

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
1	Option B is correct	A complete, closed circuit will light the bulb when the switch is closed. A complete circuit is a closed path through which charged electrons (electric current) flow uninterrupted from the negative terminal (-) of a battery through a conductive material, and back again through the positive terminal (+) of the battery. A typical example of a complete circuit includes a source of electrical energy (e.g., battery), a path for the electric current (e.g., copper wire), a device (e.g., a light bulb) to convert the electrical energy to another type of energy such as light energy, and a switch to turn the circuit on (by closing the switch) or off (by opening the switch).
	Option A is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open between the bulb and the switch.
	Option C is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open between the battery and the bulb.
	Option D is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open—there is no wire between the battery and the switch.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
2	Option J is correct	Earth rotating on its axis every 24 hours makes the sun appear to move across the sky.
	Option F is incorrect	Earth's distance from the sun is not responsible for the sun's apparent movement across the sky.
	Option G is incorrect	Earth's revolution around the sun is responsible for the calendar year.
	Option H is incorrect	The tilt of the Earth on its axis is responsible for the seasons, not the sun's apparent movement across the sky.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
3	Option B is correct	Light travels in a straight line to the student's eye.
	Option A is incorrect	Light is not reflected by the tube in this way.
	Option C is incorrect	The light does not travel along a curved path.
	Option D is incorrect	Light travels through the tube—no light is absorbed by the tubes.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
4	Option J is correct	The objects that would float are less dense than water.
	Option F is incorrect	A penny is denser than water.
	Option G is incorrect	A metal spoon is denser than water.
	Option H is incorrect	A metal spoon and a penny are denser than water.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
5	Option C is correct	Grasses are producers, which capture energy from the sun and make food for consumers.
	Option A is incorrect	Grasses do not decompose small organisms.
	Option B is incorrect	Grasses are producers and do not have control over what organisms are in a food chain.
	Option D is incorrect	Grasses are not decomposers, which break down dead material and recycle nutrients.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
6	Option G is correct	Water carrying material to a new location describes erosion, which is the action most likely happening in Section Y. Section Y is located on a vertical slope of a cliff, so it is most susceptible to landslides and other erosion events caused by the force of water flowing downhill.
	Option F is incorrect	Wind and rain cause weathering and erosion, which involves breaking up rocks rather than producing larger pieces.
	Option H is incorrect	The gluing of sediments is most likely to occur in areas where rocks and soil can pile up to form layers. The slope at Section Y is too steep for sediments to build up. This is more likely to occur at or below Section Z, which has less of a slope.
	Option J is incorrect	The pressure resulting from materials piling up is most likely to occur in the area below Section Z. Rocks and other land material would flow down the steep slope at Section Y through Section Z and settle at the bottom of the sea, forming layers over time.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
7	Option D is correct	The fan produces mechanical energy, and the lamp produces thermal energy. Mechanical energy is made up of kinetic energy (or the energy of an object's motion) and potential energy (or the energy of an object's position). Thermal energy is the energy an object has based on the movement of its particles.
	Option A is incorrect	Only the lamp produces light energy. Both objects use electrical energy. Light is a type of electromagnetic energy that is visible. Electrical energy results from the movement of charged atomic particles.
	Option B is incorrect	Only the fan produces mechanical energy. Both objects use electrical energy.
	Option C is incorrect	The lamp produces both light energy and thermal energy.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
8	Option H is correct	Cucumbers are ready for harvest in 55–65 days (about 2 months) and watermelons are ready for harvest in 80–100 days (about 3 and a half months).
	Option F is incorrect	Although pumpkins have the greatest number of days until ready to harvest, they do not take the most time to sprout.
	Option G is incorrect	Information about seed size is not provided in the data table.
	Option J is incorrect	Information about fruit size is not provided in the data table.



## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
9	Option B is correct	Neptune is an outer planet, and it is the farthest planet from the sun.
	Option A is incorrect	Although Jupiter is an outer planet, it is not the farthest planet from the sun.
	Option C is incorrect	Mercury is an inner, smaller planet that is closest to the sun.
	Option D is incorrect	Although Saturn is an outer planet, it is not the farthest planet from the sun.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
10	Option H is correct	The gerbil had to learn to obtain water from a metal tube.
	Option F is incorrect	Twitching whiskers is an instinctual behavior.
	Option G is incorrect	Burrowing is an instinctual behavior.
	Option J is incorrect	Walking on four legs is an instinctual behavior.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
11	Option D is correct	Water vapor (a gas) forming droplets as it cools describes the process of condensation.
	Option A is incorrect	Water flowing downhill describes runoff or water moving within a stream or river, not condensation.
	Option B is incorrect	Liquid water turning into water vapor describes evaporation, not condensation.
	Option C is incorrect	Polar ice turning into liquid water describes melting, not condensation.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
12	Option H is correct	Barracudas are predators of other fish, which are other living elements of the environment.
	Option F is incorrect	Surface ocean currents are nonliving elements of the environment.
	Option G is incorrect	Oil rigs and jetties are nonliving elements of the environment.
	Option J is incorrect	Warm waters are nonliving elements of the environment.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
13	Option B is correct	Spinning wind turbines, a hammer hitting a nail, and a wrecking ball breaking down a building all use mechanical energy in the form of motion to perform their functions. Mechanical energy is made up of kinetic energy (or the energy of an object's motion) and potential energy (or the energy of an object's position).
	Option A is incorrect	A campfire burning does not use mechanical energy.
	Option C is incorrect	A campfire burning does not use mechanical energy, while spinning wind turbines do use mechanical energy.
	Option D is incorrect	While a hammer hitting a nail and a wrecking ball breaking down a building use mechanical energy to perform their functions, spinning wind turbines also use mechanical energy.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
14	Option F is correct	Water freezing and then thawing within a small space in the rock would cause the space to grow until it resulted in a large crack in the rock.
	Option G is incorrect	Wind blowing particles against the rock would cause abrasions to the rock but not the large crack in the rock.
	Option H is incorrect	Water moving and dropping the rock may be responsible for the location of the rock but not the large crack in the rock.
	Option J is incorrect	A glacier scraping over the rock would cause scratches or gouges called striations but not the large crack in the rock.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
15	Option C is correct	The difference in foot shape between a hawk and a chicken is due to the way that they obtain food: the hawk grasps live prey, and the chicken eats grain from the ground.
	Option A is incorrect	The difference in foot shape between a hawk and a chicken is not due to the predators that hunt them. Hawks are top predators.
	Option B is incorrect	The difference in foot shape between a hawk and a chicken is not due to the climate in which they live. Both chickens and hawks can live in similar climates.
	Option D is incorrect	The difference in foot shape between a hawk and a chicken is not due to the distance that they can fly. Flight distance is most influenced by wing characteristics.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
16	Option H is correct	Metals conduct thermal energy.
	Option F is incorrect	The mass of an object would not provide evidence that it is a metal.
	Option G is incorrect	All matter can exist in different physical states.
	Option J is incorrect	Metals do not dissolve in water.



## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
17	Option B is correct	Strawberries and earthworms are living parts of the environment.
	Option A is incorrect	Climbing onto a rock and walking on the ground are actions done on nonliving parts of the environment.
	Option C is incorrect	The pond is made up of water, which is a nonliving part of the environment.
	Option D is incorrect	Digging a hole in the sand and climbing onto a rock are actions done on nonliving parts of the environment.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
18	Option J is correct	Sugar dissolves in water to form a solution. A solution is a mixture of two or more substances (called solutes) that are uniformly (or evenly) distributed in another substance (called a solvent).
	Option F is incorrect	Sugar does not break down to form a new substance in water.
	Option G is incorrect	Sugar does not change water into a new substance when combined in solution.
	Option H is incorrect	Sugar does not float on the surface of water.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
19	Option C is correct	Light is refracted when it passes through the lenses of the microscope.
	Option A is incorrect	Light changes direction when it passes through the lenses of the microscope.
	Option B is incorrect	While light does move in straight lines, this does not cause the light to increase in brightness.
	Option D is incorrect	Moving in straight lines does not prevent light from being reflected.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
20	Option F is correct	Wind and water power are renewable resources. They can be replenished or replaced by nature.
	Option G is incorrect	Coal and natural gas are nonrenewable resources.
	Option H is incorrect	Coal and petroleum are nonrenewable resources.
	Option J is incorrect	Coal, natural gas, and petroleum are nonrenewable resources.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
21	Option C is correct	Both butterflies and hummingbirds eat the same food (nectar) from flowers.
	Option A is incorrect	Migration does not influence tongue length.
	Option B is incorrect	Long tongues are not necessary for brightly colored flowers.
	Option D is incorrect	Tongue length has no connection to predators.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
22	Option F is correct	Food webs provide descriptions of feeding relationships among organisms in a community. An organism identified at the base of an arrow is an organism that is eaten (the food source), while the organism at the point of an arrow is the consumer of that organism. In this food web, both the hawks and snakes eat mice.
	Option G is incorrect	The lizards eat grasshoppers and rabbits eat grasses.
	Option H is incorrect	The mice eat grasses, and the snakes eat mice.
	Option J is incorrect	The grasshoppers eat grasses, and the lizards eat grasshoppers.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
23	Option B is correct	Iron is attracted to magnets.
	Option A is incorrect	Sugar is not attracted to magnets.
	Option C is incorrect	Salt is not attracted to magnets.
	Option D is incorrect	Wheat is not attracted to magnets.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
24	Option F is correct	A power source is needed at Position X to sound the buzzer when Switch K is closed.
	Option G is incorrect	Although insulated wire is a safe way to move electricity from one place to another, a power source is necessary to generate electricity to power the buzzer.
	Option H is incorrect	Adding another bulb will not enable the buzzer to sound when Switch K is closed.
	Option J is incorrect	Another switch is not necessary to sound the buzzer when Switch K is closed.



## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
25	Option D is correct	Neither the alligator nor the heron is well-adapted to survive for long periods in an extremely cold, dry environment, such as the tundra.
	Option A is incorrect	The reindeer and the arctic fox have the characteristics, such as fur for warmth, needed to survive the extreme cold conditions of the tundra.
	Option B is incorrect	The musk ox has thick fur, and the arctic owl has thick plumage and a rounded body that help them survive the extreme cold conditions of the tundra.
	Option C is incorrect	The polar bear and the arctic hare have thick fur that helps them survive the extreme cold conditions of the tundra.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
26	Option J is correct	Spinning Earth in a circle once models one 24-hour day/night rotation of Earth.
	Option F is incorrect	Moving the moon around Earth once models the lunar cycle, not the 24-hour day/night rotation of Earth.
	Option G is incorrect	Spinning the sun in a circle once does not model the 24-hour day/night rotation of Earth.
	Option H is incorrect	To move Earth around the sun once models the calendar year, not the 24-hour day/night rotation of Earth.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
27	Option B is correct	The palm plant grows in a warm, tropical climate, so the fossil provides evidence that this area in Alaska was once warmer than it is now.
	Option A is incorrect	The palm plant is not an aquatic plant, so the fossil does not provide evidence that this area in Alaska was once covered with an ocean.
	Option C is incorrect	The palm plant does not grow in an arctic climate that would support polar bears, so the fossil does not provide evidence that this area in Alaska was once populated by polar bears.
	Option D is incorrect	The palm plant fossil does not provide evidence that this area in Alaska was changed by earthquakes.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
28	Option F is correct	A canyon is formed by a river.
	Option G is incorrect	A sand dune is not formed by an earthquake; it typically forms because of blowing wind.
	Option H is incorrect	A delta is not formed by the wind; it is formed by water depositing sediment at the mouth of a river.
	Option J is incorrect	A rock formation with layers is formed by cycles of erosion, deposition, compaction, and cementation.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
29	Option A is correct	A fly's missing antenna is not likely an inherited trait that is determined by genes; it is most likely the result of an injury.
	Option B is incorrect	A butterfly's black and yellow stripes are an inherited trait that is determined by genes.
	Option C is incorrect	A dragonfly's two sets of wings are an inherited trait that is determined by genes.
	Option D is incorrect	A beetle's green spots are an inherited trait that is determined by genes.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
30	Option G is correct	Of the four soil types, sand and gravel allow the most water to pass through over time. Based on the information provided, the desert plants survive best in water that drains away easily.
	Option F is incorrect	Clay does not allow the water to drain away as well as gravel does to meet the needs of the desert plants.
	Option H is incorrect	Silt does not allow water to drain away as well as sand does to meet the needs of the desert plants.
	Option J is incorrect	Neither silt nor clay allow the water to drain away as well as sand and gravel do to meet the needs of the desert plants.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
31	Option A is correct	Cooking oil is less dense than water, so the cooking oil floats on the water in the jar.
	Option B is incorrect	Water is denser than cooking oil, sinking to the bottom of the jar.
	Option C is incorrect	Water does not dissolve in cooking oil. The water and oil remain separate in the jar.
	Option D is incorrect	Cooking oil does not dissolve in water.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
32	Option F is correct	Oil fields are formed by dead animals and plants that have been buried for millions of years.
	Option G is incorrect	Oil fields cannot simply be created from the fossilized remains of plants eaten by consumers. The remains must be buried in a low-oxygen environment for millions of years for oil to form.
	Option H is incorrect	Oil fields are not formed by heat causing underground rocks to undergo chemical changes. Oil requires the transformation of organic material to form.
	Option J is incorrect	Oil fields do not form by rocks at the surface of the Earth melting and then solidifying. Oil requires the transformation of organic material to form.



## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
33	Option B is correct	The car will move toward the wall due to the force of the air leaving the balloon through the straw.
	Option A is incorrect	The car will move in the opposite direction toward the wall, as the air leaves the balloon through the straw.
	Option C is incorrect	The car will not move fast due to the straw getting lighter. The mass of the straw stays the same as air is released from the balloon.
	Option D is incorrect	The car will move due to the air escaping from the balloon.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
34	Option J is correct	Copper, iron, and tin are metals. Metals conduct thermal energy and electrical energy. They are not soluble in water.
	Option F is incorrect	Copper, iron, and tin are metals. Metals conduct thermal energy. Iron is highly magnetic, and therefore would attract to magnets. Tin has very weak magnetic properties and copper is nonmagnetic.
	Option G is incorrect	Copper, iron, and tin are metals. Metals are not soluble in water. Iron is highly magnetic, and therefore would attract to magnets. Tin has very weak magnetic properties and copper is nonmagnetic.
	Option H is incorrect	Copper, iron, and tin are metals. Metals are <u>not</u> soluble in water.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
35	Option B is correct	When crested floating heart covers a lake, less sunlight will reach the plants that grow underwater.
	Option A is incorrect	When crested floating heart covers a lake, small fish will have more places to hide from predators.
	Option C is incorrect	When crested floating heart covers a lake, it is not certain that there will be an increase in another plant type—for example, new trees along the lake shore.
	Option D is incorrect	The growth of crested floating heart will not result in the use of all available water.

## 2022 STAAR Grade 5 Science Rationales

Item #	Rationale	
36	Option H is correct	This experiment tests three surfaces at the same time and with the same force. This is an example of a controlled experiment. One variable (surface texture) is being manipulated (or changed) by the students; this is called the independent variable. The variable being tested or measured is the friction on each of the surfaces; this is called the dependent variable. All other variables in the experiment are kept constant or the same (e.g., the marbles, the starting time, and the force applied to each of the marbles).
	Option F is incorrect	This experiment fails to test for friction by not varying the surface. The students may have confused friction with gravity, as they drop the balls from the same height.
	Option G is incorrect	This experiment fails to test for friction by keeping everything the same and not varying the surface.
	Option J is incorrect	This experiment fails to test for friction by not varying the surface and testing on one ramp only.