NJSLA-S Online Practice Test Answer and Alignment Document
Science: Grade 8 – Unit 3

Items 1–5

Domain: Earth and Space Science
Phenomenon: Even though lunar and solar eclipses occur with about equal frequency, lunar eclipses are visible from Earth more often than solar eclipses.

Item 1

UIN: 2308M031_04
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS1.B; SEP: DUM; CCC: C and E
SR/AT/Paper Key: Statement 1: B; Statement 2: A; Statement 3: A,B
Key: A correct response will look like this:

Statements	Solar Eclipse	Lunar Eclipse
Happens during a full moon	☐	☑
Reduces solar radiation reaching Earth	☑	☐
Occurs when one celestial body moves into the shadow of another	☑	☑

Rationale:
Row 1: Figure 1A shows that a lunar eclipse can only happen during a full moon, when the Moon and Sun are on opposite sides of Earth and the Moon moves into Earth's shadow.
Row 2: Figure 1B shows that a solar eclipse happens when the Moon moves between Earth and the Sun, partially blocking the light's path and thus reducing the amount of solar radiation that reaches Earth's atmosphere.
Row 3: Figure 1 shows that during a lunar eclipse, Earth is positioned between the Sun and the Moon, casting Earth's shadow on the Moon; and during a solar eclipse, the Moon passes between Earth and the Sun, casting the Moon's shadow on Earth.

Item 2

UIN: 2308M031_06
Item Type: Multiple Choice
Standards Alignment: DCI: ESS1.B; SEP: CEDS; CCC: C and E
Key: C
Rationale:
Answer C is valid. During a solar eclipse, a person standing in position N, in the center of the shadow (umbra) cast by the Moon, would see a complete blackout of the Moon. The Sun's corona would be visible around the perimeter of the shadow.
Answer A is invalid because that view would be seen from one of the other positions.
Answer B is invalid because that view would be seen from one of the other positions.
Answer D is invalid because that view would be seen from one of the other positions.

Item 3

UIN: 2308M031_01
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS1.B; SEP: AQDP; CCC: C and E
Key: D, E
Rationale:
Answer D is correct because Figure 1 shows the alignment of the Sun, Moon, and Earth during a lunar eclipse (1A) and a solar eclipse (1B).
Answer E is correct because Figure 1 shows where the shadows will be cast on from Earth during a lunar eclipse (1A) and where the shadow will be visible from Earth during a solar eclipse (1B). Figure 1B further shows specific locations on Earth in the umbra and penumbra.
Answer A is invalid because Figure 1 provides no data on frequency of solar and lunar eclipses.
Answer B is invalid because Figure 1 provides no data on the seasonal occurrence of eclipses.
Answer C is invalid because Figure 1 provides no information on Earth's distance from the Sun during the eclipses.

Item 4

UIN: 2308M031_03
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS1.B; SEP: EAE; CCC: S & SM
SR/AT/Paper Key: Box X: A; Box Y: B; Box Z: A
Key: A correct response will look like this:

Because of the Moon's size and distance from the Earth, the shadow cast on the Moon is [larger] during a lunar eclipse than the shadow cast on Earth during a solar eclipse. As a result, it takes longer for [the Moon] to pass through the shadow during a lunar eclipse.

Therefore, the student's claim [is] supported.

Rationale:
The data show that the Moon is significantly smaller than Earth, so it will take the Moon much longer to move through the large shadow that Earth casts during a lunar eclipse (1A) than it will for the Moon to pass through the shadow cast during a solar eclipse (1B). This supports the student's claim.

Item 5

UIN: 2308M031_08
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS1.B; SEP: OECI; CCC: C and E
SR/AT/Paper Key: Box X: B; Box Y: B; Box Z: B
Key: A correct response will look like this:

When the Moon moves through Earth's shadow during a lunar eclipse, the eclipse is visible from wherever the Moon is above the horizon, which is [50] percent of Earth. When the Moon moves in front of the Sun during a solar eclipse, the shadow cast by the Moon is [smaller] than Earth; therefore, solar eclipses are visible only [within a narrow path].

Rationale:
Figure 1A shows the Moon passing through Earth's large shadow during a lunar eclipse. Because Earth is large enough to cast a shadow on the entire Moon, any location that can view the Moon will see the lunar eclipse, which is the 50% of Earth facing away from the Sun and toward the Moon. When the Moon passes between the Sun and Earth during a solar eclipse (1B), the shadow that the Moon casts on Earth is much smaller than Earth because the Moon is much smaller than Earth. Only the places within the narrow path where the Moon's shadow is cast on Earth will experience the solar eclipse.

Items 6–10

Domain: Physical Science
Phenomenon: A student observes that an electric teakettle causes water to boil.

Item 6

UIN: 2208M005_01
Item Type: Multiple Choice
Standards Alignment: DCI: PS3.B; SEP: CEDS; CCC: PAT
Key: D
Rationale:
Answer D is valid. Heat is transferred from the heating element (coils) to the water (water molecules) in the bottom of the teakettle. The heated water molecules in the bottom of the teakettle gain energy and move upward, transferring heat energy to the cooler water near the top of the teakettle through convection.
Answer A is invalid because electricity causes the heating element to turn on, but it does not explain how heat is transferred from hotter to colder regions.
Answer B is invalid because the material used for the teakettle experiences conduction and insulation of heat, but it does not explain how heat is transferred from hotter to colder regions.
Answer C is invalid because it describes a change of state, not how heat is transferred in the water.

Item 7

UIN: 2208M005_07
Item Type: Technology Enhanced
Standards Alignment: DCI: PS1.A; SEP: EAE; CCC: S & SM
SR/AT/Paper Key: Box X: A; Box Y: B; Box Z: B
Key: A correct response will look like this:

Water is made of molecules that [move] in the teakettle and have [constant] contact with one another. Therefore, the student's claim [is not] supported.

Rationale:
Water is a liquid. Molecules in a liquid can move about freely, unlike solids, but remain in contact with each other, unlike gases. Since water molecules can move, they transfer heat energy to the molecules they come into contact with, spreading heat to all the water molecules. This fact is the opposite of the student's claim.

Item 8

UIN: 2208M005_05
Item Type: Multiple Choice
Standards Alignment: DCI: PS1.A; SEP: AQDP; CCC: PAT
Key: B
Rationale:
Answer B is valid. Liquid boils and changes state to a gas at 100°C. Knowing how added heat up to and past 100°C affects the state of the water and helps to explain what happens to the water when it is heated to 100°C.
Answer A is invalid because knowing how high water can be heated does not explain what happens to the water when it is heated to a specific temperature below its highest temperature.
Answer C is invalid because measuring the heat transferred to the water does not explain what happens to the water when it is heated to 100°C.
Answer D is invalid because knowing how energy is transferred from the teakettle to the water explains how the water is heated, not what happens to the water when it is heated to 100°C.

Item 9

UIN: 2208M005_03
Item Type: Technology Enhanced
Standards Alignment: DCI: PS3.B; SEP: AID; CCC: E&M
SR/AT/Paper Key: B
Key: A correct response will look like this:

Energy Required to Reach Boiling Point	Conditions of the Water
Least energy	1,000 grams of water at 25°C
↓	1,500 grams of water at 25°C
Most energy	1,500 grams of water below 0°C

Rationale:
The amount of water and its starting temperature impact how long it will take for all the water to reach a certain temperature. The more water in a container, the longer it takes to heat the water. The lower the starting temperature, the longer it takes to heat the water. The longer it takes to heat the water, the more energy is required to do so. Therefore, the lesser amount of water starting at the higher temperature will take the least energy to heat. The greater amount of water starting at the lower temperature will take the most energy to heat. The greater amount of water starting at the higher temperature will take an amount of energy that is between the amounts of energy used by the other two samples.

Item 10

UIN: 2208M005_04
Item Type: Technology Enhanced
Standards Alignment: DCI: PS3.A; SEP: EAE; CCC: C and E
SR/AT/Paper Key: Box X: B; Box Y: A; Box Z: A
Key: A correct response will look like this:

As the temperature of water [increases] , the [average kinetic] energy of the molecules increases. Therefore, the student's claim [is] supported.

Rationale:
Temperature is the measure of the average kinetic energy of the molecules in a substance. Since they have a direct relationship, when temperature increases, it means that the molecules move faster and have a greater average kinetic energy. Since Investigation 3 in Table 1 started at the highest temperature, the molecules in this substance move fastest in their initial state.

Items 11–13

Domain: Life Science

Phenomenon: Modern corn evolved from ancient grass.

Item 11

UIN: 2308M034_01

Item Type: Multiple Choice

Standards Alignment: DCI: LS4.B; SEP: AQDP; CCC: SC

Key: D

Rationale:

Figure 3 provides information on the gene responsible for branching, ear size, and number of kernels for maize and describes a genetic cross that was performed to create a hybrid with different traits than the parent plants.

Answer A is invalid because no data are provided on changes in kernel color before domestication.

Answer B is invalid because no data are provided on genes responsible for kernel color.

Answer C is invalid because no data are provided on human consumption of teosinte before domestication.

Item 12

UIN: 2308M034_02

Item Type: Technology Enhanced

Standards Alignment: DCI: LS4.B; SEP: EAE; CCC: SC

SR/AT/Paper Key: Claim 1: A; Claim 2: A; Claim 3: B

Key: A correct response will look like this:

Claim	Supported	Not Supported
Some early maize varieties resembled teosinte.	◉	○
Evolutionary changes to the structure of the maize plant led to fewer ears per plant.	◉	○
Evolutionary pressures on kernel structure were unchanged over 7,000 years.	○	◉

Rationale:

Row 1: Figure 2 shows that early maize and teosinte were both similar in shape and both had kernels.

Row 2: Table 1 indicates that the average number of ears on maize after domestication of teosinte is significantly lower than that of teosinte itself.

Row 3: Figure 1 shows that kernel structure did change as a result of domestication, which means evolutionary pressures on the kernel structures must have changed over time.

Item 13

UIN: 2308M034_04
Item Type: Technology Enhanced
Standards Alignment: DCI: LS4.B; SEP: DUM; CCC: SF
SR/AT/Paper Key: Box Y: B; Box Z: B
Key: A correct response will look like this:

During the domestication period, ancient farmers likely saved and planted maize kernels from plants that had [softer kernels and larger ears] .

This was the earliest form of [selective breeding] .

Rationale:
Table 1 shows characteristics of teosinte and the resulting cultivar, maize, which exhibits characteristics that would be considered desirable to ancient farmers. These included soft kernels and larger ears. The process of selecting desirable traits to create new cultivars is called selective breeding.

Items 14–17

Domain: Earth and Space Science
Phenomenon: Living shorelines are nature-based solutions that help restore and preserve New Jersey's coastal habitats.

Item 14

UIN: 2208M500_01
Item Type: Multiple Choice
Standards Alignment: DCI: ESS3.C; SEP: CEDS; CCC: SF
Key: C
Rationale:
Answer C is valid. Based on the data, the purpose of a living shoreline is to restore and protect New Jersey's coastline. This form of restoration is most effective in areas where wind and water are actively eroding the shoreline.
Answer A is invalid because the nearshore area falls below the low tide line in a submerged area and would not provide protection for shore habitats.
Answer B is invalid because the back dune area is not subject to active erosion by water since it is not typically exposed to waves or currents.
Answer D is invalid because the mixing of freshwater and saltwater in bays and lagoons plays little to no role in erosion.

Item 15

UIN: 2208M500_03
Item Type: Multiple Choice
Standards Alignment: DCI: ESS3.C; SEP: EAE; CCC: SF
Key: C
Rationale:
Answer C is valid. Figure 2 shows that plastic netting contains openings that could entangle seabirds and other shoreline organisms and prevent them from escaping. Since it does not biodegrade quickly, it presents a long-term hazard for shoreline organisms.
Answer A is invalid because allowing more water to pass through would increase erosion, and no actual data are provided on the amount of water that can pass through coconut logs or plastic netting.
Answer B is invalid because the frequency of replacement does not impact the amount of shoreline erosion.
Answer D is invalid because no data are provided on how well coconut logs and plastic netting hold up to storm activity.

Item 16

UIN: 2208M500_04
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS3.C; SEP: EAE; CCC: SF
SR/AT/Paper Key: Box Y: C; Box Z: B
Key: A correct response will look like this:

Hybrid living shorelines provide for [greater erosion control] than natural living shorelines and they create a [more natural connection] between aquatic and terrestrial ecosystems compared to structural living shorelines.

Rationale:
Table 1 indicates that hybrid living shorelines incorporate human-made materials that can increase erosion control along natural shorelines, but they do not create a more natural habitat or reduce species disruption. They do, however, create a more natural connection between the aquatic and terrestrial environments, as shown in Figure 1, compared to structural shorelines that are entirely composed of human-made materials.

Item 17

UIN: 2208M500_06
Item Type: Technology Enhanced
Standards Alignment: DCI: ESS3.C; SEP: AQDP; CCC: SC
Key: C, D
Rationale:
Answer C is valid because the amount of wave energy significantly impacts shoreline erosion and is therefore important in considering which solution will best reduce erosion in the area.
Answer D is valid because it is important to assess the positives and negatives of the solution being implemented to ensure that it causes the least harm to the local environment.
Answer A is invalid because sites need to be cleared of debris regardless of which solution is implemented, so the question is irrelevant.
Answer B is invalid because prioritizing sites based on need does not play a role in determining the best solution to implement, so the question is irrelevant.
Answer E is invalid because whether or not a permit is required for the site does not play a role in determining the best solution to implement, so the question is irrelevant.

Items 18–21

Domain: Life Science
Phenomenon: Two species of Hawaiian birds compete for nectar from the same two species of trees.

Item 18

UIN: 1908B007_01
Item Type: Technology Enhanced
Standards Alignment: DCI: LS2.A; SEP: EAE; CCC: E&M
SR/AT/Paper Key: Box X: B; Box Y: B; Box Z: B
Key: A correct response will look like this:

The number of birds found on *Metrosideros* trees will be [fewer than] the number of birds found on *Sophora* trees.

Metrosideros trees produce [fewer flowers than] *Sophora* trees during each flowering season. *Metrosideros* trees also produce nectar with a [lower sugar concentration than] *Sophora* trees do.

Rationale:
Fewer birds will visit *Metrosideros* trees because not only do they produce fewer flowers during both February and June than do *Sophora* trees, but the flowers of *Metrosideros* trees also have a lower sugar concentration than those of *Sophora* trees, as indicated in Table 1.

Item 19

UIN: 1908B007_04
Item Type: Technology Enhanced
Standards Alignment: DCI: LS2.A; SEP: CEDS; CCC: S & SM
SR/AT/Paper Key: Box Y: B; Box Y: B
Key: A correct response will look like this:

Himatione birds are on *Sophora* trees [less often than] *Chlorodrepanis* birds are on *Metrosideros* trees. This suggests that *Chlorodrepanis* birds are [more competitive than] *Himatione* birds for available food resources.

Rationale:
Figure 2 shows that *Himatione* birds spend significantly less time on *Sophora* trees than *Chlorodrepanis* birds spend on *Metrosideros* trees, which indicates that *Chlorodrepanis* birds are more competitive for the nectar produced by *Sophora* flowers than *Himatione* birds.

Item 20

UIN: 1908B007_05
Item Type: Constructed Response
Standards Alignment: DCI: LS2.A; SEP: EAE; CCC: C and E
Sample Student Response:
(4 pts)
Claim: *Chlorodrepanis* birds most likely have a larger population size than *Himatione* birds. (1 pt)
Support (3 pts): Based on Figure 2, *Chlorodrepanis* birds primarily feed on *Sophora* trees, and *Himatione* birds primarily feed on *Metrosideros* trees. (1 pt) Based on Table 1, *Sophora* trees have a higher average number of flowers and a higher nectar sugar concentration than *Metrosideros* trees. (1 pt) Both *Sophora* and *Metrosideros* occupy the same proportion of the island, based on a sentence above Table 1. (1 pt)
Rationale:
The student needs to recognize that *Chlorodrepanis* birds are most likely to have a larger population on the island because they feed primarily on *Sophora* trees, which produce more flowers with a higher sugar concentration than the *Metrosideros* tree flowers that *Himatione* birds feed on. Therefore, *Sophora* trees can support a larger bird population even though both types of trees are distributed relatively equally across the island. The data also show that the number of *Chlorodrepanis* birds observed on *Sophora* trees is typically higher than that of *Himatione* birds on *Metrosideros* trees, further supporting the claim.

Item 21

UIN: 1908B007_10
Item Type: Technology Enhanced
Standards Alignment: DCI: LS2.A; SEP: PACI; CCC: C and E
SR/AT/Paper Key: Box X: A; Box Y: C; Box Z: B
Key: A correct response will look like this:

The independent variable is the [flower color] and the dependent variable is the [hawk's decoy selection]. The experiment was most likely testing how the [background environment] affects the hawk's ability to locate its prey.

Rationale:
The experiment tested the impact of flower color on a hawk's ability to locate prey; therefore, flower color is the independent variable. The hawk's selection was impacted by flower color; therefore, the hawk's decoy selection is the dependent variable. Flower color is an environmental factor, so the investigation tested how the background environment affected the hawk's selection.