

2021 Grade 5 Science Rationales

Item#	Rationale	
1	Option C is correct	Thermal energy is the only type of energy listed that can cause water to change from a liquid to a gas.
	Option A is incorrect	Light energy from streetlights will not cause water to evaporate.
	Option B is incorrect	Sound energy from passing cars will not cause water to evaporate.
	Option D is incorrect	Mechanical energy from nearby streets will not cause water to evaporate.

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Item#	Rationale	
2	Option F is correct	Earth makes a complete rotation on its axis once every 24 hours.
	Option G is incorrect	30 days is about the time for the moon to complete its cycle of phases.
	Option H is incorrect	60 minutes is the time it takes for one hour to pass.
	Option J is incorrect	365 days is about the time for Earth to complete one revolution around the sun.

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Item#	Rationale	
3	Option D is correct	The light was not visible past the mirror because a mirror is not transparent, and light will not pass through it.
	Option A is incorrect	This statement is incorrect. Light can travel very long distances.
	Option B is incorrect	Although some light is absorbed and most of the light is reflected, the light cannot be seen past the mirror because the mirror does not allow light to pass through it.
	Option C is incorrect	A mirror reflects most of the light. In order for the light to be refracted, it would have to pass through the mirror.

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Item#	Rationale	
4	Option G is correct	Sample 2 conducts electricity and heat, is not soluble in water, and is a solid at room temperature, which are characteristics of metals.
	Option F is incorrect	Sample 1 is soluble in water, and plastics are not soluble in water.
	Option H is incorrect	There is not enough information given in the table to determine if Sample 3 is attracted to magnets.
	Option J is incorrect	There is not enough information given in the table to determine the density of Sample 4.

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Item#	Rationale	
5	Option D is correct	The wagon will slow when the friction is opposite of the direction of the force applied.
	Option A is incorrect	The force of gravity pulls objects down and would not act in the same direction of the arrow.
	Option B is incorrect	A force in the same direction as the arrow would make the wagon continue to move.
	Option C is incorrect	The force of gravity pulls objects down and would not act in the opposite direction of the arrow.

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Item#	Rationale	
6	Option F is correct	A bear looking in a trash can for food is a learned behavior because bears must learn that food can be found inside trash cans. This is the behavior that is incorrectly classified.
	Option G is incorrect	An owl being active at night is an inherited trait, so this behavior is correctly classified.
	Option H is incorrect	A dog coming when its name is called is a learned behavior because the dog must learn what its name is. This behavior is correctly classified.
	Option J is incorrect	A squirrel getting seeds from a bird feeder is a learned behavior because the squirrel must learn that it can get seeds from the bird feeder. This behavior is correctly classified.

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Item#	Rationale	
7	Option B is correct	Canyons and mesas are both formed from wind and water erosion. Mesas are part of a plateau that has been eroded. Canyons are v-shaped, which means they were formed by water.
	Option A is incorrect	Glaciers carve valleys to make a u-shape and do not form mesas.
	Option C is incorrect	Mesas are part of plateaus, which form differently than mountains.
	Option D is incorrect	Canyons and mesas are also found in areas that are not deserts.

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Item#	Rationale	
8	Option J is correct	Only one bulb will be lit when a wire is added between the right post of the top bulb and the left post of the bottom right bulb because only one light will be on a complete circuit.
	Option F is incorrect	If a wire is added from the top bulb to Switch 2, and another wire from Switch 1 to Switch 2, then no bulbs will light.
	Option G is incorrect	If a wire is added from the left post of the top bulb to the left post of the bottom right bulb, then two bulbs will light.
	Option H is incorrect	If a wire is added from the right post of the top bulb to Switch 1, then no bulbs will light.

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Item#	Rationale	
9	Option B is correct	According to the food web, swamp rabbits, hermit crabs, and swamp sparrows obtain their energy from plants, which produce their own food.
	Option A is incorrect	According to the food web, bald eagles and spotted sandpipers obtain their energy from other animals and do not directly eat plants.
	Option C is incorrect	According to the food web, phytoplankton produce their own food.
	Option D is incorrect	Wiregrass, clover grass, and phytoplankton produce their own food.

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Item#	Rationale	
10	Option H is correct	The lamp uses batteries to produce electrical energy that provides light.
	Option F is incorrect	Even though the lamp is clamped to the counter by using mechanical energy, it is not using mechanical energy to produce light.
	Option G is incorrect	Even though the lamp produces thermal energy that warms the water, it is not the energy that produces light.
	Option J is incorrect	Even though the lamp may vibrate and produce sound when clicked on, sound energy is not the energy that produces the light from the lamp.

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Item#	Rationale	
11	Option A is correct	When water vapor touches the cool glass, it cools and condenses, forming drops of water on the outside of the glass.
	Option B is incorrect	The water on the outside of the glass is formed when water vapor cools, not from the liquid water already present in the glass.
	Option C is incorrect	The water on the outside of the glass is formed when water vapor cools, not from the liquid water already present in the glass.
	Option D is incorrect	Glass does not allow water to pass through. It would not be a good material for a container if water could pass through the glass.

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Item#	Rationale	
12	Option H is correct	The moon is about $\frac{1}{4}$ the diameter of Earth. The marble shown is about $\frac{1}{4}$ the size of the tennis ball.
	Option F is incorrect	The moon and Earth are not about the same size as shown by the basketball and soccer ball.
	Option G is incorrect	The moon and Earth are not about the same size, as shown by the baseball and tennis ball.
	Option J is incorrect	The moon is not larger than Earth, as shown by the golf ball and the baseball.

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Item#	Rationale	
13	Option B is correct	By comparing the teeth of the dinosaur to animals alive today, scientists can determine which type of food the dinosaur most likely ate.
	Option A is incorrect	Skin is not often preserved as a fossil because it is too soft.
	Option C is incorrect	The head of the fossil dinosaur is not likely to give a clue as to how fast the heart was beating.
	Option D is incorrect	Fossilized eggs have been found, but the fossilized head of the dinosaur will not give a clue about how many eggs are in the nest.

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Item#	Rationale	
14	Option F is correct	The order of the planets from the sun to Earth are Mercury, then Venus.
	Option G is incorrect	Mercury is the first planet from the sun and Venus is the second planet from the sun. Earth is the third planet from the sun.
	Option H is incorrect	Mercury is the closest planet to the sun, and Venus is the second planet from the sun.
	Option J is incorrect	Earth is the third planet from the sun, not Mercury. Mercury is the closest planet to the sun, not Venus.

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Item#	Rationale	
15	Option D is correct	Bird 1 has toes and a beak that are best suited for trees in a forest. Bird 2 has toes and a beak that are best suited for the muddy waters of a marsh. Bird 3 has toes and a beak that are best suited for a grassland environment with few trees. Bird 4 has toes and a beak that are best suited for a body of water such as a pond.
	Option A is incorrect	Bird 1 is not well suited for a prairie, where few trees are found.
	Option B is incorrect	Bird 4 would need a water environment such as a pond, which would be more difficult to find in a prairie.
	Option C is incorrect	Bird 1 is not well suited for a prairie, where few trees are found.

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Item#	Rationale	
16	Option J is correct	All of the objects are solids, and they do not dissolve in water.
	Option F is incorrect	The objects are all solids, but they do not conduct electricity.
	Option G is incorrect	The objects are not metals, so they do not conduct electricity and are not magnetic.
	Option H is incorrect	The objects are not metals, so they cannot be magnetic.

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Item#	Rationale	
17	Option B is correct	The life cycle of the oak tree and the life cycle of the lady beetle both show that they go through a series of changes.
	Option A is incorrect	The life cycle of the oak tree and the life cycle of the lady beetle do not show how much energy is used by the organisms in their series of changes.
	Option C is incorrect	The life cycle of the oak tree and the life cycle of the lady beetle do not show how the organisms can adapt to changes in the environment.
	Option D is incorrect	The life cycle of the oak tree and the life cycle of the lady beetle do not show a relationship between the oak tree and the lady beetle.

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Item#	Rationale	
18	Option H is correct	When salt water evaporates because of the sun's energy, all of the salts are left behind.
	Option F is incorrect	Rain falls on the ocean as well as on the land.
	Option G is incorrect	Water can evaporate during the nighttime.
	Option J is incorrect	It cannot be said that precipitation will happen less often because precipitation is part of the water cycle.

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Item#	Rationale	
19	Option B is correct	Based on the food web, zebras feed on plants, and cheetahs feed on zebras.
	Option A is incorrect	Based on the food web, barn owls feed on moles, not on termites.
	Option C is incorrect	Based on the food web, spotted hyenas feed on zebras and gemsboks, not on termites.
	Option D is incorrect	Based on the food web, Grant's golden moles feed on termites, not on gemsboks.

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Item#	Rationale	
20	Option F is correct	All of the lights are on because all of the lights are connected to each other. Light one is connected to the battery, and the left switch is closed.
	Option G is incorrect	Lights three and four are also on because they are part of a complete circuit.
	Option H is incorrect	Lights one and two are also on because they are part of the circuit. They are connected to each other and to a battery, and the switch is closed.
	Option J is incorrect	All of the lights will be lit.

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Item#	Rationale	
21	Option C is correct	The water vapor in the air condenses on the chilled fruit. Sugar dissolves in this water. The sugar could no longer be seen because the sugar dissolved in the water.
	Option A is incorrect	The sugar will not evaporate.
	Option B is incorrect	If the sugar settled to the bottom of the container, it could still be seen.
	Option D is incorrect	Inside the refrigerator the temperature is too cold to melt sugar.

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Item#	Rationale	
22	Option F is correct	The hummingbird interacts with a flower in statement 1. The flower and the hummingbird are both living. A cactus wren eats seeds from a cactus fruit in statement 4. The wren and the cactus are both living. A bear scratches its back against a tree in statement 6. The bear and the tree are both living.
	Option G is incorrect	A fish absorbs oxygen through its gills in statement 3. Oxygen is not living. A sea star clings to a rock in a tidal pool in statement 5. A rock is not living.
	Option H is incorrect	A lizard burrows into the sand in statement 2. Sand is not living. A sea star clings to a rock in a tidal pool in statement 5. A rock is not living.
	Option J is incorrect	A lizard burrows into the sand in statement 2. Sand is not living. A fish absorbs oxygen through its gills in statement 3. Oxygen is not living.

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Item#	Rationale	
23	Option C is correct	The first diagram shows 11 hours of daytime. There are about 24 hours in a day-night cycle, so the hours of nighttime would be 13. $11 + 13 = 24$.
	Option A is incorrect	The first diagram shows 11 hours of daytime. There are about 24 hours in a day-night cycle, so the hours of nighttime would be 13. $11 + 13 = 24$. 11 hours of nighttime would only be 22 hours of the day-night cycle, not 24.
	Option B is incorrect	The first diagram shows 11 hours of daytime. There are about 24 hours in a day-night cycle, so the hours of nighttime would be 13. $11 + 13 = 24$. 12 hours of nighttime would only be 23 hours of the day-night cycle, not 24.
	Option D is incorrect	The first diagram shows 11 hours of daytime. There are about 24 hours in a day-night cycle, so the hours of nighttime would be 13. $11 + 13 = 24$. 24 hours of nighttime would be 35 hours of the day-night cycle, not 24.

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Item#	Rationale	
24	Option G is correct	Object 1 shows the light bending or refracting when the light goes through it. Object 2 shows no light being reflected and no light going through it, so it is being absorbed. Object 3 shows the light bouncing off, so object 3 is reflecting the light.
	Option F is incorrect	Object 1 is refracting, not scattering, the light.
	Option H is incorrect	Object 1 is refracting the light, not reflecting the light. Object 3 is reflecting the light, not refracting the light.
	Option J is incorrect	Object 1 is refracting, not absorbing, the light. Object 2 is absorbing, not refracting, the light. Object 3 is reflecting, not scattering, the light.

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Item#	Rationale	
25	Option C is correct	The soil is deep enough for the white oak tree roots.
	Option A is incorrect	The soil is too thin for the white oak tree roots.
	Option B is incorrect	The soil is too rocky for white oak tree roots, and there doesn't seem to be enough rain.
	Option D is incorrect	The amount of rain appears to be too high and the soil too thin for white oak trees.

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Item#	Rationale	
26	Option J is correct	Sediments are deposited, compacted, and cemented to form sedimentary rocks.
	Option F is incorrect	Glaciers are formed from snow.
	Option G is incorrect	Mountains are formed from uplift and eruptions.
	Option H is incorrect	Sand dunes are formed from sand deposited by wind. Compaction and cementation would change the sand into sedimentary rock.

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Item#	Rationale	
27	Option D is correct	The cubes are floating or sinking in water because of their density compared to water.
	Option A is incorrect	The cubes are not described as dissolving in water.
	Option B is incorrect	The two cubes that both float in the middle of the beaker could have the same masses.
	Option C is incorrect	The two cubes that both float in the middle of the beaker could be made of the same material.

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Item#	Rationale	
28	Option G is correct	The construction of a six-lane highway through an ecosystem would reduce the number of places animals could live.
	Option F is incorrect	The competition for natural resources would be increased instead of reduced because there would be fewer resources available after the construction of the highway.
	Option H is incorrect	Air pollution would most likely increase instead of decrease due to more pollution from cars and fewer trees.
	Option J is incorrect	Water pollution would most likely increase instead of decrease due to increased littering.

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Item#	Rationale	
29	Option A is correct	Decreasing the height of the ramp will require less effort to move the masses.
	Option B is incorrect	Increasing the height of the ramp will require more effort to move the masses.
	Option C is incorrect	Adding an additional mass will require more effort to move the masses.
	Option D is incorrect	Pulling the spring scale with two hands will not reduce the effort needed to move the masses. The amount of force needed to move the masses will not change. There is less force per hand, but the total amount of force remains the same.

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Item#	Rationale	
30	Option J is correct	The number of tomatoes depends more on environmental conditions than on inherited traits.
	Option F is incorrect	The color of the flower is an inherited trait.
	Option G is incorrect	The shape of the leaves is an inherited trait.
	Option H is incorrect	The type of roots is an inherited trait.

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Item#	Rationale	
31	Option A is correct	Solar energy and wood are renewable, and petroleum, natural gas, and coal are nonrenewable.
	Option B is incorrect	Natural gas is a fossil fuel and is therefore nonrenewable. Wood is renewable.
	Option C is incorrect	Coal is a fossil fuel and is therefore nonrenewable. Solar energy is renewable.
	Option D is incorrect	Solar energy and wood are renewable. Petroleum, natural gas, and coal are nonrenewable.

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Item#	Rationale	
32	Option F is correct	Grams are a measure of mass. $45 + 40 = 85$ grams.
	Option G is incorrect	Milliliters are a measure of volume, not mass.
	Option H is incorrect	Grams are a measure of mass. The volume of the mixtures is 60 milliliters.
	Option J is incorrect	Milliliters are a measure of volume. The volume of the mixtures is 60 milliliters.

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Item#	Rationale	
33	Option D is correct	Plants provide oxygen for the snails.
	Option A is incorrect	Snails do not eat fish.
	Option B is incorrect	There is nothing that would eat the snails, so they do not need to hide.
	Option C is incorrect	Snails do not use carbon dioxide to breathe.

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Item#	Rationale	
34	Option G is correct	Deltas are formed when rivers slow and drop their sediment at the mouth of the river.
	Option F is incorrect	Rivers tend to move and deposit sediment instead of cementing them.
	Option H is incorrect	Deltas are formed by the accumulation of sediment, not the erosion of sediment.
	Option J is incorrect	Deltas are formed by rivers dropping sediment, not from ocean waves dropping sediment.

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Item#	Rationale	
35	Option B is correct	Sharp teeth help them to survive by catching food to eat. This answer focuses more on how to get food rather than on how to escape.
	Option A is incorrect	Paws that help them climb trees can help them escape predators.
	Option C is incorrect	Long tails that help them balance in trees can keep them from falling.
	Option D is incorrect	Good eyesight at night can help them see predators and perhaps avoid them.

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Item#	Rationale	
36	Option H is correct	Glaciers are very slow-moving "rivers" of ice.
	Option F is incorrect	Transport by rivers can take place very quickly, especially if the river is flooded.
	Option G is incorrect	Transport by winds can take place very quickly, especially if there is no protection for the topsoil.
	Option J is incorrect	Transport by ocean currents can take place very quickly.