

PRACTICE TEST

Science and
Technology/Engineering

Grade 5

Student Name

School Name

District Name

Grade 5 Science and Technology/Engineering Practice Test

This practice test contains 24 questions.

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

For some questions, you will mark your answers by filling in the circles in your Practice Test Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided in this Practice Test Booklet. Only responses written within the provided space will be scored.

This session is divided into sections. If you do not know the answer to a question, you may go on to the next question. When you finish a section, you may review your answers and go back to any questions you did not answer in that section only.

Go On ➡

The following section focuses on a student and a nature center volunteer visiting a local park. They explore a river ecosystem and make observations about the river and the organisms that live in it.

- 1 The picture shows a river that flows through the park.



Select **two** water cycle processes that directly add water to the river.

- Ⓐ absorption
- Ⓑ condensation
- Ⓒ evaporation
- Ⓓ precipitation
- Ⓔ runoff

- 2 The student and the volunteer observe leaves and organisms in the river. The student writes some observations in a notebook, as shown.

Observations

- *clusters of leaves are found behind rocks in the river water*
- *leaves feel slimy and have holes*
- *fungi live on the leaves*
- *insect larvae found on leaves in water*

Fungi perform an important function in the habitat. What type of organisms are fungi?

- Ⓐ producers
- Ⓑ consumers
- Ⓒ decomposers

This is supported by the observation that the leaves are

- Ⓐ found in the water.
- Ⓑ being broken down.
- Ⓒ eaten by insect larvae.

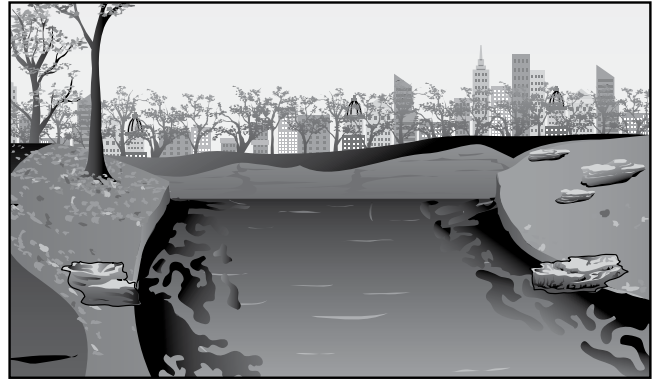
- 3 The student and the volunteer walk farther down a trail. At this location, they observe that the river is wider and that more sunlight reaches the river. They also observe that there are fewer rocks and leaves in the river.

Pictures from Locations 1 and 2 are shown.

Location 1



Location 2



More algae are observed at Location 2 than at Location 1. Algae are organisms that perform photosynthesis.

Which of the following **best** explains why more algae are observed at Location 2 than at Location 1?

- Ⓐ The river is wider at Location 2.
- Ⓑ There are fewer rocks in the river at Location 2.
- Ⓒ There is more air available near the river at Location 2.
- Ⓓ There is more sunlight shining on the water at Location 2.

- 4 The volunteer and student investigate organisms that live in the river by making a mesh bag with leaves inside. A picture of the mesh bag with leaves is shown.



The volunteer and student want to make sure the mesh bag with leaves stays in one place in the river. They decide to attach the bag to a rock using a string.

Which of the following is a property of the rock that **most** helps to keep the mesh bag in place?

- Ⓐ color
- Ⓑ hardness
- Ⓒ texture
- Ⓓ weight

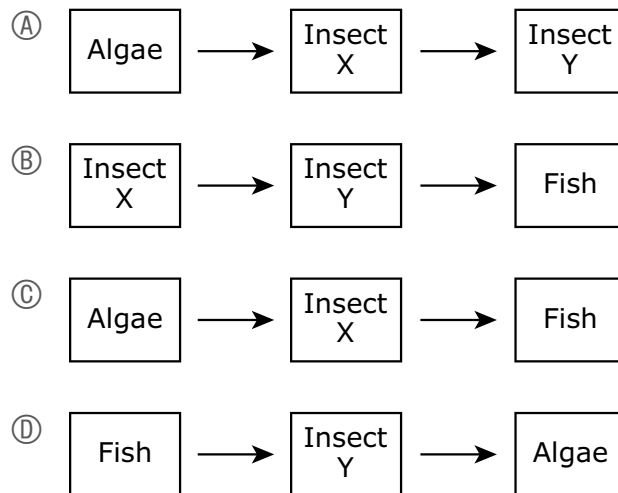
This question has two parts.

- 5** The volunteer and student collect information about several types of organisms they find in the mesh bag with the leaves, including insect X, insect Y, and algae. They also record information about the fish they see in the river. Some of their observations are listed.

- The fish eat insects X and Y.
- Insects X and Y eat algae.
- The algae perform photosynthesis.

Part A

Which of the following models shows how energy flows among these organisms?

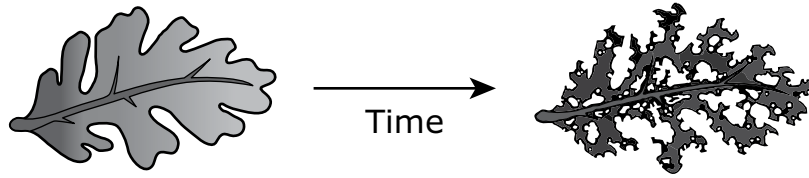


Part B

- | | | |
|-------------|--------------|--------------|
| Algae are | Ⓐ consumers. | Ⓑ producers. |
| Insects are | Ⓐ consumers. | Ⓑ producers. |
| Fish are | Ⓐ consumers. | Ⓑ producers. |

- 6 The leaves in the mesh bag break down over time, as shown in the diagram.

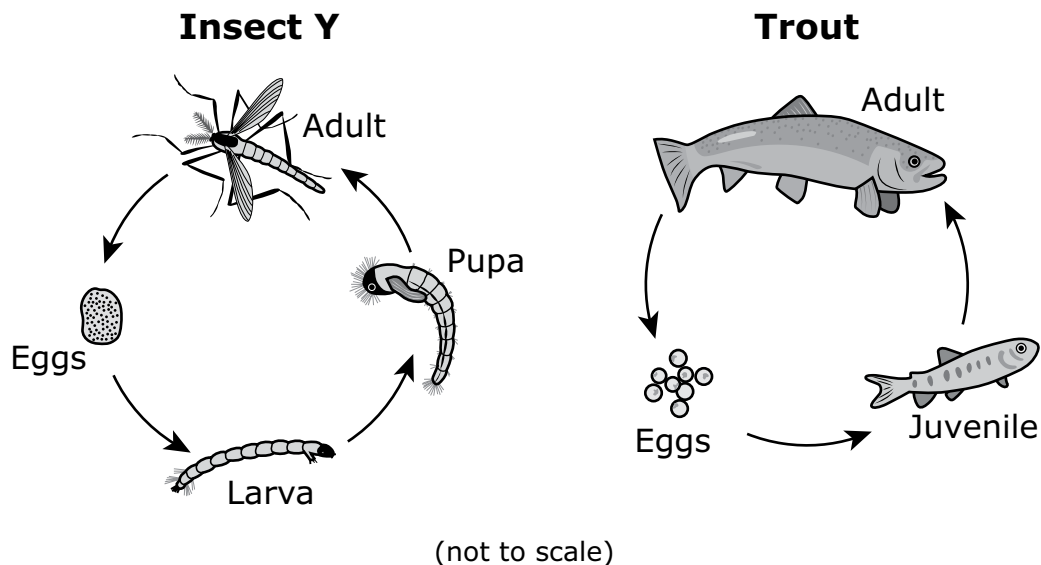
Leaf Condition over Time



Which of the following best describes what happens to the matter from the leaves when they break down?

- Ⓐ The matter turns into rocks.
- Ⓑ The matter evaporates into the air.
- Ⓒ The matter is changed into river water.
- Ⓓ The matter is used by other organisms.

- 7 Insect Y and trout, a type of fish, live in the river. The life cycles of insect Y and trout are shown in the diagrams.



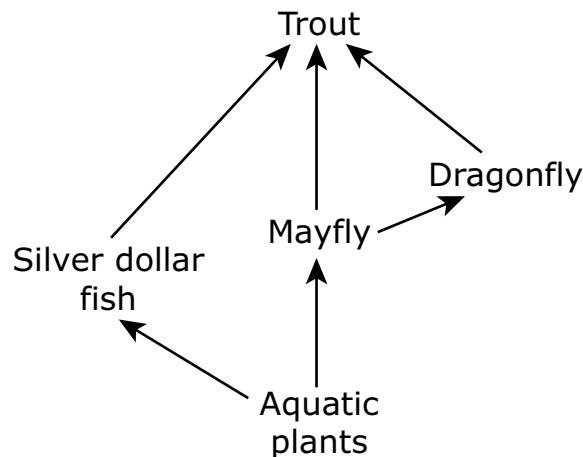
Which of the following can be supported by the life cycle diagrams?

- Ⓐ The insect pupa and the trout eggs are similar life cycle stages.
- Ⓑ The life cycle of insect Y is longer than the life cycle of the trout.
- Ⓒ The life cycle of the trout produces more adults than the life cycle of insect Y.
- Ⓓ The adult insect and the adult trout are the life cycle stages in which reproduction takes place.

This question has three parts. Write your response on the next page. Be sure to label each part of your response.

- 8** The student and the volunteer find out that there is a plan to build a parking lot near the river. Many trees near the river will need to be removed before the parking lot is built. If the trees are removed, more sunlight will reach the river.

A food web of some organisms that live in the river is shown.



- A. Identify whether the mayfly population will most likely increase, decrease, or stay the same if more sunlight reaches the river. Explain your reasoning.
- B. Identify whether the trout population will most likely increase, decrease, or stay the same if more sunlight reaches the river. Explain your reasoning.
- C. The student claims that after the parking lot is built, the river habitat will be less healthy.

Describe one piece of evidence that would support the student's claim. Explain your reasoning.

8

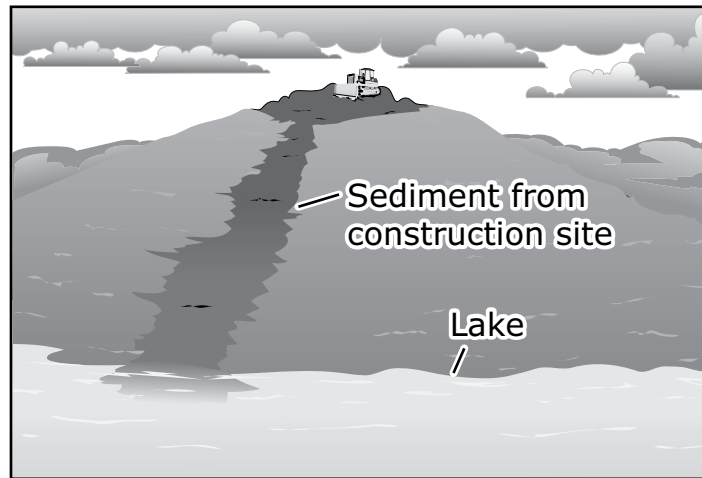


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check your work for this section only.**

**When you have completed Section 1,
go on to the next page.**

The following section focuses on students taking a field trip to a construction site. The students make observations about how the construction site affects a nearby lake.

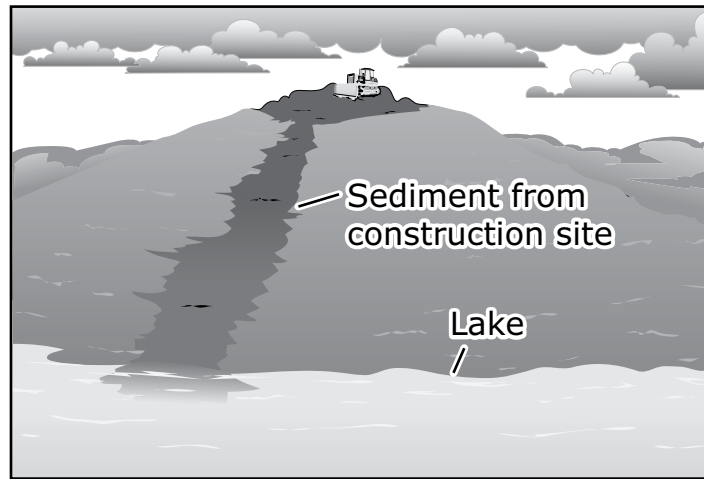
- 9 The construction site is located on the top of a hill. The diagram shows the construction site and the lake on a rainy day.



Which of the following parts of the water cycle moves sediment from the construction site to the lake?

- Ⓐ absorption
- Ⓑ condensation
- Ⓒ evaporation
- Ⓓ runoff

- 10 At the construction site, sediment moves down the hill, as shown in the diagram.

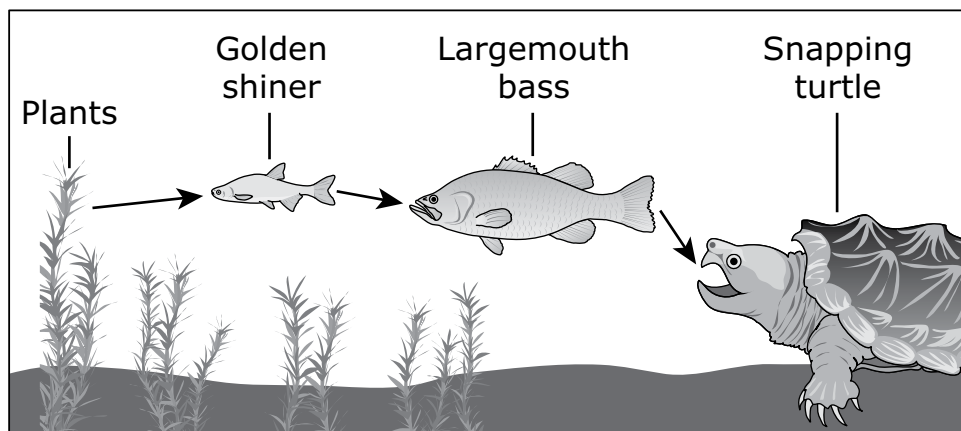


Which of the following causes the sediment to move down the hill?

- Ⓐ thermal energy
 - Ⓑ electrical energy
 - Ⓒ a balanced force
 - Ⓓ a gravitational force
- 11 If the lake water becomes muddy, less sunlight will be able to reach plants growing in the lake. Which of the following best describes the plant structure that would be most directly affected by a lack of sunlight?
- Ⓐ leaves, because they use sunlight to make food
 - Ⓑ seeds, because they use sunlight to make flowers
 - Ⓒ roots, because they use sunlight to absorb minerals
 - Ⓓ stems, because they use sunlight to transport minerals

This question has two parts.

- 12** The students learn more about the organisms living in the lake ecosystem. The diagram shows a food chain in the lake.



Part A

The plants in the lake ecosystem are

- Ⓐ producers.
- Ⓑ consumers.
- Ⓒ decomposers.

The snapping turtles in the lake ecosystem are

- Ⓐ producers.
- Ⓑ consumers.
- Ⓒ decomposers.

Part B

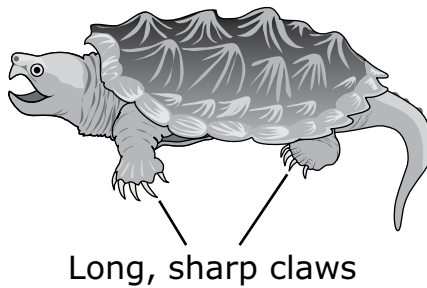
A decrease in the number of largemouth bass would cause the number of golden shiners to

- Ⓐ increase.
- Ⓑ decrease.
- Ⓒ stay the same.

This would cause

- Ⓐ more plants to be eaten.
- Ⓑ fewer plants to be eaten.
- Ⓒ the same number of plants to be eaten.

- 13 The picture shows a snapping turtle that has long, sharp claws on its feet.



Select **two** functions of the claws that help the snapping turtle survive in the lake ecosystem.

- Ⓐ digesting food
- Ⓑ holding on to prey
- Ⓒ detecting predators
- Ⓓ blending in with the bottom of the lake
- Ⓔ digging in the mud at the bottom of the lake

- 14 The students observe barriers at the construction site. They investigate whether barriers can be used to keep mud out of the lake. The picture shows a section of a barrier at a construction site.



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The barrier must be able to catch and hold sediment in the construction site. Which of the following is most important to consider when selecting the materials for the barrier?

- Ⓐ color
- Ⓑ strength
- Ⓒ hardness
- Ⓓ reflectivity

- 15 The students research how much mud enters the lake from the construction site during light and heavy rainfalls. A muddiness scale is used to determine the amount of mud in the water that reaches the lake. On the scale, zero represents clear water and four represents very muddy water. The table shows the data the students collected.

Rainfall	Muddiness Scale
light	3
heavy	4

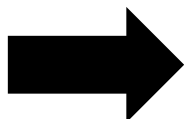
The water reaching the lake during a heavy rainfall is

- Ⓐ more muddy than it is during a light rainfall.
- Ⓑ less muddy than it is during a light rainfall.
- Ⓒ equally as muddy as it is during a light rainfall.

This is evidence that, during a heavy rainfall, there is

- Ⓐ more erosion occurring.
- Ⓑ less weathering occurring.
- Ⓒ more evaporation occurring.
- Ⓓ an equal amount of deposition occurring.

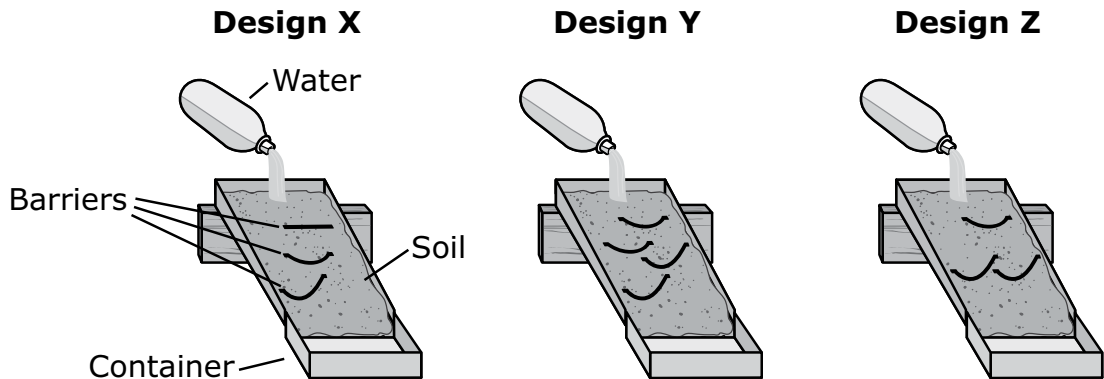
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***Go On* ➡**

This question has three parts. Write your response on the next page. Be sure to label each part of your response.

- 16** The students consider different types of barriers that could be used to keep mud out of the lake. They create models of three designs, X, Y and Z, as shown.
- To test each design, water will be poured from the top of each model and will be collected in a container at the bottom.



- A. One student thinks the same amount of water should be poured on each model to test the designs. Identify whether the student is correct. Explain your reasoning.
- B. The students use a muddiness scale to determine how muddy the water is that collects at the bottom of each model. Zero represents clear water and four represents very muddy water. The table shows the students' data.

Design	Muddiness Scale
X	4
Y	3
Z	3

- The students evaluate each design based on the following criteria:
- must prevent the greatest amount of mud from entering the container
 - must use the smallest number of barriers
- Identify whether design X, Y, or Z best meets both criteria. Explain your reasoning.
- C. Engineers must consider criteria and constraints when building construction site barriers. Describe a constraint the engineers will most likely need to consider when building a barrier.

16



**This is the end of the section. You may
check your work for this section only.**

**When you have completed Section 2,
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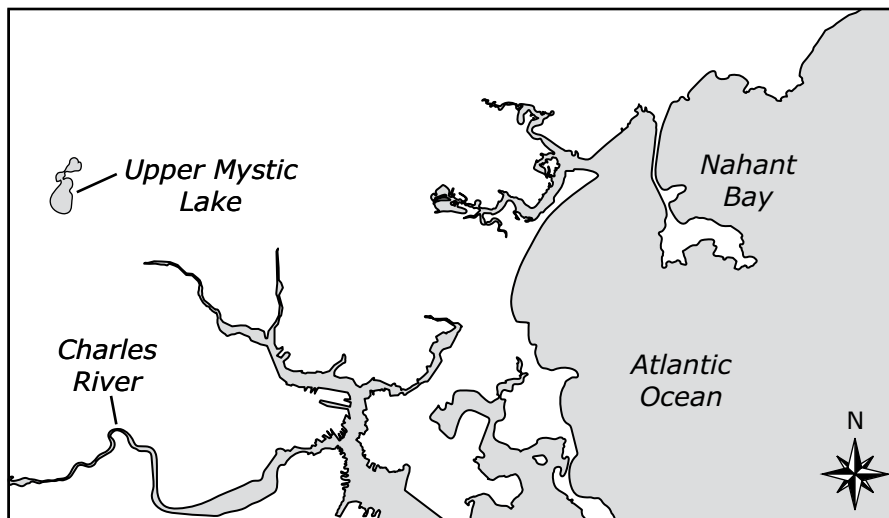
The following section focuses on students working on a science fair project about water. They research how water is used and also design a device to obtain fresh water from salt water.

- 17** The students learn that people use water for many purposes, including to generate electricity. Engineers are designing devices that can transform the energy in ocean waves into electricity.

Which of the following best describes this type of energy?

- Ⓐ renewable, because water is a renewable resource
- Ⓑ renewable, because electricity is a renewable resource
- Ⓒ nonrenewable, because water is a nonrenewable resource
- Ⓓ nonrenewable, because electricity is a nonrenewable resource

- 18 The students observe a map showing bodies of water in and around Massachusetts. Some of the bodies of water contain fresh water, and some contain salt water. Four bodies of water are labeled.



Select **two** bodies of water on the map that are sources of fresh water.

- Ⓐ Atlantic Ocean
- Ⓑ Charles River
- Ⓒ Nahant Bay
- Ⓓ Upper Mystic Lake

- 19 The students design and conduct an investigation to learn more about salt water. They add salt to a container of fresh water to make salt water. The students claim that salt water is a mixture and that a chemical reaction did not take place when they combined the salt and fresh water.

Determine whether each observation supports a claim that combining a solid substance with a liquid substance results in a mixture or a chemical reaction.

Observation: Temperature increases.

- Ⓐ evidence of a mixture
- Ⓑ evidence of a chemical reaction

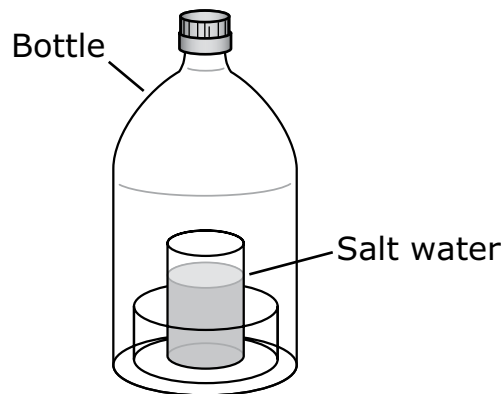
Observation: Bubbles form in the liquid.

- Ⓐ evidence of a mixture
- Ⓑ evidence of a chemical reaction

Observation: The two substances can be easily separated.

- Ⓐ evidence of a mixture
- Ⓑ evidence of a chemical reaction

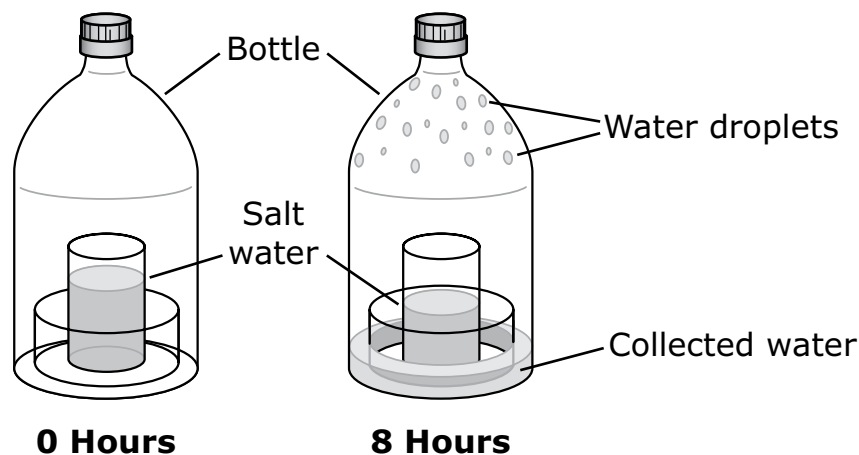
- 20 The students design a device to obtain fresh water from salt water using a bottle. A diagram of their prototype is shown.



What is the **main** purpose of the students' prototype?

- Ⓐ to communicate how to build the device
- Ⓑ to determine the time required to build a large-scale device
- Ⓒ to test for failure points and determine how to improve the device
- Ⓓ to identify the purpose of the device and figure out how to solve a problem

- 21** The students test their device to obtain fresh water from salt water. During their investigation, they place the device outside and record the amount of salt water, the amount of collected water, and the temperature of the salt water over eight hours. The diagram shows the device at the beginning of the investigation and eight hours later.



The students' data are shown in the table.

Time (hr)	Salt Water (g)	Collected Water (g)	Temperature of Salt Water (°F)
0	40.0	0.0	75
4	35.6	4.4	138
8	31.5	8.5	75

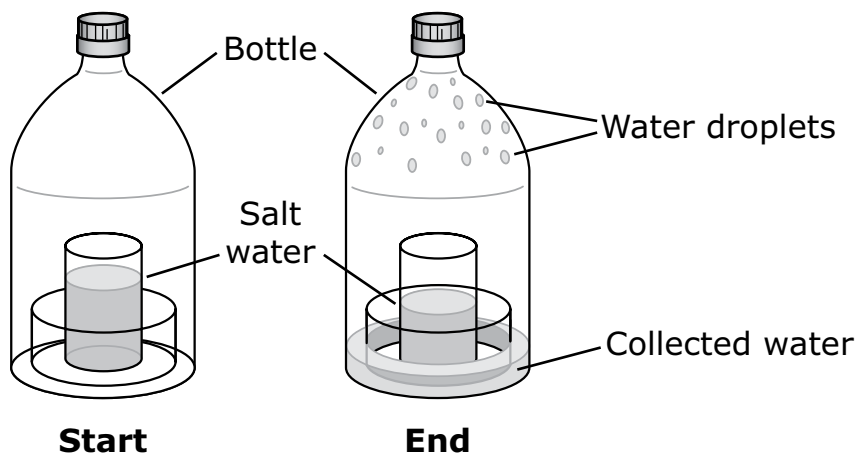
A student claims that the amount of water in the device after eight hours is the same as the amount of water in the device at the beginning of the investigation.

Which of the following would provide the **best** evidence to support the student's claim?

- Ⓐ adding the temperature of the salt water at the beginning of the investigation to the temperature of the salt water at the end of the investigation
- Ⓑ comparing the temperature of the salt water at the beginning of the investigation with the temperature of the salt water at the end of the investigation
- Ⓒ adding the mass of the salt water at the beginning of the investigation to the total mass of the collected water and salt water at the end of the investigation
- Ⓓ comparing the mass of the salt water at the beginning of the investigation with the total mass of the collected water and salt water at the end of the investigation

This question has two parts.

- 22 The students run four trials using the device to obtain fresh water from salt water. They want to determine which factors cause more fresh water to be collected. The students place either 30 g or 50 g of water in the device to start. Then they place the device in either a sunny or shady location for each trial. The diagram shows the device at the start and end of one of the trials.



The students' data are shown in the table.

Trial	Location of Bottle	Starting Amount of Salt Water (g)	Final Amount of Collected Water (g)
1	sunny	50	8.5
2	shady	50	2.0
3	sunny	30	8.5
4	shady	30	2.0

Part A

Which of the following factors caused the most fresh water to be collected?

- Ⓐ shady location
- Ⓑ sunny location
- Ⓒ starting with 30 g of salt water
- Ⓓ starting with 50 g of salt water

Which of the following best explains why this factor caused the most fresh water to be collected?

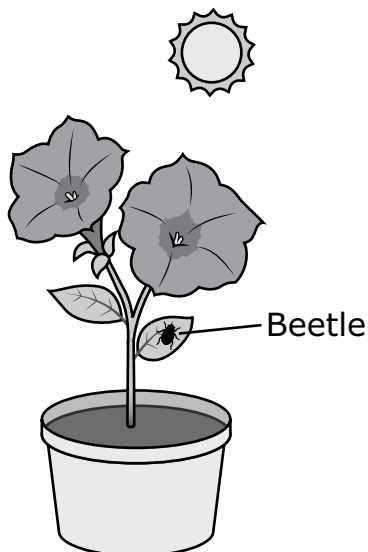
- Ⓐ More energy was added to the device during trials with this factor than during the other trials.
- Ⓑ More water particles were inside the device during trials with this factor than during the other trials.

Part B

Which of the following occurs in the device during each of the trials?

- Ⓐ melting followed by precipitation
- Ⓑ condensation followed by melting
- Ⓒ absorption followed by evaporation
- Ⓓ evaporation followed by condensation

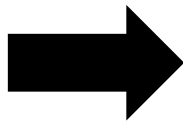
- 23 Students use the fresh water they collected from their device to water a plant outside. While the students are watering the plant, they observe a beetle eating a part of the plant, as shown.



The students make a model to show how energy is transferred in this situation. Which of the following models shows the transfer of energy in this situation?

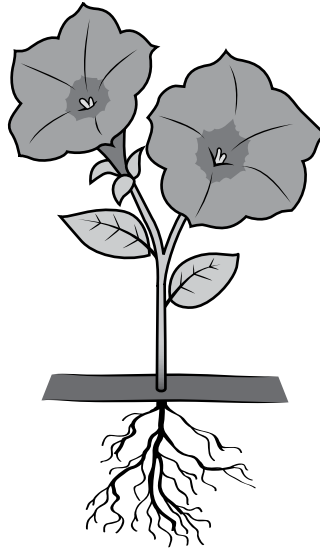
- (A) beetle → Sun → water
- (B) water → plant → Sun
- (C) Sun → plant → beetle
- (D) plant → beetle → water

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This item has three parts. Write your response on the next page. Be sure to label each part of your response.

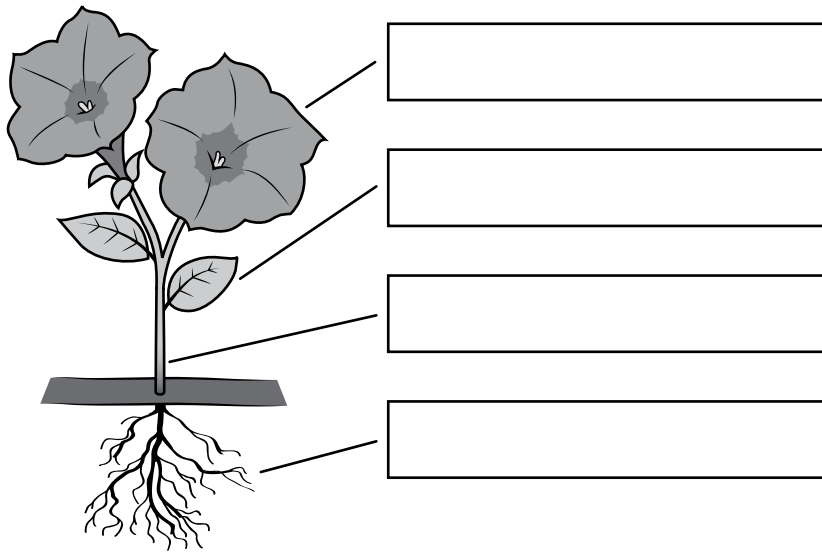
- 24** The students learn about the different structures of a plant that is growing outside. A picture of the plant is shown.



- A. In the diagram on the next page, write a label from the list below in each box to identify the structures of the plant.
- Flower
 - Leaf
 - Root
 - Stem
- B. The students learn about how fresh water is used by the plant.
- Identify the main process occurring in a plant's leaves that uses water. Explain how this process is important for a plant's survival.
- C. One of the students claims that stems are not important for a plant's survival.
- Identify whether the claim is correct or incorrect. Explain your reasoning.

24

A.



This is the end of the session. You may check your work for this section only.





**This is the end of the session. You may
check your work for this section only.**