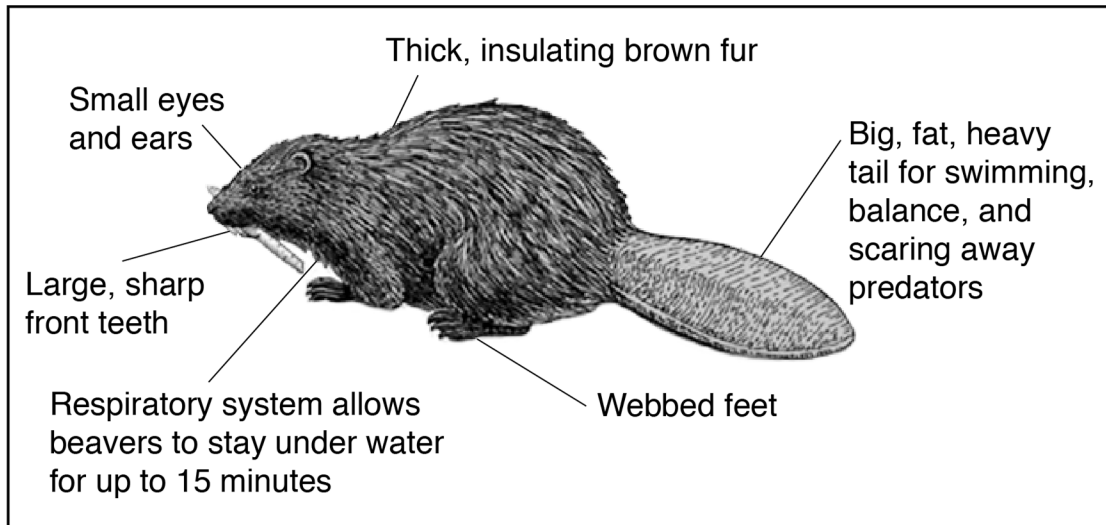


Base your answers to questions 1 through 6 on the information below and on your knowledge of science.

North American Beaver



The beaver is New York State's official mammal. This animal has many unique structures that serve various functions for growth and survival. A beaver's eyes work best for short distances, yet they contain a second set of eyelids made of a thin transparent (see-through) membrane. The extra lids are pulled over the eyeballs, allowing the beaver to see under water. The beaver's thick, oily coat/fur keeps the animal warm and helps it float in water. Their four front teeth (incisors) are self-sharpening. These large teeth continuously grow. If the teeth become too long, the beaver's mouth will not be able to close and the grinding teeth will not meet, leading to starvation. Gnawing on woody material wears down the teeth and keeps them at a length that allows the beaver to survive and get food. Beavers also have oversized lungs that help them stay under water for up to 15 minutes.

The beaver is one of the few animals that change their environment in order to live. When a beaver family identifies a stream area that has enough food and water resources, they can quickly, working at night, turn a wooded area with a flowing stream into a pond with a dam.

- 1 Identify **one** external structure that functions to support the behavior of beaver in its habitat. Explain how this structure supports the behavior of the beaver. [1]

External structure: _____

Explanation: _____

The teeth of the beaver are important structures that serve many functions for the survival of the beaver. A student recorded some other facts about beaver teeth.

Fact 1: The beaver has large, sharp teeth to cut through wood.

Fact 2: Beavers have 20 teeth in their mouth.

Fact 3: Bright orange teeth are visible in the beaver's mouth.

Fact 4: Self-sharpening teeth help the beaver cut down small trees.

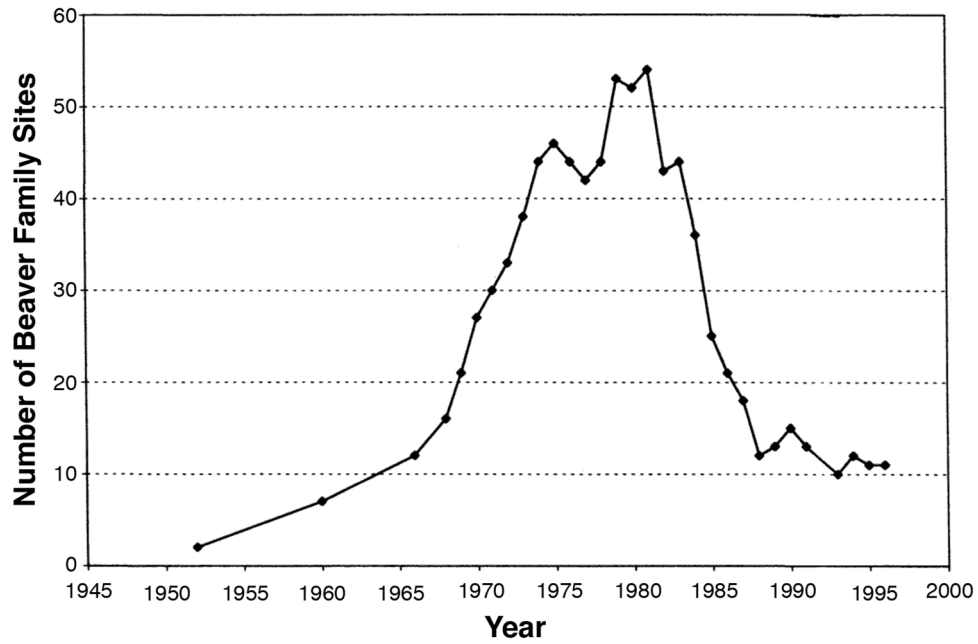
- 2 Which facts describe how the teeth function to support the survival of the beaver?
- A facts 1 and 2
 - B facts 2 and 3
 - C facts 3 and 4
 - D facts 4 and 1

The map below shows the areas (shaded gray) of North America where beaver populations can be found. The location of two different beaver populations, one in California and one in Massachusetts, are labeled. Both populations are located near water sources.

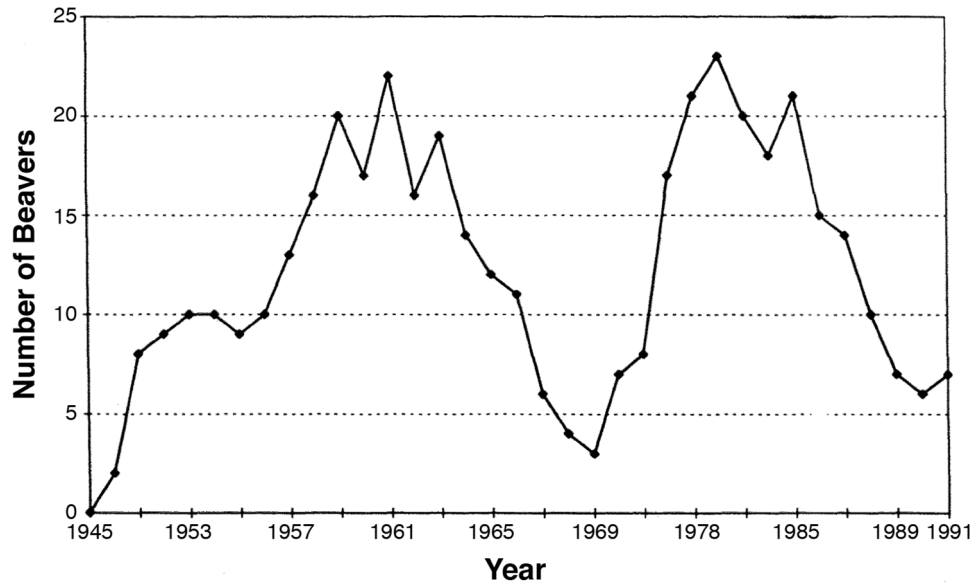


The graphs below show the changing populations of beavers over about a 40-year time span in the two locations indicated on the map.

Number of Beaver Families: Massachusetts (1952-1996)



Number of Beavers: California (1945-1991)



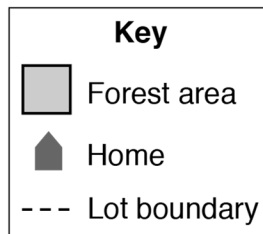
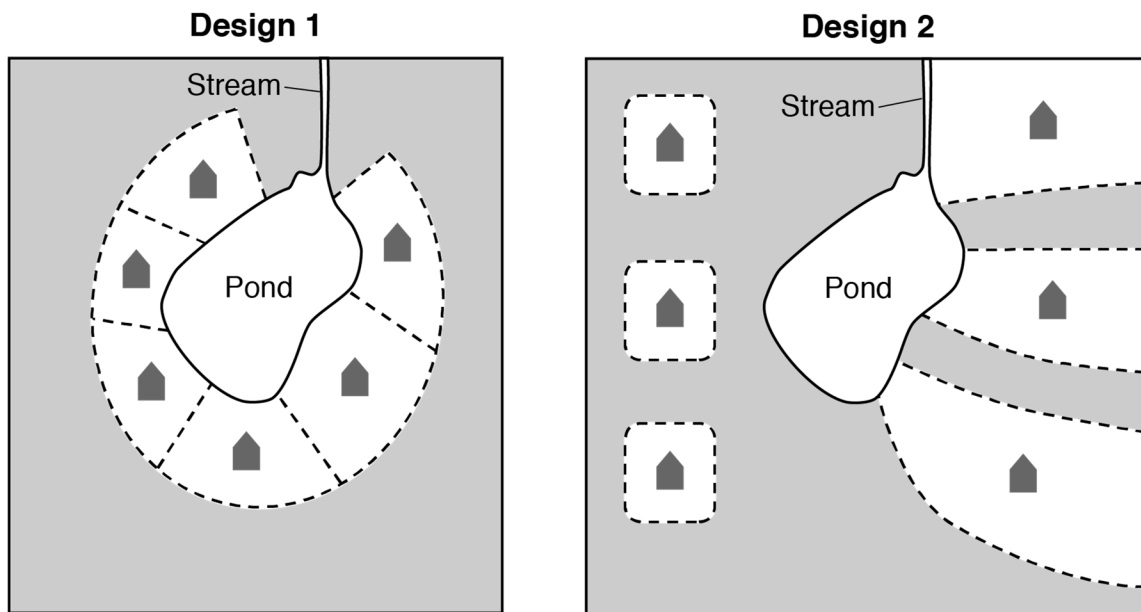
- 3 Using evidence from the map and graphs, which claim accurately describes that in a particular habitat, beavers sometimes survive well, less well, or cannot survive at all.
- A Beavers survive well in many regions of North America, and the population of the beaver only increased in Massachusetts and California over 40 years.
 - B Beavers are found only in a few regions of North America, and the population of beavers in California and Massachusetts changed over 40 years.
 - C Beavers survive well in many regions of North America, and the population of beavers in California and Massachusetts changed over 40 years.
 - D Beavers are found only in a few regions of North America, and the population of beavers only increased in Massachusetts and California over 40 years.
- 4 One graph shows the number of beaver families, and the other graph shows the number of beavers. Using evidence from the graphs, describe how both beaver populations changed over the same time span regardless of their location in the United States. [1]

A company wants to clear some forested areas around the pond and stream inhabited by beavers to build six houses.

The criteria for the project is listed below:

- Clear six forest sites to build houses
- Have a view of the pond from some houses
- Maintain a forest area between each house for privacy
- Maintain the beaver habitat and population

The models below show the two designs for the project.



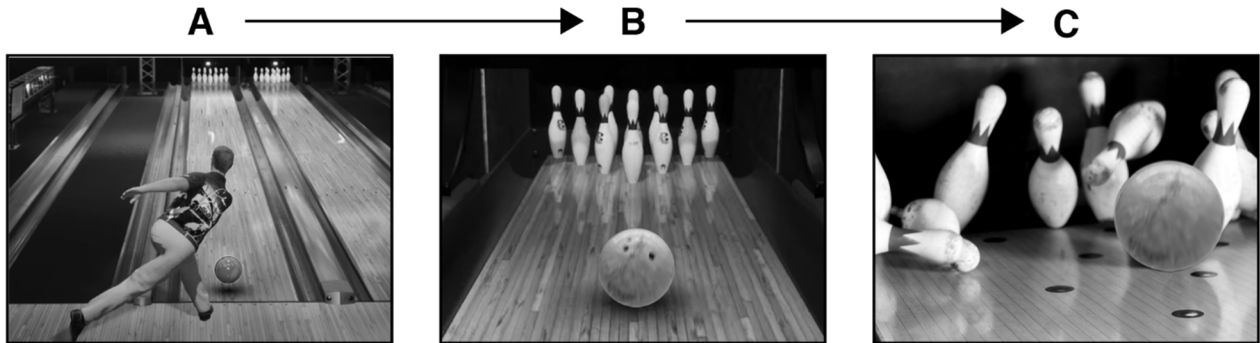
- 5 Which statement best explains why one of the designs is more appropriate for maintaining the beaver population around the pond?
- A Design 1 is more appropriate because it provides easy access to the food in the forested areas.
 - B Design 1 is more appropriate because it provides a view of the pond from all the houses.
 - C Design 2 is more appropriate because it provides easy access to the food in the forested areas.
 - D Design 2 is more appropriate because it provides a view of the pond from all of the houses.
- 6 Identify **one** environmental factor, other than humans, that could be responsible for changing a beaver population. Make a claim about how this factor could change a beaver population. [1]

Environmental factor: _____

Claim: _____

Base your answers to questions 1 through 5 on the information below and on your knowledge of science.

Bowling is a sport in which a person rolls a ball down a lane into ten pins. The goal of bowling is to knock down the pins in one or two rolls. The sequence of photographs below, labeled *A*, *B*, and *C*, shows an adult person rolling a bowling ball down a lane and that same bowling ball colliding with pins.



When the person releases the bowling ball as seen in photograph *A*, the ball is traveling about 21 miles per hour. By the time the ball reaches the position shown in photograph *B*, it is traveling about 17 miles per hour.

- 1 Construct an explanation, with evidence, for what happens to the amount of motion energy the ball has as the ball moves from the position shown in photograph *A* to the position shown in photograph *B*. [1]

- 2 Kinetic energy is the energy an object has due to its motion. Which statement accurately describes the change in the kinetic energy of the ball and the pins from photograph *B* to photograph *C*?
- A The kinetic energy of the ball and the kinetic energy of the pins both decrease.
 - B The kinetic energy of the ball and the kinetic energy of the pins both increase.
 - C The kinetic energy of the ball decreases and the kinetic energy of the pins increases.
 - D The kinetic energy of the ball increases and the kinetic energy of the pins decreases.
- 3 The bowling pins have multiple forces acting on them even though they are not moving. When the bowling ball strikes the pins, the forces on the pins become
- A balanced, because the sum of all forces on the pins is 0.
 - B balanced, because the sum of all forces on the pins is greater than 0.
 - C unbalanced, because the sum of all forces on the pins is 0.
 - D unbalanced, because the sum of all forces on the pins is greater than 0.
- 4 In addition to energy being transferred to the pins during the collision, energy is also converted from one form to another. Identify **one** type of energy conversion that occurs when the ball collides with the pins. [1]

from _____ energy to _____ energy

Photograph *D* shows a fifth-grade student bowling on the same lane as the adult person in photograph *A*, using the same bowling ball. When the student releases the bowling ball, the ball is traveling about 10 miles per hour as it rolls straight down the lane.

D

- 5 Compared to the strength and direction of the force exerted on the bowling ball by the adult person, place **one** check mark in the table to describe the strength of the force and place **one** check mark in the table to describe the direction of the force exerted on the same bowling ball by the fifth-grade student shown in photograph *D*. [1]

	Less	More	Same
Strength of Force			

	Different	Same
Direction of Force		

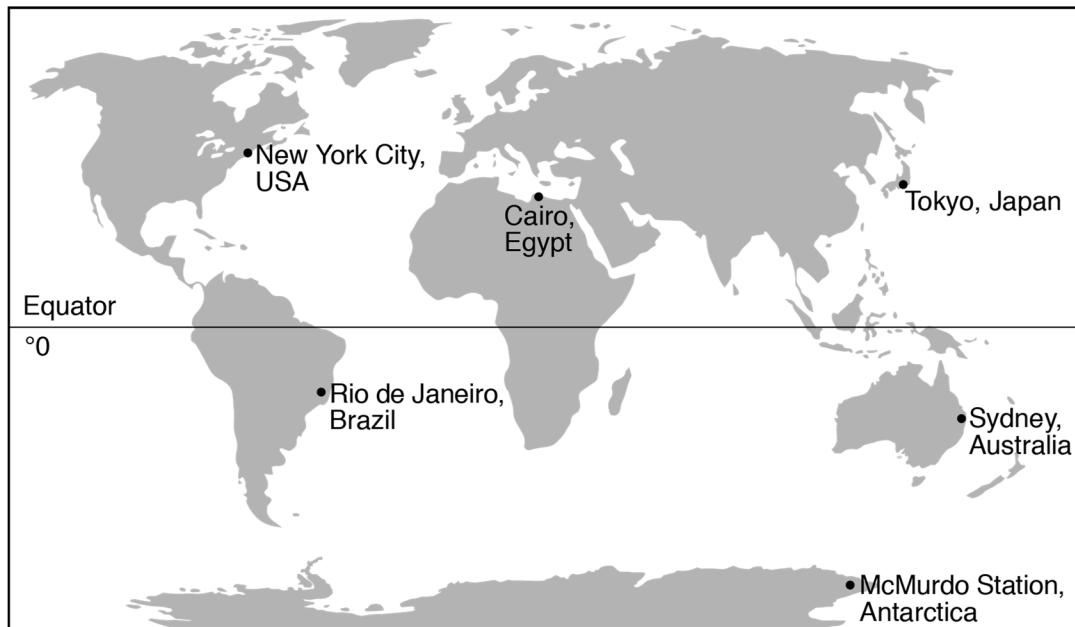
Base your answers to questions 1 through 5 on the information below and on your knowledge of science.

The Köppen-Geiger climate classification is one of the most widely used climate classification systems. It divides climates into five main groups based on the seasonal precipitation and temperature patterns that occurred over a long period of time. The table below shows a modified version of this classification system.

Group	Description	Average Annual Precipitation (inches)	Average Temperature (°F)	
			Coollest Month	Warmest Month
A	tropical	59 or more	64 or warmer	64 or warmer
B	arid	less than 10	27 or warmer	104 or warmer
	hot semi-arid	10 to 20	32 or warmer	64 or warmer
	cold semi-arid	10 to 20	32 or cooler	64 or cooler
C	subtropical and temperate	30 to 79	between 27 and 64	50 or warmer
D	continental (hot/warm summers and cold winters)	24 to 47	27 or cooler	50 or warmer
E	polar	less than 10	27 or cooler	between 14 and 50

- 1 What are the general temperature and precipitation conditions of a tropical region?
- A warm and dry
 - B warm and rainy
 - C cool and dry
 - D cool and rainy

The map below shows the location of five cities and a scientific research station. The table below shows temperature and precipitation data for four of these cities.



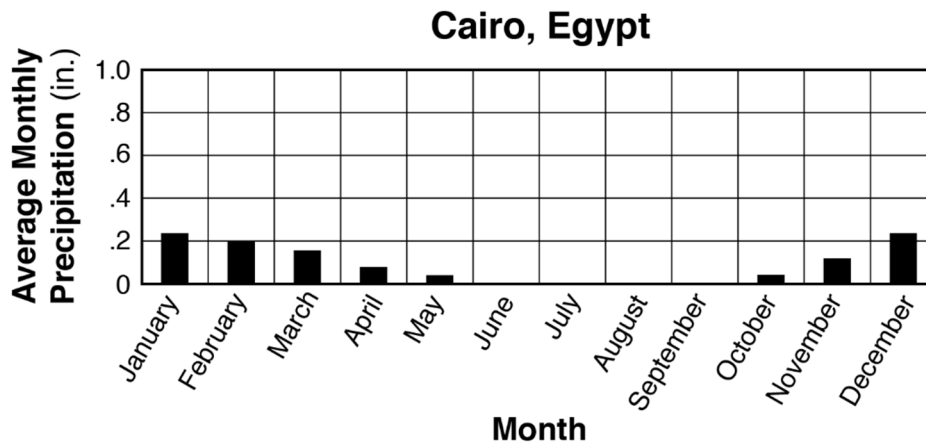
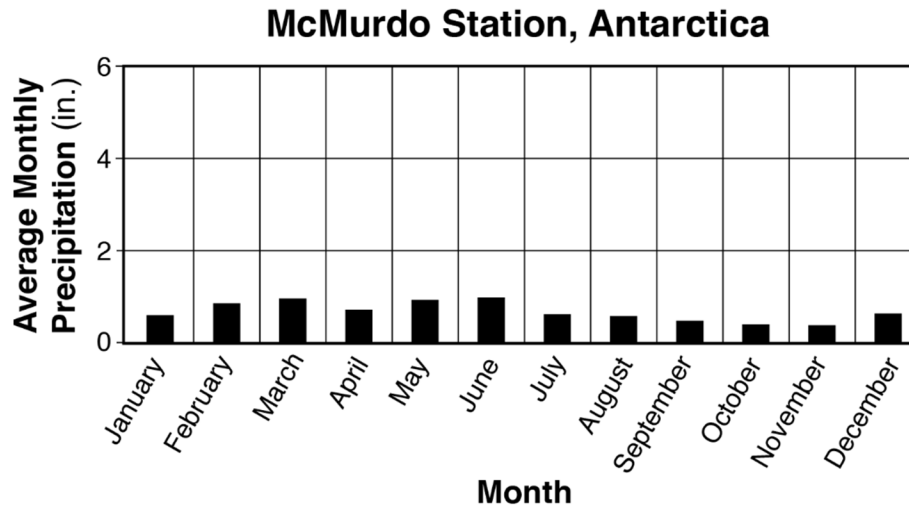
Cities	Average Yearly Precipitation in Inches	Average Yearly Temperature (°F)	
		Yearly Minimum	Yearly Maximum
New York City, USA	44	46	61
Tokyo, Japan	60	51	66
Rio de Janeiro, Brazil	43	69	79
Sydney, Australia	48	57	71

2 The climate of Tokyo, Japan is best described as

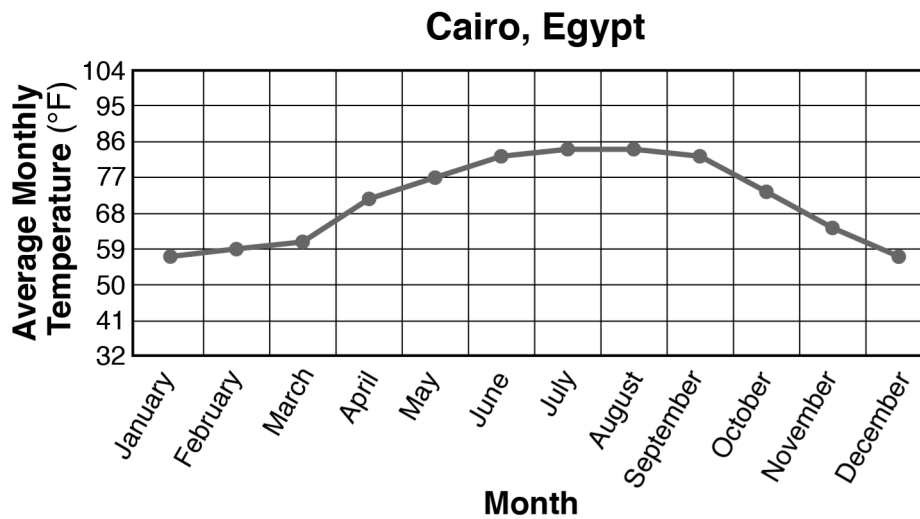
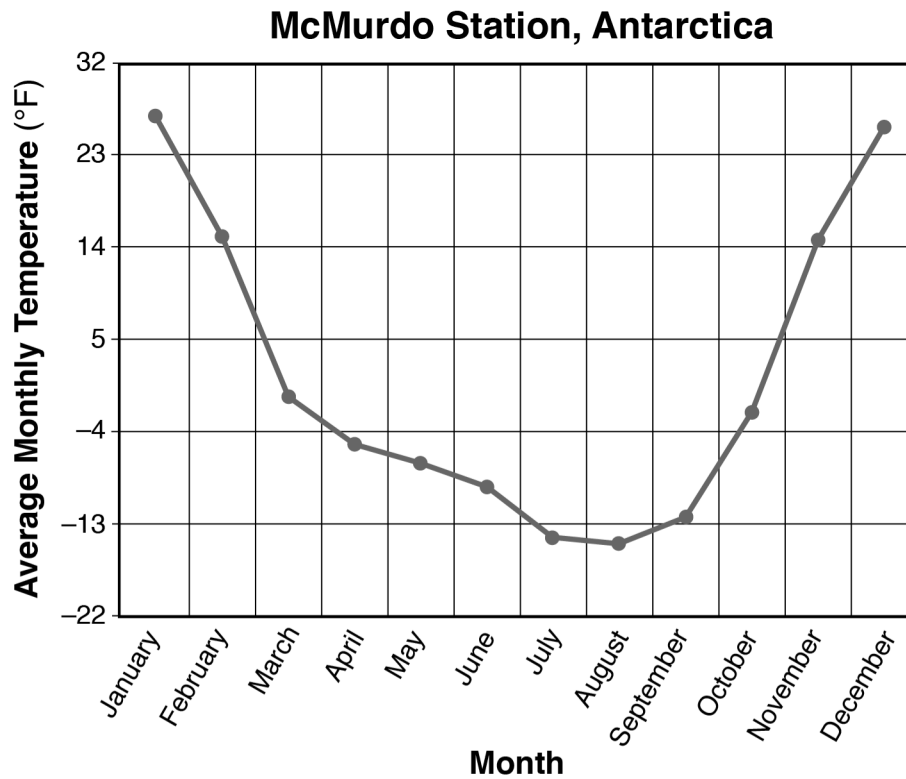
- A hot semi-arid
- B cold semi-arid
- C subtropical
- D continental

- 3 Identify the evidence that explains why the climate of New York City is cooler than the climate of Rio de Janeiro even though they receive about the same amount of yearly precipitation. [1]

The two graphs below show average monthly precipitation data in inches (in.) for two locations, McMurdo Station, Antarctica and Cairo, Egypt.



- 4 The climate at McMurdo Station, Antarctica is described as polar, while the climate at Cairo, Egypt is described as arid. Explain why the climate at McMurdo Station and Cairo could also be classified as deserts. Support your explanation using numerical data from tables or graphs. [1]



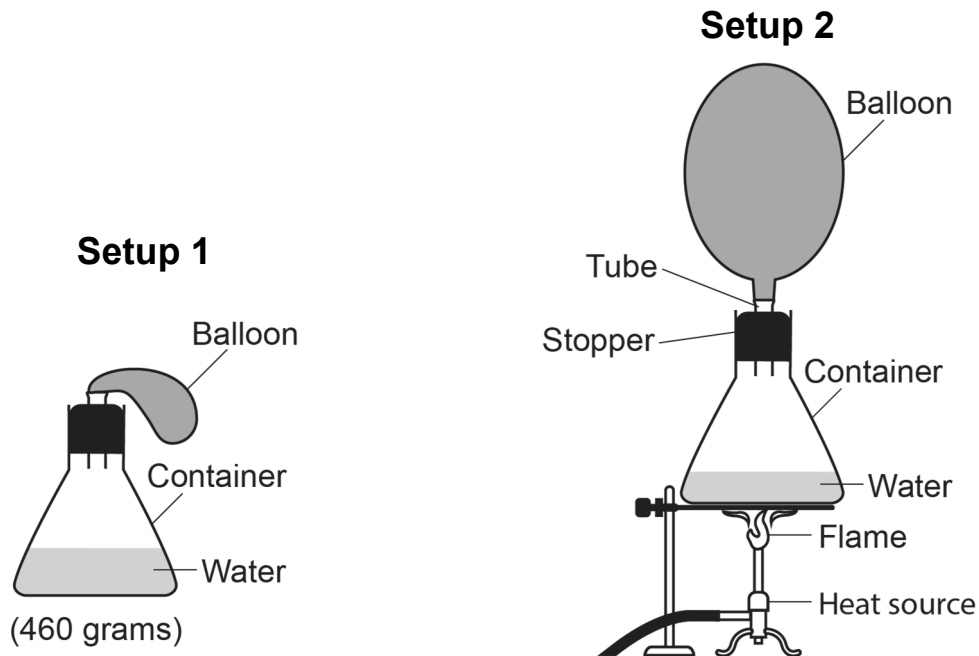
- 5 Based on the average monthly temperature data for McMurdo Station, Antarctica and Cairo, Egypt, what claim can be made about these two locations?
- A Both locations are in the Northern Hemisphere.
 - B Both locations are in the Southern Hemisphere.
 - C McMurdo Station is in the Northern Hemisphere and Cairo is in the Southern Hemisphere.
 - D McMurdo Station is in the Southern Hemisphere and Cairo is in the Northern Hemisphere.

Base your answers to questions 1 through 5 on the information below and on your knowledge of science.

Energy and Matter in a Closed System

The diagram below represents the setups a teacher showed students for an investigation about energy and matter using a closed system. In *Setup 1*, the teacher placed a balloon over the top of a container that has some water in it. The total mass of this closed system was 460 grams.

In *Setup 2*, the teacher used appropriate safety equipment and followed all safety procedures as the container was placed on a stand above a heat source for five minutes. The students observed changes in the water and the balloon.

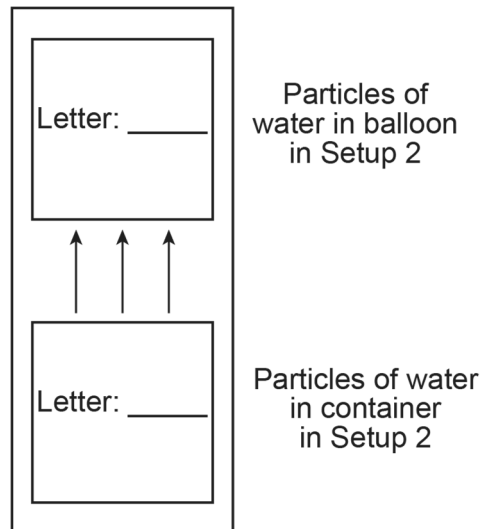
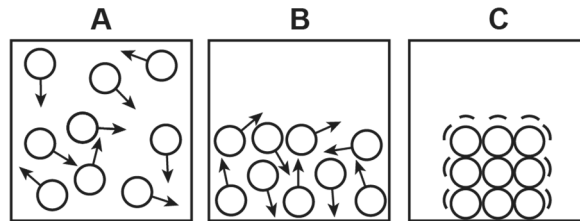


- 1 In *Setup 2*, energy is *first* transferred from the
- A container to the flame
 - B container to the water
 - C flame to the container
 - D water to the container

- 2 The images below show water particles in different phases. Based on the balloon observations in *Setup 2*, a student made a claim that even though matter is made of particles too small to be seen, matter can be detected by other means.

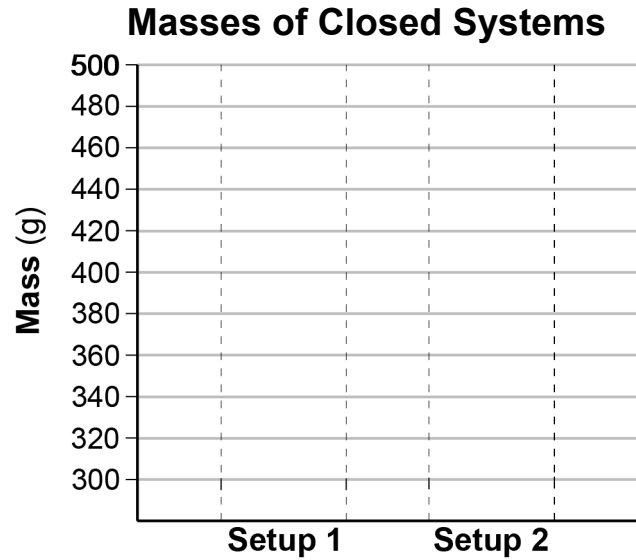
Select the correct lettered images of water particles and place the letters in the appropriate boxes to develop a model that supports the student's claim and provides evidence for the change in size of the balloon from *Setup 1* to *Setup 2*. [1]

Models of Water Particles in Different Phases

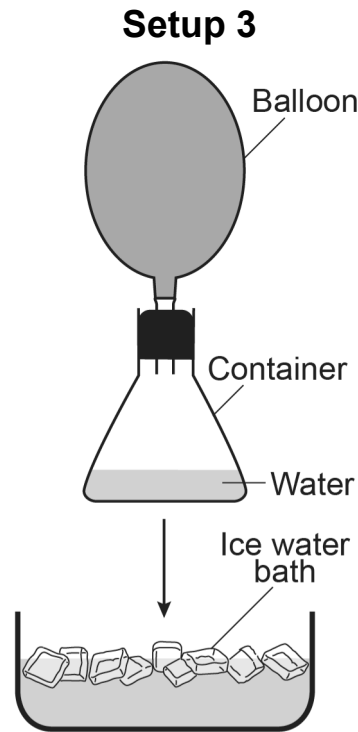


(Not drawn to scale)

- 3 Complete the bar graph below to represent the masses of this closed system in *Setup 1* and *Setup 2* by drawing each bar between the dashed lines above each setup label. In *Setup 2*, the system is made up of the same balloon, container, tube, stopper, and water, as in *Setup 1*. The stand and heat source are *not* part of the system. [1]



The teacher continued the investigation by placing the same container in an ice water bath, shown in *Setup 3*, in order to model a water cycle process that affects Earth's weather.

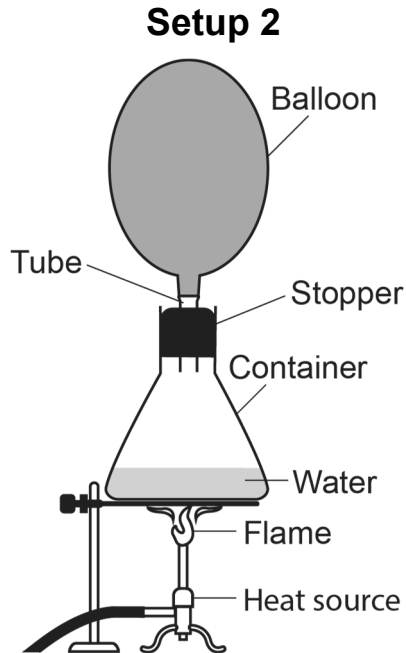


- 4 Identify the water cycle process that will occur inside the balloon as a result of placing the container in the ice water bath. Then, describe how this water cycle process changes **one** weather condition in Earth's atmosphere. [1]

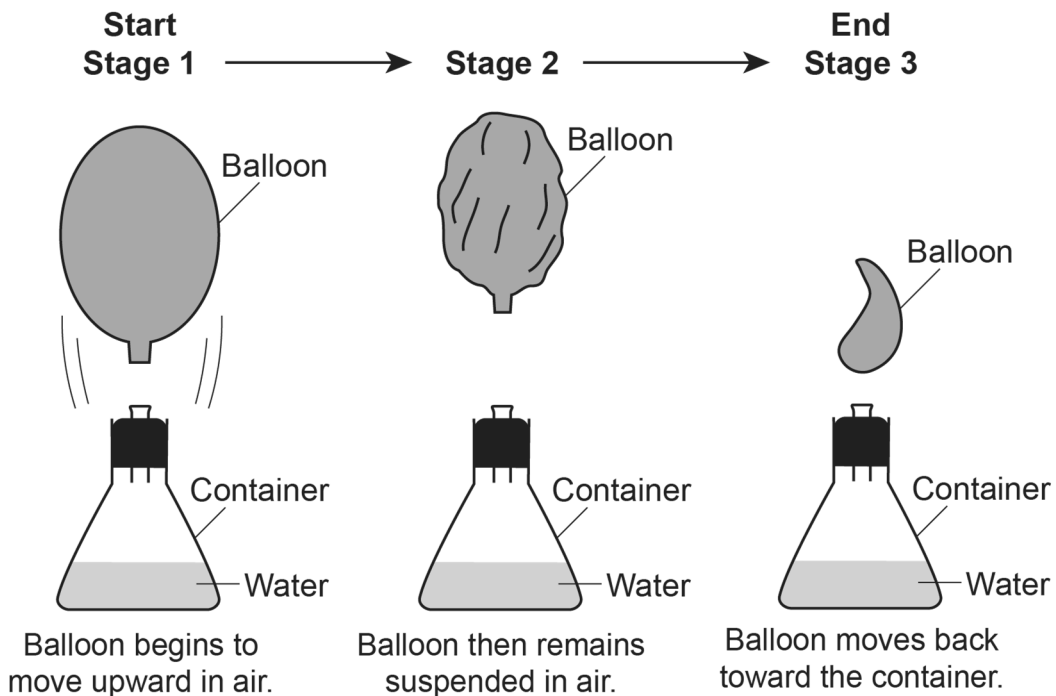
Water cycle process: _____

Description of weather condition: _____

The teacher performed another investigation using *Setup 2* to demonstrate what would happen if the balloon was released from the tube in the stopper.



The model below represents three stages in the motion of the balloon from the start of this new investigation to the end.



- 5 Which argument explains the motion of the balloon after being released from the tube in Stage 1?
- A In Stage 1, the gravitational force on the balloon is balanced by another force, causing the balloon to begin to rise.
 - B In Stage 2, the gravitational force and another force on the balloon are unbalanced, causing the balloon to be suspended motionless in the air.
 - C In Stage 3, the gravitational force and another force on the balloon are unbalanced, causing the balloon to fall downward.
 - D In Stages 1 through 3, the gravitational force is directed upward, causing the different motions of the balloon.