

OPEN-ENDED ITEM

17. Meteor Crater is a rimmed, bowl-shaped feature that lies in the desert of northern Arizona. The crater measures 1,200 meters (m) in diameter, with the crater floor lying 180 m beneath the rim. The rim rises about 60 m above the surrounding desert. In the early twentieth century, most scientists theorized that the crater formed as a result of volcanic activity (volcanism theory). However, Daniel Barringer proposed that a powerful meteor impact formed the crater (impact theory).

Part A: Explain why the impact theory is classified as a theory rather than an opinion.

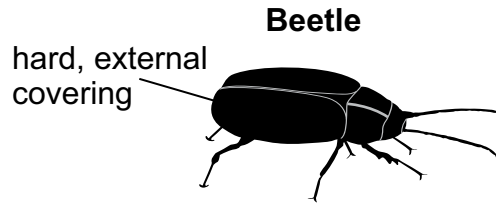
Part B: Barringer's impact theory was eventually accepted by a majority of scientists. Describe what is needed for a new theory to become widely accepted by the scientific community.

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.



OPEN-ENDED ITEM

18. Use the drawing below to answer the question.



Beetles have a hard, external covering on their bodies.

Part A: Describe one function of the hard, external covering on the beetle.

Part B: Identify a human body structure and describe how its function is similar to the hard, external covering of a beetle.

Human Body Structure: _____

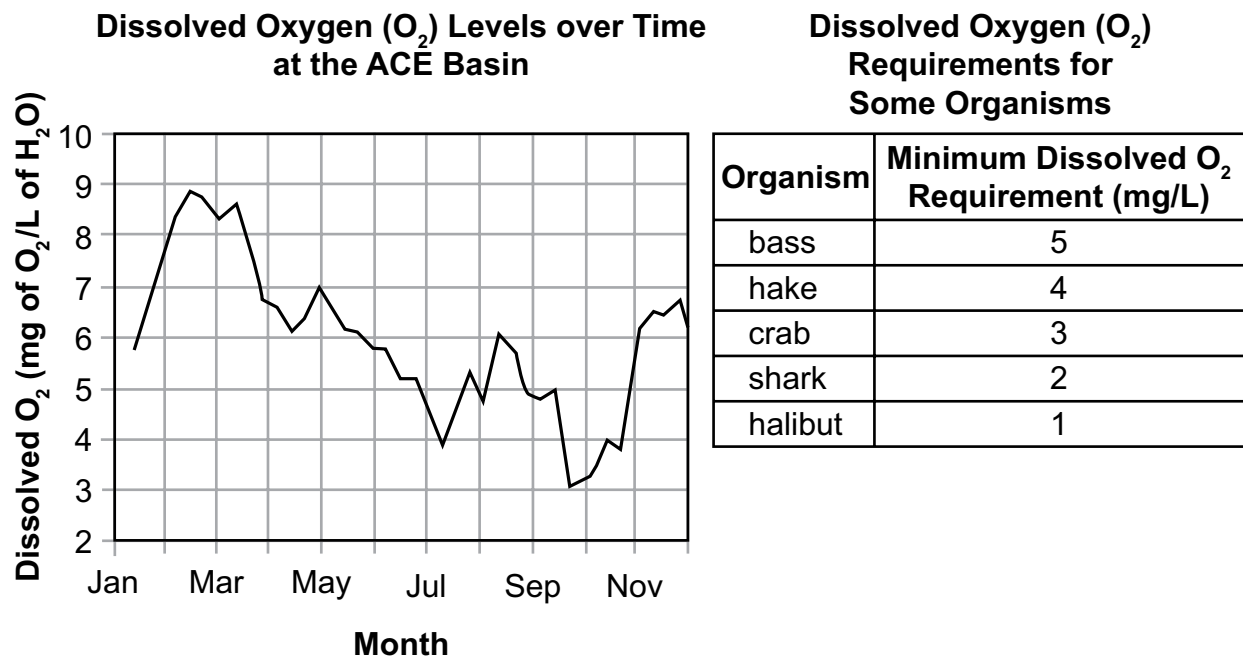
Similarity in Function: _____

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OPEN-ENDED ITEM

17. Use the information below to answer the question.



Scientists measured dissolved oxygen levels at the Ashepoo, Combahee, and Edisto (ACE) Basin National Estuarine Research Reserve.

Part A: Based on the data shown in the graph and the data table, predict which organism(s) would likely survive year-round in the ACE Basin.

Part B: Describe a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year.

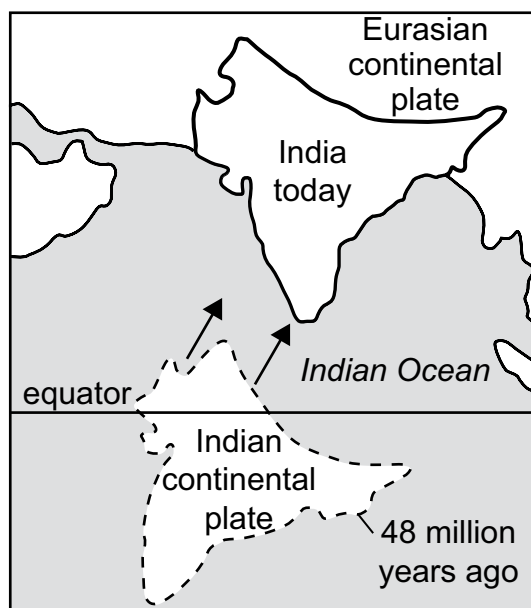
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OPEN-ENDED ITEM

18. Use the diagram below to answer the question.

Movement of the Indian Continental Plate



The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part A: Describe the natural process that moved the Indian continental plate from its location 48 million years ago to its current location.

Part B: Describe the results of the collision between the Indian continental plate and the Eurasian continental plate.

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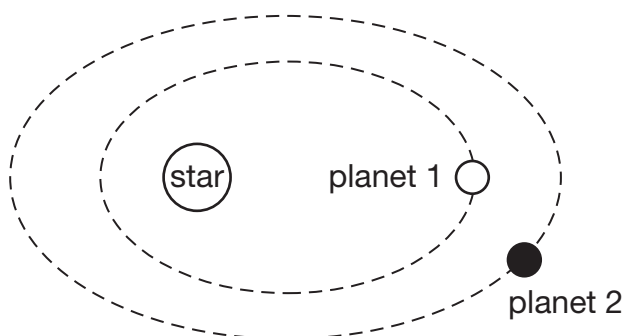
SCIENCE

FIRST OPEN-ENDED ITEM

D.3.1.2

This is a short open-ended (SOE) question. It is worth two points.

Use the diagram and table below to answer question 10.



Mass Comparison

Object	Mass (kg)
planet 1	6.0×10^{24}
planet 2	6.5×10^{23}
star	2.0×10^{30}

10. Answer parts A and B below about the movements of the objects in this star system.

Part A: How is the movement of planet 1 in this star system influenced by the other two objects in this star system?

Star: _____

Planet 2: _____

Part B: Which part of this star system has the greatest influence on movement of objects within the star system? Explain your answer.

SCIENCE

SECOND OPEN-ENDED ITEM

B.3.3.1

This is a short open-ended (SOE) question. It is worth two points.

11. The Arctic National Wildlife Refuge in Alaska is over 19 million acres of land. Its unique habitat supports at least 45 species of land and marine animals, 36 species of fish, and 180 species of birds. Some people want to drill for oil in parts of the refuge. Scientists estimate that the total amount of recoverable oil in the refuge is between 5 and 16 billion barrels.

Part A: Describe an environmental problem that could be caused by drilling for oil in Alaska.

Part B: Describe a regional benefit of drilling for oil in Alaska.

SCIENCE

THIRD OPEN-ENDED ITEM

A.2.2.3

This is a short open-ended (SOE) question. It is worth two points.

12. Answer parts A and B below about how a doctor uses microscopes.

Part A: Describe one way microscopes are used to help doctors determine whether people are healthy.

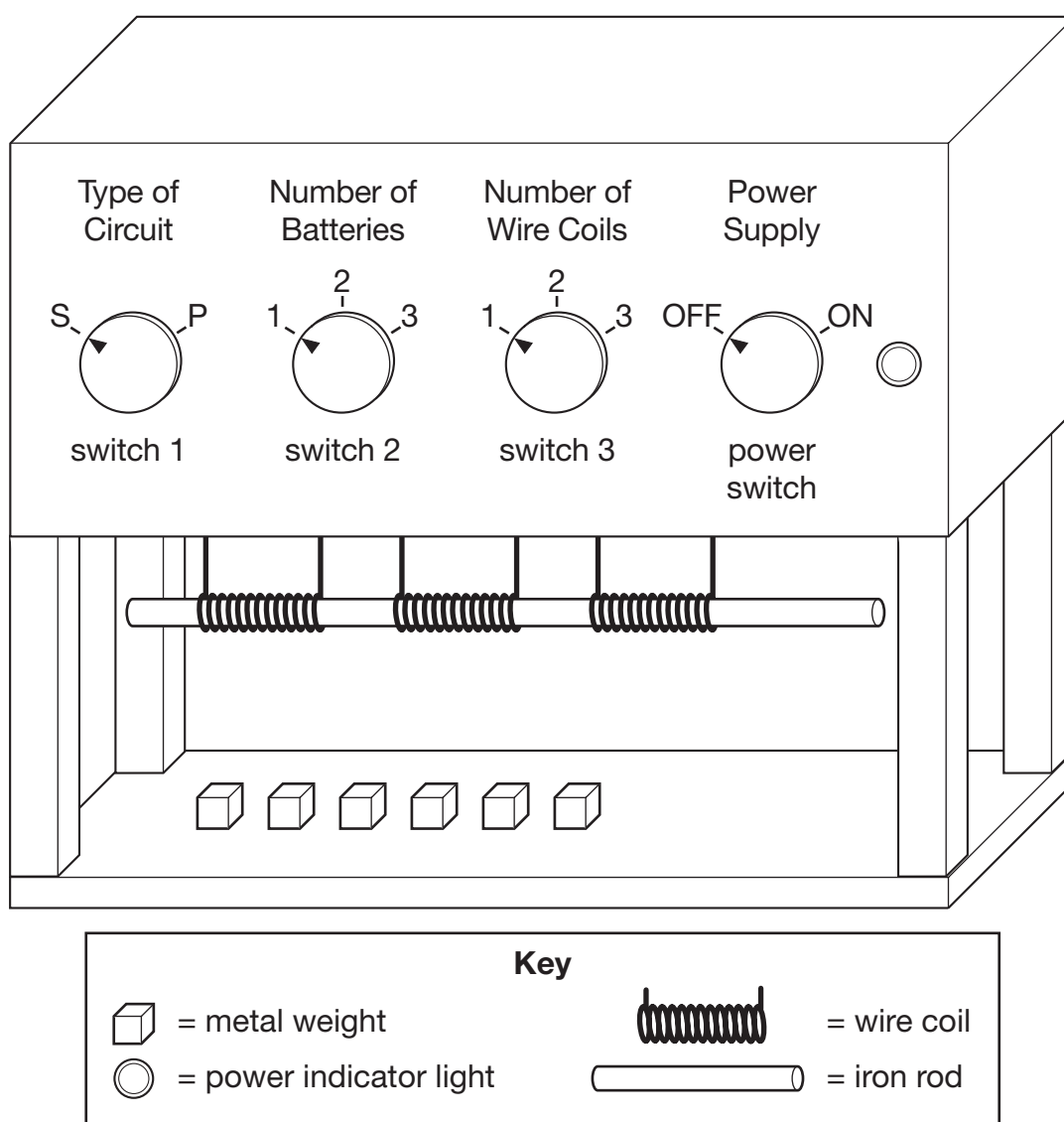
Part B: Describe one way a doctor's job would be different if the doctor did **not** have a microscope as a tool for diagnosis.

SCIENCE SCENARIO

Directions: Use the information presented on pages 25 and 26 to answer questions 13 through 16.

Students made the device shown in the experimental setup below for testing the effects of different electromagnetic fields on substances. The testing device has three batteries, three coils of insulated copper wire, one iron rod, three adjustable selector switches, and one on/off switch with a power indicator light.

Experimental Setup



SCIENCE SCENARIO

Directions: Use the information presented on pages 25 and 26 to answer questions 13 through 16.

Six metal weights are available for the tests; each weight has the same volume and mass. The strength of the electromagnet is measured by counting the number of metal weights that can be suspended from the rod like a chain. A description of the functions of the device's switches is below.

Functions of Adjustable Selector Switches

- switch 1: determines whether the batteries are part of a series circuit (S) or a parallel circuit (P)
- switch 2: determines the number of batteries that are part of the circuit
- switch 3: determines the number of wire coils that are receiving electrical current

SCIENCE SCENARIO

Directions: Use the information presented on pages 25 and 26 to answer questions 13 through 16.

C.2.1.3

13. Which sequence correctly shows the energy conversions that allow the testing device to attract a metal weight with magnetic properties?
- A battery (chemical to heat) → wire coil (heat to magnetic) → metal weight (magnetic to frictional)
 - B battery (chemical to electrical) → wire coil (electrical to magnetic) → metal weight (magnetic to mechanical) *
 - C battery (electrical to magnetic) → wire coil (magnetic to heat) → metal weight (heat to mechanical)
 - D battery (electrical to mechanical) → wire coil (mechanical to magnetic) → metal weight (magnetic to gravitational)

- A *Heat is not a useful form of energy in this sequence, so it does not play a role in this setup.*
- B *Key: Chemical energy from the battery is converted into electrical energy, which moves through the wire; the electrical energy is converted to magnetic energy in the electromagnet, which in turn, pulls and holds the cube to the rod.*
- C *Heat is not a useful form of energy in this sequence, so it does not play a role in this setup.*
- D *There is no direct transformation from electrical energy to mechanical energy in this setup.*

SCIENCE SCENARIO

Directions: Use the information presented on pages 25 and 26 to answer questions 13 through 16.

A.2.1.6

14. Students attempted to use the device and the weights in an investigation. None of the metal weights were attracted to the electromagnet when they were placed near it. The students made sure that the power indicator light was on, then they tried every switch combination. Which system modification and test are necessary to solve the design flaw in the experimental setup?
- A Use copper metal weights and test the batteries.
 - B Use a copper rod and test the batteries.
 - C Use smaller metal weights and test the original weights and the smaller weights with a bar magnet. *
 - D Use a larger iron rod and test the original metal weights with a bar magnet.

- A *Copper is not magnetic.*
- B *Copper is not magnetic.*
- C *Key: Testing with a bar magnet will determine whether the cubes are magnetic. Smaller cubes would verify whether the original metal weights were too massive.*
- D *A larger iron rod will not help to determine whether there is a flaw in the system.*

C.3.1.1

15. Which statement correctly describes the forces acting on the metal weights when the system design prevented them from being attracted to the electromagnet?
- A The balanced magnetic and gravitational forces were insufficient to overcome the inertia of the metal weight. *
 - B The balanced frictional and gravitational forces were insufficient to overcome the momentum of the metal weight.
 - C The unbalanced frictional and gravitational forces were insufficient to overcome the inertia of the metal weight.
 - D The unbalanced magnetic and gravitational forces were insufficient to overcome the momentum of the metal weight.

- A *Key: For an object to move, an unbalanced force must act on it.*
- B *A frictional force that does not have a significant role in this device.*
- C *If the forces acting on the cube were unbalanced, the cube would move.*
- D *If the forces acting on the cube were unbalanced, the cube would move.*

SCIENCE SCENARIO

Directions: Use the information presented on pages 25 and 26 to answer questions 13 through 16.

A.2.1.3

16. The power switch is on. Which procedure will **best** determine the type of circuit that makes an electromagnet?
- A Set switch 1 to S.
Change switches 2 and 3 to every combination.
Observe the motion of the metal weights.
 - B Set switch 1 to P.
Change switches 2 and 3 to every combination.
Observe the motion of the metal weights.
 - C Set switch 2 to a constant setting.
Change switches 1 and 3 to every combination.
Observe the motion of the metal weights.
 - D Set switches 2 and 3 to constant settings.
Change switch 1 from P to S.
Observe the motion of the metal weights. *

- A *This procedure would not test both types of circuits.*
- B *This procedure would not test both types of circuits.*
- C *This procedure tests too many variables.*
- D *Key: This procedure tests the type of circuits while holding other variables constant.*

SCIENCE

A.2.1.5, B.3.2.3

This is a Short Open-Ended (SOE) question. It is worth two points.
Use the table below to answer question 14.

Plant Flowering Experiment

Species	Plant	Number of Hours		Receives 15 Minutes of Light during Dark Period?	Produces Flowers?
		In Light	In Dark		
X	1	14	10	no	yes
	2	10	14	yes	yes
	3	10	14	no	no
Y	4	14	10	no	no
	5	14	10	yes	no
	6	10	14	no	yes

14. A gardener wanted two plant species in his house to flower at the same time. He read that light is one factor that can affect whether plants produce flowers. The gardener designed an experiment to determine the effect of light on his two plant species (X and Y). He placed three plants of each species in separate rooms. Each plant was exposed to periods of light and dark. Some plants received an additional 15 minutes of light at the same time during the dark period. The results of the gardener's experiment are shown in the table.

A. Identify the plant **species** that needs long nights to flower and the plant **species** that needs short nights to flower. Explain your answers.

SCIENCE

B. Explain why 15 minutes of light helped one of the plants to produce flowers.

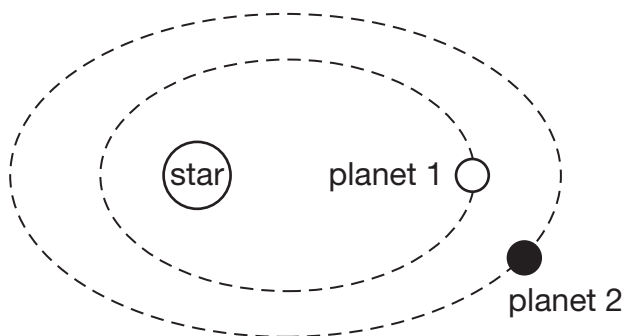
SCIENCE

FIRST OPEN-ENDED ITEM

D.3.1.2

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Planet 2: _____

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SCIENCE

SECOND OPEN-ENDED ITEM

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Part A: Describe an environmental problem that could be caused by drilling for oil in Alaska.

Part B: Describe a regional benefit of drilling for oil in Alaska.

SCIENCE

THIRD OPEN-ENDED ITEM

A.2.2.3

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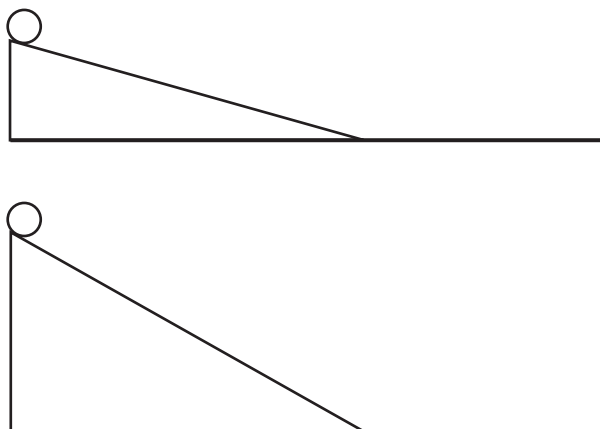
Part B: Describe one way a doctor's job would be different if the doctor did **not** have a microscope as a tool for diagnosis.

SCIENCE

FIRST OPEN-ENDED ITEM

A.2.1.2

Use the figures below to answer question 17.



17. An experiment is set up to investigate how different ramps affect a ball's speed.

Part A: Create a question that could be tested using these two ramps.

Part B: State a hypothesis that could scientifically test the question.

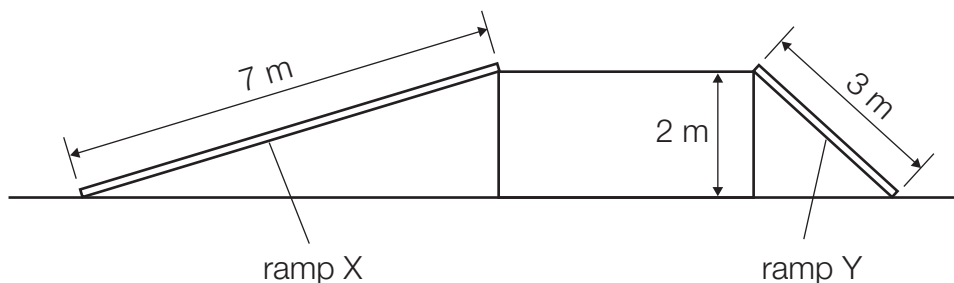
Sampler Sequence	Scorepoint 2	Scorepoint 1	Scorepoint 0
17	50%	34%	16%

SCIENCE

SECOND OPEN-ENDED ITEM

C.3.1.3

Use the diagram below to answer question 18.



18. A worker needs to move a box of heavy equipment from the ground to a platform 2 meters high. Rather than lift the box, the worker can use one of two ramps. Ramp X is 7 meters long and ramp Y is 3 meters long.

Part A: Why would a worker use a ramp rather than lift the box?

Part B: Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

Sampler Sequence	Scorepoint 2	Scorepoint 1	Scorepoint 0
18	25%	39%	36%

SCIENCE SCENARIO

Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.

Cloud Study

As part of a school project, a student records the types of clouds observed in the sky near the student's home for five days. These data are shown in the table below.

Types of Clouds



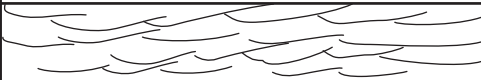


Day	Observations
Monday	wispy clouds that curl in thin streams
Tuesday	puffy clouds that are mostly small and move slowly through the sky
Wednesday	a layer of light grayish cloud that covers the entire sky
Thursday	thin, wispy clouds that curl in thin streams
Friday	very tall, puffy gray clouds that move quickly across the sky

SCIENCE SCENARIO

Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.

The student also decides to sketch the clouds observed. The sketches are shown in the table below.

Daily Cloud Sketches

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

SCIENCE SCENARIO

MULTIPLE-CHOICE ITEMS

Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.

A.2.2.3

19. When the student's parent heard about the cloud project, the parent gave the student a barometer and explained that it can help the student make weather predictions. How can this instrument help the student make weather predictions?

- A It measures pressure changes. *
- B It measures temperature changes.
- C It measures cloud precipitation.
- D It measures wind speed.

- A *Key: Barometers are used to measure air pressure, and changes in air pressure generally indicate changes in the weather.*
- B *Temperature changes are measured using thermometers.*
- C *Precipitation is measured using rain gauges.*
- D *Wind speed is measured using an anemometer.*

A	B	C	D
47%	14%	20%	20%

D.2.1.3

20. According to the student's observations, on which days would precipitation **most likely** have occurred?

- A Monday and Tuesday
- B Monday and Thursday
- C Wednesday and Thursday
- D Wednesday and Friday *

- A *The clouds on Monday are cirrus clouds followed by light cumulus clouds on Tuesday. Neither of these is likely to cause precipitation.*
- B *Both Monday and Thursday are clear days with some cirrus clouds, so rain is not likely.*
- C *Slow rains seem likely for Wednesday, but the cirrus clouds on Thursday would not cause noticeable precipitation.*
- D *Key: Wednesday is likely to have slow rains, while Friday is likely to have thunderstorms.*

A	B	C	D
6%	11%	9%	74%