Student Name _____

P

DC Science

The District of Columbia Assessment of the Next Generation Science Standards

Grade 5 Test Booklet

Practice Test

Unit 1

Welcome! Today you will take unit 1 of the DC Science Assessment Practice Test.

To respond to the tasks on this test, you may be asked to review information in the form of text, images, data tables, and graphs. Analyze all the information and tasks carefully and then respond to each task. You may need to read across multiple pages to see all the information. You will be allowed to use a calculator for all units in this test.

Some tasks require more than one response. You may look back at the information as often as necessary.

For tasks that ask you to explain, describe, or answer in your own words, write your responses in the space provided. You may use scratch paper to organize your thinking before writing your response in the space provided.

For tasks that ask you to fill in the blank spaces or write answers in the correct box, you may write the letter corresponding to the response or write the entire response in the blank space.

If you are unsure about an answer, select or compose an answer you think is the best response. You can always go back to the items you are unsure of after you've answered all other questions in the unit.

Finally, before beginning the test, please write your name on the top of the cover page and wait for the test administrator to inform you to turn the page.

A student notices that toy cars roll faster going downhill. She wonders if steeper hills make things roll even faster. Her class builds a wooden ramp to investigate. They test how the height of the wooden ramp might change the speed of a toy car that has a mass of 31 grams. The investigation set up is shown in Figure 1. By measuring the length of the ramp with a ruler, and the time it takes the car to reach the end of the ramp with a stopwatch, the students calculate the speed of the car. The results of the investigation are shown in Table 1.

Figure 1. Car on Ramp

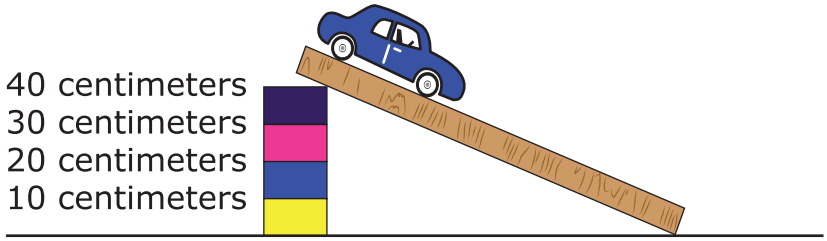


Table 1. Results of Investigation

Ramp height in centimeters	Speed in centimeters per second
0	0
10	25
20	50
40	100
50	125

1. Why does the car remain still when the ramp is placed flat, at a height of 0 centimeters?

Ⓐ There are no forces acting on the car.

Ⓑ The forces on the car are all balanced.

Ⓒ The force of gravity only pulls on objects that are at some height off of the ground.

Ⓓ The force of the ramp pushing up on the car is greater than the force of gravity pulling down on the car.

2. Which of the following are true about the force of gravity acting on the car in the different trials in Table 1?

Select **two** correct answers.

Ⓐ The force of gravity on the car is the same in every trial.

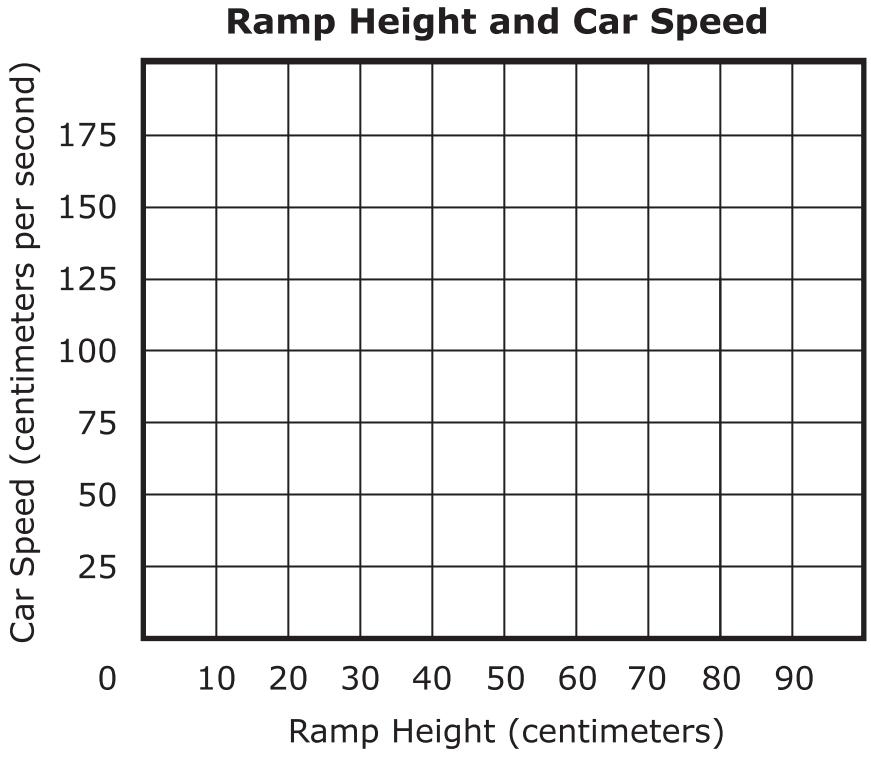
Ⓑ The force of gravity on the car is greater as the ramp increases in height.

Ⓒ As ramp height increases, the force of gravity on the car pulls the car down the ramp.

Ⓓ As ramp height increases, the force of gravity on the car is opposed by stronger and stronger forces.

3. Use the data in Table 1 to graph the speed of the car at the five ramp heights provided. Then predict the speed of the car at a ramp height of 70 centimeters by graphing a sixth point.

Draw 6 points on the graph. You can use the calculator to help you find the answers.



4. The students wanted their investigation to be fair. Complete the sentences to describe how they did this.

Write the answers in the correct boxes. Not all answers will be used. Each answer may be used more than once.

A. height of the ramp	B. mass of the car	C. controlled
D. responding	E. the same	F. a different

Many factors can affect the outcome of an investigation.

A [ ] variable is a factor that could change, but is kept constant on purpose to make the investigation fair. For example, the students used the same car every time. They also made sure [ ] student released the car for every trial. One student was designated as the timekeeper and used [ ] stopwatch every time. The only variable in the investigation that the students changed was the [ ].

5. The students suggest the hypothesis that a heavier car will roll down the ramp faster than a lighter car. Which are ways to test this hypothesis?

Write the correct answers in the box. Not all answers will be used.

A. Test the same car on a wider and taller ramp.

B. Test the same car with pennies glued to the top of the car.

C. Test the same car on a lighter ramp made of plastic.

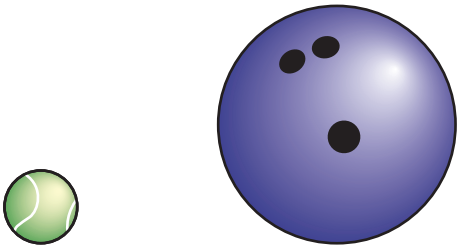
D. Test the same car with fan behind the ramp.

E. Test a different car that has a mass of less than 31 grams.

Will test the hypothesis

6.

Figure 2. Tennis and Bowling Balls



59 grams 7,000 grams

Information that is gathered from investigations can help us make predictions about the forces that are around us every day. Use what you know about the student investigation in your answers to the following:

- The toy car is released at a ramp height of 50 centimeters. Describe what happens as the 31 gram toy car collides with a 59 gram tennis ball at the end of the ramp.
- Explain why the toy car has the effect that it does on the tennis ball.
- Describe what will happen in the above investigation if the 31 gram toy car collides with a 7,000 gram bowling ball instead of the 59 gram tennis ball.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

A class goes on a school trip to learn about the types of organisms that live in a local river. They work in groups and use nets to collect organisms out of the river. One group captures water striders and dragonflies (Figure 1). They make a data table to compare the traits of the water striders and dragonflies (Table 1).

Figure 1. Reproductive Cycles

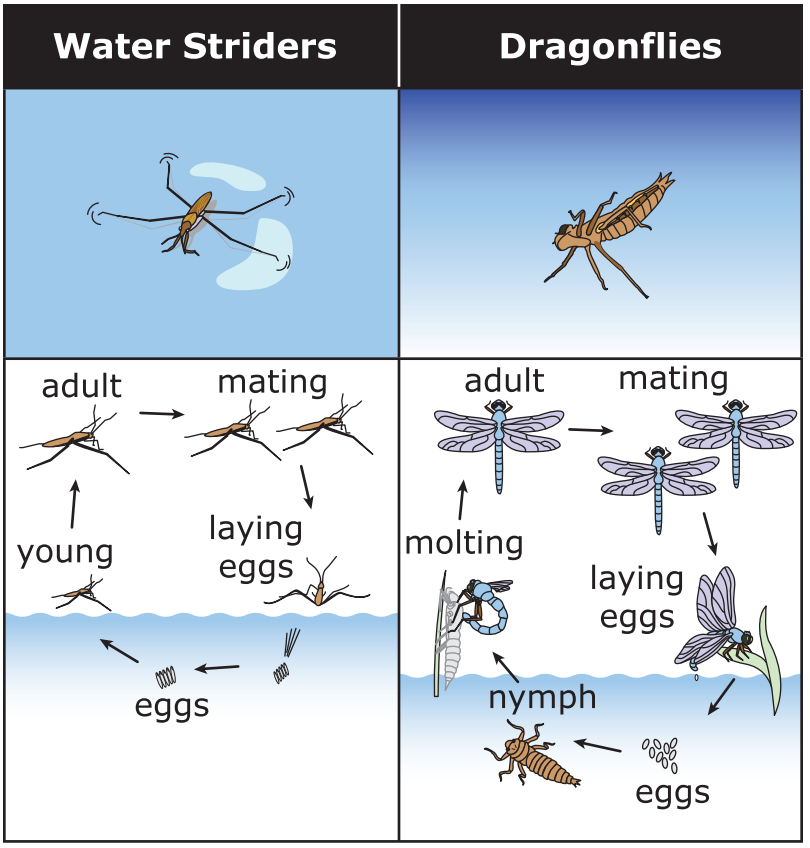


Table 1. Water Strider and Dragonfly Traits

Characteristic	Water Strider	Dragonfly
Body parts	6 thin legs that trap air bubbles with tiny hairs	6 thin legs and short antennae
Behavior	gather in swarms for feeding and mating; move rapidly on the surface of the water to catch insects for food	gather in swarms for feeding; catch insects for food
Appearance of adults	some have wings and some do not	adult form is brightly colored and has 2 sets of wings
Environment	can live in freshwater or saltwater	found only in freshwater and migrate when weather grows cold
Appearance of young	young look like smaller versions of adults	nymph has gills and short antennae

7. Water striders and dragonflies are insects. A dragonfly has laid eggs in the water by the edge of the river. Use Table 1 and Figure 1 to determine which traits the nymphs will have in common with the parents after the eggs hatch.

Select **two** correct answers.

Ⓐ 6 legs

Ⓑ 2 sets of wings

Ⓒ ability to migrate

Ⓓ bright-colored body

Ⓔ antennae to sense movement

8. Which trait allows dragonflies to be easily seen by potential mates?

Ⓐ 6 legs

Ⓑ ability to molt

Ⓒ bright-coloration

Ⓓ tiny hairs on their legs

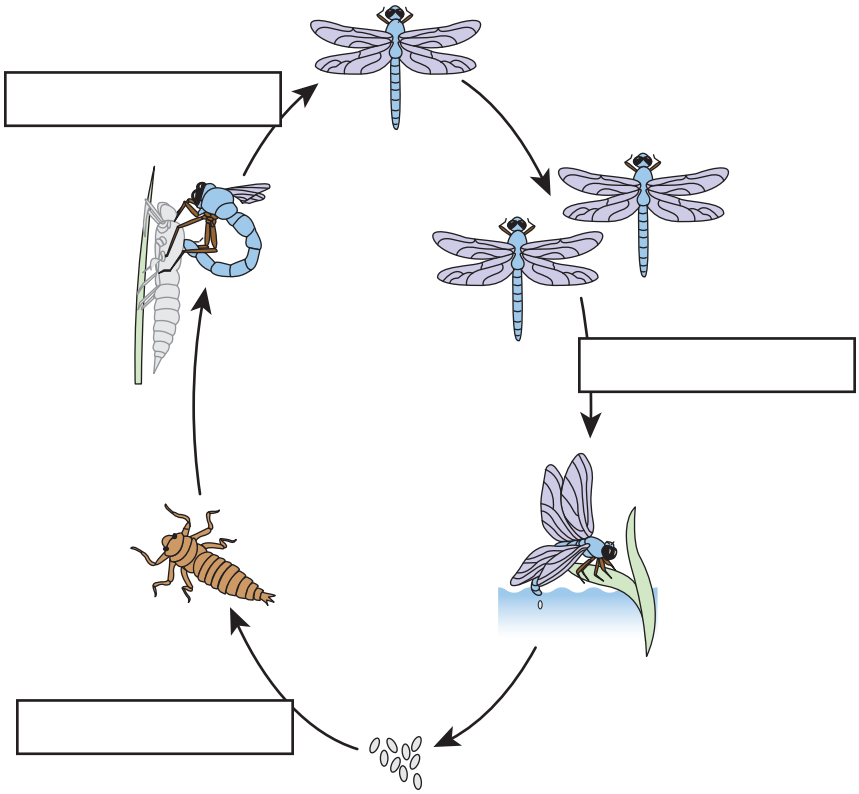
9. The students want to make a model to compare the life stages of the dragonfly to the water strider. Complete the dragonfly life stage model by labeling the model.

Write the correct answer in each box.

A. birth

B. reproduction

C. molting



10.

Table 2. Dragonfly and Damselfly Traits

Trait	Adult Dragonfly	Adult Damselfly
Eyes	So large that they touch each other	Large but there is a gap between them
Wings	Rear wing pair is larger than front wing pair	Both wing pairs are the same size
Other Appendages	6 legs and 2 antennae	6 legs and 2 antennae
Resting Pose	Wings out to the side like airplane wings	Wings in-line together across the back

The students discover a swarm of insects. They look like dragonflies, but their teacher tells them that they might be damselflies. The students catch a few of the swarming insects in a net and bring them back to school. They do some research about the traits of dragonflies and damselflies so that they can correctly identify the insects. The information they found is shown in Table 2.

Circle the correct answers from each list to complete the sentences.

When they examined the insects closely, the students discovered that each insect they captured had 6 legs, 2 antennae, wing pairs of the same size, and that they held their wings in-line across their backs. The students concluded that all of the captured insects were [dragonflies / damselflies]. The students predicted that if they allowed these insects to mate and produce offspring, the adult offspring would have large eyes that [touch each other / have a gap between them].

11.

Table 3. Water Strider Collection Data

Location	Number of Prey Insects per Cubic Meter	Average Length of Water Strider Wings	Type of Water at Location
A	6	5 millimeters	freshwater
B	19	No wings	saltwater
C	4	6 millimeters	saltwater
D	9	4 millimeters	freshwater
E	17	No wings	freshwater

Students observed the water striders at several locations, counted the number of prey insects at the various locations, and captured some water striders at the various locations in order to measure their wing lengths. The students recorded their data in Table 3.

Write the correct answer in each box. Not all answers will be used.

A. wing traits	D. less food
B. type of water	E. lay more eggs
C. more food	F. migrate

The evidence supports a connection between the amount of food available and [ ]. This may be because water striders that live in places with [ ] need to [ ].

12. Many insects have very different characteristics at different stages of their life cycle. Use the information provided about dragonflies in Figure 1 and Table 1 to answer the following questions.

- How are the traits of the adult form and the nymph form of the dragonfly different?
- How do the traits of the adult dragonfly make it suited for survival during this life stage?
- How do the traits of the nymph dragonfly make it suited for survival during this life stage?

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

Students on a camping trip in Maryland saw the sun setting as they played on a hilltop (Figure 1). When stars appeared overhead one student noticed that the stars were dim and tiny compared to the Sun. The student picked up a pebble and held it up at arm's length toward the sky. The pebble covered up one star, then another, and another. One of the students said that in South American night skies, there are many stars that are not visible in North America. Later, the student with the pebble threw pebbles toward the stars. Each pebble thrown toward the sky followed a similar path as it returned to Earth's surface (Figure 2).

Figure 1. The Setting Sun

Figure 2. Path of Thrown Pebble

13. What causes the pebble to follow the path shown in Figure 2 and fall back down to the Earth, after it is thrown in the air?

Ⓐ the force of Earth's gravity

Ⓑ the force of the Sun's gravity

Ⓒ the force of the Moon's gravity

Ⓓ the force of Earth's, the Sun's, and the Moon's gravity combined

14. What characteristic is true about the stars in Figure 2?

Ⓐ They are the same size as the pebble.

Ⓑ They shine because they reflect the light of the Sun.

Ⓒ They are different distances from Earth than the Sun.

Ⓓ They disappear during the day because they move out of the sky.

15. The Sun appears huge and bright from Earth, but a student can cover other stars with a single pebble from a hilltop on Earth. Explain this difference by completing the sentence.

Write the correct answer in each box.

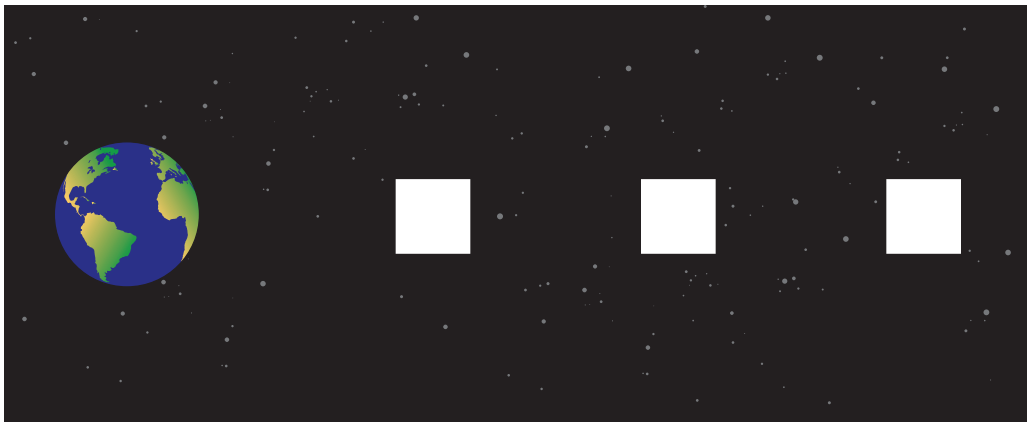
A. less than

B. greater than

The distance from the Earth to the Sun is [ ] the distance from the Earth to the Moon. The distance from the Earth to the Sun is [ ] the distance from the Earth to the other stars.

16. After sunset on the hilltop, the students notice three stars of different brightness. These stars are all the same type of star. Predict the relative distances from Earth for these three stars.

Write the correct answer in each box.



not to scale

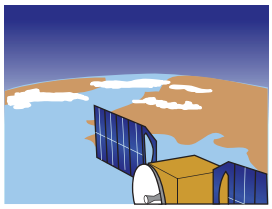
A. 

B. 

C. 

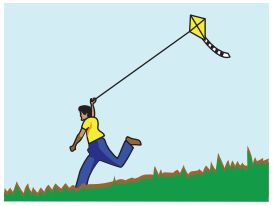
17. Scientific evidence supports the argument that Earth is a globe. Which observations could be evidence to support this argument?

Write the correct answers in the box. Not all answers will be used.

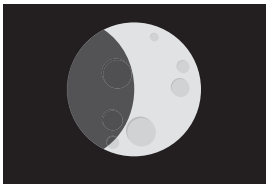


A. looking back at Earth's surface from a satellite

B. the shape of a shadow at noon



C. a flying kite



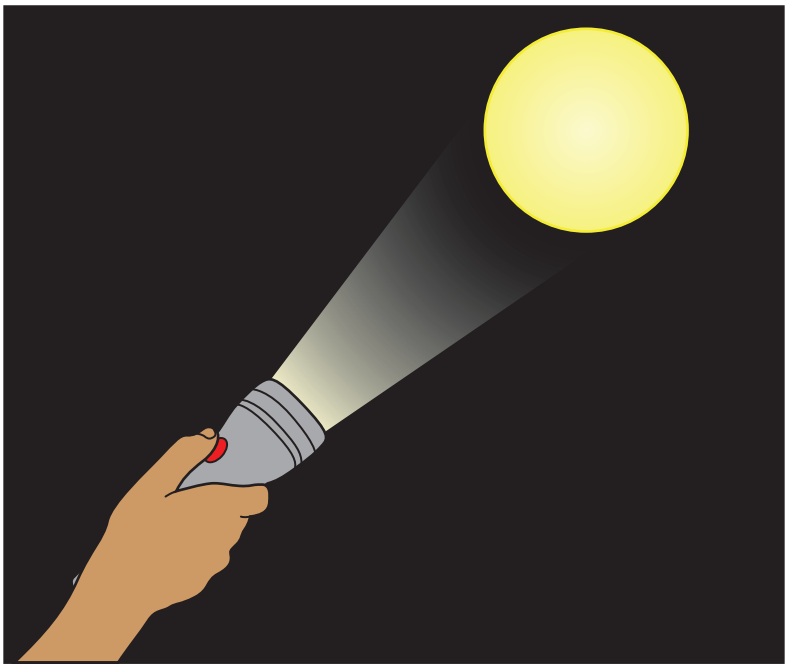
D. the shape of Earth's shadow during a lunar eclipse

E. different stars visible in the Northern and Southern Hemispheres on the same night

Evidence

18.

Figure 3. Student Using a Flashlight



A student claims that "The Sun appears brighter than other stars because it is closer to Earth."

- Explain how students could support the claim by modeling the distance from Earth to the Sun and the other stars with two flashlights.
- Galaxies are groups of stars that appear like a single point in the sky from Earth. Explain how students could model this observation with flashlights.
- A student sees two lights of equal brightness on the distant horizon. Can the student make an argument about the distance between the lights and the student using only this evidence? Explain your answer.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.


STOP


STOP


STOP

Unit 2

Welcome! Today you will take unit 2 of the DC Science Assessment Practice Test.

To respond to the tasks on this test, you may be asked to review information in the form of text, images, data tables, and graphs. Analyze all the information and tasks carefully and then respond to each task. You may need to read across multiple pages to see all the information. You will be allowed to use a calculator for all units in this test.

Some tasks require more than one response. You may look back at the information as often as necessary.

For tasks that ask you to explain, describe, or answer in your own words, write your responses in the space provided. You may use scratch paper to organize your thinking before writing your response in the space provided.

For tasks that ask you to fill in the blank spaces or write answers in the correct box, you may write the letter corresponding to the response or write the entire response in the blank space.

If you are unsure about an answer, select or compose an answer you think is the best response. You can always go back to the items you are unsure of after you've answered all other questions in the unit.

A student is walking and sees acorns all over the sidewalk. The student collects one for further investigation.

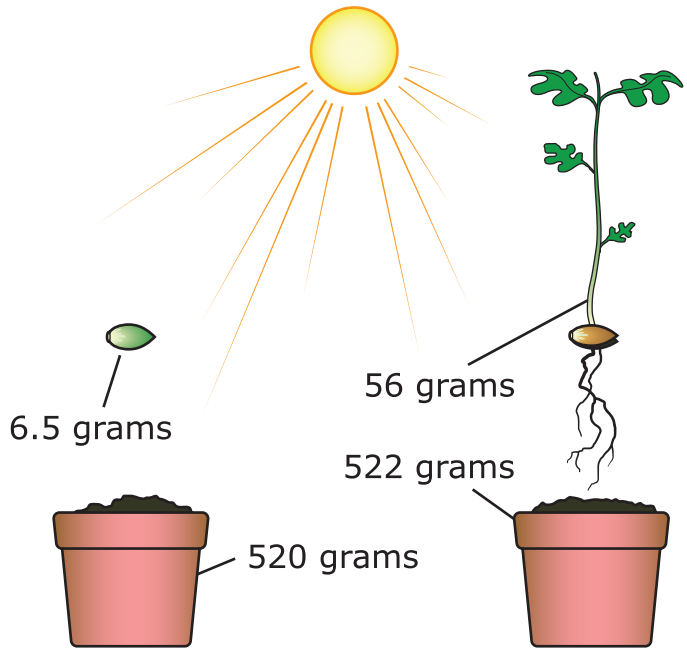
The student then does some research and learns the following facts:

- Acorns are the seeds of oak trees.
- Deer, wild turkeys, squirrels, blue jays, and acorn weevils eat acorns.
- The acorn weevil, an insect, lays eggs inside of acorns.
- Acorns that are dropped from oak trees are called "mast."

The student learns that factors in both the living and non-living environment can affect the acorn mast year to year. The mast ratings for recent years are provided in Figure 2. Mast ratings range from 0 to 5. A mast rating of 0 indicates no acorns are present. A mast rating of 5 indicates a very large number of acorns are present.

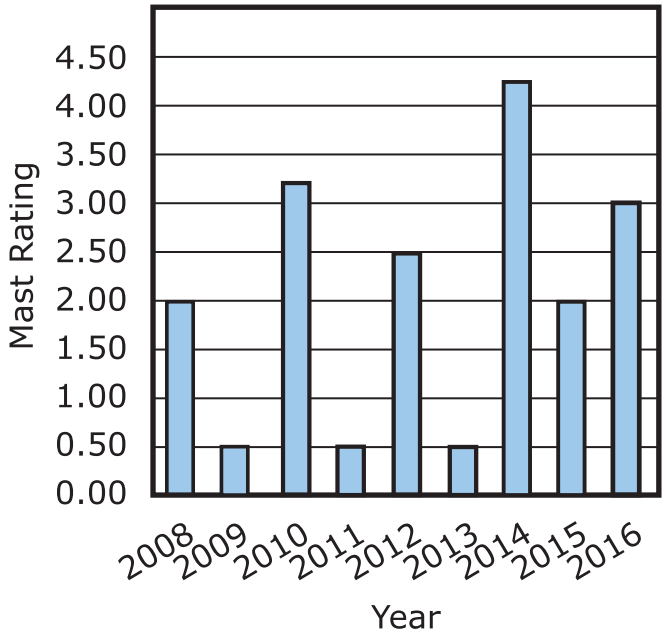
The student decides to plant an acorn to perform the investigation described in Figure 1.

Figure 1. Acorn Investigation



The student plants an acorn in a pot of soil after determining their masses. The student places the pot on a windowsill in their classroom in direct sunlight. They add 25 milliliters of water to the soil every day for two months. After two months of growth, the oak seedling is carefully removed from the pot and all soil on the plant roots is scraped off the roots and returned to the pot. The mass of the seedling is determined, and after the soil is allowed to dry, the mass of the pot and soil is determined.

Figure 2. Acorn Mast Ratings by Year



Source: North Carolina Wildlife Resources Commission

19. Review Figure 2. From where did the deer, wild turkeys, squirrels, and blue jays get the energy they needed to survive in 2009, 2011, and 2013?

Ⓐ from air and water

Ⓑ directly from the Sun

Ⓒ from the high acorn mast

Ⓓ from a variety of food sources

20. After examining Figure 2, the student argues that in the years 2010 and 2014, the trees had more of the materials they needed to make food. What evidence could the student use to support this idea?

Ⓐ an increase in the amount of rainfall in those years

Ⓑ a greater number of cloudy days during those years

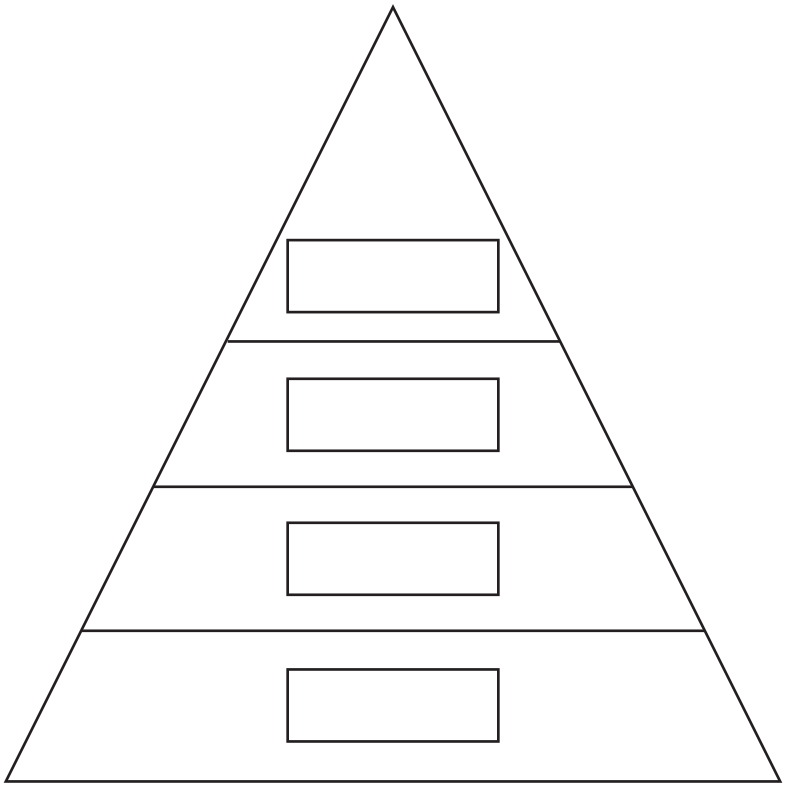
Ⓒ the amount of soil that was used up by the trees in those years

Ⓓ a larger population of deer, wild turkeys, squirrels, and blue jays in those years

21. Make a model to show how squirrels get the energy they need to live. The narrowing of the pyramid as it gets taller represents the loss of some energy each time energy is transferred. The bottom of the pyramid is the source of energy in the system.

Write the correct answer in each box to complete the model. Not all answers will be used.

Energy Pyramid



A. acorn	C. oak tree	E. soil
B. squirrel	D. sunlight	F. water

22. After completing the acorn investigation shown in Figure 1, the student makes the claim that plants gain mass by taking matter from air and water.

Write the answers that support the claim in the box. Not all answers will be used.

A. plant gained mass	B. plant received direct sunlight
C. soil did not lose mass	D. plant was provided water daily

Supports the claim

23. Examine the acorn mast data in Figure 2. Complete the sentences below.

Write the correct answer in each box.

A. increased | B. decreased

In the growing seasons that produced the mast of 2014, there was likely [ ] amounts of sunlight.

In the growing seasons that produced the mast of 2015, there was likely [ ] amounts of sunlight.

24. Use the information provided to answer these tasks.

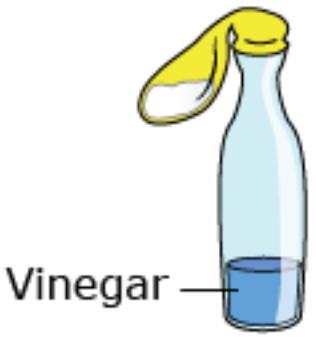
- Describe the flow of energy from the non-living environment to the acorn weevil.
- Describe how the acorn weevil obtains and uses matter from the non-living environment for its growth.
- How is the acorn weevil population likely affected by low acorn mast years? Explain your answer.

Analyze the information carefully. Then write your answers in the space provided. Support your answers with details.

For an investigation, students put baking soda into a balloon and pour vinegar into a bottle. Then the students attach the balloon to the bottle, as shown in Figure 1.

A student lifts the balloon so that all the baking soda falls into the vinegar. A white foam forms in the bottle, and the balloon becomes larger. Then the balloon pops off of the bottle and travels upward into the sky.

Figure 1. Balloon Rocket Investigation



25. What causes the balloon to become larger?

Ⓐ The vinegar is a liquid.

Ⓑ The bottle is full of air.

Ⓒ The balloon fills with gas.

Ⓓ The baking soda evaporates.

26. What caused the change in volume of the balloon?

Ⓐ A new substance is formed with the properties of baking soda, but not vinegar.

Ⓑ A new substance is formed with properties different from those of baking soda or vinegar.

Ⓒ No chemical reaction has occurred so the substance has the properties of vinegar, but not baking soda.

Ⓓ No chemical reaction has occurred so the substance has the properties of both baking soda and vinegar.

27. Complete the sentence below to describe a change that occurs when the baking soda and vinegar are combined as described in Figure 1.

Write the correct answer in each box. Not all answers will be used. Each answer may be used more than once.

A. mass
B. volume
C. greater than
D. less than

The total [ ] of the substances in the bottle and balloon after the baking soda and vinegar are combined is [ ] the total [ ] of the substances in the bottle and balloon before the baking soda and vinegar were combined.

28. Based on this investigation, match each property to the substance it describes.

Write the correct answers in each box. Not all answers will be used. Each answer may be used more than once.

A. solid	D. has mass
B. liquid	E. has volume
C. gas	

Vinegar	Baking soda

GO ON ▶

GO ON TO NEXT PAGE

29. The students wondered if a different liquid would increase the maximum height of the balloon in the sky. In their next investigation, the students combined baking soda with water as well as vinegar. The students' results are shown in Table 1.

Table 1. Balloon Rocket Fuel Types

Fuel	Observations
water and baking soda	• No bubbles were produced when liquid and solid fuels combined. • No baking soda is visible at the bottom of the container. • The volume of the liquid is the same before and after the baking soda was added.
vinegar and baking soda	• Mixture begins to bubble and fizz when liquid and solid fuels are combined. • After the bubbling stops, none of the baking soda is visible in the container. • Less volume of liquid is visible in the container after the bubbling has stopped.

Use Table 1 to predict the results of mixing baking soda and water to launch a balloon rocket by completing the sentences.

Write the correct answer in each box. Not all answers will be used.

A. will

B. will not

C. support

D. do not support

A balloon rocket fueled by baking soda and water [ ] travel higher than the balloon rocket fueled by baking soda and vinegar. The observations from Table 1 [ ] the claim that a new substance forms when baking soda and water combine.

30. The students want to use the same substances to make the balloon rocket travel a greater distance.

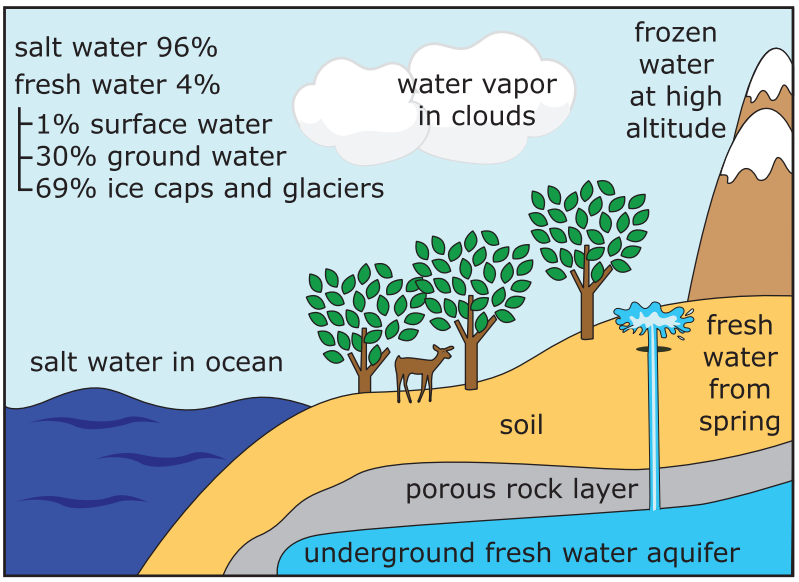
- Identify a variable from the first balloon rocket investigation the students could change.
- Describe how the students could measure this variable in their investigation.
- Identify the metric units of the measurements used in the investigation.

Analyze the information carefully. Then write your answers in the space provided. Support your answers with details.

GO ON ▶

A student is hiking and notices a small spring[1]. The student sees that the water is coming up through rocks. The student wonders where the water comes from, and whether it is fresh or salty. The student finds a diagram of the area (Figure 1) and a graph of the amount of salt in the aquifer[2] water (Figure 2). The student realizes that much of what is pictured in the diagram can be explained by the interaction of the Earth's four spheres: the geosphere, hydrosphere, biosphere, and atmosphere.

Figure 1. Diagram of the Area

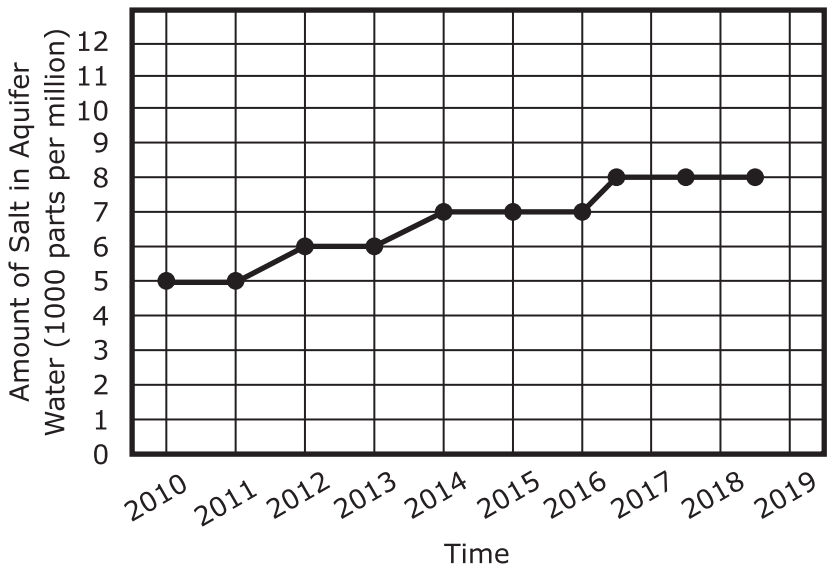


[1]spring—A source of water coming up from the ground.

[2]aquifer—A layer of rock or sand that can absorb and hold water.

GO ON ▶

Figure 2. Amount of Salt in Aquifer Water



31. What could be the cause of the change shown in Figure 2?

Ⓐ increase in rainfall

Ⓑ increase in land erosion

Ⓒ increase in snow melting

Ⓓ increase in spring water volume

32. What interaction causes the water to come out of the spring[1]?

Ⓐ Ocean water mixes with the aquifer[2] water.

Ⓑ Dry air speeds up evaporation of ocean water.

Ⓒ Rain soaks through the soil and porous[3] rock to fill the aquifer.

Ⓓ Trees draw the water through the porous rock and out through the spring.

[1]spring—A source of water coming up from the ground.

[2]aquifer—A layer of rock or sand that can absorb and hold water.

[3]porous—Having small holes that allow air or liquid to pass through.

33. While hiking, a student notices more clouds forming in the sky. The student wonders where the water came from that forms the clouds.

Use Figure 1 to compare different places water can evaporate from to form the clouds in the sky.

Write the correct answer in each box.

A. fresh water from the spring

B. salt water in the ocean

C. fresh water in the aquifer

Most of the water evaporates from [ ].

A small amount of water evaporates from [ ].

No water evaporates from [ ].

34. The student wants to identify the parts of the map that show the relationship between only the hydrosphere and geosphere.

Write the answers that show a relationship between the hydrosphere and geosphere in the box. Not all answers will be used.

A. deer drinking water from the spring

B. trees absorbing water from the soil

C. rivers carrying sediment and depositing it in the ocean

D. water evaporating from the ocean and condensing to form clouds

E. porous rocks filtering groundwater as it passes through the layer

Shows the relationship between hydrosphere and geosphere

35. Use the information in Figure 1 to explain how the interaction between the atmosphere and hydrosphere can determine the amounts of water present in different locations.

Write the correct answer in each box.

A. increase

B. decrease

C. remain the same

Warmer air temperatures can cause the amount of fresh water ice in the mountains to [ ] .

If water from the clouds in the air condenses and falls in the ocean, then the percentage of salt water in the area will [ ] .

If rain falls from the sky and enters the underground aquifer, then the percentage of fresh water in the area will [ ] .

36.

Figure 3. Streamflow in Mountain Creek from Morning to Afternoon

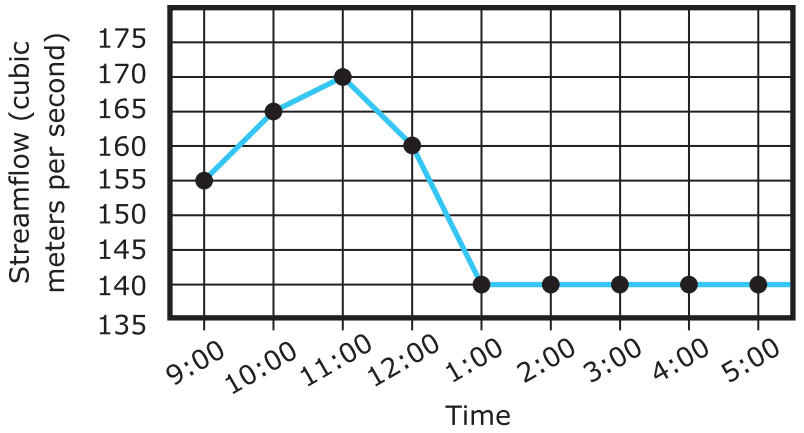


Figure 3 shows the streamflow of Mountain Creek from one morning to the afternoon. Mountain Creek flows from the mountains shown in Figure 1.

- Identify the time of day when streamflow is increasing and describe what could have caused this increase.
- Identify the time of day when streamflow is decreasing and describe what could have caused this decrease.
- Identify the time of day when streamflow is constant and describe why the flow has become constant.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

STOP


STOP


STOP

Unit 3

Welcome! Today you will take unit 3 of the DC Science Assessment Practice Test.

To respond to the tasks on this test, you may be asked to review information in the form of text, images, data tables, and graphs. Analyze all the information and tasks carefully and then respond to each task. You may need to read across multiple pages to see all the information. You will be allowed to use a calculator for all units in this test.

Some tasks require more than one response. You may look back at the information as often as necessary.

For tasks that ask you to explain, describe, or answer in your own words, write your responses in the space provided. You may use scratch paper to organize your thinking before writing your response in the space provided.

For tasks that ask you to fill in the blank spaces or write answers in the correct box, you may write the letter corresponding to the response or write the entire response in the blank space.

If you are unsure about an answer, select or compose an answer you think is the best response. You can always go back to the items you are unsure of after you've answered all other questions in the unit.

Students on a playground are not able to hear their teacher's whistle. They decide to test three new whistles to identify a whistle they can hear. They use a special app on a cell phone placed 3 meters away from the whistles to examine the sound waves produced by each whistle. Figure 1 shows the height of each sound wave. Figure 2 shows the spacing between each wave peak.

Next, they explore whether the sound that comes out of each whistle can move objects. They place several, identical small foam balls on a table. Students blow each whistle 1 meter away from the foam balls. They record their observations in Table 1.

GO ON ▶

Figure 1. Height of Sound Waves of Whistles

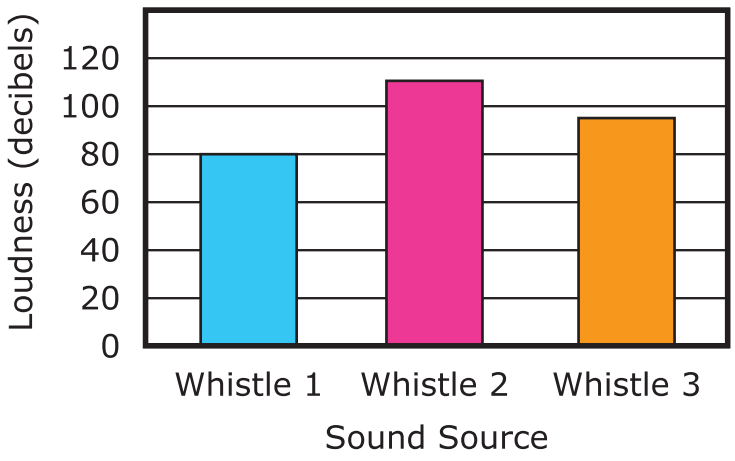


Figure 2. Spacing of Sound Waves of Whistles

Whistle	Sound wave
1	
2	
3	

GO ON ▶

Table 1. Movement of Foam Balls

Whistle	Distance Foam Ball Rolled
1	0 centimeters
2	2 centimeters
3	1 centimeter

37. The students observed that sound moved the foam balls. They wonder whether louder sounds cause more motion. How should they change the investigation to answer this question?

Select **two** correct answers.

Ⓐ Use only one type of whistle.

Ⓑ Blow a whistle for a longer time.

Ⓒ Put more foam balls on the table.

Ⓓ Use foam balls that are different sizes.

Ⓔ Blow the whistle with different levels of effort.

38. The students study the wave patterns in Figure 2. One student comments that Whistle 2 has the shortest spacing between wave peaks. What else is true about the wave produced by Whistle 2?

Ⓐ It has the tallest wave height.

Ⓑ It had the least effect on the foam balls.

Ⓒ It has the longest spaces between wave peaks.

Ⓓ It had the only whistle recorded on the cell phone.

39. Circle the correct answers from each list to complete the sentences.

Whistles are often used by animal trainers. For whistles to be effective, the animal being trained must be able to hear the whistle from far away. The data show that the whistle that produces waves with the [greatest / least] wave height is best for training animals. This is because that whistle creates [the loudest sound / the longest waves].

GO ON ▶

40. A good whistle is not only loud enough for people to hear it, but it must produce the right sound waves to be heard at a distance. A student and a teacher perform an investigation using three whistles to see how far the sound can travel through the air.

Write the correct answers in the empty boxes to complete the procedure.

A. The student moves 10 meters farther away from the teacher and then stands with eyes closed.

B. The teacher chooses a different whistle and the student returns to a position 10 meters from the teacher.

C. The teacher blows the whistle.

D. The teacher records if the student has a hand up.

Step	Event
1	The teacher chooses a whistle and stands in the center of the playground.
2	The student stands, with eyes closed, 10 meters from the teacher.
3	
4	If the student can hear the whistle, the student raises a hand.
5	
6	
7	Steps 3 - 6 are repeated until the student can no longer hear the whistle.
8	

41.

Figure 3. Plastic Cup Phone in Use

The students notice that it is more difficult to hear the teacher's whistle as they move farther from the teacher on the playground. This makes them curious about how sound can travel very long distances using cell phones between different cities that are hundreds of kilometers apart. The students connect two plastic cups with a 50-meter-long string between them. One student blows the whistle into a cup while another student listens into the other cup 50 meters away. Other students on the playground cannot hear the whistle inside the cup, but the student listening into the plastic cup 50 meters away can hear the whistle clearly. They call their device a plastic cup phone, but know that it is different from a cell phone.

Match the features with the type of phone they describe. Write the correct answer or answers in each box. All options will be used.

A. transfers sound by digital signals

B. transfers sound by movement

C. transfers sound over very long distances

D. transfers sound through a code

Cell phone	Plastic cup phone

42. The students are asked by the school's swim coach to choose the best whistle for the team's needs. The swimmers need to be able to hear the whistle underwater and across the entire pool. The students do some research and find the following facts:

- Some people cannot hear sounds when the sound waves have very short spaces between peaks.
- Sound waves with longer spaces between peaks can travel farther in both air and water.
- The normal splashing and cheering that occurs at swim practice produces a background noise level of up to 80 decibels.

Use all of the information provided to complete the following tasks:

- Explain why Whistle 3 is likely the best option for the swim team.
- Describe what testing the swim team could do to determine if Whistle 3 really is the best option for the team.
- Describe how an underwater pool speaker system placed in the water might be a better option than a whistle blown from outside the water.

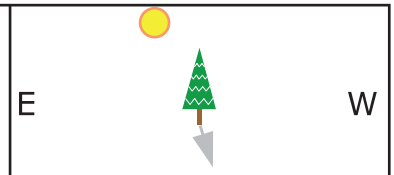
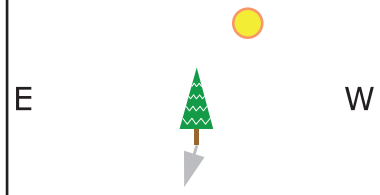
Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

Students were excited to camp out and observe the motion of the Sun during the day and the appearance of the stars at night. As part of a school project, they recorded the position of the Sun in the sky and the position of the shadow of a tree at different times of the day. The students stood in the same location, directly north of the tree, for each observation.

They were having so much fun playing games in the afternoon that they forgot to complete the 3 p.m. drawing. At 7 p.m., while the Sun was going down, the stars came out. The drawings the students produced are shown in Figure 1.

GO ON ▶

Figure 1. Student Drawing

11:00 a.m.	
1:00 p.m.	
3:00 p.m.	E W
5:00 p.m.	
7:00 p.m.	

43. What causes the change in the position of the Sun between 11 a.m. and 7 p.m.?

Ⓐ The Sun is orbiting the Earth.

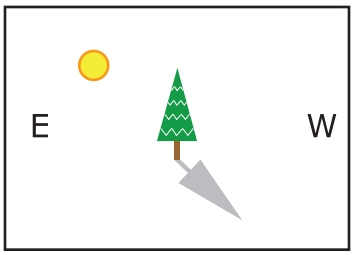
Ⓑ The Earth is orbiting the Sun.

Ⓒ The Earth is spinning on its axis.

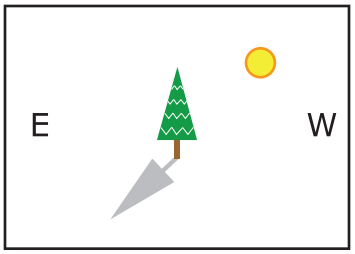
Ⓓ The Sun is moving through space.

44. If the students had completed their drawing at 3 p.m., what would it have looked like?

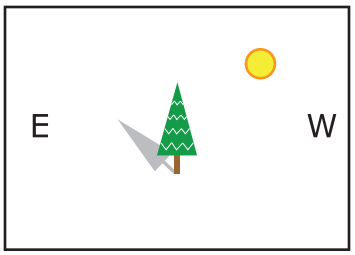
Ⓐ



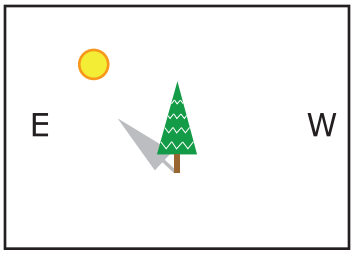
Ⓑ



Ⓒ



Ⓓ

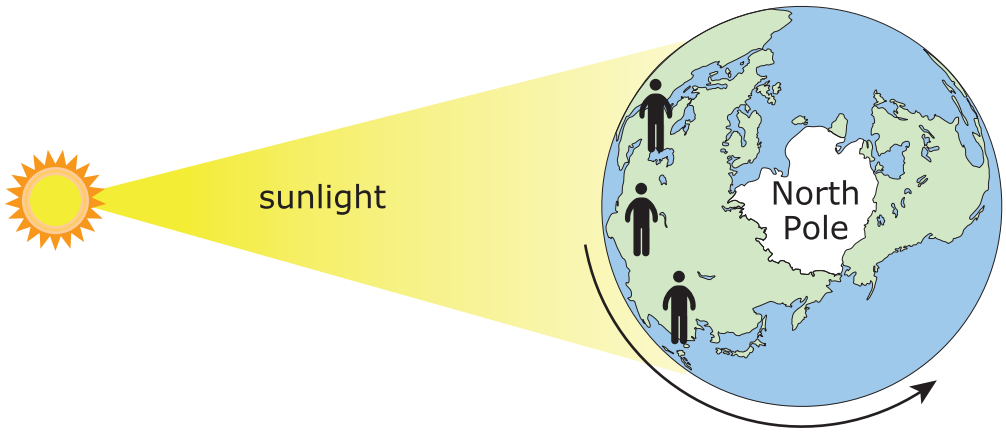


GO ON TO NEXT PAGE

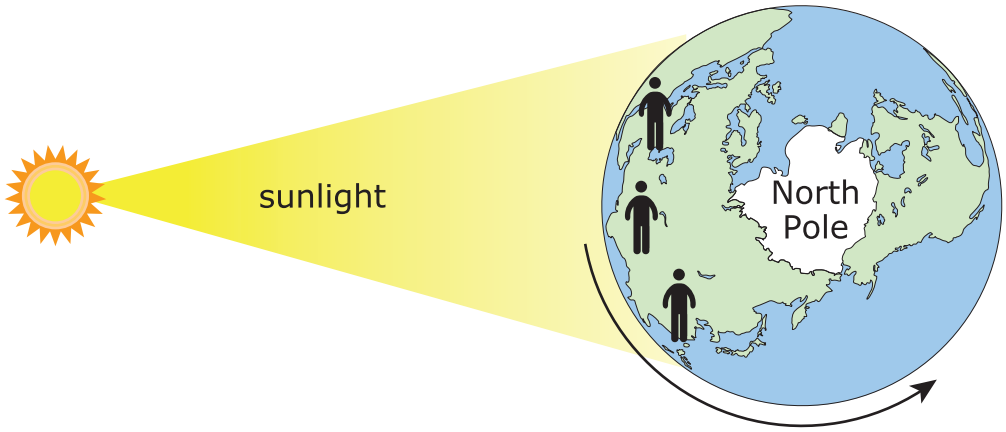
45. After returning to school, one student finds the model below to help explain what the students saw during the camping trip. Use the model to describe what the human figure on the Earth would see at each location given the position of the Sun.

Circle the **one** human figure in **each** picture for whom the Sun and shadow description is correct.

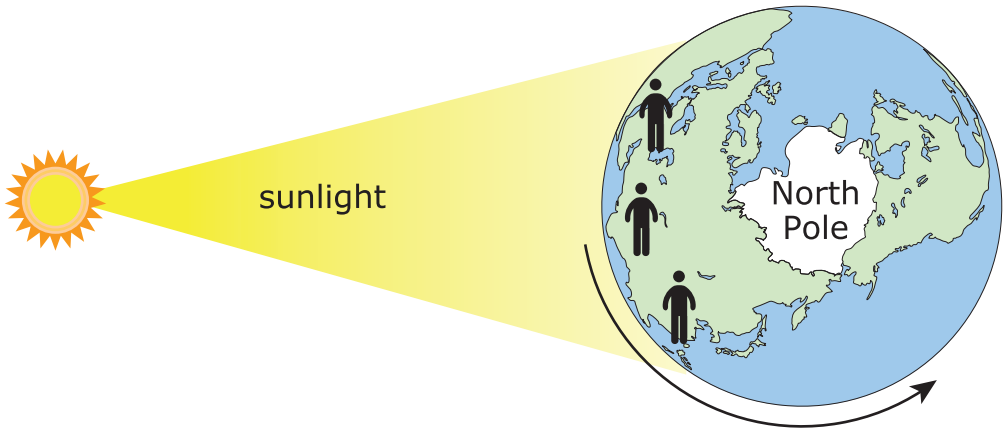
The Sun is low in the West.
Shadows are very long.



The Sun is high overhead.
Shadows are very short.



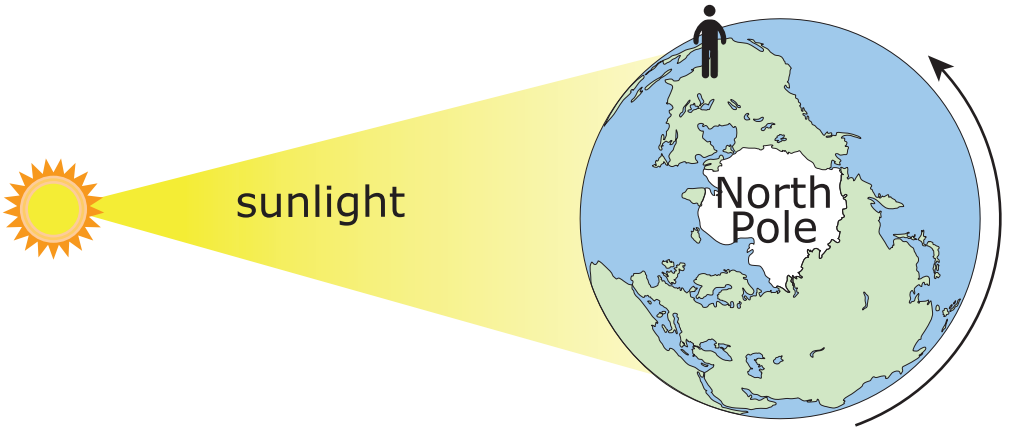
The Sun is low in the East.
Shadows are very long.



GO ON ▶

46. A student claims that while the model above can be used to explain many observations, it could be improved to be more realistic.

Indicate whether the property of the model should be increased or decreased to make the model more realistic. Write the correct answer in each box. All options should be used.



A. the size of the Sun

B. the distance between the Earth and the Sun

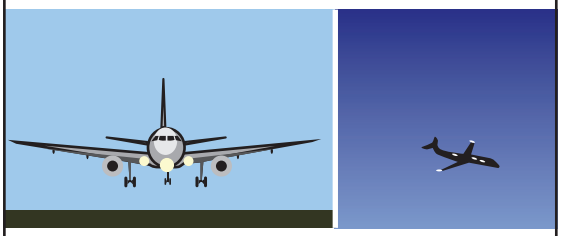
C. the size of the human figure

Increase	Decrease

47. As the sun goes down, one student claims that "the Sun seems so much brighter than the other stars because it is closer to Earth." What observations could the student use to support the claim?

Write the correct answers in the box. Not all answers will be used.

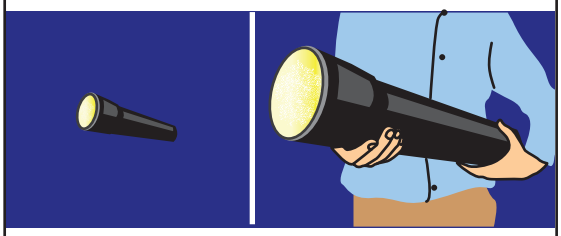
A.



airplane lights on the ground

airplane lights in the sky

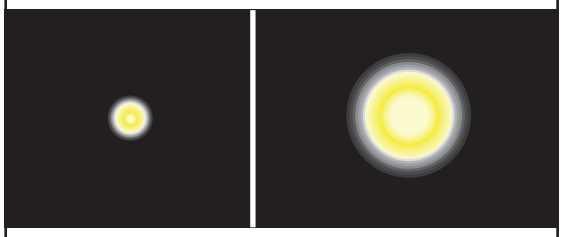
B.



a tiny flashlight

a huge flashlight

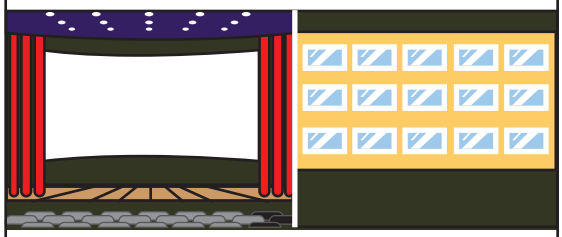
C.



a flashlight beam that is far away

a flashlight beam that is close

D.



a movie screen

TV monitors

Observations that could support the claim

48. The students decide to make a graph to show the relationship between the apparent position of the Sun in the sky and the length of the tree shadow. Answer the following to describe how you would complete this task.

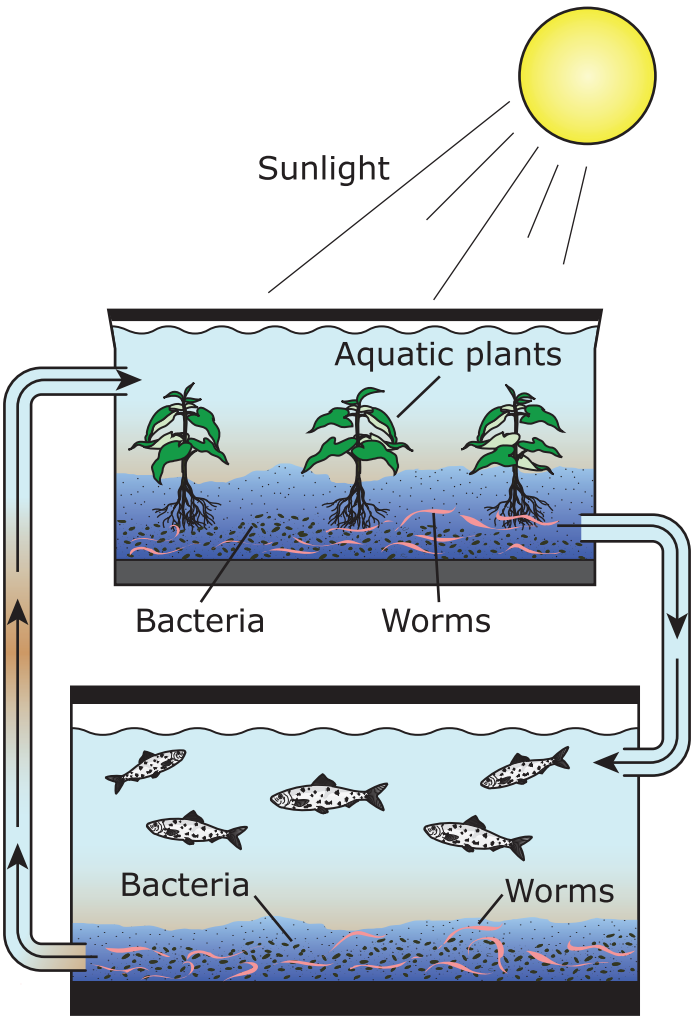
- Describe a pattern in the length of the tree shadow that students would have observed throughout the day.
- Describe a pattern in the direction of the tree shadow that students would have observed throughout the day.
- Explain the relationship between the position or motion of Earth and the changes in shadow length and direction.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

GO ON ▶

A student reads about growing plants in water with no soil. The student's teacher tells the student that fish can be raised using the same water in which aquatic[1] plants grow. The student researches to discover if the fish and the plants somehow help each other to grow. The student makes a sketch of a model of how a system like this might work (Figure 1).

Figure 1. Growing Plants and Raising Fish with No Soil



[1]aquatic—Living or found in or near water.

49. In the system shown, the plants are healthy and grow well. From where do the plants get most of the matter for their growth?

Select **two** correct answers.

Ⓐ light from the Sun

Ⓑ water in the plant tank

Ⓒ gravel in the plant tank

Ⓓ gases dissolved in the tank water

50. Soil usually contains some nutrients that plants need. How do nutrients enter the water in the system shown?

Select **two** correct answers.

Ⓐ dead plants decay

Ⓑ plants filter the water

Ⓒ pollen falls from the air

Ⓓ fish waste breaks down

GO ON ▶

51. In the system shown, all of the living parts are important in keeping the system healthy. Match the part of the system with the most important process it performs in the system.

Write the correct answer in each box.

A. Recycle dead matter and waste.

B. Produce carbon dioxide gas.

C. Filter water and return it to the environment.

Plants

Fish

Bacteria and Worms

52. In the system shown in Figure 1, fish, worms and bacteria, and plants help keep the system healthy. What would happen if parts of the system were missing? Match each part to the effect it would have on the system if that part were missing.

Write the correct answer in each box. All options should be used.

A. Water would contain less oxygen.

B. Water would contain fewer nutrients.

C. Water would contain more waste and dead matter.

Plants	Fish

Bacteria and Worms

53.

Table 1. Results of the Willow Tree Experiment

Time Passed (years)	Mass of Willow Tree (kilograms)	Mass of Dry Soil (kilograms)
0	2	90
5	77	90

In researching how plants might be able to live in the system shown in Figure 1, the student reads about a famous experiment. In this experiment, a scientist planted a willow tree in a pot of completely dry soil. The scientist let the willow tree grow outside, exposed to sun and rain for 5 years, and did not allow any soil to be added to or taken away from the pot. The results of the experiment are shown in Table 1. Complete the sentences to explain what can be concluded from the experiment.

Write the correct answer in each box.

A. soil | B. air | C. water

The results in Table 1 provide evidence that [ ]

does not contribute much to the mass of a plant. Instead, the

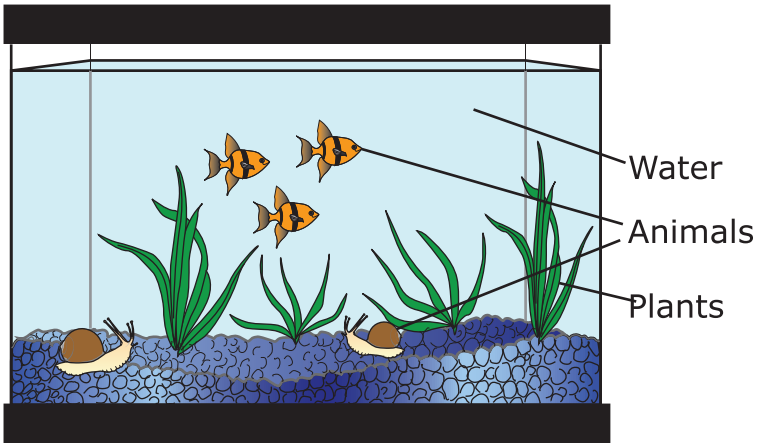
mass of a plant must come from [ ]

and [ ].

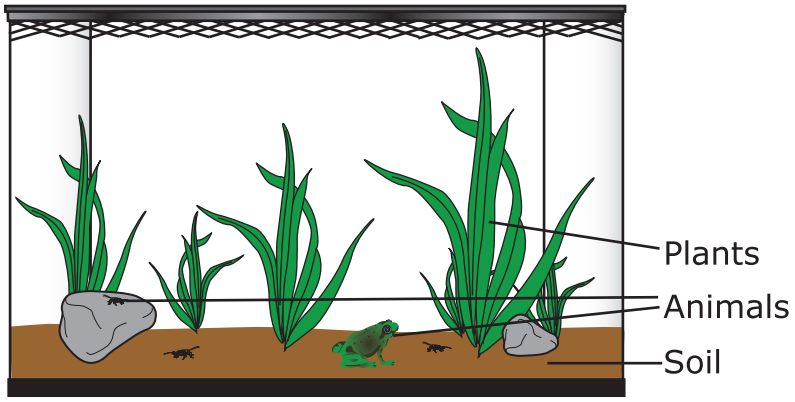
GO ON TO NEXT PAGE

54. A student wants to investigate the roles of water, air, and soil in the growth of plants in both aquariums and terrariums. The pictures below show an aquarium and a terrarium.

Aquarium



Terrarium



- Describe how plants in an **aquarium** get nutrients from the decomposition of matter.
- Describe how plants in a **terrarium** get nutrients from the decomposition of matter.
- Are both air and soil always required for plant growth? Answer yes or no and explain your answer.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.


STOP


STOP


STOP

Unit 4

Welcome! Today you will take unit 4 of the DC Science Assessment Practice Test.

To respond to the tasks on this test, you may be asked to review information in the form of text, images, data tables, and graphs. Analyze all the information and tasks carefully and then respond to each task. You may need to read across multiple pages to see all the information. You will be allowed to use a calculator for all units in this test.

Some tasks require more than one response. You may look back at the information as often as necessary.

For tasks that ask you to explain, describe, or answer in your own words, write your responses in the space provided. You may use scratch paper to organize your thinking before writing your response in the space provided.

For tasks that ask you to fill in the blank spaces or write answers in the correct box, you may write the letter corresponding to the response or write the entire response in the blank space.

If you are unsure about an answer, select or compose an answer you think is the best response. You can always go back to the items you are unsure of after you've answered all other questions in the unit.

A group of students are on a trip and notice white crystals on some rocks along the beach. The white crystals look just like salt. The students collect some of the crystals, along with some pebbles and sand from the beach.

They decide to test whether the properties of the substances are similar to salt. The students know that salt dissolves, so they investigate by mixing the different substances into 50 milliliters of water. The students record the results of the five different tests in Table 1.

GO ON ▶

Table 1. Substances Mixed with 50 Milliliters of Water

Test	Substance	Mass	Results
1	salt from kitchen	10 grams	not visible
2	white crystals from beach	10 grams	not visible
3	rock salt from kitchen	10 grams	partly visible
4	sand from beach	10 grams	visible
5	pebbles from beach	10 grams	visible

55. After completing Test 1, the students cannot see any salt in the container. They are not sure if the salt is still there. They want to investigate the water to find out. Which investigation would show that salt is still in the container with the water?

Ⓐ Add more water.

Ⓑ Boil the water away.

Ⓒ Freeze the water until it is solid.

Ⓓ Mix crystals from the beach into the water.

56. Why could the students no longer see the substances that they mixed with the water in Tests 1 and 2?

Ⓐ The water particles melted the particles of the substances.

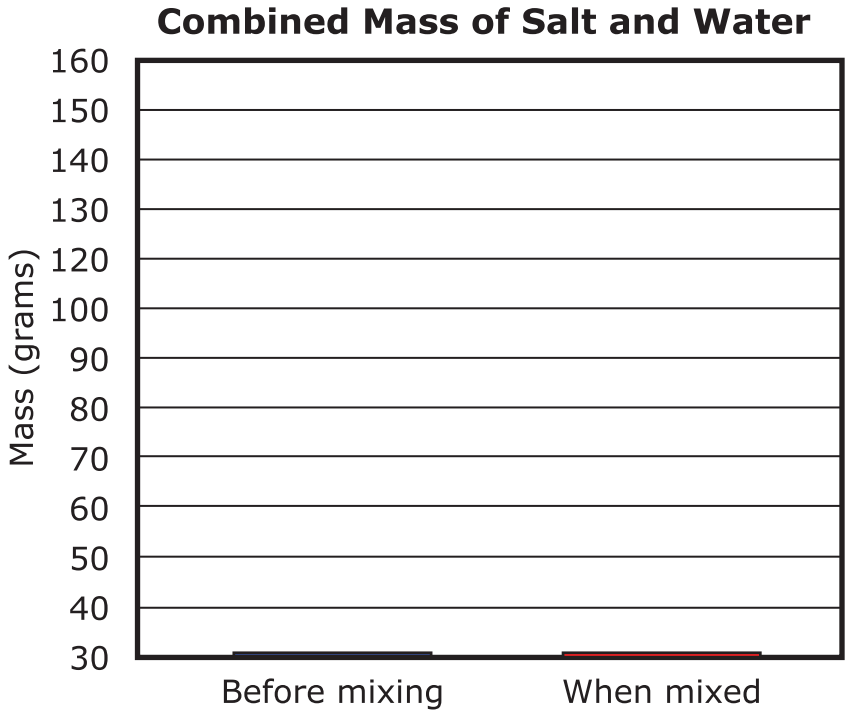
Ⓑ The particles of the substances changed into water particles.

Ⓒ The particles of the substances evaporated from the water particles.

Ⓓ The water particles separated the substances into very small particles.

57. For Test 1, the students begin by measuring the mass of the salt and the mass of the water separately on a balance. They find that the mass of 50 milliliters of water is 50 grams. Then they mix the substances together and measure the combined mass. They make a graph to compare the masses.

Complete the graph by drawing and shading each of the bars to the correct height.



58. After the students complete Test 1, they leave the container near the window. After a week, they look at the container. There is no water left, but salt crystals have formed at the bottom of the container. How many grams of salt are left in the container?

Write the correct answer in the box.

grams

GO ON ▶

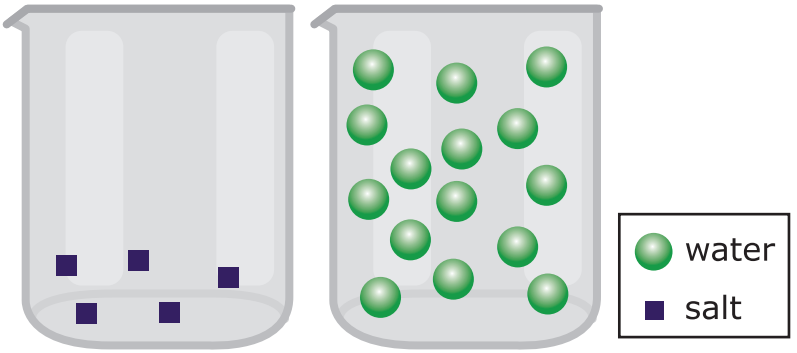
59. The students observed the properties of the substance from Test 2 before combining with water and when combined with water. What were the properties of the substance before combining and when combined with the water?

Place a check mark in the correct box or boxes to indicate your answer choices.

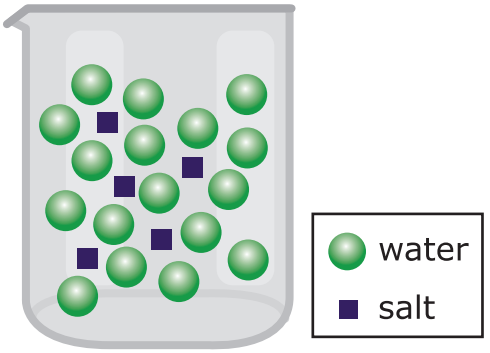
	Before Combining With Water	When Combined With Water
mass equals 10 grams	☐	☐
white-colored	☐	☐
shaped like crystals	☐	☐

60.

Particles Before Combining



Particles After Combining



The students made models to show the particles before and after their tests. The models above show the particles before combining and after combining in Test 1.

- Use the models to explain why the particles of salt are not visible to the students after combining.
- Identify which other Test(s) from Table 1 would look similar to this one if modeled.
- Describe how the model for Test 3 would look after the salt and the water are combined.

Analyze the information carefully. Then write your answers in the space provided. Support your answers with details.

GO ON ▶

A hurricane is approaching the coast. Students are concerned and check weather data every hour. Weather scientists online explain that hurricanes cause a sudden rise in the sea level and high wind speeds. The students record the data from the weather reports as shown in Table 1.

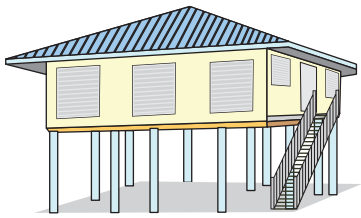
Table 1. Approaching Hurricane Data

Time	Wind Speed (kilometers per hour)	Rise of Sea Water (meters)	Distance from the coast (kilometers)
9:00 a.m.	225	1.5	600
10:00 a.m.	230	2.4	490
11:00 a.m.	235	4.0	375
12:00 p.m.	230	4.3	280
1:00 p.m.	225	4.3	190
2:00 p.m.	215	4.3	110
3:00 p.m.	205	4.3	60
4:00 p.m.	160	4.5	20

GO ON ▶

When weather scientists warn that a hurricane is approaching the coast, people must make changes to their lives and daily routines. People begin taking time to prepare their homes for the storm. Two homeowners who live within one kilometer of the beach prepare their homes as shown in Figure 1.

Figure 1. Preparation of Homes

Home 1	Home 2
	
• sandbags lined 2 meters high around house • outside furniture brought inside • trimmed loose tree branches	• house on 5-meter-tall stilts • wind-resistant roof • windows boarded • outside furniture brought inside

GO ON ▶

Following the hurricane, the students compare the storm with previous hurricanes using the data in Table 2.

Table 2. Most Damaging South Carolina Hurricanes

Hurricane	Highest Wind Speed (kilometers per hour)	Highest Rise of Sea Water (meters)	Estimated Damage Cost
Hurricane Hugo	225	5.5	$14.1 billion
Hurricane Gracie	200	2.7	$120 million
Hurricane Hazel	225	5.2	$1.5 billion

Source: South Carolina Department of Natural Resources

61. Examine the data tables. The weather service tells homeowners to bring any outdoor furniture inside. What is the most likely reason for this?

Ⓐ to protect the furniture from the rain

Ⓑ to protect the furniture from falling tree branches

Ⓒ to have seats for people trapped by rising sea water

Ⓓ to prevent wind from blowing the furniture around and causing damage

62. Examine how the homeowners have prepared for the storm in Figure 1 and review the data that scientists collected in Table 1. At what time could rising sea water begin to damage Home 1 but not damage Home 2?

Ⓐ 9:00 a.m.

Ⓑ 10:00 a.m.

Ⓒ 11:00 a.m.

Ⓓ 12:00 p.m.

GO ON ▶

63.

Table 3. Hurricane Categories

Category	Wind Speed (kilometers per hour)	Rise of Sea Water (meters)
5	252+	5.8+
4	209-251	4.0-5.5
3	178-208	2.7-3.7
2	154-177	1.8-2.4
1	119-153	0.9-1.5

Source: NOAA/NHC

Hurricanes can be categorized using their highest wind speed data. Review the data in Tables 1, 2, and 3 to correctly categorize the hurricanes.

Write the correct answer or answers in each box. All answers should be used.

A. Hugo

B. Gracie

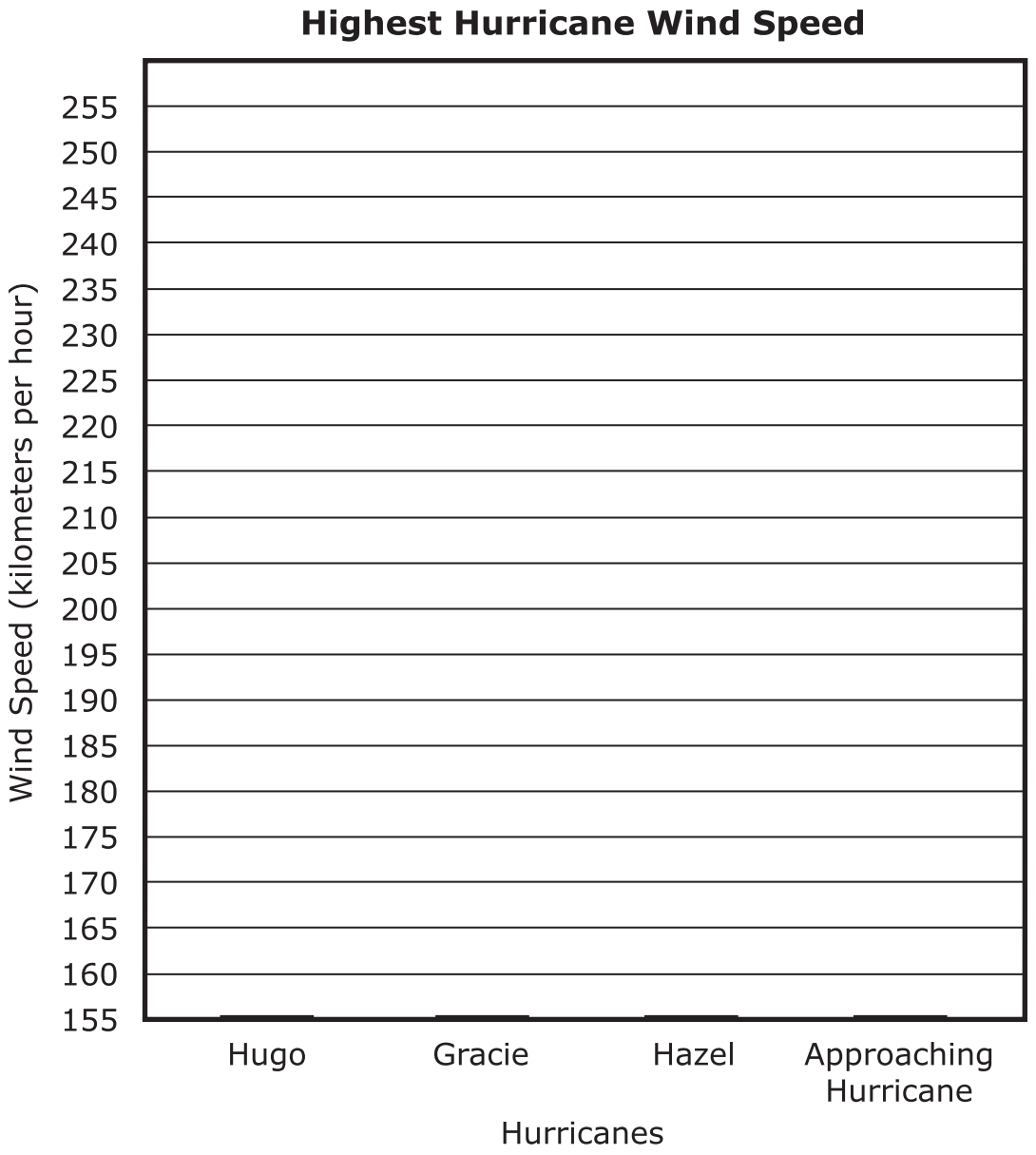
C. Hazel

D. approaching hurricane

Category 2	**Category 3**
Category 4	**Category 5**

64. Use Tables 1 and 2 to create a bar graph of highest wind speeds to compare past hurricanes with the approaching hurricane.

Complete the graph by drawing and shading each of the bars to the correct height.



65. According to the data provided in Table 1, how does the strength of the approaching hurricane change over time?

Write the correct answer in each box.

A. increase	B. decrease

At first, the winds speeds [ ] as the hurricane gets closer to the coast. Once the hurricane is within 300 kilometers of the coast, the outer parts of the hurricane are hitting the coast. After this time, the wind speeds [ ].

66.

Table 3. Hurricane Categories

Category	Wind Speed (kilometers per hour)	Rise of Sea Water (meters)
5	252+	5.8+
4	209-251	4.0-5.5
3	178-208	2.7-3.7
2	154-177	1.8-2.4
1	119-153	0.9-1.5

Source: NOAA/NHC

Use Figure 1 and Tables 1, 2 and 3 to answer the following tasks.

- Explain the likelihood of the approaching hurricane becoming a Category 5 hurricane.
- Explain changes in threats to homes as the category of a hurricane increases.
- Damage to homes and businesses from hurricanes is costly. Describe how you would represent data in a graph, diagram, or picture to compare the damage done by a hurricane to the category of a hurricane.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

GO ON ▶

A student sees a video of a raccoon searching for food around a pond. The raccoon finds a small piece of fruit and holds it with both of its paws. The raccoon rolls the fruit in its paws under the water and does this several times before eating it. The student wonders how the raccoon holds onto the fruit and why the raccoon rolls the fruit in the water.

After doing some research, the student learns the following facts:

- Raccoons eat both plants and animals like humans do.
- Raccoons prefer to find food at night and sleep during the day.
- Raccoons roll items around in their paws under water because the water improves their sense of touch.
- Even if there is no water around, raccoons will roll items around in their paws.
- Raccoons can hold objects with their paws, but they cannot grasp objects as well as humans do.
- Humans have opposable thumbs, which means that humans can touch the tip of the thumb to the tip of every other finger. Raccoon thumbs are not opposable.

Later, the student finds more information about the sense of touch in raccoons and humans that is shown in Figures 1 and 2.

Figure 1. Raccoon Sense of Touch

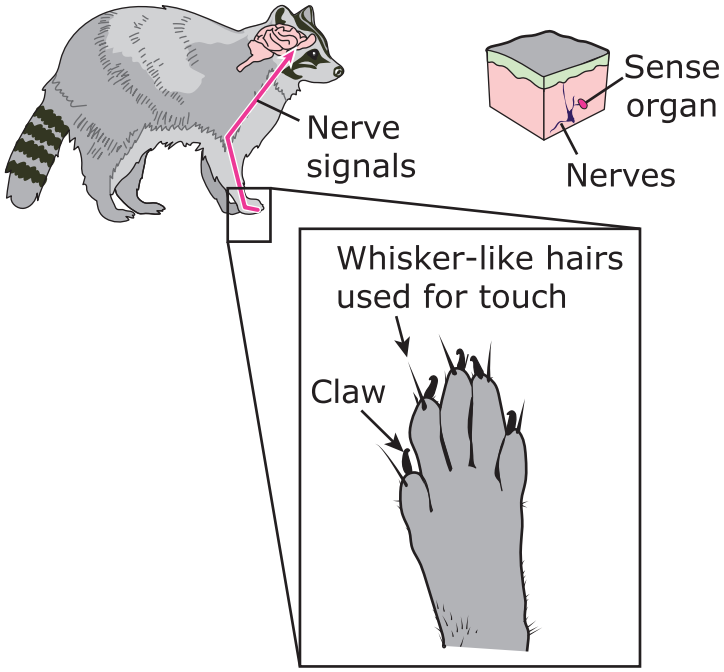
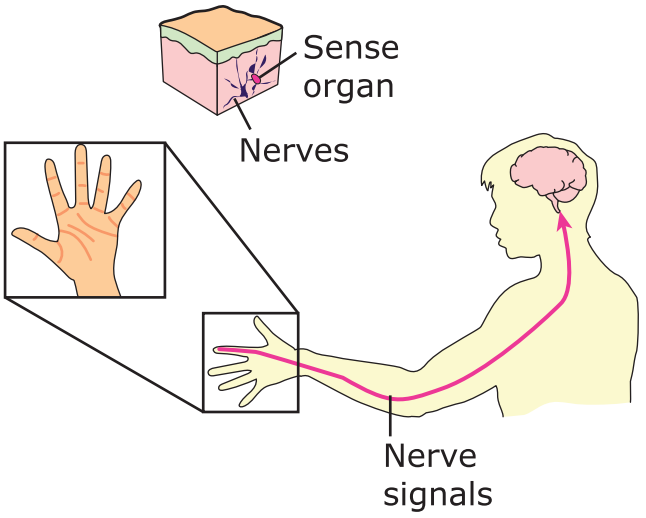


Figure 2. Human Sense of Touch



67. In which ways are the raccoon paw and the human hand similar?

Select **three** correct answers.

Ⓐ They grasp objects by using opposable thumbs.

Ⓑ They have sensory organs within their fingers/toes.

Ⓒ They have whisker-like hairs that can sense by touch.

Ⓓ They have five fingers/toes used for grasping objects.

Ⓔ They are used to collect information that is sent to the brain.

GO ON ▶

68. Which of the following explains the most likely reason the raccoon rolls the fruit between its paws in the water?

Ⓐ The raccoon is attempting to clean the fruit before it eats it.

Ⓑ The raccoon is attempting to soften the fruit before it eats it.

Ⓒ The raccoon is attempting to identify the item to determine if it is food.

Ⓓ The raccoon is attempting to attract fish in order to catch the fish and eat them.

69. A student claims that humans and raccoons are similar. Complete the Venn diagram to describe how humans and raccoons are similar and how they are different.

A: Memories stored in the brain influence behavior.

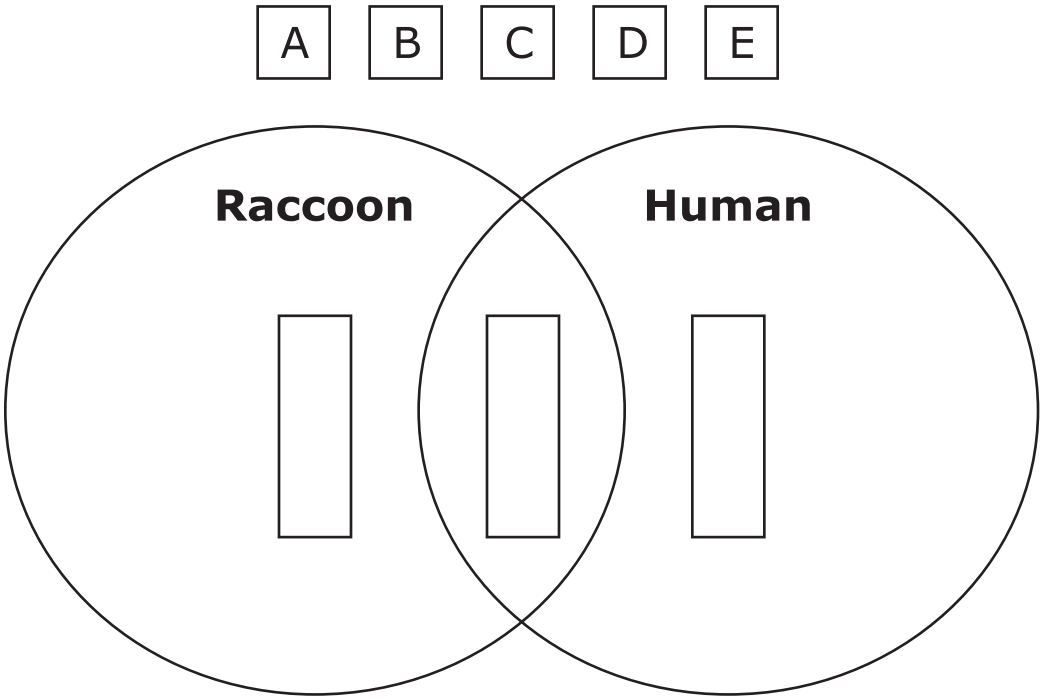
B: Uses sensory organs to study objects.

C: Uses whisker-like hairs to study objects.

D: Brain processes sensory information.

E: Can touch the tip of the thumb to the tip of every other finger.

Write the correct answer or answers in each box of the Venn diagram. All answers should be used. More than one letter can be used per box.



70.

Figure 3. Cat Paw

Compare the image of the cat paw in Figure 3 to the raccoon paw in Figure 1. What are some advantages of the raccoon paw?

Write the correct answer in each box. Not all answers will be used. Each answer may be used more than once.

A. easier	B. food	C. harder	D. longer	E. predators	F. shorter

The raccoon paw has [ ] toes that make it [ ] to hold objects when searching for [ ]. This trait makes it [ ] for the raccoon to survive in its environment.

71. The same raccoon later finds another piece of the same type of fruit and rolls the fruit in its paws under the water. What events will likely follow this one?

Order the events. Write the correct answer in each box.

A. The raccoon's brain processes sensory signals.

B. The raccoon knows the fruit is safe to eat and takes a bite.

C. Whisker-like hairs on the paws send sensory signals to the raccoon's brain.

D. The raccoon remembers what it learned about the fruit it has already eaten.

Step	Event
1	The raccoon rolls the fruit in its paws under the water.
2	
3	
4	
5	

GO ON ▶

GO ON TO NEXT PAGE

72. Use the information provided to answer the following tasks.

- Explain how an external structure, other than its paws, allows a raccoon to survive.
- 75% of the sensory part of a raccoon's brain is dedicated to processing touch. Explain how this is important for the survival of a raccoon.
- Only 8% of the sensory part of a human's brain is dedicated to processing touch. Explain how senses other than touch are important for the survival of a human.

Analyze the information carefully. Then write your answer in the space provided. Support your answer with details.

GO ON ▶

STOP


STOP


STOP

P

5 - SCI

1121397 1 2 3 4 5 A B C D E Printed in the USA ISD31993