SY2020
-2021

Idaho Science Sample Test Answer Key

SCIENCE AT MIDDLE SCHOOL

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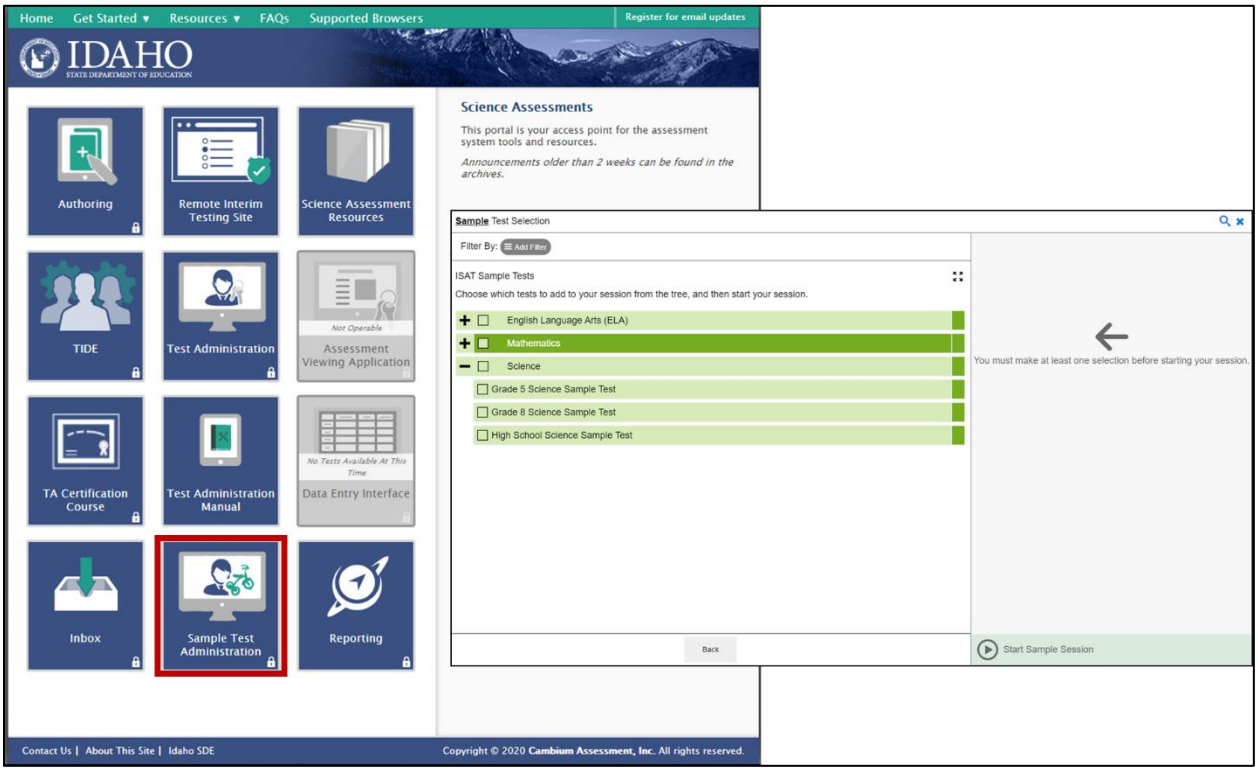
Accessing the Idaho Science Sample Test

The Science Sample Tests are available via the ISAT Portal.

The Science Sample Tests can be administered with the Sample Test Administration panel. A Test Administrator clicks on the Sample Test Administration panel and starts a Sample Test Session. Students can use the Idaho Secure Browser to log in and take a Science Sample Test using their first name, EDUID, and the Sample Test Session number.

Figure 1 shows the Sample Test Administration panel and the Sample Test Selection window.

Figure 1: Sample Test Administration App and the Sample Test Selection Window



A Guest User can also log into with a Guest Session and take a Science Sample Test as many times as he/she would like to take a grade 5, grade 8 or high school science sample test.

To access the Science Sample Tests as a Guest User, click on the Practice & Training Tests panel on the ISAT Portal homepage. From there, click on the Take the Sample/Training Tests panel. A new tab will open, and you can login as a Guest User.

Figure 2 shows the Practice & Training Tests panel.

Figure 2: Practice & Training Tests

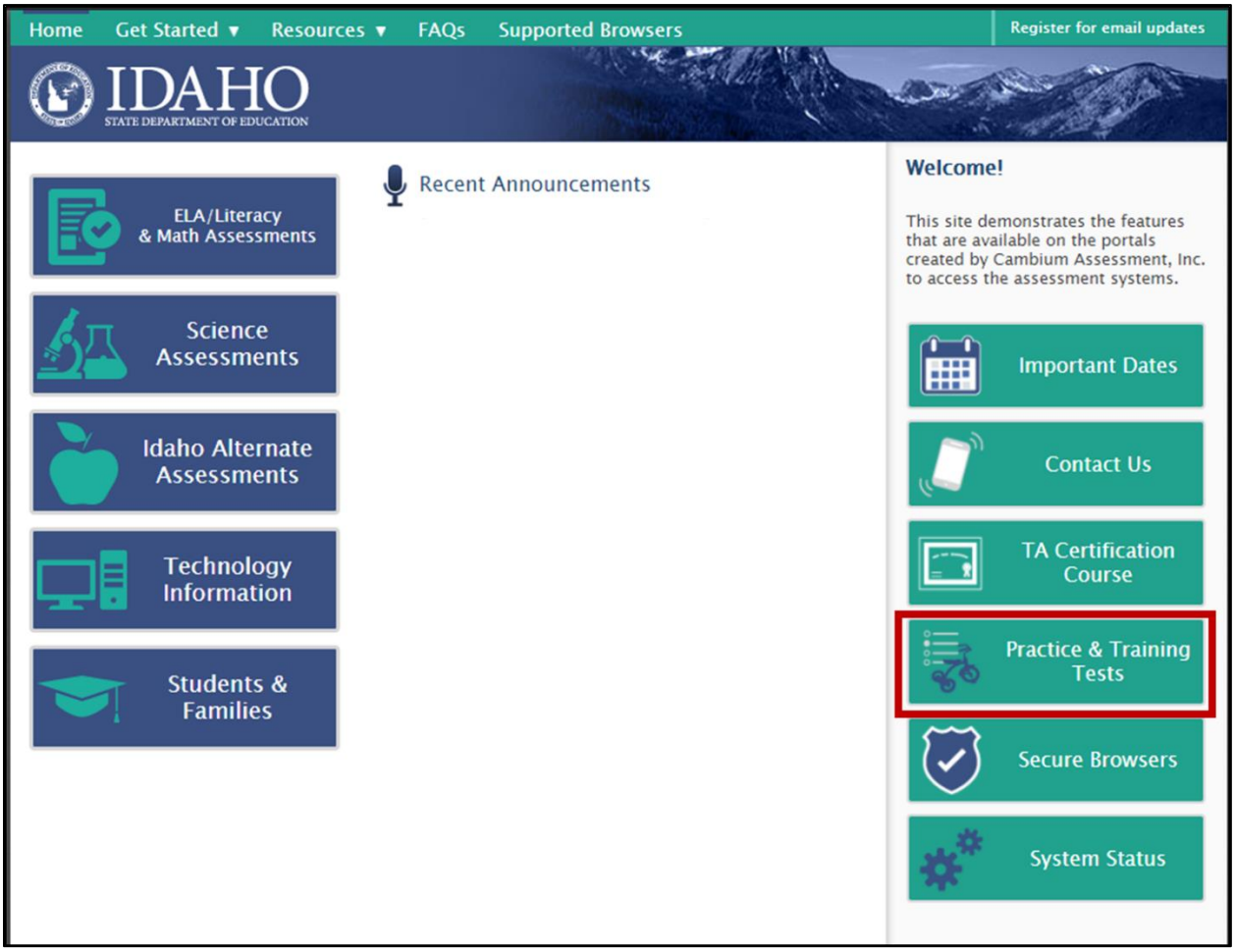
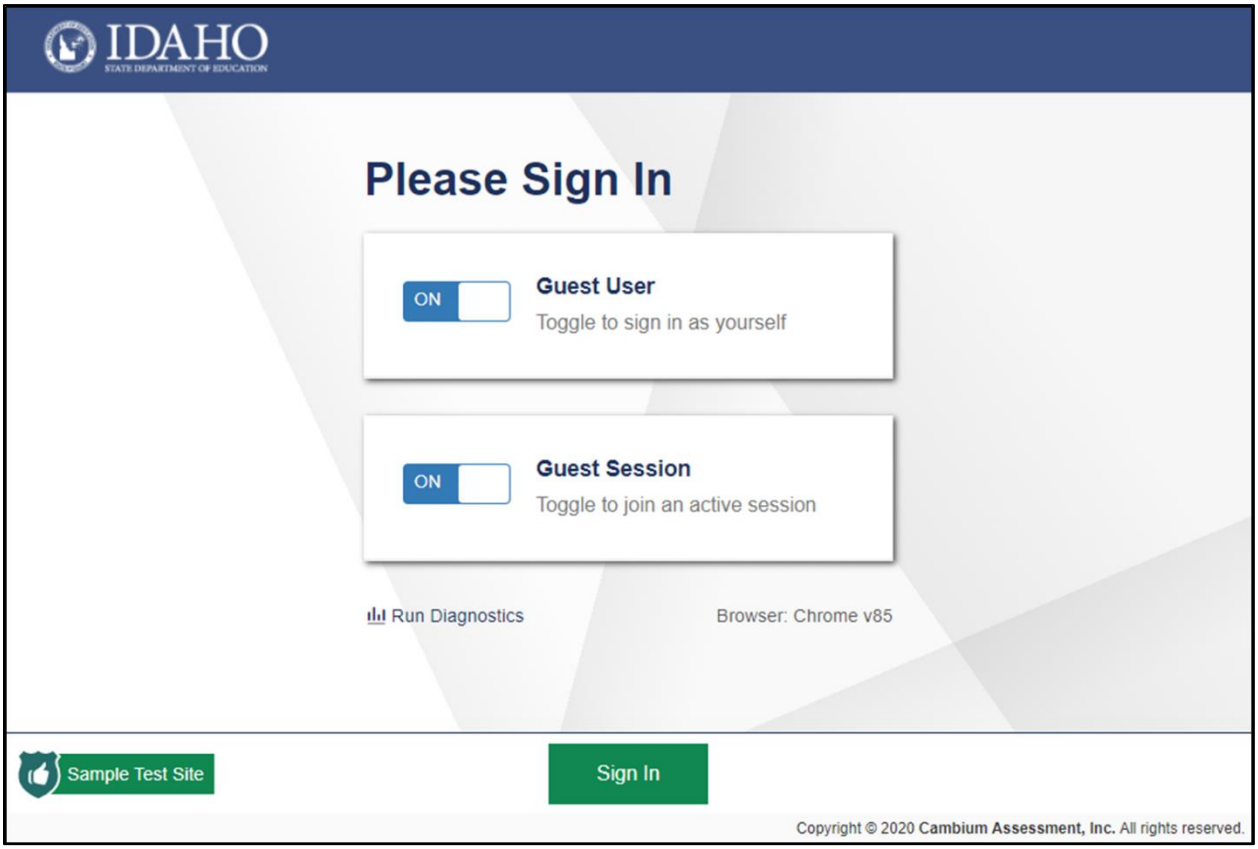


Figure 3 shows the Take the Sample/Training Tests panel.

Figure 3: Take the Sample/Training Tests Panel

Figure 4 shows the Guest User and Guest Session login page.

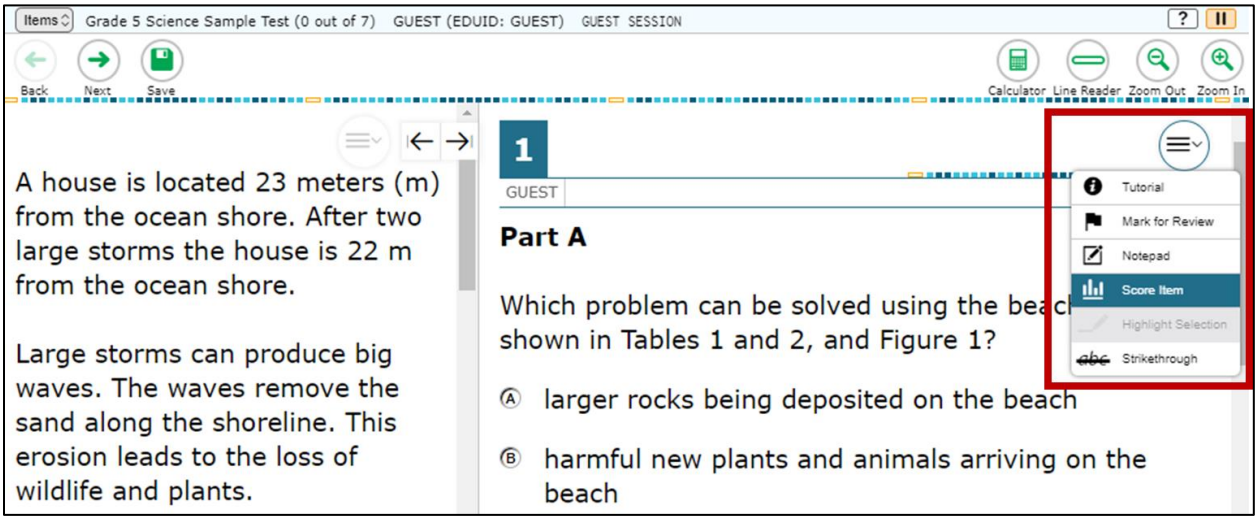
Figure 4: Guest User and Guest Session Login Page



As a Guest User is taking a Science Sample test, he/she can check their score. After answering a few or all of the questions, click on the Context Menu in the upper right corner, and then click on Score Item.

Figure 5 shows the location of the Context Menu and Score Item.

Figure 5: Context Menu and Score Item



Question #1: Middle School Sample Test

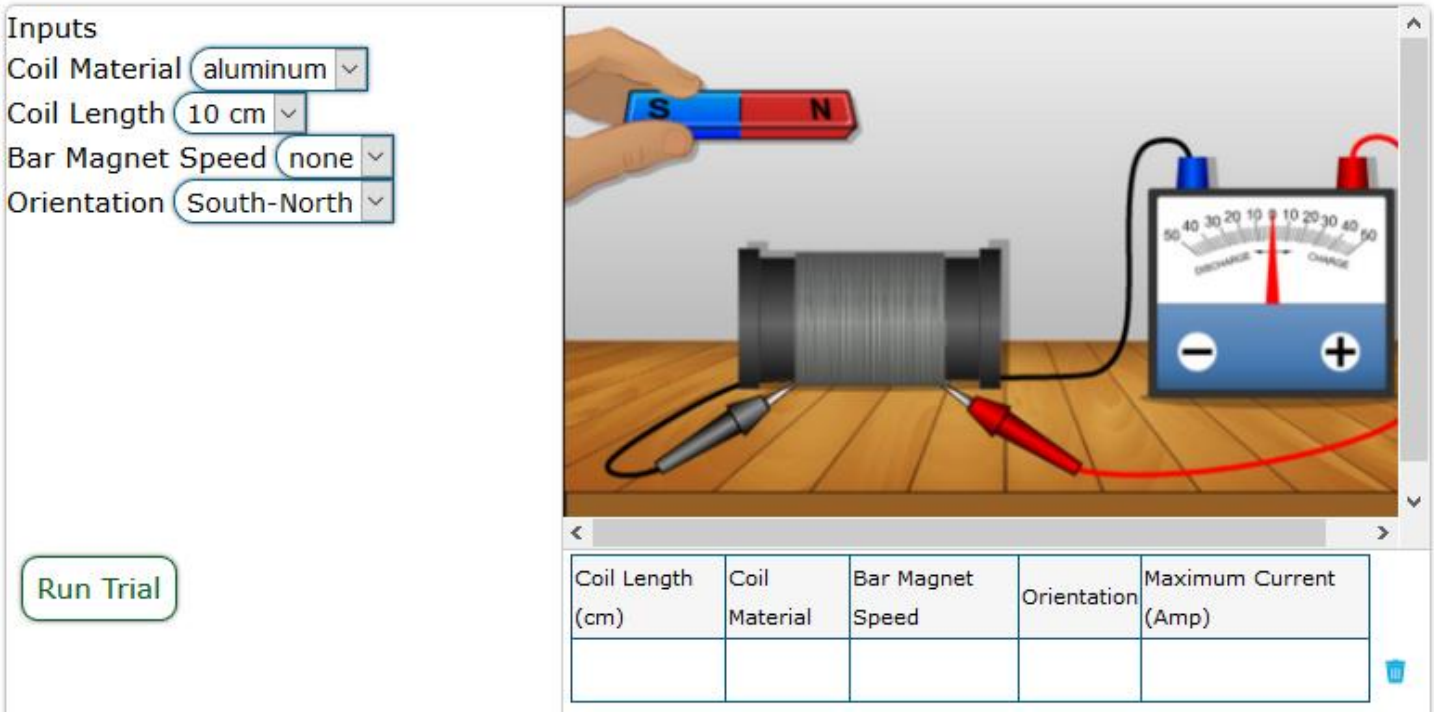
Alignment: PS2-MS-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

- **SEP:** Planning and Carrying Out Investigations
- **Science Content:** PS2.B Types of Interactions
- **CCC:** Cause and Effect

Part A

Using the simulation, select inputs to design and run a controlled experiment to determine how each coil material affects the movement of the ammeter needle.

- You may run up to 4 trials. If you would like to delete a trial, click on the trash can icon next to the row of data you would like to delete, and generate new data.
- Coil length is measured in centimeters (cm).
- Click Run Trial to run a trial.



Answer: Responses will vary. The student receives a point for running a controlled experiment to determine the effect of coil material on the movement of the needle. This is an example of a controlled experiment, changing only the coil material:

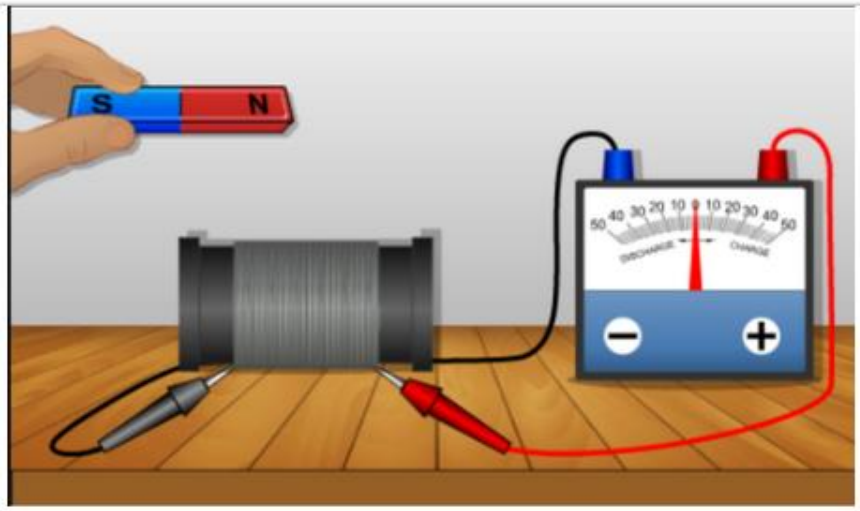
Coil Length (cm)	Coil Material	Bar Magnet Speed	Orientation	Maximum Current (Amp)
10	aluminum	fast	South-North	-50
10	iron	fast	South-North	-14
10	nickel	fast	South-North	-20
10	plastic	fast	South-North	0

Part B

Using the simulation, design and run a second experiment to determine how the motion of the magnet affects the movement of the needle.

- Click Run Trial again to run a new trial.
- You may run up to 4 trials. If you would like to delete a trial, click on the trash can icon next to the row of data you would like to delete, and generate new data.

Inputs
Coil Material aluminum
Coil Length 10 cm
Bar Magnet Speed none
Orientation South-North



Run Trial

Coil Length (cm)	Coil Material	Bar Magnet Speed	Orientation	Maximum Current (Amp)

Answer: Responses will vary. The student receives a point for run a controlled experiment to determine the effect of the speed of the magnet on the movement of the needle. This is an example of a controlled experiment, changing on the bar magnet speed:

Coil Length (cm)	Coil Material	Bar Magnet Speed	Orientation	Maximum Current (Amp)
10	aluminum	none	South-North	0
10	aluminum	fast	South-North	-50
10	aluminum	slow	South-North	-25

Part C

Select the **two** conditions that are required for the ammeter needle to jump.

- [ ] The coil must be 20 cm long.
- [ ] The bar magnet must be moving.
- [ ] The coil material must attract magnets.
- [x] The coil material must conduct electricity.
- [ ] The magnet must not touch the ammeter.
- [ ] The bar magnet's N pole must point in the direction of motion.

Answer:

- [ ] The coil must be 20 cm long.
- [x] The bar magnet must be moving.
- [ ] The coil material must attract magnets.
- [x] The coil material must conduct electricity.
- [ ] The magnet must not touch the ammeter.
- [ ] The bar magnet's N pole must point in the direction of motion.

Part D

Click on each blank box and select phrases to complete the sentence describing what causes the ammeter needle to jump.

The ammeter needle jumps because a [ ] [ ]

Options:

- Moving electric field
- Moving magnetic field
- Stationary electric field
- Stationary magnetic field

- Induces a magnetic field in the coil.
- Causes the coil to conduct electricity.
- Induces an electric current in the coil.
- Attracts or repels the needle, depending on the direction of the poles.

Answer:

The ammeter needle jumps because a [moving magnetic field] [induces an electric current in the coil.]

Scoring Assertions

Q#	Part	Scoring Assertions
1	A	The student ran a controlled experiment to determine the effect of the coil material on the movement of the needle, running four trials, each with a different coil material, in which all other variables were held constant. This provides some evidence of an ability to make observations about magnetic or electric fields that exist between two objects that are not in contact with one another.
1	B	The student ran a controlled experiment to test the effect of speed on the movement of the ammeter needle, and ran at least two trials in which they varied the speed of the magnet while keeping all other variables constant. This provides some evidence of an ability to make observations about magnetic or electric fields that exist between two objects that are not in contact with one another.
1	C	The student selected "the bar magnet must be moving", providing some evidence of an ability to interpret and communicate data from an investigation that provides evidence of forces acting on objects that are not in contact.
1	C	The student selected "the coil material must conduct electricity", providing some evidence of an ability to interpret and communicate data from an investigation that provides evidence of forces acting on objects that are not in contact.
1	D	The student identified that the ammeter needle jumped because of a moving magnetic field, providing some evidence of an understanding of the cause of the induced current.
1	D	The student predicted that the material "induces an electric current in the coil", providing some evidence of an ability to use the cause and effect relationship between the magnet and the coil to predict the results when a change in the experimental design is made.

Question #2: Middle School Sample Test

Alignment: PS3-MS-3: Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

- **SEP:** Constructing Explanations and Designing Solutions
- **Science Content:** PS3.A Definitions of Energy & PS3.B Conservation of Energy & ETS1.A Defining and Delimiting an Engineering Problem & ETS1.B Developing Possible Solutions
- **CCC:** Energy and Matter

Select the blank boxes to indicate whether each criterion is fulfilled by Design X, Design Y, or both designs.

Criteria	Design X	Design Y	Both Designs
The food tray is evenly heated.	☐	☐	☐
The food is warmed to a higher temperature than the other tray.	☐	☐	☐
The flame(s) does/do not directly touch the food.	☐	☐	☐
The flame(s) is/are as far as possible from the handles.	☐	☐	☐
The setup uses as little fuel as possible.	☐	☐	☐

Answer:

Criteria	Design X	Design Y	Both Designs
The food tray is evenly heated.	☐	☑	☐
The food is warmed to a higher temperature than the other tray.	☑	☐	☐
The flame(s) does/do not directly touch the food.	☐	☐	☑
The flame(s) is/are as far as possible from the handles.	☐	☑	☐
The setup uses as little fuel as possible.	☐	☑	☐

Scoring Assertions

Q#	Scoring Assertion
2	The student selected "Design Y" for "The food tray is evenly heated," providing some evidence of an ability to identify the constraints of two different designs for keeping trays of food warm.
2	The student selected "Design X" for "The food is warmed to a higher temperature than the other tray," providing some evidence of an ability to identify the constraints of two different designs for keeping trays of food warm.
2	The student selected "Both Designs" for "The flames do not directly touch the food," providing some evidence of an ability to identify the constraints of two different designs for keeping trays of food warm.
2	The student selected "Design Y" for "The flames are as far as possible from the handles," providing some evidence of an ability to identify the constraints of two different designs for keeping trays of food warm.
2	The student selected "Design Y" for "The setup conserves as much fuel as possible," providing some evidence of an ability to identify the constraints of two different designs for keeping trays of food warm.

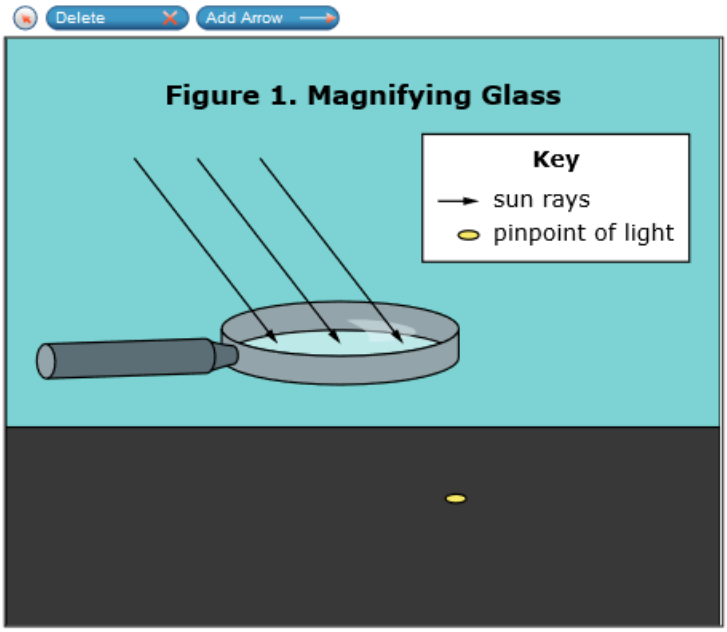
Question #3: Middle School Sample Test

Alignment: PS4-MS-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

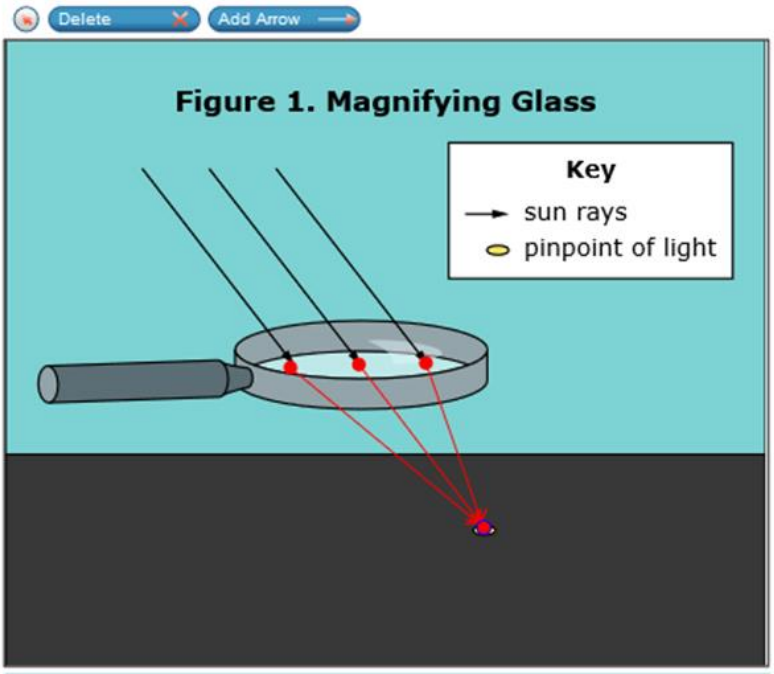
- **SEP:** Developing and Using Models
- **Science Content:** PS4.A Wave Properties & PS4.B Electromagnetic Radiation
- **CCC:** Structure and Function

Part A

Use the Add Arrow tool to draw **three** arrows to model how the small point of light is formed on the ground.



Answer:



Part B

Click on the blank boxes and select words or phrases to explain what happens in the model created in part A.

When light enters the magnifying glass, light is [ ] the glass to form the small point of light.

Options:

- Absorbed by
- Reflected off
- Produced by
- Refracted through

Answer:

When light enters the magnifying glass, light is [refracted through] the glass to form the small point of light.

Scoring Assertions

Q#	Part	Scoring Assertion
3	A	The student drew an arrow from the end of each arrow or from just under the magnifying glass to the point of light, showing light bending at different angles when it hits the glass at different thicknesses on the lens. This provides some evidence of an ability to model how light travels through different media.
3	B	The student indicated that the light wave is refracted through the glass. This provides some evidence of the ability to explain how wave properties change when the light hits the glass.

Question #4: Middle School Sample Test

Alignment: LS4-MS-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

- **SEP:** Using Mathematics and Computational Thinking
- **Science Content:** LS4.C Adaptation
- **CCC:** Cause and Effect

Part A

Calculate the rates of change in first flowering dates per degree Celsius for the average species, the highbush blueberry, and the yellow wood sorrel, between 1852 and 2006. Round your answers to one decimal point.

Plant	Rate of Change in First Flowering Date (days per °Celsius)
43 Species	
Highbush blueberry	
Yellow wood sorrel	

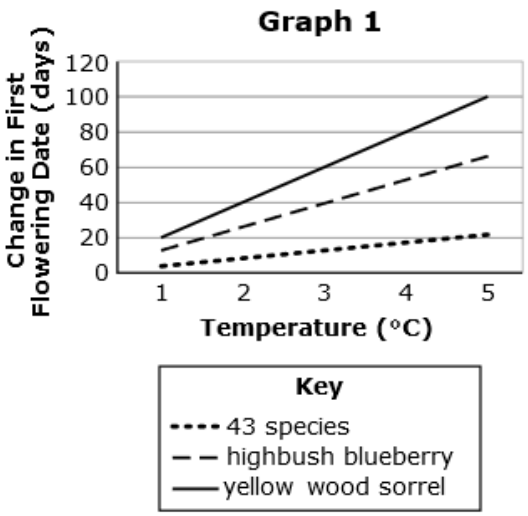
Answer: Responses my vary. Correct responses include +/- 0.1 for each blank. Actual correct values are:

Plant	Rate of Change in First Flowering Date (days per °Celsius)
43 Species	4.4
Highbush blueberry	13.1
Yellow wood sorrel	20

Part B

Which graph matches the rates of change you calculated in part A?

Ⓐ



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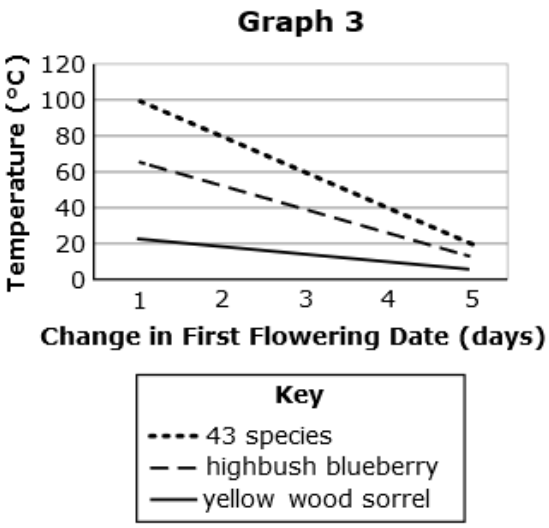

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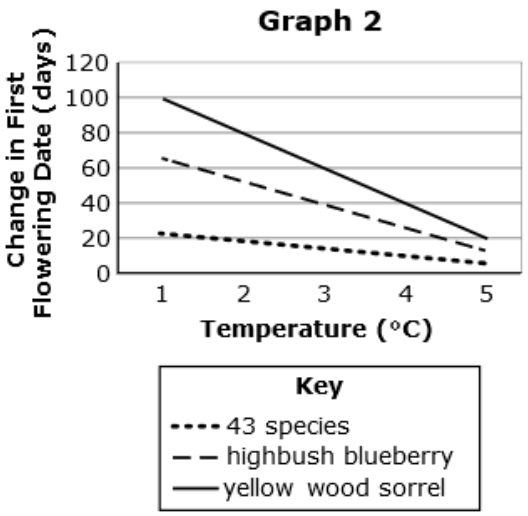

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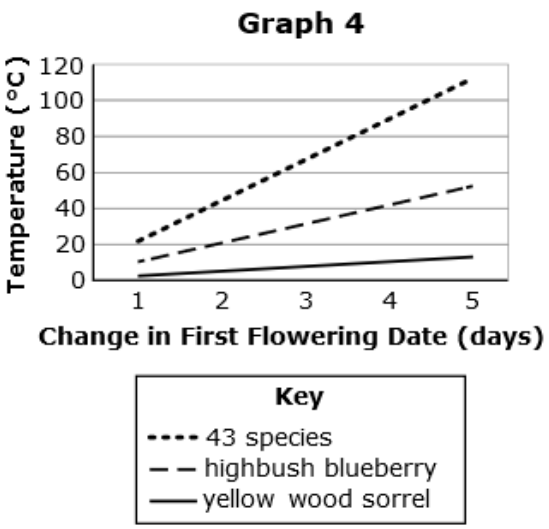


Answer: A

Part C

Which statement is supported by the calculations and observations you have made?

Ⓐ The first flowering date of each plant species was affected differently by the increase in temperature.

Ⓑ The first flowering dates of all plant species were affected the same amount by the increase in temperature.

Ⓒ The first flowering dates of different plant species were affected by the number of hours of sunlight the plants received.

Ⓓ The first flowering dates of all the plants within the same species were affected the same amount by the increase in temperature.

Answer: A

Part D

Select **two** pieces of evidence you would need to support the hypothesis that natural selection caused the change in first flowering dates of the sorrels and the blueberry bushes.

- ☐ Clones of the same plant have a different first flowering date in environments with different temperatures.
- ☐ There is a genetic difference between the plants that flower earlier and the plants that flower later within each species.
- ☐ Farmers in Connecticut planted more of the yellow wood sorrel and highbush blueberry plants with earlier first flowering dates.
- ☐ The gene(s) that determines the first flowering date for the yellow wood sorrels is different from the gene(s) for the highbush blueberry plants.
- ☐ Plants that have an earlier first flowering date are better able to survive, and produce more seeds than the plants that have later first flowering dates.

Answer:

- [ ] Clones of the same plant have a different first flowering date in environments with different temperatures.
- [x] There is a genetic difference between the plants that flower earlier and the plants that flower later within each species.
- [ ] Farmers in Connecticut planted more of the yellow wood sorrel and highbush blueberry plants with earlier first flowering dates.
- [ ] The gene(s) that determines the first flowering date for the yellow wood sorrels is different from the gene(s) for the highbush blueberry plants.
- [x] Plants that have an earlier first flowering date are better able to survive, and produce more seeds than the plants that have later first flowering dates.

Scoring Assertions

Q#	Part	Scoring Assertion
4	A	When asked to calculate the rate of change in the first flowering date per increase in degree Celsius for 43 species, the student indicated 4.4 days/°C (allowable range of 4.3-4.5), providing some evidence that the student understands how to calculate rate.
4	A	When asked to calculate the rate of change in the first flowering date per increase in degree Celsius for the highbush blueberry plant, the student indicated 13.1 days/°C (range of 13.0-13.3), providing some evidence that the student understands how to calculate rate.
4	A	When asked to calculate the rate of change in the first flowering date per increase in degree Celsius for the yellow wood sorrel plant, the student indicated 20 days/°C (range of 20-20.2), providing some evidence that the student understands how to calculate rate.
4	B	When asked to select a graph that matches the rate of changes that they calculated in Part A, the student indicated Graph A which shows the steepest slope for the yellow wood sorrel, and the flattest slope for the 43 species, providing some evidence that the student understands how to graph comparative rates.
4	C	When asked to select a statement that is supported by their calculations and observations from Parts A and B, the student indicated that the first flowering date of each plant species was affected differently by the increase in temperature, providing some evidence that the student understands the relationships of the changes of a trait to a variety of species under changing conditions.
4	D	When asked what evidence would be needed to support the idea that natural selection was responsible for the change in first flowering date, the student indicated that there would need to be a genetic difference between the plants that flowered earlier and the plants that flowered later within each species. This provides some evidence that the student understands how natural selection leads to changes in the presence of certain traits in a population over time.
4	D	When asked what evidence would be needed to support the idea that natural selection was responsible for the change in first flowering date, the student indicated that plants that have an earlier first flowering date are better able to survive and produce more seeds than the plants that have a later first flowering date. This provides some evidence that the student understands how natural selection leads to changes in the presence of certain traits in a population over time.

Question #5: Middle School Sample Test

Alignment: LS3-MS-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of an organism.

- **SEP:** Developing and Using Models
- **Science Content:** LS3.A Inheritance of Traits & LS3.B Variation of Traits
- **CCC:** Structure and Function

Click on each blank box to select the statements that complete the chain of events explaining how the bar-eyed mutation reduces a fly's eyesight.

Chain of Events

Step	Event
1	
2	
3	
4	The eyesight of a fly is reduced.

Options:

- The fly's eye structures become wider.
- The fly's eye structures become narrower.
- There is a change in the protein production.
- There is no change in the protein production.
- A chromosome has less than one copy of the B gene.
- A chromosome has more than one copy of the B gene.

Answer:

Chain of Events

Step	Event
1	A chromosome has more than one copy of the B gene.
2	There is a change in the protein production.
3	The fly's eye structures become narrower.
4	The eyesight of a fly is reduced.

Scoring Assertions

Q#	Scoring Assertion
5	When asked to complete the chain of events explaining how the bar-eyed mutation reduces a fly's eyesight, the student selected "A chromosome has more than one copy of the B gene" before "There is a change in the protein production," thereby providing some evidence that the student understands how to use the model to describe how genes control the production of proteins.
5	When asked to complete the chain of events explaining how the bar-eyed mutation reduces a fly's eyesight, the student selected "There is a change in the protein production" before "The fly's eye structures became narrower, " thereby providing some evidence that the student understands how to use the model to describe how the production of proteins at the cellular level affects the traits at the organism level.

Question #6: Middle School Sample Test

Alignment: ESS3-MS-4: Construct an argument supported by evidence for how increases in human populations and per-capita consumption of natural resources impact Earth's systems.

- **SEP:** Engaging in Argument from Evidence
- **Science Content:** ESS3.C Human Impacts on Earth Systems
- **CCC:** Cause and Effect

Part A

Select **two** conclusions that can be made about Port A and Port B based on the evidence.

- [ ] Ports with fewer bottom dwellers have healthier marine habitats.
- [ ] A port with more consumption of fish results in fewer species of bottom dwellers.
- [ ] The size of the port has a greater impact on biodiversity than the use of ship paints.
- [ ] A port with higher heavy metal concentrations shows more signs of a disturbed habitat.
- [ ] The effects of ship painting on the amount of pollutants in the water can be found in both ports.

Answer:

- [ ] Ports with fewer bottom dwellers have healthier marine habitats.
- [ ] A port with more consumption of fish results in fewer species of bottom dwellers.
- [ ] The size of the port has a greater impact on biodiversity than the use of ship paints.
- [x] A port with higher heavy metal concentrations shows more signs of a disturbed habitat.
- [x] The effects of ship painting on the amount of pollutants in the water can be found in both ports.

Part B

Select two pieces of evidence that support the claims in part A.

- Click on the first pencil icon.
- Then, click on a highlighted section from the passage with the pencil to make your first selection. Click on the second pencil icon to make a second selection.
- To change a selection, click on the circular arrow that follows the selection you would like to change.

Answer:

Competition is usually found in disturbed habitats.

Copper and zinc are heavy metals that act as preservatives in paint on the bottoms of ships.

Part C

Click on each blank box and select the statement that matches each step of the incomplete model in Figure 2.

Options:

- Fewer resources are available for new fish species.
- The biodiversity of bottom dweller organisms decreases.
- The population of the Mediterranean port cities increases.
- The population of the Mediterranean port cities decreases.
- More pollutants are washed off the ships into the water.
- The number of ships bringing supplies to the ports increases.
- The number of ships bringing supplies to the ports decreases.

Answer:

The population of the Mediterranean port cities increases.

↓

The number of ships bringing supplies to the ports increases.

↓

More pollutants are washed off of the ships into the water.

↓

The biodiversity of bottom dweller organisms decreases.

Part D

What additional information would support the incomplete Figure 2 model?

Ⓐ main diet of competing species found in ports

Ⓑ number of bottom dweller organisms before 2017

Ⓒ population data in western and eastern coastal cities

Ⓓ water sport trends in Mediterranean ports since 1970

Answer: B

Scoring Assertions

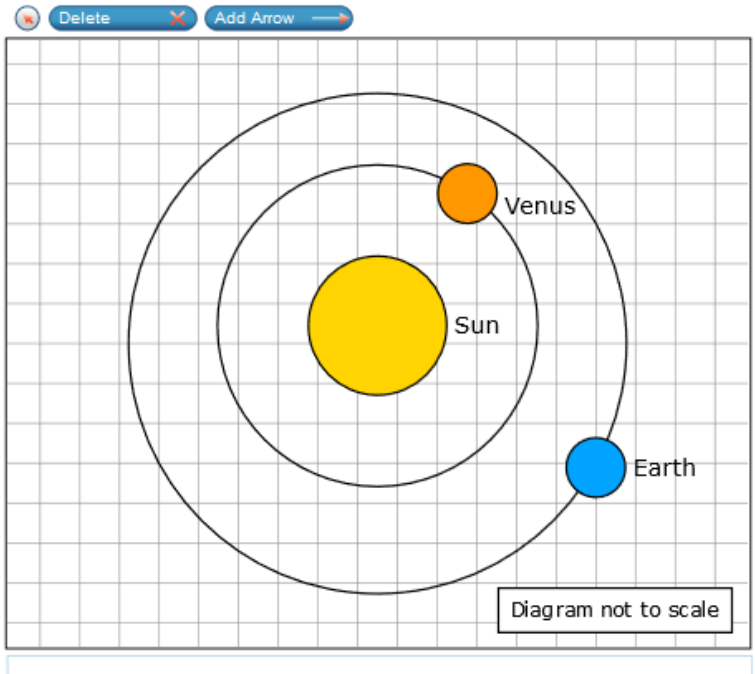
Q#	Part	Scoring Assertions
6	A	The student selected "A port with higher heavy metal concentrations shows more signs of a disturbed habitat." This provides some evidence of an ability to use patterns in the data to describe the relationship between consumption and biodiversity of the two Mediterranean ports.
6	A	The student selected "The effects of ship painting on amount of pollutants in the water can be found in both ports." This provides some evidence of an ability to use patterns in the data to describe the relationship between consumption and biodiversity of the two Mediterranean ports.
6	B	The student selected "Competition is usually found in disturbed habitats" as evidence to support the conclusion selected in part A. This provides some evidence of an ability to identify information to support an explanation of how increases in human population in the Mediterranean coast and consumption impact the biodiversity in Mediterranean habitats.
6	B	The student selected "Copper and zinc are heavy metals that act as preservatives in paint on the bottoms of ships." as evidence to support the conclusion selected in part A. This provides some evidence of an ability to identify information to support an explanation of how increases in human population in the Mediterranean coast and consumption impact the biodiversity in Mediterranean habitats.
6	C	The student selected "The population of the Mediterranean port cities increases" as the step before "The number of ships bringing supplies to the port cities increases" in Figure 2. This provides some evidence of an ability to use evidence to describe the relationship between increases in human population and consumption and their impact on the population of bottom dweller organisms in Mediterranean ports.
6	C	The student selected "The number of ships bringing supplies to the ports increases" as the step before "More pollutants are washed off of the ships into the water" in Figure 2. This provides some evidence of an ability to use evidence to describe the relationship between increases in human population and consumption and their impact on the population of bottom dweller organisms in Mediterranean ports.
6	C	The student selected "More pollutants are washed off of the ships into the water" as the step before "The biodiversity of bottom dweller organisms decreases." This provides some evidence of an ability to use evidence to describe the relationship between increases in human population and consumption and their impact on the population of bottom dweller organisms in Mediterranean ports.
6	D	The student selected "number of bottom dweller organisms before 2017" as additional information to support the selections in part C. This provides some evidence of an ability to identify information to support an explanation of how increases in human population in the Mediterranean coast and consumption impact the biodiversity in Mediterranean habitats.

Question #7: Middle School Sample Test

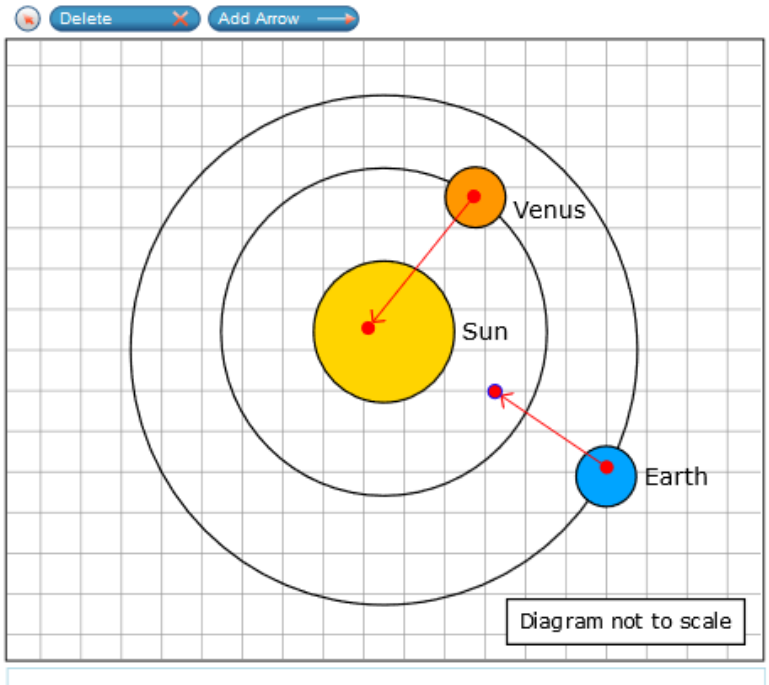
Alignment: ESS1-MS-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

- **SEP:** Developing and Using Models
- **DCI:** ESS 1.A The Universe and Its Stars & ESS1.B Earth and the Solar System
- **CCC:** Systems and System Models

Create a model to describe the difference in orbital speed. Use the Add Arrow tool and draw one arrow for each planet to show the magnitude and direction of the force of gravity on each planet. Longer arrows represent forces with greater magnitude.



Answer:



Scoring Assertions

Q#	Scoring Assertion
7	The student drew arrows starting from each planet towards the sun. This provides some evidence of an understanding of how gravity pulls a planet towards the sun, resulting in the planet's orbit.
7	The student drew two arrows that showed the force of gravity experienced by Venus as larger than that of Earth. This provides some evidence of an understanding of how gravity affects objects at different distances to create the different orbits of planets in the solar system.