# NJSLA–S Online Practice Test Answer and Alignment Document
# Science: Grade 8 – Unit 2

## Items 1-3

**Domain:** Physical Science
**Phenomenon:** Lighthouses provide light to ships navigating the ocean.

## Item 1

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS4.B; SEP: DUM; CCC: S and SM
**Screen Reader (SR)/Assistive Technology (AT)/Paper Key:** Box X: B; Box Y: B; Box Z: C
**Key:** A correct response will look like this:

In the projection method shown in Figure 1, light waves travel
in straight lines until they reflect off the surface of
the mirror .

**Rationale:** All light waves travel in straight lines until they encounter another medium where they are either reflected, absorbed, or transmitted. In Figure 1, the light waves travel in straight lines until they meet the surface of the mirror. Because the mirror is curved, all the light waves reflect off the surface of the mirror in paths that are parallel to one another.

## Item 2

**Item Type:** Multiple Choice
**Standards Alignment:** DCI: PS4.B; SEP: AQDP; CCC: C and E
**Key: A**
**Rationale:** Figure 2 shows that the light waves that reach the lens pass through the lens, so the light waves are transmitted through the lens and not reflected by the lens.
Answer B is invalid because the lens does not affect the color of the light waves.
Answer C is invalid because the lens does not affect the distance the light waves travel.
Answer D is invalid because the lens does not actively transfer matter from one side to the other.

## Item 3

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS4.A; SEP: OECI; CCC: SF
**SR/AT/Paper Key:** Lighthouse: B, C; Foghorn: A, C
**Key:** A correct response will look like this:

| | Lighthouse | Foghorn |
|---|---|---|
| The signal is transmitted by compression and expansion of air particles. | ☐ | ☑ |
| The signal system is designed to focus the wave in a specific direction. | ☑ | ☐ |
| The signal transmits energy. | ☑ | ☑ |

**Rationale:** Row 1: Light waves consist of electromagnetic radiation and do not require a medium through which to travel. The foghorn uses sound waves that require a medium through which to travel. In this case, the sound waves are transmitted by the compression and expansion of air particles. Row 2: Figure 1 and Figure 2 show that the signal system used by lighthouses is designed to focus light waves in a specific direction. However, sound waves are emitted by the foghorn in all directions. Row 3: Light is a form of energy. The signal system used by a foghorn emits sound, which is also a form of energy.

## Items 4-7

**Domain:** Life Science
**Phenomenon:** Bat activity can be affected by artificial lighting.

## Item 4

**Item Type:** Multiple Choice
**Standards Alignment:** DCI: LS2.C; SEP: AQDP; CCC: C and E
**Key:** D
**Rationale:** The data show that, of the colors tested, red light has the least effect on the bats' behavior compared with when no artificial light is present.
Answer A is invalid because the data in Figure 1 show that green light affects bat activity but do not explain why this happens.
Answer B is invalid because Figure 1 shows data on the number of times bats passed by different colored lights and does not include data on how bats can distinguish green and red insects.
Answer C is invalid because the data in Figure 1 do not provide information about how the combination of green and red light affects bat activity.

## Item 5

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: LS1.D; SEP: PACI; CCC: C and E
**SR/AT/Paper Key:** Box Y: C; Box Z: B
**Key:** A correct response will look like this:

The independent variable in this investigation is the [color of light] .

The investigation provided evidence that the bats' [nervous system] is reacting to a stimulus and affecting the behavior of the bats.

**Rationale:** The independent variable is the color of light, which the researchers manipulate and is indicated on the x-axis of Figure 1. Light acts as a stimulus to the bats' nervous system, which coordinates the behavioral response of the bats to the light.

## Item 6

**Item Type:** Multiple Choice
**Standards Alignment:** DCI: LS1.D; SEP: EAE; CCC: S and SM
**Key:** A
**Rationale:** Student 1's claim explains how the nervous system coordinates a response to a stimulus by sending messages to the muscular system. Student 2's claim explains how a bat's ears sense sounds and send this information to the brain.
Answer B is invalid because the brain is needed to process information about sounds and muscle memory does not occur when the nervous system sends messages to the muscles for immediate action.
Answer C is invalid because neither students' claim explains how the brain stores memories nor how memories may be useful in locating prey.
Answer D is invalid because Student 1's claim does not discuss the role of sounds and Student 2's claim does not explain the storage of memories.

## Item 7

**Item Type:** Multiple Choice
**Standards Alignment:** DCI: LS2.C; SEP: CEDS; CCC: SC
**Key:** C
**Rationale:** Figure 1 shows that white light decreased the number of times bats passed by. Since bats will avoid the white light, the bats will eat fewer insects in the area with light. So, the number of insects will increase in the area with white light.
Answers A and B are invalid because the study did not investigate the effect of light on the activity of insects.
Answer D is invalid because the study did not investigate the effect of light on the ability of bats to see different sizes of prey.

## Items 8-12

**Domain:** Physical Science
**Phenomenon:** Only some parts of a bicycle rusted when left outside.

### Item 8

**Item Type:** Multiple Choice
**Standards Alignment:** DCI: PS1.B; SEP: PACI; CCC: C and E
**Key:** A
**Rationale:** Figure 1 shows an investigation with metal exposed to different conditions. Since the metal only rusts when certain conditions/components are present, the investigation is trying to identify what components produce rust.
Answer B is invalid because the investigation did not test different types of metals.
Answer C is invalid because the investigation did not measure the amount of rust in 10 day increments, simply the presence and relative amount of rust after 10 days under different conditions.
Answer D is invalid because the investigation did not measure changes in mass across the samples.

### Item 9

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS1.B; SEP: CEDS; CCC: SC
**SR/AT/Paper Key:** Box Y: C; Box Z: C
**Key:** A correct response will look like this:

Evidence of a chemical reaction is shown in [both test tubes 1 and 4 ▾]

because the iron pieces [formed a new substance ▾] .

**Rationale:** The formation of rust is a chemical reaction since the molecules reorganize to form a new substance, which is shown in only test tubes 1 and 4.

### Item 10

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS1.B; SEP: CEDS; CCC: S,P, and Q
**SR/AT/Paper Key:** Box X: A; Box Y: B; Box Z: A
**Key:** A correct response will look like this:

The types of atoms found in the reactants and products are
[the same ▾] . During the reaction, the atoms form
[different ▾] molecules. The number of atoms in the reactants will be
[equal to ▾] the number of atoms in the product.

**Rationale:**
When a chemical reaction takes place, different molecules are formed due to the rearrangement of atoms. Since matter is conserved when a chemical reaction occurs, the same number and types of atoms should be present in both the reactants and the products.

## Item 11

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS1.B; SEP: EAE; CCC: C and E
**SR/AT/Paper Key:** Box Y: B; Box Z: A
**Key:** A correct response will look like this:

**Claim A**

Group 1: A bicycle will only rust when the air is salty.

**Group 2: A bicycle will rust faster when the air is salty.**

**Claim B**

**Group 1: A bicycle will rust outdoors because water and oxygen are in the atmosphere.**

Group 2: A bicycle will rust outdoors because only oxygen is in the atmosphere.

**Rationale:**
Rust is created when iron is exposed to oxygen and moisture. For claim A, only oxygen and water are required to form rust, as shown by test tube 1. When salt is present, the formation of rust is sped up, but it is not a requirement. For claim B, if only oxygen is present, the chemical reaction that produces rust will not occur and rust will not form. Water must be present for rust to form, as seen by the fact that test tube 2 does not show any rust.

## Item 12

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: PS1.B; SEP: OECI; CCC: SF
**SR/AT/Paper Key:** Box W: B; Box X: A; Box Y: B; Box Z: A
**Key:** A correct response will look like this:

| Properties | Evidence | Not Evidence |
|---|---|---|
| Physical state at room temperature | ○ | ● |
| Density | ● | ○ |
| Mass | ○ | ● |
| Melting Point | ● | ○ |

**Rationale:**
Since iron and rust are solids at room temperature, their physical state at room temperature does not provide evidence that iron and rust are not the same substance. The density of a substance is dependent upon the atoms that make up the substance, therefore if two substances with the same phase have different densities then they are made of different atoms, which makes them different substances. Therefore, since the density of iron is different from the density of rust, this is evidence that they are different substances. The mass of a substance does not provide evidence that a substance is not the same as another substance, it just shows that one sample is smaller than the other. The melting point of a substance is dependent upon the strength of the bonds between the atoms in the substance, therefore if their melting points are different then they are different substances. Since iron and rust have different melting points, this is evidence that they are different substances.

## Items 13-16

**Domain:** Life Science

**Phenomenon:** The number of diamondback terrapin nests is dropping in Jamaica Bay on Long Island, New York.

## Item 13

**Item Type:** Technology Enhanced

**Standards Alignment:** DCI: LS2.C; SEP: UMCT; CCC: PAT

**SR/AT/Paper Key:** Box Y: B; Box Z: C

**Key:** A correct response will look like this:

**Part A**

19 %

**Part B**

The percentage of algae in the diet of Oyster Bay terrapins is

less than the percentage of algae in the diet of Jamaica Bay terrapins. This suggests that the Oyster Bay ecosystem

is healthier for terrapins than the Jamaica Bay ecosystem.

**Rationale:** From Table 1, the percentage of algae in the diet of terrapins in Oyster Bay is 20% (24/120 x 100%). From Figure 2, the percentage of algae in the diet of terrapins in Jamaica Bay is 39%. Therefore, the difference is 19% (39% - 20%). The percentage of algae in the diet of Oyster Bay terrapins is less than the percentage of algae in the diet of Jamaica Bay terrapins. Algae is lower in protein and difficult for the terrapins to digest. Since there is less algae present in the diet of Oyster Bay terrapins, this suggests that the Oyster Bay ecosystem is healthier for terrapins than the Jamaica Bay ecosystem.

## Item 14

**Item Type:** Multiple Choice

**Standards Alignment:** DCI: LS2.A; SEP: CEDS; CCC: E and M

**Key: B**

**Rationale:** Terrapins require nutrients to reproduce. The data show that algae makeup 39% of the diet of diamondback terrapins in Jamaica Bay. Algae is lower in protein and difficult for the terrapins to digest. Therefore, the increased proportion of algae in the terrapins' diet does not provide as much of the nutrients needed for the terrapins to reproduce.

Answer A is invalid because terrapins are consumers and not producers.

Answer C is invalid because the number of female terrapins in the research study remained the same.

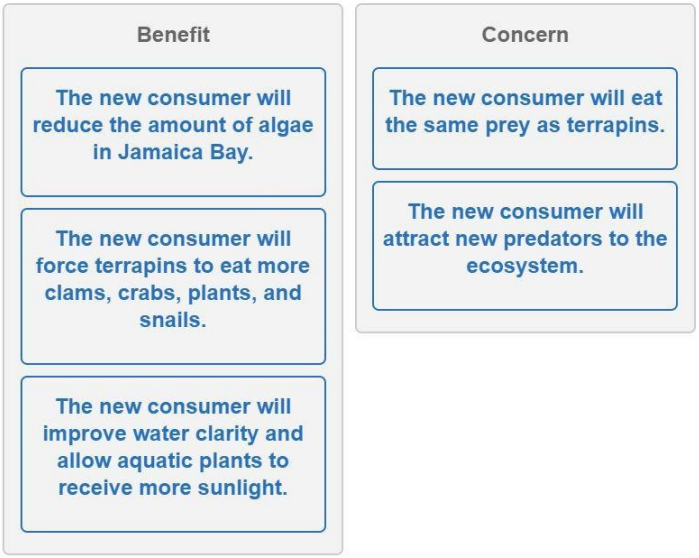
Answer D is invalid because there was a 50% drop in the number of nests (indicating that the rate of reproduction decreased) and the amount of marshland decreased.

## Item 15

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: LS2.C; SEP: CEDS; CCC: SC
**Key:** C, D
**Rationale:** An increase in algae will provide more nutrients to snails for reproduction (C) but will provide fewer nutrients that the terrapins need to reproduce (D).
Answer A is invalid because a change in the ecosystem may cause raccoons to leave the ecosystem but will not make the raccoons go extinct.
Answer B is invalid because an increase in algae will increase the resources available for clams and crabs.
Answer E is invalid because the ecosystem is not as healthy due to excess algae, which tends to decrease the diversity of organisms in the ecosystem.

## Item 16

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: LS2.C; SEP: EAE; CCC: SC
**SR/AT/Paper Key: C, D, E**
**Key:** A correct response will look like this:




**Rationale:** The introduction of a non-native algae consumer should help decrease the number of algae present in the Jamaica Bay ecosystem. This is a benefit because increased amounts of algae are linked to a decrease in terrapin reproduction. The new consumer will compete with terrapins for algae as a food source. This is a benefit because it will force the terrapins to eat more clams, crabs, plants, and snails, which have more of the nutrients the terrapins need. A reduction in the number of algae should improve water clarity. This is a benefit because aquatic plants will be exposed to more sunlight and, as producers, be able to provide more energy for the consumers. The new consumer and terrapins both eat algae. This is a concern because the terrapins will have to compete with the new consumer for resources. The new consumer will attract new predators to the ecosystem. This is a concern because these predators may also harm organisms that are native to the Jamaica Bay ecosystem.

## Items 17-20

**Domain:** Earth and Space Science
**Phenomenon:** Because of density differences, the sinking of cold water and the movement of warm water set up a massive convection current in the oceans.

### Item 17

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: ESS2.C; SEP: UMCT; CCC: C and E
**SR/AT/Paper Key:** Box X: B; Box Y: B; Box Z: A
**Key:** A correct response will look like this:

The data shown in Figure 2 are an example of [quantitative] data.

The amount of weathering and erosion at DEWA would be expected to be highest in [May/June]. This is because precipitation causes [an increase] in the rate of weathering and erosion.

**Rationale:** The data in figure 2 are data that can be measured and are quantitative. Weathering and erosion increase when precipitation increases, so the weathering and erosion will be greatest in May/June.

### Item 18

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: ESS2.C; SEP: DUM; CCC: C and E
**SR/AT/Paper Key:** Box X: B; Box Y: A; Box Z: C
**Key:** A correct response will look like this:

Figure 3 shows that, at sea level, where air temperatures are the highest, [evaporation] of water occurs. Figure 3 also shows that freezing temperatures can cause [crystallization], which with gravity, often leads to water falling to the ground as solid precipitation. Then as [runoff], the water moves across the surface, eventually flowing into the lake and the ocean.

**Rationale:** When temperatures are high, water will change from the liquid state to the gaseous state, so evaporation will occur. Freezing temperatures cause water to change from the gaseous state to the solid state, so crystallization will occur. Once the water falls to the ground, it will move as runoff and flow to lakes and oceans.

## Item 19

**Item Type:** Technology Enhanced
**Standards Alignment:** DCI: ESS2.C; SEP: EAE; CCC: SC
**Key:** D, E
**Rationale:** Table 1 shows that a location's position downstream indicates a higher level of physical erosion. Table 1 also shows that gypsum and quartz sediment levels are higher in Trenton.
Answer A is invalid because comparing data from sites 1-3 does not support the student's explanation.
Answer B is invalid because Trenton's position is not close to the gap and the other sites upstream must be closer.
Answer C is invalid because physical erosion along the Delaware River is not a function of the size of a nearby city.

## Item 20

**Item Type:** Constructed Response
**Standards Alignment:** DCI: ESS2.C; SEP: CEDS; CCC: PAT
**Sample student response:**
The data in the table show that both weathering and erosion measurements are greater at Riegelsville than at DEWA and even greater at Trenton. To find out the cause of the increase, an investigation needs to determine what variables change between DEWA, Riegelsville, and Trenton. The investigation could study what kind of rock or soil is found upstream of each site. It could also study how far it is between the sites, and which sites are farther down the river than the others, or if any are near urban areas, or any other regional occurrences that would cause additional run off such as using deicer on the roads. Also, if there are elevation changes that could affect the deposition of sediments with a sloped area having smaller values than a broad flat area. If one or more of these variables changes in a similar pattern to the pattern shown in the table, those variables probably help explain the pattern.

**Key:** This item has 4 quality points:

- Identifying the pattern of increasing sediments and solids
- Explaining the need to determine what varies between the sites
- Describing one or more suggestions of variables to investigate
- Describing a means of interpreting the results of the investigation

**Rationale:** The student needs to recognize that the rate and extent of weathering and erosion varies by location. The factors that can affect the rate can include rock or soil type, proximity to a river, and human changes to the environment. An investigation into some of these variables can show students if there is a pattern similar to the pattern in the table. If there is, the variables will help explain the pattern.