

STAAR Spring 2024 Grade 8 Science Rationales

Item Position	Rationale	
1	Option A is correct	Mice and Beetles are the primary consumers because they eat grasses. Secondary consumers eat primary consumers. The hawks, bats, owls, raccoons, and dragonflies all eat primary consumers.
	Option B is incorrect	Other than mice and beetles, there are six organisms in the food web. But grasses do not eat primary consumers.
	Option C is incorrect	There are seven organisms above grasses in the food web, but this is not the number of organisms that feed on primary consumers.
	Option D is incorrect	There are a total of eight organisms in the food web, but this is not the number of organisms that feed on primary consumers.

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Item Position	Rationale	
2	Option B is correct	Contour lines are closest together in Area X, indicating a steep slope. The steep slope will cause more flowing water and therefore more erosion.
	Option A is incorrect	The contour lines at Area W are farther apart, so the water flow in Area W will be less than that in Area X.
	Option C is incorrect	Area Y is nearly flat land and will experience less water flow and therefore less erosion than Area X.
	Option D is incorrect	Area Z is a gentle slope and will not experience as much water flow as Area X.

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Item Position	Rationale	
3	Option A is correct	According to Newton’s third law, whenever an object exerts a force on a second object, the second object will exert an equal and opposite force on the first object.
	Option B is incorrect	The amount of force the floor exerts on the ball is equal to, not greater than, the amount of force the ball exerts on the floor.
	Option C is incorrect	The gym floor pushing up on the ball and gravity pulling down on the ball do not form an action-reaction pair. Also, these two forces are not equal in magnitude.
	Option D is incorrect	The gym floor pushing up on the ball and gravity pulling down on the ball do not form an action-reaction pair.

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Item Position	Rationale	
4	Option B is correct	Breaking an egg does not change any of the chemical properties of the egg. Therefore, it is a physical change.
	Option D is correct	When a popsicle freezes, the water molecules are still water molecules. The chemical structure is not changed. Therefore, this is a physical change.
	Option A is incorrect	When wood is burned, the chemical makeup of the wood is changed, and new products are formed. This is a chemical change.
	Option C is incorrect	When an egg is cooked, the yolk and the white are chemically changed.
	Option E is incorrect	When iron rusts, the chemical makeup of the iron is changed, and new products are formed. Therefore, this is a chemical change.

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Item Position	Rationale	
5	Option A is correct	Since the northern Hemisphere is tilted away from the sun, it is experiencing winter, and the Southern Hemisphere is experiencing summer. This means that the Southern Hemisphere experiences a longer period of daylight, and the Northern Hemisphere experiences a shorter period of daylight.
	Option B is incorrect	The Northern Hemisphere is not tilted toward the sun in the model.
	Option C is incorrect	The reasoning for this option is reversed. The length of daylight at Point X is shorter, not longer, than at Point Y.
	Option D is incorrect	The Northern Hemisphere is not tilted toward the sun in the model, and Point X experiences shorter, not longer, period of daylight, than Point Y.

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Item Position	Rationale	
6	2 pts	Proton charge and location: +1, Nucleus Neutron charge and location: 0, Nucleus Electron charge and location: -1, Energy levels
	1 pt	The student answers half of the questions correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
7	Option B is correct	When viewed from Earth, the moon appears to be a waning crescent moon when it is in Position X. This is because the dark portion of the moon is getting larger, and only a small amount of light can be seen on the left side of the moon.
	Option A is incorrect	When it is in Position W, the moon appears to be a waxing crescent moon. This is because, from Earth's perspective, the moon is mostly dark with a small amount of light on the right side, and that light portion is getting larger each day.
	Option C is incorrect	When it is in Position Y, the moon appears to be a waning gibbous moon. This is because, from Earth's perspective, the moon is mostly lit up, and the area covered by light is decreasing.
	Option D is incorrect	When it is in Position Z, the moon appears to be a waxing gibbous moon. This is because, from Earth's perspective, the moon is mostly lit up, and the area covered by light is growing.

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Item Position	Rationale	
8	2 pts	<p>The student identifies the nervous system and integumentary system AND explains how both systems interact to allow the student to feel the rain on their skin.</p> <p>Nervous system:</p> <ul style="list-style-type: none"> ▪ This system responds to internal and external stimuli (the rain falling onto the skin). ▪ The stimulus sends a signal to the brain that something cold and wet has touched the body, causing an external response (shivering). <p>Integumentary system:</p> <ul style="list-style-type: none"> ▪ This system is responsible for protecting the body and its organs. ▪ This system detects a stimulus (rain falling onto skin) and regulates body temperature (the shivering).
	1 pt	The student answers half of the questions correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
9	Option B is correct	Group 18 contains the noble gases, which are nonreactive.
	Option A is incorrect	Metals are typically solid at room temperature and cannot be classified as nonreactive.
	Option C is incorrect	Metalloids cannot be classified as nonreactive and are not gases at room temperature.
	Option D is incorrect	Members of Group 2 are metals, so they are typically solid at room temperature and cannot be classified as nonreactive.

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Item Position	Rationale	
10	Option C is correct	Honeybees pollinate 100% of almonds. Without honeybees, this plant may become extinct.
	Option A is incorrect	Many crops, such as peanuts, grapes, and soybeans, rely on various other pollinators to reproduce.
	Option B is incorrect	Apples rely heavily on honeybees for pollination. Honeybees pollinate only a small percentage of the peanut crop.
	Option D is incorrect	Many plants are adapted to specific pollinators.

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Item Position	Rationale	
11	Option D is correct	This graph shows that, when the time is equal to zero, the baseball player's distance from the base is zero. Also, as time increases, the distance from the base increases at an increasing rate.
	Option A is incorrect	This graph indicates that, when the time is equal to zero, the baseball player is a positive distance from the base. Also, the baseball player is moving at a constant speed, rather than accelerating.
	Option B is incorrect	This graph shows acceleration, but it also indicates that the baseball player is a positive distance from the base when the time is equal to zero.
	Option C is incorrect	This graph shows that the baseball player starts at a distance of zero when time is equal to zero. But it indicates that the player moves away from the base at a constant rate as the time increases. Therefore, this graph shows constant velocity and does not show acceleration.

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Item Position	Rationale	
12	Option C is correct	Organisms in Kingdom Animalia are multicellular, are heterotrophic, and have a nucleus.
	Option A is incorrect	Organisms in Kingdom Bacteria do not have a nucleus.
	Option B is incorrect	Fungi are not autotrophic.
	Option D is incorrect	Organisms in Kingdom Archaea are not multicellular.

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Item Position	Rationale	
13	Option D is correct	Burning fossil fuels increases the amount of carbon dioxide in the atmosphere. Using devices that use electricity in place of fossil fuels reduces this carbon dioxide, therefore decreasing the amount absorbed by ocean water.
	Option A is incorrect	Plants reduce the amount of carbon dioxide in the air, so cutting down trees will not help.
	Option B is incorrect	Farmland often grows many plants. Building on farmland means there will be fewer plants to remove carbon dioxide from the atmosphere.
	Option C is incorrect	Public transportation decreases the number of vehicles on the road. It is better to have one bus with many students than to have many cars emitting carbon dioxide into the atmosphere.

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Item Position	Rationale	
14	Option A is correct	Plants convert light energy to chemical energy for plant growth.
	Option B is incorrect	Plants do not convert thermal energy into light energy.
	Option C is incorrect	Plants do not convert thermal energy into mechanical energy.
	Option D is incorrect	Plants do not convert light energy into electrical energy.

Item Position	Rationale	
15	Part A	
	Option A is correct	Mountains form at convergent boundaries, and rift valleys form at divergent boundaries.
	Option B is incorrect	Rift valleys form at divergent boundaries; however, mountains form at convergent boundaries.
	Option C is incorrect	Mountains form at convergent boundaries, and rift valleys form at divergent boundaries.
	Option D is incorrect	Mountains form at convergent boundaries; however, rift valleys form at divergent boundaries. Landforms such as faults, trenches, and linear valleys may form at transform boundaries.
	Part B	
	Option D is correct	Mountains form at convergent boundaries, where tectonic plates move toward each other, and rift valleys form at divergent boundaries, where plates move away from each other.
	Option A is incorrect	Mountains form at convergent boundaries, where tectonic plates move toward each other (not away from each other), and rift valleys form at divergent boundaries, where plates move away from each other.
	Option B is incorrect	Mountains form at convergent boundaries, where tectonic plates move toward each other, and rift valleys form at divergent boundaries, where plates move away from each other (not the opposite).
	Option C is incorrect	Mountains form at convergent boundaries, where tectonic plates move toward each other, and rift valleys form at divergent boundaries, where plates move away from each other. When tectonic plates move past each other, it forms a transform boundary. Fault lines typically occur at transform boundaries.

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Item Position	Rationale	
16	Option D is correct	The force can be found by multiplying the total mass by the acceleration, $(10 \text{ kg} + 20 \text{ kg}) \times 2.5 \text{ m/s}^2 = 75 \text{ N}$.
	Option A is incorrect	This is equal to the total mass divided by the acceleration. The total mass should be multiplied by the acceleration.
	Option B is incorrect	The total mass is 30 kg. The force can be found by multiplying the total mass by the acceleration.
	Option C is incorrect	This is the larger mass multiplied by the acceleration. The force can be found by multiplying the total mass by the acceleration.

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Item Position	Rationale	
17	Option B is correct	Elements with the same number of valence electrons are in the same group and have similar reactivity. Therefore, they will have similar chemical properties.
	Option A is incorrect	Having the same number of neutrons does not play as much of a role in determining chemical properties as the number of valence electrons does.
	Option C is incorrect	Two atoms can have the same number of energy levels but be very different chemically if they have different numbers of valence electrons.
	Option D is incorrect	Having an even number of protons and electrons does not mean the elements will have similar properties, because properties are determined by the number of valence electrons.

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Item Position	Rationale	
18	Option B is correct	Similar fossils are found on various modern continents. This shows that the continents were most likely joined over 230 million years ago and slowly moved apart.
	Option A is incorrect	Fossils being found on the same continent does not help explain the movement of multiple continental plates. The time difference between the fossils is not relevant.
	Option C is incorrect	Fossils being found on the same continent does not help explain the movement of multiple continental plates. That the fossils were in the same time period does not account for the movement of multiple plates.
	Option D is incorrect	Fossils in the coastal regions are similar, not unique.

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Item Position	Rationale	
19	2 pts	From top to bottom: Comet, Meteor, Star, Comet or Meteor, Nebula
	1 pt	The student answers half of the questions correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
20	Option C is correct	The body shape does not form extensions, one end of the body forms a point, and the organism has one flagellum.
	Option A is incorrect	The body is not oval -shaped; one end of the body forms a point.
	Option B is incorrect	The body does have a flagellum.
	Option D is incorrect	The body does not have two flagella.

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Item Position	Rationale	
21	Option D is correct	Because there is less water and more salt being added to the soil, the native plant population will likely decrease.
	Option A is incorrect	Most native consumers do not eat salt cedar trees, so the number of consumers will not increase.
	Option B is incorrect	Salt cedar trees use more water than native species; therefore, the water levels in the soil will decrease.
	Option C is incorrect	Salt cedar trees add salt to the soil, so the salt levels will increase.

Item Position	Rationale	
22	Part A	
	Option B is correct	Acceleration of Cart X = $F_{\text{net}}/m = (15 \text{ N} - 10 \text{ N}) / 10 \text{ kg} = 0.5 \text{ m/s}^2$.
	Option A is incorrect	Acceleration of Cart W = $F_{\text{net}}/m = (15 \text{ N} - 10 \text{ N}) / 5 \text{ kg} = 1 \text{ m/s}^2$.
	Option C is incorrect	Acceleration of Cart Y = $F_{\text{net}}/m = (30 \text{ N} - 15 \text{ N}) / 5 \text{ kg} = 3 \text{ m/s}^2$.
	Option D is incorrect	Acceleration of Cart Z = $F_{\text{net}}/m = (30 \text{ N} - 15 \text{ N}) / 10 \text{ kg} = 1.5 \text{ m/s}^2$.
	Part B	
	Option C is correct	The net force equals the difference between the applied force and the frictional force, and when acting on the larger mass, it will cause the lower acceleration.
	Option A is incorrect	The net force equals the difference between, not the sum of, the applied force and the frictional force.
	Option B is incorrect	The net force equals the difference between, not the sum of, the applied force and the frictional force. Also, the larger mass, not the smaller, will undergo the lower acceleration for a given net force.
	Option D is incorrect	The larger mass, not the smaller, will undergo the lower acceleration for a given net force.

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Item Position	Rationale	
23	Option B is correct	A new moon occurs approximately every 29 days. 365 days divided by the number of days it takes between full moons (29 days) shows that 12.59 new moons can occur during a 365-day period. Therefore, there are about 13 new moons that can occur in 365 days
	Option A is incorrect	Eight is the number of lunar phases, not the number of new moons in a year.
	Option C is incorrect	Twenty-nine is the number of days between each new moon, not the number of new moons per year.
	Option D is incorrect	Thirty-one is the greatest number of days in a month, not the number of new moons in a year.

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Item Position	Rationale	
24	Option D is correct	Energy transfer from one trophic level to the next is not very efficient, as energy is lost at each level.
	Option A is incorrect	Producers directly provide energy only to primary consumers.
	Option B is incorrect	Primary consumers provide energy to the trophic level above them (secondary consumers) but not the level below them.
	Option C is incorrect	The secondary consumer trophic level does not contain the most energy. The producer level contains the most energy.

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Item Position	Rationale	
25	Option B is correct	Protons and neutrons contribute the most to the atomic mass.
	Option A is incorrect	Protons contribute to the atomic mass, but electrons do not significantly contribute.
	Option C is incorrect	Neutrons contribute to the atomic mass, but electrons do not significantly contribute.
	Option D is incorrect	Electrons do not significantly contribute to the atomic mass.

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Item Position	Rationale	
26	Option C is correct	One molecule of CH ₄ has 1 atom of carbon and 4 atoms of hydrogen, so 4 molecules have 4 atoms of carbon and 16 atoms of hydrogen.
	Option A is incorrect	One molecule of methane contains only 1 atom of carbon and 4 atoms of hydrogen. Four molecules of methane would contain 4 atoms of carbon and 16 atoms of hydrogen.
	Option B is incorrect	Four molecules of methane would contain 16 hydrogen atoms, not 1.
	Option D is incorrect	Four molecules of methane would contain only four atoms of carbon, not 16.

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Item Position	Rationale	
27	Option D is correct	The position of the moon as shown in the diagram would result in the lowest tide, 0.4 m, which occurred on May 26.
	Option A is incorrect	The position of the moon as shown in the diagram would result in the lowest tide, but the tide on May 15 was not the lowest.
	Option B is incorrect	The position of the moon as shown in the diagram would result in the lowest tide, but the tide on May 18 was the highest.
	Option C is incorrect	The position of the moon as shown in the diagram would result in the lowest tide, but the tide on May 22 was not the lowest.

Item Position	Rationale	
28	Option A is correct	There is more distance covered by the object in the first three seconds than in the last three seconds of the graph. This indicates a change in speed. The change in the slope of the line at 3 seconds also indicates a change in direction of the object which means the velocity is changing as well.
	Option B is incorrect	The graph shows that the speed and velocity change, because the slope changes and the object changes direction.
	Option C is incorrect	The speed does change from 3 m/s to 4.5 m/s, but the velocity also changes, because the object changes direction—it is moving away from the origin and then begins moving toward the origin.
	Option D is incorrect	The speed does change because the object moves at 3 m/s during the first 3 seconds and then moves at 4.5 m/s during the last 2 seconds.

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Item Position	Rationale	
29	2 pts	The student identifies the second and fifth characteristics from the top as two of the four principles of cell theory.
	1 pt	The student answers half of the questions correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
30	Option B is correct	Oceanic ridges and continental rift valleys occur at divergent plate boundaries (Boundary 1). Trenches and volcanoes occur at convergent plate boundaries (Boundary 2).
	Option A is incorrect	Continental rift valleys are formed at divergent plate boundaries, not convergent plate boundaries.
	Option C is incorrect	Oceanic ridges do not occur at convergent plate boundaries.
	Option D is incorrect	Trenches do not occur at divergent plate boundaries, and oceanic ridges do not occur at convergent plate boundaries.

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Item Position	Rationale	
31	Option A is correct	Metals such as nickel are malleable, while metalloids such as silicon are brittle.
	Option B is incorrect	Metals such as nickel are ductile, while metalloids such as silicon are not ductile.
	Option C is incorrect	Metals such as nickel are generally more conductive than metalloids such as silicon.
	Option D is incorrect	Metals (nickel) and metalloids (silicon) are both solid at room temperature.

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Item Position	Rationale	
32	Option A is correct	The snake populations' color patterns changed as they adapted to different environments.
	Option B is incorrect	The snakes may have migrated to different environments, but this does not directly explain the different colors.
	Option C is incorrect	Individuals cannot decide to change their traits. Individuals that have traits that help them survive will reproduce successfully and pass their traits on to their offspring.
	Option D is incorrect	Inherited traits are not deliberately chosen by individual organisms.

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Item Position	Rationale	
33	Option C is correct	The number of hydrogen atoms in the reactants is equal to the number of hydrogen atoms in the products. This provides evidence that the total mass is conserved.
	Option A is incorrect	While two new substances were formed, this does not give any information about the mass of the products and reactants, so no claim can be made about the conservation of mass.
	Option B is incorrect	While this statement is true, this information does not provide any information about the mass of the products and reactants, so no claim can be made about the conservation of mass.
	Option D is incorrect	While this statement is true, this information does not provide any information about the mass of the products and reactants, so no claim can be made about the conservation of mass.

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Item Position	Rationale	
34	2 pts	The diagram shows that the Northern and Southern Hemispheres experience different seasons at the same time, AND, the reason for the differences in seasons between the hemispheres is that Earth is tilted on its axis and revolves around the sun. As a result, one hemisphere of Earth is tilted toward the sun and experiences summer, while at the same time, the other hemisphere is tilted away from the sun and experiences winter.
	1 pt	The student answers half of the questions correctly.
	0 pt	The response is incorrect or irrelevant.

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Item Position	Rationale	
35	Option C is correct	The grasshopper mouse is competing with herbivores (wood rats and pallid-winged grasshoppers) for brittlebush. It is also competing with carnivores (elf owls) for grasshoppers.
	Option A is incorrect	The grasshopper mouse is not competing with producers for food.
	Option B is incorrect	Decomposers are not represented in this food web, so this conclusion cannot be drawn from the food web.
	Option D is incorrect	The grasshopper mouse is not competing with decomposers.

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Item Position	Rationale	
36	From left to right: 7 newtons, 8 newtons	The net force can be determined using Newton's second law: $F_{\text{net}} = ma = (1 \text{ kg})(1 \text{ m/s}^2) = 1 \text{ N}$. Since the net force is 1 newton, then the two correct labels should have a difference of 1 newton. The only options with a difference of 1 newton are "7 newtons" and "8 newtons." Since the net force is 1 newton to the west, then the 7-newtons option needs to go in the box on the left (pushing east) and the 8-newtons option needs to go in the box on the right (pushing west).

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Item Position	Rationale	
37	Option A is correct	Location X is much higher than Location Y, so the cart has more gravitational potential energy at Location X than it does at Location Y. The potential energy lost by the cart as it moves from Location X to Location Y is converted to kinetic energy, so the kinetic energy of the cart is greater at Location Y than it is at Location X.
	Option B is incorrect	There is more, not less, potential energy at Location X, and there is less, not more, kinetic energy at Location X than at Location Y.
	Option C is incorrect	The potential energy of the cart decreases as it moves from Location X to Location Y, and the kinetic energy increases. Therefore, the kinetic and potential energy at Location X cannot be the same as at Location Y.
	Option D is incorrect	The cart has less kinetic energy at Location X than it has at Location Y.

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Item Position	Rationale	
38	Option C is correct	Magnesium has 12 protons.
	Option A is incorrect	Carbon has 6 protons.
	Option B is incorrect	Chromium has 24 protons.
	Option D is incorrect	Zinc has 30 protons.