2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
1	Option D is correct	Primary consumers eat producers, and secondary consumers eat other consumers. Grasses are producers, and grasshoppers are consumers.
	Option A is incorrect	Badgers are not eating beetles in this food web.
	Option B is incorrect	The lupines are not being consumed by the ants in this food web. Therefore, a producer–consumer relationship cannot exist between lupines and ants.
	Option C is incorrect	The ground squirrels do not eat beetles in this food web. Therefore, a predator–prey relationship cannot exist between beetles and ground squirrels.
2	Option F is correct	Star formation begins in a giant cloud of dust and gas, which is a nebula.
	Option G is incorrect	Unlike what all other star groups do, white dwarfs do not become main-sequence stars when mass is increased. Instead, white dwarfs shrink in size when mass is increased.
	Option H is incorrect	Supergiants are stars that can become black holes. Supergiants are not capable of absorbing black holes.
	Option J is incorrect	Main-sequence stars are formed from protostars, not by comets.
3	Option B is correct	The material that formed was a new substance with properties different from the properties of the metal and the solution, which is an indication that a chemical reaction took place.
	Option A is incorrect	Whether or not a reactant or product is visible does not indicate that a chemical reaction did or did not take place.
	Option C is incorrect	A change in color alone is not evidence that a chemical reaction did or did not take place.
	Option D is incorrect	A change in volume is not evidence that a chemical reaction did or did not take place.
4	Option F is correct	Thermal energy is used to heat the water and is then changed to sound energy as the steam escapes from the tea kettle.
	Option G is incorrect	The energy in the natural gas does not turn directly into sound energy when heating the water. Sound energy does not change into light energy when the tea kettle becomes warm.
	Option H is incorrect	There is no electrical energy in the natural gas. Thermal energy is not transformed into light energy when the steam leaves the tea kettle.
	Option J is incorrect	There is no light energy in the natural gas. The chemical energy in the natural gas does not transform into kinetic energy.
5	Option D is correct	The bacteria that were not killed by the antibiotic passed their genetic information to subsequent generations, resulting in a population of bacteria that was resistant to the antibiotic.
	Option A is incorrect	The bacteria that survived the antibiotic did not stop reproducing. The bacteria continued to reproduce, and that is why the patient got sick again with the same type of infection.
	Option B is incorrect	Changes in temperature related to a high fever are not enough to inactivate the antibiotic.
	Option C is incorrect	Antibiotics are effective at killing bacteria that are not resistant to that particular antibiotic, not just slowing the life cycle.

Texas Education Agency
Student Assessment Division
September 2018

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
6	Option G is correct	The correct answer was obtained by using the formula *Force* = *mass* × *acceleration* to determine the net force acting on the vehicle. 1,100 kilograms × − 1.2 m/s^2 = 1,300 N
	Option F is incorrect	This answer was obtained by adding instead of multiplying. *Force*=*mass*+*acceleration* was used instead of *Force*=*mass*×*acceleration*.
	Option H is incorrect	This answer was obtained by dividing instead of multiplying. *Force*=*mass* / *acceleration* was used instead of *Force* = *mass* × *acceleration*.
	Option J is incorrect	No rearrangement of the formula *Force* = *mass* × *acceleration*. This answer was obtained by dividing 1,000 kg by 9.8, then dividing by -1.2 m/s^2.
7	Option D is correct	Earth's axis is tilted at 23.5 degrees. This tilt results in seasons starting at different months for different parts of the year.
	Option A is incorrect	The changes in seasons are caused by the Earth's tilt, not its orbit.
	Option B is incorrect	The size of the landmass does not affect when seasons start.
	Option C is incorrect	The pull of the moon affects tides, not seasons. Seasons are caused by the Earth's tilt.
8	Option H is correct	Arteries and veins are used to transport nutrients, water, and oxygen to body cells.
	Option F is incorrect	The integumentary system protects vital organs from injury. The system shown is the circulatory system.
	Option G is incorrect	The digestive system chemically breaks down food into smaller pieces. The system shown is the circulatory system.
	Option J is incorrect	The endocrine system produces hormones that regulate growth and metabolism. The system shown is the circulatory system.
9	Option A is correct	In Situation 1, the amount of work done is equal to: $W = Fd$ = 800 N × 0 m = 0 joules. In Situation 2, the amount of work done is equal to: $W = Fd$ = 2,000 N × 6.0 m = 12,000 N m = 12,000 J. W = Fd = 2,000 N × 6.0 m = 12,000 N m = 12,000 J.
	Option B is incorrect	The values for Situation 1 and Situation 2 are incorrect. There is no information given in the diagram to support this number.
	Option C is incorrect	In Situation 1, the student obtained the correct answer of 0 J (no work done) by multiplying 800 N by 0 meters. In Situation 2, however, the values are incorrect.
	Option D is incorrect	The values for Situation 1 and Situation 2 are incorrect. There is no information given in the diagram to support this number.
10	Option G is correct	Food webs in areas with a greater variety of species are likely to be more complex, resulting in a more stable ecosystem when natural disasters occur.
	Option F is incorrect	Barren land does not contribute to the sustainability of the ecosystem.
	Option H is incorrect	A narrow transition area between two neighboring ecosystems does not lead to a more sustainable ecosystem.
	Option J is incorrect	Fewer species means less biodiversity.
11	5 and any equivalent values are correct.	On a periodic table, all elements in Group 15 have 5 valence electrons.

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
12	Option H is correct	Converging plates can lead to uplift and the steep slopes of a mountain range.
	Option F is incorrect	Erosion would not form a mountain range but would result in rounding of the jagged peaks after formation.
	Option G is incorrect	Transform plates that move side by side cause earthquakes that would result in rock being broken apart, not built up into a mountain range.
	Option J is incorrect	Divergent plates would result in an oceanic ridge or rift valley, not the formation of a mountain range.
13	Option B is correct	The data shows that the living branches on the pine trees in the dense forest were near the top of the tree. This indicates that the pine trees in the dense forest had to compete for sunlight with the other plants in that ecosystem.
	Option A is incorrect	The data shows that the pine trees that grew in a dense forest grew just as tall as the pine trees in an open meadow.
	Option C is incorrect	There is no information in the data to support any inference on food webs for either ecosystem.
	Option D is incorrect	The data shows that pine trees in a dense forest have fewer living branches than pine trees in an open meadow.
14	Option F is correct	The aerialist's feet and the rope are in contact with each other. When two objects are in contact with each other, an action-reaction pair of forces exists between these two objects.
	Option G is incorrect	The rope and the balancing bar are not in direct contact with each other. Since they are not in direct contact with each other, an action-reaction pair of forces does not exist between these two objects.
	Option H is incorrect	The two ends of the rope are not in direct contact with each other. Since they are not in direct contact with each other, an action-reaction pair of forces does not exist between these two objects.
	Option J is incorrect	The aerialist's arms and legs are not in direct contact with each other. Since they are not in direct contact with each other, an action-reaction pair of forces does not exist between these two objects.
15	Option A is correct	The outer shell of neon can hold up to eight valance electrons. A full shell means the element is least reactive.
	Option B is incorrect	Since there are only seven valence electrons, the outer shell is not complete, and the element will react with other elements until it obtains eight valence electrons.
	Option C is incorrect	Since there are only three valence electrons, the outer shell is not complete, and the element will react with other elements until it obtains eight valence electrons.
	Option D is incorrect	Since there are only four valence electrons, the outer shell is not complete, and the element will react with other elements until it obtains eight valence electrons.
16	Option H is correct	Sirius A would be approximately at the 21-meter mark. The distances in the model are proportional. Using the proportion for Proxima Centauri (10 m/4.2 ly), multiply to determine the distance for each star.
	Option F is incorrect	Barnard's Star would be approximately at the 14-meter mark.
	Option G is incorrect	Wolf 359 would be approximately at the 18-meter mark.
	Option J is incorrect	Ross 248 would be approximately at the 25-meter mark.
17	Option A is correct	An increase in rainfall will lead to an increase in the producer populations. An increase in the producer populations will, in turn, lead to an increase in the wildebeest population. As a result of the increase in the wildebeest population, the lion and cheetah populations would increase as well.
	Option B is incorrect	The increase in rainfall leads to an increase in grass. More grass means more wildebeests.
	Option C is incorrect	If the wildebeest population increases, the lion and cheetah populations increase as well.
	Option D is incorrect	An increase in rainfall leads to an increase in the grass populations. An increase in the grass populations will, in turn, lead to an increase in the wildebeest population. As a result of the increase in the wildebeest population, the lion and cheetah populations would increase as well.

Texas Education Agency
Student Assessment Division
September 2018

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
18	Option J is correct	The atomic number of zinc is 30. This means that there are 30 protons in the nucleus of a zinc atom. There are also 30 electrons outside the nucleus.
	Option F is incorrect	The atomic number of indium is 49. This means that there are 49 protons in the nucleus of an indium atom. Neutrons are inside the nucleus.
	Option G is incorrect	The atomic number of scandium is 21. This means that there are 21 electrons outside the nucleus of a scandium atom. The mass is 45 and is made up of protons and neutrons. There are 23 neutrons inside the nucleus.
	Option H is incorrect	The atomic number of aluminum is 13. This means that there are 13 protons in the nucleus of an aluminum atom. There are 13 electrons outside the nucleus.
19	Option A is correct	These are the moon phases listed in the correct order.
	Option B is incorrect	The first quarter does not follow a waning gibbous moon; third quarter does.
	Option C is incorrect	The new moon phase does not follow the full moon phase. Waning gibbous follows the full moon phase.
	Option D is incorrect	Waning gibbous follows the full moon phase. Waning crescent also does not follow the new moon phase.
20	Option G is correct	Silicon is a metalloid, and copper is a metal. Since copper is a metal, it conducts electricity better than silicon.
	Option F is incorrect	The statement is true, but the question is asking for an incorrect statement. Silicon is a metalloid, and sulfur is a nonmetal. Therefore, silicon conducts electricity better than sulfur does.
	Option H is incorrect	The statement is true, but the question is asking for an incorrect statement. Silicon is a metalloid that is solid at room temperature, and argon is a noble gas that is a gas at room temperature.
	Option J is incorrect	The statement is true, but the question is asking for an incorrect statement. Silicon is less malleable than silver.
21	Option C is correct	Most of the potential energy has been converted to kinetic energy at Location Y because it is at the lowest part of the track.
	Option A is incorrect	The amount of kinetic energy at Location W is less than at Location X, Location Y, and Location Z because it is above those locations.
	Option B is incorrect	The amount of kinetic energy at Location X is less than at Location Y.
	Option D is incorrect	The amount of kinetic energy at Location Z is less than at Location Y.
22	Option J is correct	The number of oxygen atoms involved in this chemical reaction is six. The six oxygen atoms in $3O_2$ get rearranged as four oxygen atoms in $2CO_2$ and two oxygen atoms in $2H_2O$.
	Option F is incorrect	The number of oxygen atoms in this chemical reaction is ten. The six oxygen atoms in $2AgNO_3$ and the four oxygen atoms in K_2SO_4 get rearranged as four oxygen atoms in Ag_2SO_4 and six oxygen atoms in $2KNO_3$.
	Option G is incorrect	The number of oxygen atoms in this chemical reaction is twelve. The six oxygen atoms in $6H_2O$ and the six oxygen atoms in $3O_2$ get rearranged as twelve oxygen atoms in $4Fe(OH)_3$.
	Option H is incorrect	The number of oxygen atoms involved in the chemical reaction is eighteen. The twelve oxygen atoms in $6CO_2$ and the six oxygen atoms in $6H_2O$ get rearranged as six oxygen atoms in $C_6H_{12}O_6$ and twelve oxygen atoms in $6O_2$.
23	Option B is correct	Earth's atmosphere and oceans receive thermal energy from the sun, not from within Earth.
	Option A is incorrect	Warm air in Earth's atmosphere and warm water in Earth's oceans rise, just as the warm water rises in the model.
	Option C is incorrect	Convection cells in Earth's atmosphere and oceans flow in opposite directions, as shown in the model.
	Option D is incorrect	Cold air in Earth's atmosphere is denser than warm air, and cold water in Earth's oceans is denser than warm water.

Texas Education Agency
Student Assessment Division
September 2018

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
24	Option H is correct	The young birds are providing food to the parasite larvae. Therefore, the young birds are hosts to the larvae.
	Option F is incorrect	The young birds are not hunting and eating the larvae.
	Option G is incorrect	The larvae are not hunting and eating the young birds.
	Option J is incorrect	The young birds are not eating the larvae.
25	Option A is correct	Sulfur hexafluoride is made up of the elements sulfur and fluorine that are chemically bonded to produce a new substance.
	Option B is incorrect	The formula SF_6 indicates that one atom of sulfur is chemically bonded to six atoms of fluorine. Atoms of different elements are not identical.
	Option C is incorrect	Elements are not present in atomic nuclei or outside an atom's nucleus.
	Option D is incorrect	Organic compounds are composed of any combinations of carbon, hydrogen, oxygen, and nitrogen. Compounds that contain sulfur are not considered to be organic.
26	Option F is correct	Newton's second law is *Force* = *mass* × *acceleration*. Therefore, *acceleration* = *Force/mass*, and the smaller the mass, the greater the acceleration. A = 8 N/2 kg = 4 m/s^2
	Option G is incorrect	A box with a mass of 4 kg will experience an acceleration of 2 m/s^2. A = 8 N/4 kg = 2 m/s^2
	Option H is incorrect	A box with a mass of 6 kg will experience an acceleration of 1.34 m/s^2. A = 8 N/6 kg − 1.34 m/s^2
	Option J is incorrect	A box with a mass of 8 kg will experience an acceleration of 1 m/s^2. A = 8 N/8 kg = 1 m/s^2
27	Option B is correct	The plates are moving away from each other. At each side of a mid-ocean ridge, the plates move away from each other.
	Option A is incorrect	The plates are moving in the same direction. At each side of a mid-ocean ridge, the plates move away from each other.
	Option C is incorrect	The plates are moving toward each other. At each side of a mid-ocean ridge, the plates move away from each other.
	Option D is incorrect	The plates are sliding past each other. At each side of a mid-ocean ridge, the plates move away from each other.
28	Option J is correct	A gas escaping is the only way that mass could have decreased in a chemical reaction. An increase in mass could have resulted from a gas that was not part of the reaction combining with one of the reactants.
	Option F is incorrect	If all or most of the liquid evaporated, there would have been a greater decrease in the mass of the products. If a gas was produced and escaped from the reaction, the mass of the products would have been reduced.
	Option G is incorrect	Mass is not converted into thermal energy.
	Option H is incorrect	Differences in densities do not change the mass of the products. Combining the reactants into one product does not change the mass of the product.
29	Option A is correct	The data indicates that larger sparrows are mainly found in the North, where temperatures are cooler.
	Option B is incorrect	The data indicates that smaller sparrows are found in the West.
	Option C is incorrect	The data indicates that larger sparrows are not found in the South.
	Option D is incorrect	The data indicates that larger sparrows are not found along the East Coast.
30	Option J is correct	Following a new moon, from Earth only a small portion of the illuminated side is visible. The moon appears to be waxing, or growing larger.
	Option F is incorrect	The moon appears to be more than one-half but not fully illuminated by direct sunlight. The waxing-gibbous phase is seen after a first-quarter moon.
	Option G is incorrect	The moon appears to be more than one-half but not fully illuminated by direct sunlight. The waning-gibbous phase is seen after the full moon.
	Option H is incorrect	The moon appears to be partly but less than one-half illuminated by direct sunlight. The waning-crescent phase is seen after the third-quarter moon and before a new moon.

Texas Education Agency
Student Assessment Division
September 2018

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
31	Option B is correct	The group, the symbol, and the classification for each element are correct in the table.
	Option A is incorrect	Nitrogen, N, is a nonmetal, and helium, He, is a nonmetal.
	Option C is incorrect	Nickel, Ni, is a metal, and carbon, C, is a nonmetal.
	Option D is incorrect	Sulfur, S, is a nonmetal, and antimony, Sb, is a metalloid.
32	0.36 and any equivalent values are correct	The value 0.36 m/s was obtained by using the formula $S = D/T$ = 0.90 m/2.5 s = 0.36
33	Option A is correct	The close lines west of the highest point represent steep elevation. Contours farther east are farther apart, representing a gentler slope.
	Option B is incorrect	The peak is not centrally located on the hill.
	Option C is incorrect	The map shows that the hill is not flat east of the highest point.
	Option D is incorrect	The map shows that there is not a valley and another hill east of the highest point.
34	Option G is correct	A decrease in the number of fish leads to negative effects for commercial fishermen.
	Option F is incorrect	Water in dead zones is not toxic. It lacks oxygen. This does not affect drilling.
	Option H is incorrect	Dead zones do not affect the course of ocean currents.
	Option J is incorrect	Sand mining is not affected by lack of oxygen in water.
35	Option D is correct	White dwarfs have faint luminosity and very high temperatures, and they are shown on the graph in Area Z.
	Option A is incorrect	Area M represents supergiant stars, which have higher luminosity and cooler temperatures.
	Option B is incorrect	Area X represents giant stars, which have moderate luminosities and high temps.
	Option C is incorrect	Area P represents main-sequence stars, which are much brighter than white dwarfs and have higher temperatures.
36	Option F is correct	Muscle action causes physical changes by breaking apart the food into smaller pieces, and peptidase leads to chemical changes by breaking down the food into simpler compounds that can be absorbed.
	Option G is incorrect	The action of peptidase results in chemical changes.
	Option H is incorrect	Muscle contractions result in physical changes, and the action of peptidase results in chemical changes.
	Option J is incorrect	Muscle contractions result in physical changes, not chemical changes.
37	Option B is correct	The calculated acceleration is $A = F/m$ = 900 N/ 140 kg = 6.42 m/s^2. An opposing force caused by friction led to the lower than expected average acceleration value of 0.36 m/s^2.
	Option A is incorrect	The calculated acceleration is $A = F/m$ = 900 N/ 140 kg = 6.42 m/s^2. Another force in the direction of motion would have increased the acceleration value, not decreased it.
	Option C is incorrect	The calculated acceleration is $A = F/m$ = 900 N/ 140 kg = 6.42 m/s^2. Another force toward the teacher would have caused acceleration greater than 0.36 m/s^2. 0.36 m/s2 is a lower acceleration than 6.42 m/s^2.
	Option D is incorrect	The calculated acceleration is $A = F/m$ = 900 N/ 140 kg = 6.42 m/s^2. The friction force caused the actual acceleration to be less than the expected acceleration. 0.36 m/s^2 is a lower acceleration than 6.42 m/s^2.

Texas Education Agency
Student Assessment Division
September 2018

2018 STAAR Grade 8 Science Rationales

Item #	Rationales	
38	Option F is correct	Larger grains were preferred to provide more food per plant for humans.
	Option G is incorrect	Taller stems to block sunlight would not benefit farmers by providing more food.
	Option H is incorrect	Larger flowers were not preferred over larger grains. Farmers did not sell flowers.
	Option J is incorrect	Thinner stems were not preferred for human consumption.
39	Option C is correct	Energy is transferred from the level below to the level above.
	Option A is incorrect	Energy is transferred from the level below to the level above.
	Option B is incorrect	Energy lost at any level does not continue to flow through the energy pyramid.
	Option D is incorrect	The organisms at the bottom level directly provide energy only to organisms in the level above.
40	Option J is correct	This graph shows that the speed of the block is decreasing.
	Option F is incorrect	This graph shows that the speed of the block is increasing.
	Option G is incorrect	This graph shows that the speed of the block decreased, then remained constant.
	Option H is incorrect	This graph shows that the speed of the block is remaining constant, not decreasing.
41	Option B is correct	Gravity is the attractive force that keeps planets in orbit.
	Option A is incorrect	Light energy cannot keep planets from moving in a straight line.
	Option C is incorrect	Inertia cannot keep planets from moving in a straight line.
	Option D is incorrect	Potential energy cannot keep planets from moving in a straight line.
42	Option H is correct	Sharks obtain oxygen from the water that passes through their gills.
	Option F is incorrect	Gills are used for gas exchange, not to control temperature.
	Option G is incorrect	Sharks obtain food by hunting for prey. Gills do not help them get food.
	Option J is incorrect	Gills are used for gas exchange and are not directly used to avoid predators.

Texas Education Agency
Student Assessment Division
September 2018