical characteristics through natural selection. Certain characteristics that help the species survive and successfully reproduce in their environment were passed down from generation to generation.
	Option B is incorrect	It is unlikely that an organism would be able to move to a new environment that would be well-suited to the organism's traits. Organisms with traits well-suited for their environment are developed through natural, random variation in the species. The random traits that improve the organism's adaptation to the environment help the individual organism survive and reproduce and are then passed on to offspring.
	Option C is incorrect	Organisms cannot choose their traits. Traits are influenced by environmental factors. Favorable traits that help a species survive in a given environment will be passed to the next generation.
	Option D is incorrect	Each wolf type has certain favorable adaptations that help it survive and successfully reproduce in its environment.

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Item Position	Rationale	
10	Option B is correct	When light leaves the water, it refracts, causing the appearance of the coin to change.
	Option A is incorrect	Light reflected from the surface of the water will not create the image of the coin at the bottom of the pool.
	Option C is incorrect	This statement is not true, because the light can be refracted after it is reflected.
	Option D is incorrect	If the light were absorbed by the water, then the image of the coin would not be seen.

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Item Position	Rationale	
11	Option C is correct	The student uses sound energy to hear the toy car travel across the room.
	Option D is correct	The student uses light energy to see the toy car.
	Option A is incorrect	The toy car runs on electricity, but the student uses light energy and sound energy to see and hear the toy car.
	Option B is incorrect	The toy car's motion is mechanical energy, but the student uses light energy and sound energy to see and hear the toy car.
	Option E is incorrect	The toy car produces heat as it runs on electricity, but the student uses light energy and sound energy to see and hear the toy car.

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Item Position	Rationale	
12	Option A is correct	The ducks have learned that students feed them often and have learned to expect food. The person has also learned how to balance and perform tricks on a skateboard.
	Option B is incorrect	Butterflies naturally land on flowers, and it isn't a behavior that needs to be learned. Likewise, squirrels don't need to learn to run up trees.
	Option C is incorrect	Dogs bark at other dogs naturally, and the behavior does not need to be learned. The behaviors in Observations 2 and 6 also occur naturally and do not need to be learned.
	Option D is incorrect	While the behaviors in Observations 1 and 5 are learned behaviors, squirrels do not need to learn to run up trees.

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Item Position	Rationale	
13	From left to right: condensation, gas, liquid	The water droplets forming on the ceiling of the greenhouse are a result of the water vapor (gas) rising from the floor and forming a liquid. This process is known as condensation.

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Item Position	Rationale	
14	Option D is correct	Rabbits and rats compete for plants.
	Option A is incorrect	Snakes and lizards do not directly compete for resources. According to this food web, the primary food source for lizards is butterflies, and the primary food source for snakes is rats.
	Option B is incorrect	Butterflies do not compete for food with golden eagles. Golden eagles do not consume plants.
	Option C is incorrect	Rats and snakes do not compete. Rats are prey for snakes.

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Item Position	Rationale	
15	2 pts	The student identifies that, by having water erode sand as it travels downhill and deposits the sand at the bottom, the students are modeling erosion and deposition of sediment.
	1 pt	The student answers half of the question correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
16	Option D is correct	The data show that frogs and toads hatch their eggs much more quickly than turtles and birds.
	Option A is incorrect	There are no data in the table about the life span of any of the animals.
	Option B is incorrect	There are no data given about the lengths of the other stages of the life cycle, so this conclusion cannot be drawn from the data.
	Option C is incorrect	The number of eggs laid is not given in the data table.

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Item Position	Rationale	
17	Option A is correct	A screen can filter out the large chunks of gravel. The iron filings will be attracted to the magnet. Finally, filter paper can be used to separate the water from any dust or debris that may be in the water.
	Option B is incorrect	Small bits of gravel will make it through the funnel.
	Option C is incorrect	A hot plate cannot be used to remove iron filings from the mixture.
	Option D is incorrect	Gravel is best separated using a screen, and water is best separated by using filter paper.

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Item Position	Rationale	
18	Option B is correct	The lightbulb is part of a closed circuit, so it glows; the bell is part of an open circuit, so it does not ring.
	Option A is incorrect	The bell is part of an open circuit, so it does not ring.
	Option C is incorrect	The lightbulb glows, and the bell does not ring.
	Option D is incorrect	The lightbulb is part of a closed circuit, so it glows.

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Item Position	Rationale	
19	Option D is correct	The force with which the ball is thrown is the independent variable, and the height of the splash is the dependent variable. The three other variables must be controlled.
	Option A is incorrect	The weight and type of ball should be controlled variables. The force with which the ball is thrown is the independent variable, and the height of the splash is the dependent variable.
	Option B is incorrect	The independent and dependent variables should be swapped. The force with which the ball is thrown is the independent variable, and the height of the splash is the dependent variable.
	Option C is incorrect	The weight and type of ball should be controlled variables. The force with which the ball is thrown is the independent variable, and the height of the splash is the dependent variable.

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Item Position	Rationale	
20	Option C is correct	Each worker bee is living, and the tree is also living.
	Option A is incorrect	The shed is not living.
	Option B is incorrect	The water trough, the ground, and the weather are not living.
	Option D is incorrect	Wax is not living.

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Item Position	Rationale	
21	Option D is correct	The average temperature and amount of rainfall over a 30-year period will provide patterns that allow the student to research the climate in that area.
	Option A is incorrect	Wind speed is a result of daily weather.
	Option B is incorrect	Rainfall is a result of current weather.
	Option C is incorrect	The total rainfall and average wind speed over a single month are more related to the weather that month than to the overall climate.

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Item Position	Rationale	
22	2 pts	Clockwise, starting from the top: Weathering, Erosion, Deposition, Compaction, Cementation
	1 pt	Half or more than half of the answer is correct.
	0 pt	Less than half of the answer is correct.

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Item Position	Rationale	
23	Part A	
	Option D is correct	Apples have their seeds dispersed by animals that eat the fruit and carry the seeds away in their digestive tracts. Fruit-bearing trees do not have to compete for resources with their offspring.
	Option A is incorrect	Apple trees do not have easier access to surface water than mosses do.
	Option B is incorrect	Apples are large fruits that are not easily carried by wind. Apple seeds are dispersed by animals that eat the fruit and carry the seeds away in their digestive tracts.
	Option C is incorrect	Apple trees have a longer life span than mosses do.
	Part B	
	Option C is correct	The parent tree and offspring will not compete for resources if the offspring grow farther away from the parent. This is possible since seeds are dispersed in different areas by animals.
	Option A is incorrect	Apples are generally not dispersed by wind.
	Option B is incorrect	Apple trees have a longer life span than mosses do, and the length of a life span does not lead to an increase in the growth and development of the apples.
	Option D is incorrect	Trees and mosses have equal access to surface water.

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Item Position	Rationale	
24	Option B is correct	The sun's light reflects off the trees and then reflects off the water and to the observer's eye.
	Option A is incorrect	The trees do not produce visible light.
	Option C is incorrect	In general, trees do not refract light. Even if the trees did, that refracted light would not be responsible for the reflected light on the surface of the water.
	Option D is incorrect	Light does not "refract from the water"; it reflects off the surface of the water. Additionally, the light follows a path opposite to the one described to make the reflection of the trees appear on the surface.

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Item Position	Rationale	
25	Option D is correct	Object X is the least dense because it floats on top of the water. Therefore, the water is more dense than Object X. Object Y is more dense than the water because it sank to the bottom of the container. Finally, Liquid 2 is the most dense because Object Y is floating on it.
	Option A is incorrect	Object Y is not less dense than the water, because Object Y sank to the bottom of the water.
	Option B is incorrect	Object X is less dense than the water because Object X is floating on top of the water. Also, Liquid 2 is the most dense.
	Option C is incorrect	Object X is less dense than the water because Object X is floating on top of the water.

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Item Position	Rationale	
26	Option A is correct	Gravity pulls the student down, causing the student to speed up when moving from Position A to Position B.
	Option B is incorrect	Since gravity is pulling the student down, the student is slowing down when moving from Position B to Position C.
	Option C is incorrect	Since the student is swinging, the student does not stop at Position B.
	Option D is incorrect	The force of the student pulling down on the swing does not affect the forward-and-backward motion of the swing and is also not responsible for the brief stop at Position A as the student changes direction.

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Item Position	Rationale	
27	Option B is correct	Deltas are triangular landforms found at the mouths of rivers. They are caused by the river water slowing as it meets the ocean. Gravity causes the sediments carried by the water to be deposited, with the heavier sediments being deposited first.
	Option A is incorrect	The sediment that forms a delta is carried downstream by the river and deposited as the current slows at the mouth of the river.
	Option C is incorrect	The river water slows down at the mouth, which results in deposition.
	Option D is incorrect	Sediment deposited during delta formation is carried from the river toward the ocean, not away from it.

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Item Position	Rationale	
28	Option C is correct	Both Animals 1 and 3 have methods of staying cool in a hot environment, and Animal 3 is able to absorb water through its skin.
	Option A is incorrect	Animal 2 has claws for climbing trees and is able to jump between trees. In an environment where there is low rainfall, there are not likely to be many trees.
	Option B is incorrect	Animal 4 depends on water to get its oxygen. This animal would not survive in a hot environment with low rainfall.
	Option D is incorrect	Animal 3 may live in the environment described, but because of the low rainfall in the environment, Animal 4 would not.

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Item Position	Rationale	
29	Option D is correct	All these objects require electricity to function, so when they are unplugged or turned off, an electric circuit that was closed is opened. The hair dryer and fan use mechanical energy when their blades are turning. When turning off the radio, the student uses mechanical energy to push a button or turn a knob.
	Option A is incorrect	Electrical energy is involved in all these activities, but sound energy is not involved in turning off a ceiling fan.
	Option B is incorrect	Light energy is not used in any of these activities.
	Option C is incorrect	Mechanical energy is involved in all these activities, but sound energy is not involved in turning off a ceiling fan.

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Item Position	Rationale	
30	Option A is correct	The sand helps keep the soil loose and ensures there are tiny spaces between particles so that water can more easily flow through the soil and improve drainage.
	Option C is correct	Humus adds important nutrients, such as nitrogen, to the soil; these nutrients help plants grow.
	Option B is incorrect	Silt cannot increase the size of sand particles.
	Option D is incorrect	If temperatures are high enough, the water will evaporate despite the humus.
	Option E is incorrect	Silt does not prevent roots from growing into the soil. If it did, then that would harm the plant.

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Item Position	Rationale	
31	Option D is correct	Sugar will keep its sweetness in solution.
	Option A is incorrect	Dissolving the sugar breaks down its crystal structure.
	Option B is incorrect	Sugar in solution is transparent.
	Option C is incorrect	The temperature of the sugar may change depending on the temperature of the water.

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Item Position	Rationale	
32	Option C is correct	Observations 1, 3, and 5 all describe inherited traits that are passed down from the parents.
	Option A is incorrect	Sleeping on a windowsill is not a trait passed down from the parents.
	Option B is incorrect	Observations 2, 4, and 6 all describe learned behaviors that are not passed down from the parents.
	Option D is incorrect	Playing with a ball of yarn is a learned behavior.