

2022 STAAR Grade 8 Science Rationales

Item #	Rationale	
1	Option C is correct	Sexual reproduction causes variations in genetic makeup. Even though the puppies all have the same two parents, they each have different combinations of the parents' genes. This results in some differences in observable physical characteristics, such as fur color patterns.
	Option A is incorrect	Asexual cloning would produce genetically identical offspring.
	Option B is incorrect	Offspring contain genetic material from both parents and not from only one parent.
	Option D is incorrect	It would be rare for seven puppies to come from the same fertilized egg. Puppies from the same fertilized egg would have nearly identical physical characteristics.

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2	Option F is correct	Both lithium (Li) and sodium (Na) are in Group 1 of the Periodic Table (located in the first column of the Periodic Table). Elements in the same group have the same number of valence electrons that determine their bonding behavior. Both Li and Na have 1 valence electron in their outer energy level (or electron shell).
	Option G is incorrect	The number of neutrons compared to the number of protons does not explain why the elements are chemically similar. Most stable isotopes have fewer protons than neutrons.
	Option H is incorrect	Li and Na each have a different number of energy levels. Li has two energy levels (or electron shells) and is classified in Period 2 of the Periodic Table, while Na has three energy levels and is classified in Period 3. Periods are indicated by rows in the Periodic Table.
	Option J is incorrect	If both atoms contained equal numbers of protons, they would be the same element.

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Item #	Rationale	
3	Option C is correct	The lines in the map are called contour lines. Contour lines help indicate elevation and steepness. The closer the contour lines are together, the steeper the slope. The close contour lines around location Y indicate a steep slope. As the steepness of a slope increases, the rate of erosion increases.
	Option A is incorrect	An area with little to no slope (or a gentle slope) would have less erosion.
	Option B is incorrect	The bottom of a slope would have some erosion, but not the most erosion, over time.
	Option D is incorrect	An area with little to no slope (or a flat slope) would have less erosion.

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Item #	Rationale	
4	Option G is correct	The Isoptera is the insect identified when the dichotomous key is followed correctly. A dichotomous key is a tool that helps scientists classify organisms. It consists of a series of steps with descriptions of physical characteristics. The absence or presence of a given characteristic at each step directs the user closer to the identification of the organism.
	Option F is incorrect	According to the dichotomous key, the insect would have one pair of wings, which is incorrect.
	Option H is incorrect	According to the dichotomous key, the insect would have triangular wings, which is incorrect.
	Option J is incorrect	According to the dichotomous key, the insect would have wings that are not a similar size and shape, which is incorrect.

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Item #	Rationale	
5	Option C is correct	Particles X and Y must consist of one proton (positive charge) and one neutron (no charge). Protons and neutrons are found in the nucleus at the center of the atom. Particle Z represents electrons, which have a negative charge. Electrons are found in orbitals outside the nucleus.
	Option A is incorrect	Three different types of particles are represented in the diagram. Particle X and particle Y represent different types of particles. Only protons and neutrons are bound in the nucleus of an atom. Neutrons have no charge. Therefore, both types of particles cannot have a positive charge. Either particle X or particle Y must be a neutron.
	Option B is incorrect	Only electrons have a negative charge. Electrons are not found in the nucleus at the center of an atom. Electrons are found in orbitals outside the nucleus. Therefore, particles X and Y could not have negative charges. Also, only protons have a positive charge. Protons are not found in the orbitals outside of the nucleus at the center of the atom. Therefore, particle Z could not have a positive charge.
	Option D is incorrect	Electrons are not found in the nucleus of an atom; therefore, neither particle X nor particle Y could have a negative charge. Also, since particle Z is outside the nucleus at the center of the atom, it could not have a positive charge. Only protons have a positive charge, and protons are not found outside the nucleus.

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Item #	Rationale	
6	Option J is correct	Based on Newton’s third law, for every action, there is an opposite and equal reaction. Therefore, interacting forces occur as action-reaction pairs. In this scenario, the bird is exerting a downward force on the fence post, while the fence post is exerting an upward force on the bird.
	Option F is incorrect	This is not an action-reaction pair. For this to be an action-reaction pair, it would have to refer to the force of the bird on the wires and the force of the wires on the bird (not the force of the wires on the fence post).
	Option G is incorrect	This is not an action-reaction pair. For this to be an action-reaction pair, it would have to refer to the force of the wires on the fence post and the force of the fence post on the wires (not the force of the fence post on the bird).
	Option H is incorrect	This is not an action-reaction pair. For this to be an action-reaction pair, it would have to refer to the force of the fence post on the bird and the force of the bird on the fence post (not the force of the bird on the wires).

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7	Option C is correct	Planting a crop that requires fewer supplemental nutrients to grow would result in less fertilizer use and fewer nutrients in agricultural runoff that can flow into nearby waterways. Excess nutrients from fertilizers in agricultural runoff can negatively affect nearby waterways by causing harmful algal blooms.
	Option A is incorrect	Plants produce oxygen through photosynthesis. Plants would not produce less oxygen unless photosynthesis is disrupted. If less oxygen is produced, it could increase the negative effects of water quality. Low oxygen levels in the water bodies can have negative effects on many types of aquatic organisms.
	Option B is incorrect	Although plants produce carbon dioxide during respiration, the carbon dioxide produced by plants does not have a negative effect on water quality.
	Option D is incorrect	Plants convert sunlight (solar energy) into chemical energy through photosynthesis. Needing less solar energy will not decrease the negative effects of water quality.

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Item #	Rationale	
8	Option G is correct	The native grass population will decrease since buffelgrass is competing against it for the same resources.
	Option F is incorrect	The native grass population will not increase since the buffelgrass is outcompeting it for space and water.
	Option H is incorrect	The buffelgrass would not develop traits like those of the native grasses since the native grass population is competing for the same resources and the buffelgrass is outcompeting the native grasses.
	Option J is incorrect	Since the buffelgrass is successful in its competition against the native grasses, it will continue to survive and reproduce. Therefore, the buffelgrass offspring would not develop traits like other invasive species if they are currently fit to survive as is.



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Item #	Rationale	
9	Option C is correct	Speed is a measure of distance over time. Student 1 travels 40 meters in 60 seconds. Student 2 travels 20 meters in 60 seconds. After an additional 30 seconds (90 seconds total), student 1 would travel another 20 meters for a total of 60 meters, and student 2 would travel another 10 meters for a total of 30 meters.
	Option A is incorrect	This response describes the distance traveled by each student after 60 seconds, not 90 seconds.
	Option B is incorrect	Moving at a constant speed of 40 meters per 60 seconds, student 1 would move more than an additional 10 meters in 30 seconds.
	Option D is incorrect	Both students are moving at a constant speed. Therefore, for student 1 to travel 70 meters and student 2 to travel 25 meters in 90 seconds, student 1 would have to increase speed and student 2 would have to decrease speed.

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Item #	Rationale	
10	Option G is correct	White dwarf stars are found to be around 20,000 K and $10^{-2}$ luminosity. The student correctly interpreted the H-R diagram to identify the white dwarfs.
	Option F is incorrect	The student likely referred to only the luminosity and not to the temperature.
	Option H is incorrect	The student likely referred to only the temperature and not to the luminosity.
	Option J is incorrect	The student likely referred to the incorrect luminosity ( $10^2$ instead of $10^{-2}$ ) and not to the temperature.

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Item #	Rationale	
11	14, 14.0, or 14.00 is correct	The force was obtained by multiplying 3.5 kg x 4.0 m/s <sup>2</sup> using the formula: $F = ma$ $F = (3.5 \text{ kg}) \times (4.0 \text{ m/s}^2)$ $F = 14 \text{ N}$

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Item #	Rationale	
12	Option F is correct	Beryllium is in the same period as lithium. Elements in the same period have the same number of energy levels.
	Option G is incorrect	Sodium is in the same group as lithium. Elements in the same group do not have the same number of energy levels. They have the same number of valence electrons.
	Option H is incorrect	Magnesium is not in the same period as lithium and therefore does not have the same number of energy levels.
	Option J is incorrect	Potassium is in the same group as lithium. Elements in the same group do not have the same number of energy levels. They have the same number of valence electrons.

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Item #	Rationale	
13	Option D is correct	A cold front results in cold, rainy weather. Location X is on a cold front on Day 1. On Day 2, once the cold front has passed, the weather is clear and sunny. A high pressure (H) area, as shown behind the front on the map, is typically associated with clear and settled weather.
	Option A is incorrect	A cold front does not result in warm weather on Day 1. On Day 2, once the cold front has passed, the rain should stop.
	Option B is incorrect	A cold front does not result in warm weather on Day 1. On Day 2, once the cold front has passed, the weather is clear, not cloudy.
	Option C is incorrect	A cold front does not result in clear skies. On Day 2, once the cold front has passed, the temperature is cool, not warm, and the rain stops.

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Item #	Rationale	
14	Option H is correct	There are 14 atoms of oxygen balanced on each side of this equation.
	Option F is incorrect	There is only 1 atom of oxygen on each side of this equation.
	Option G is incorrect	There are only 2 atoms of oxygen on each side of this equation.
	Option J is incorrect	There are only 6 atoms of oxygen on each side of this equation.

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Item #	Rationale	
15	Option A is correct	Plant 1 has a larger root system than Plant 2 and will therefore be able to absorb a greater amount of water from the soil.
	Option B is incorrect	Plant 1 obtains more sunlight than Plant 2 because it has more leaves and stems available to perform photosynthesis, not because of its greater root surface area and root depth. The root system is not responsible for capturing sunlight.
	Option C is incorrect	Plant 2 would not obtain more water than Plant 1 because Plant 2 has a smaller root surface area and root depth than Plant 1.
	Option D is incorrect	Plant 2 would not obtain more sunlight because it has fewer leaves and stems available to perform photosynthesis. Additionally, the root system is not responsible for capturing sunlight.

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Item #	Rationale	
16	Option H is correct	An energy pyramid represents feeding relationships in a community by showing the amount of energy transferred from one feeding position in a food web (trophic level) to the next. The efficiency of energy transfer typically decreases from the base (bottom) of the pyramid (producers) to the top of the pyramid (top consumers). In this energy pyramid, the secondary consumers are the catfish and gobies, which are below the redfish and flounder. Therefore, the redfish and flounder receive energy directly from them.
	Option F is incorrect	The catfish and gobies do not receive energy directly from the producers. Instead, they receive energy directly from the primary consumers.
	Option G is incorrect	The shrimp and copepods do not receive energy directly from the tertiary consumers. Instead, they receive energy directly from the producers.
	Option J is incorrect	The wire grass and phytoplankton do not receive energy directly from the primary consumers. Instead, as producers, they receive energy directly from the sun.



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Item #	Rationale	
17	Option A is correct	A solar eclipse occurs when the moon moves between the sun and Earth and casts a shadow of the moon on Earth.
	Option B is incorrect	The sun does not move between the moon and Earth. The sun is in a fixed location and has planets and various celestial bodies orbiting it. Also, the sun is a light source, which neither Earth nor the moon can cast a shadow on.
	Option C is incorrect	A lunar eclipse occurs when Earth moves between the sun and the moon and Earth casts its shadow on the moon.
	Option D is incorrect	A lunar eclipse occurs when Earth moves between the sun and the moon. As the sun is a light source, neither the moon nor Earth can cast a shadow on the sun.

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Item #	Rationale	
18	Option G is correct	Both cell membranes and cell walls allow water to move into and out of cells.
	Option F is incorrect	The mitochondria produce energy for cellular processes.
	Option H is incorrect	The nucleus contains the genetic material and directs protein synthesis within the ribosomes.
	Option J is incorrect	The nucleus controls growth and reproduction within the cell.

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Item #	Rationale	
19	Option C is correct	The formation of a solid or precipitate by mixing two clear solutions indicates that a chemical (nonreversible) change has occurred.
	Option A is incorrect	The formation of steam, or water vapor from liquid water, is a change of state, which is a physical change.
	Option B is incorrect	Freezing a liquid into a solid is a change of state, which is a physical change.
	Option D is incorrect	Crystallization indicates a physical (reversible) change as no new material is formed. The solid sugar crystals can be dissolved again in the liquid.

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Item #	Rationale	
20	Option J is correct	The sun is a closer distance to Earth than any other star, which results in it appearing brighter to people on Earth.
	Option F is incorrect	When the sun's light rays reach Earth's atmosphere, they do not intensify. The rays are absorbed, and some are reflected.
	Option G is incorrect	The sun's core does produce energy (heat and light), but this is not the reason why the sun appears brighter than any other star to people on Earth. Other stars have chemical reactions similar to those in the sun.
	Option H is incorrect	The sun does not burn at a higher temperature than any other stars. There are many stars in the universe that burn at much higher temperatures than the sun.

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Item #	Rationale	
21	Option B is correct	The circulatory system and respiratory system are the correct body systems that the students investigated, and the functions described are correct for each of those body systems.
	Option A is incorrect	The skeletal system's function is not to sense and respond to changes in the body and environment (that is the nervous system's function).
	Option C is incorrect	The nervous system's function is not to support muscles and protect organs (that is the skeletal system's function). The respiratory system's function is not to pump blood around the body to carry nutrients, oxygen, and wastes (that is the circulatory system's function).
	Option D is incorrect	Both the skeletal system and nervous system functions are correct, but these two body systems are not the ones that the students investigated.

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Item #	Rationale	
22	Option F is correct	The fuel-air mixture stores chemical potential energy, which is then converted into thermal energy (by the spark plug igniting in step 2). This energy is then converted to mechanical energy (in steps 3 and 4) when the hot gases push the piston down, which turns the crankshaft.
	Option G is incorrect	The fuel-air mixture stores chemical potential energy, not mechanical energy. This energy is then converted into thermal energy, not electrical energy.
	Option H is incorrect	The fuel-air mixture stores chemical potential energy, not electrical energy. Also, the chemical energy is first converted into thermal energy, not mechanical energy.
	Option J is incorrect	The fuel-air mixture stores chemical potential energy, not thermal energy. Also, the chemical energy is first converted into thermal energy, not electrical energy.

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Item #	Rationale	
23	Option B is correct	When the Northern Hemisphere tilts toward the sun, the United States is in the summer season.
	Option A is incorrect	Position 1 has the United States being in the spring season. It shows all hemispheres facing the sun, not just the Western Hemisphere.
	Option C is incorrect	Position 3 has the United States being in the fall season. Earth is at its closest point to the sun (perihelion) during the winter season, not summer; therefore, this does not explain the occurrence of the summer season in the United States.
	Option D is incorrect	Position 4 has the United States being in the winter season. Earth travels at the same rate as it orbits the sun.

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Item #	Rationale	
24	Option J is correct	Organisms in the Plantae kingdom are multicellular, autotrophic, and known to reproduce both sexually and asexually.
	Option F is incorrect	Organisms in the Archaea kingdom are unicellular, can be autotrophic and/or heterotrophic, and reproduce asexually.
	Option G is incorrect	Organisms in the Animalia kingdom are not autotrophic.
	Option H is incorrect	Most organisms in the Bacteria kingdom live as single-celled organisms. There are some myxobacteria (slime bacteria) that can form multicellular colonies, but they are heterotrophs, consuming nutrients in soil.



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Item #	Rationale	
25	Option A is correct	Speed does not include the direction of an object’s movement, while velocity includes the direction of an object’s movement. Since the speed of the car is doubled, its velocity is also doubled in a northeast direction.
	Option B is incorrect	Speed does not include the direction of an object’s movement, while velocity includes the object’s direction.
	Option C is incorrect	The velocity includes acceleration calculations and units (m/s <sup>2</sup> ).
	Option D is incorrect	Speed does not include the direction of an object.

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Item #	Rationale	
26	Option H is correct	Selenium (Se) and sulfur (S) are both nonmetals found in Group 16 of the Periodic Table. They have similar chemical properties because they have the same number of electrons (6) in their outermost (valence) shell. Valence electrons in the outermost shell of an atom determines how it will bond with other atoms.
	Option F is incorrect	Silicon (Si) is a metalloid found in Group 14 of the Periodic Table, while sulfur (S) is in Group 16. Si contains 4 valence electrons in its outermost shell, while S contains 6 valence electrons. A difference in the number of valence electrons indicates that these two elements are chemically dissimilar.
	Option G is incorrect	Chlorine (Cl) is a nonmetal found in Group 17 of the Periodic Table, while sulfur (S) is in Group 16. Cl contains 7 valence electrons in its outermost shell, while S contains 6 valence electrons. A difference in the number of valence electrons indicates that these two elements are chemically dissimilar.
	Option J is incorrect	Phosphorus (P) is a nonmetal found in Group 15 of the Periodic Table, while sulfur (S) is in Group 16. P contains 5 valence electrons in its outermost shell, while S contains 6 valence electrons. A difference in the number of valence electrons indicates that these two elements are chemically dissimilar.

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Item #	Rationale	
27	Option D is correct	This diagram shows a waning crescent, which is the moon phase observed by the students.
	Option A is incorrect	This diagram shows the moon as a full moon, which is not the moon phase observed by the students.
	Option B is incorrect	This diagram shows the moon as a waxing gibbous, which is not the moon phase observed by the students.
	Option C is incorrect	This diagram shows the moon as a new moon, which is not the moon phase observed by the students.

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Item #	Rationale	
28	Option F is correct	On a speed versus time graph, when there is a positive slope, the object’s speed is increasing. When there is no slope (flat line), the object’s speed is constant, and when there is a negative slope, the object’s speed is slowing down (decreasing).
	Option G is incorrect	The object is not at rest during the 3-second to 18-second time interval. A negative direction implies that the object is moving backward, which is not the case based on the speed versus time graph.
	Option H is incorrect	The object is not at rest during the 3-second to 18-second time interval.
	Option J is incorrect	The object is not moving at a constant speed during the zero- to 3-second time interval and from the 18-second to 23-second time interval. The object is also not at rest from the 3-second to 18-second time interval.

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Item #	Rationale	
29	Option D is correct	Strong storm winds would cause the most weathering and erosion to the desert land area at point X.
	Option A is incorrect	The salinity of the seawater near the land area at point X is not likely to have a significant impact on the future rate of weathering and erosion.
	Option B is incorrect	The intense rays from the sun in this desert region would contribute to weathering over time. However, the strong storm winds would cause both weathering and a significant amount of erosion as they move pieces of rock and sand from the desert at point X.
	Option C is incorrect	Solids washing up on the shore would result in deposition rather than weathering and erosion of the land.

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Item #	Rationale	
30	Option G is correct	If fish are being caught at a faster rate than they can reproduce, then the food supply will decrease over time. The numerical data gathered to calculate this rate could provide evidence that human activities are having a negative impact on food supplies from the ocean.
	Option F is incorrect	Breaking corals is destructive to local marine ecosystems, but it does not provide direct evidence that food supplies that humans depend on from the ocean are being negatively impacted.
	Option H is incorrect	Humans raising fish in a hatchery could positively impact the food supply from the ocean, as it could decrease the demand to harvest certain fish species for food from the ocean.
	Option J is incorrect	Humans constructing artificial reefs could positively impact the food supply by potentially creating habitat for marine life that would ultimately increase the food supply from the ocean. Regardless, data related to harvestable marine life present before and after the artificial reef construction would need to be evaluated.

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Item #	Rationale	
31	Option D is correct	Beryllium has an atomic number of 4, which means it has 4 protons. The element on the left side of the diagram has 4 protons (positively charged circles in the model). Boron has an atomic number of 5, which means it has 5 protons. The element on the right side of the diagram has 5 protons.
	Option A is incorrect	Oxygen has an atomic number of 8 and neon has an atomic number of 10, which means the elements would have 8 and 10 protons respectively.
	Option B is incorrect	Fluorine has an atomic number of 9 and neon has an atomic number of 10, which means the elements would have 9 and 10 protons respectively.
	Option C is incorrect	Silicon has an atomic number of 14 and phosphorus has an atomic number of 15, which means the elements would have 14 and 15 protons respectively.

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Item #	Rationale	
32	10, 10.0, or 10.00 is correct	Fluorine has an atomic number of 9. The stem provides the mass number of 19. To get the number of neutrons, the atomic number is subtracted from the mass number: $19 - 9 = 10$ neutrons



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Item #	Rationale	
33	Option C is correct	<p>The student calculated the acceleration of Rocket 3 to be about 23.301 m/s<sup>2</sup>. This is the largest acceleration of all the rockets recorded.</p> $F = ma$ $12.0 \text{ N} = (0.515 \text{ kg}) \times a$ $a = 23.301 \text{ m/s}^2$
	Option A is incorrect	<p>The student calculated the acceleration of Rocket 1 to be 22.727 m/s<sup>2</sup>, which is not the largest acceleration of all the rockets recorded.</p> $F = ma$ $12.0 \text{ N} = (0.528 \text{ kg}) \times a$ $a = 22.727 \text{ m/s}^2$
	Option B is incorrect	<p>The student calculated the acceleration of Rocket 2 to be 18.779 m/s<sup>2</sup>, which is not the largest acceleration of all the rockets recorded.</p> $F = ma$ $8.0 \text{ N} = (0.426 \text{ kg}) \times a$ $a = 18.779 \text{ m/s}^2$
	Option D is incorrect	<p>The student calculated the acceleration of Rocket 4 to be 16.771 m/s<sup>2</sup>, which is not the largest acceleration of all the rockets recorded.</p> $F = ma$ $8.0 \text{ N} = (0.477 \text{ kg}) \times a$ $a = 16.771 \text{ m/s}^2$

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Item #	Rationale	
34	Option J is correct	Water is an abiotic (nonliving) factor.
	Option F is incorrect	Predatory fish are biotic (living) factors.
	Option G is incorrect	Competition is a biotic factor.
	Option H is incorrect	Predation and scavenging are biotic factors.

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Item #	Rationale	
35	Option A is correct	Gravitational potential energy is defined by the energy stored in an object due to its height (vertical position) from the ground. The greater the height of an object, the greater its gravitational potential energy. As the bike travels down the hill, the height decreases, which causes the potential energy to decrease. Kinetic energy is the energy of motion. The kinetic energy of an object is directly proportional to the square of its speed. Therefore, as the speed of the bicycle increases down the hill, its kinetic energy increases.
	Option B is incorrect	Kinetic energy increases, but potential energy does not remain constant because of the height decreasing.
	Option C is incorrect	Potential energy decreases, but kinetic energy does not remain constant because of the potential energy being converted into kinetic energy.
	Option D is incorrect	Kinetic energy does not remain constant because of the decreasing height and conversion of potential energy to kinetic energy. The decrease in height decreases potential energy instead of increasing it.

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Item #	Rationale	
36	Option G is correct	Trees with leaves that have waxy coverings would have a decreased rate of transpiration, which would be beneficial during a long-term drought.
	Option F is incorrect	Broader leaves provide trees with a greater surface area to absorb more sunlight, but these leaves could also provide more surface area to lose water. Therefore, it is likely that there would be a smaller number of trees with broad leaves living in an area experiencing a long-term drought.
	Option H is incorrect	Small leaves would be more beneficial than broad leaves during a long-term drought because of the smaller surface area, which would cause decreased transpiration.
	Option J is incorrect	Trees with leaves without any hairlike structures would be less healthy because of increased transpiration. Having hairlike structures on their leaves would be more beneficial to trees during a long-term drought as they would prevent the trees from losing water by adding protection from wind and heat.

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Item #	Rationale	
37	Option D is correct	Divergent boundaries move away from each other, causing ridges.
	Option A is incorrect	Convergent boundaries move toward each other, causing volcanoes, mountains, or trenches.
	Option B is incorrect	Subduction boundaries occur when one plate moves below another plate.
	Option C is incorrect	Transform boundaries slide past each other but do not cause ridges.

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Item #	Rationale	
38	Option F is correct	Gravity is the force that causes the coin to fall toward the center of Earth. Gravity causes the coin to change direction while in the air and fall back down.
	Option G is incorrect	The coin's inertia would cause it to keep moving upward if the force of gravity was not acting on it to change its direction and move it back down. However, the inertia would not decrease on the way up and increase on the way down.
	Option H is incorrect	Action-reaction pairs refer to forces acting on different objects and not on the same object. Action-reaction pairs also do not cancel each other out. Forces can only cancel each other if they are acting on the same single object, not on different objects.
	Option J is incorrect	The coin will continue moving upward until the force of gravity acts on it. There is some air resistance (friction), but that does not cause the coin to change direction to be moving downward.

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Item #	Rationale	
39	Option D is correct	A star produces its own light and rotates around its axis.
	Option A is incorrect	An asteroid does not produce its own light, but it could rotate around its axis.
	Option B is incorrect	A comet does not produce its own light, but it could rotate around its axis.
	Option C is incorrect	A planet does not produce its own light, but it does rotate around its axis.

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Item #	Rationale	
40	Option H is correct	A change in the temperature of the reacting substance without the addition of an external heat source is indicative of a chemical change.
	Option F is incorrect	Vinegar taking the shape of the container is a physical property and is not indicative of a chemical change.
	Option G is incorrect	The steel wool sinking into the vinegar is not indicative of a chemical change. It is still steel wool and has not changed properties.
	Option J is incorrect	The steel wool changing shape is a physical change and is not indicative of a chemical change.



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Item #	Rationale	
41	Option D is correct	Like the mouse and swamp rabbit, both the sparrow and the Eastern cottontail rabbit are consumed by the bobcat and diamondback rattlesnake. Therefore, when the mouse and swamp rabbit populations decrease, the bobcat and diamondback rattlesnake will compete for these two organisms.
	Option A is incorrect	The raccoon is consumed by only the bobcat. Therefore, the diamondback rattlesnake and the bobcat would not be competing for this organism. The sparrow is consumed by both though.
	Option B is incorrect	The raccoon is consumed by only the bobcat. Therefore, the diamondback rattlesnake and the bobcat would not be competing for this organism. The Eastern cottontail rabbit is consumed by both though.
	Option C is incorrect	The bobcat and diamondback rattlesnake do not consume seeds and therefore would not compete for them. However, both organisms consume sparrows.

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Item #	Rationale	
42	Option G is correct	Characteristics of a nonmetal include a dull luster, an inability to conduct electricity and/or heat, and a low melting point. Element 2 fits this description.
	Option F is incorrect	Element 1 does not fit the characteristics of a nonmetal because it is shiny and conducts heat and electricity.
	Option H is incorrect	Element 3 does not fit the characteristics of a nonmetal because it is shiny, conducts heat and electricity, and has a high melting point.
	Option J is incorrect	Element 4 does not fit the characteristics of a nonmetal because it conducts heat and electricity and has a high melting point.