



Colorado Measures of Academic Success



Grade 5 Science



Paper Practice Resource for Students

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The Colorado Measures of Academic Success (CMAS) is Colorado’s standards-based assessment program designed to measure the Colorado Academic Standards (CAS) in the content areas of science, social studies, English language arts, and mathematics. The sample items included in this resource provide students with an opportunity to become familiar with the format of test items that appear in the paper-based test books.

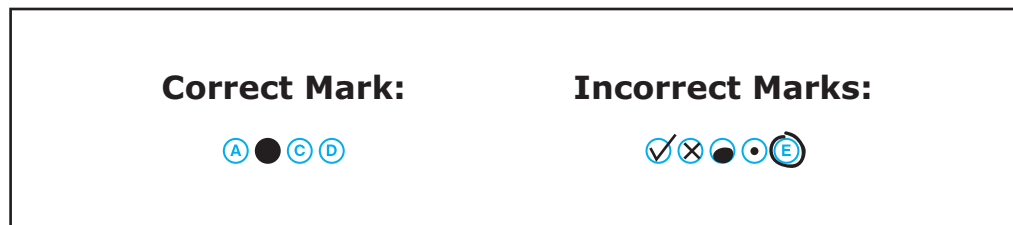
While the use of the sample items is not required, it is strongly encouraged to help ensure students are familiar with the types of items they may encounter while taking the paper-based test.

The sample item sets in the CMAS Practice Resources are not intended to be representative of a complete unit or test, nor are they intended to cover all assessed content or item types. To view assessment frameworks, high level blueprints, scoring rubrics, evidence statements and standards for the CMAS assessments, visit: https://www.cde.state.co.us/assessment/cmas_testdesign.

Item Types:

Selected Response Items

Selected response items are multiple choice questions. To respond, the student indicates their response by filling in the circle(s) next to their answer choice.



Constructed Response Items

Constructed response items are questions or prompts that require an independent, written response. To respond, the student writes his or her answer in the response box in the test book.

Converted Online Technology-Enhanced Item Types

Online technology-enhanced items converted to the paper testing format may ask students to:

- Circle the correct answer
- Complete a table with checkmarks, Xs, or letters from a list of answer choices
- Fill in the blank
- Draw lines from boxes to correct answers
- Complete a bar graph or histogram

Clusters

Clusters include groups of items that relate to a scientific topic. The information needed to respond appears before the associated items.

ITEM SET 1

- 1.** A student places two seeds on a wet sponge. The student adds water to the sponge each day. After three days, the student observes a root growing out of one seed.

Which claim does this evidence support?

- Ⓐ Plants can grow if they have fertilizer and air.
- Ⓑ Plants can grow if they have air and water.
- Ⓒ Plants need soil and fertilizer to grow.
- Ⓓ Plants need soil and water to grow.

2. Rabbits eat grass. A teacher makes an incomplete model to show the transfer of energy in the rabbit's food.

Energy in a Rabbit's Food



To complete the model, show where the energy comes from. Your answer should include:

- what the student should put in the box to complete the model
- an explanation of how energy is transferred from the source in the box to the rabbit

Directions: Use the information to answer questions 3 through 7.

Students wonder why ocean water is salty. Figure 1 shows two rivers that flow from snowy mountains to the ocean.

Figure 1: Stages of Rivers

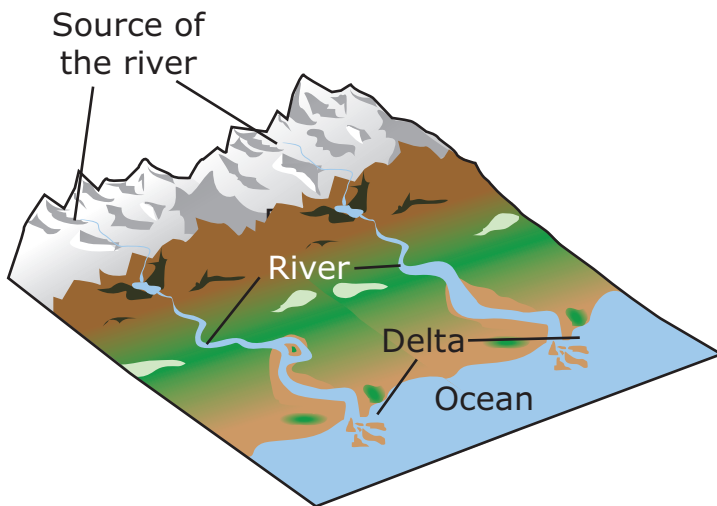
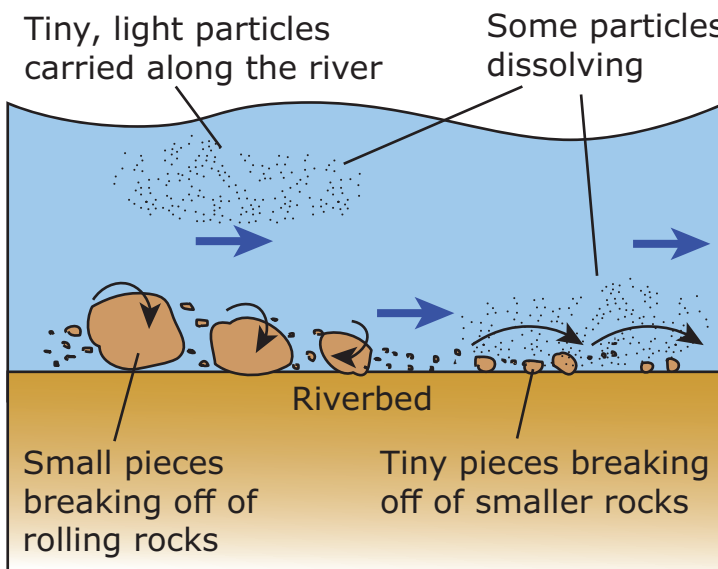


Figure 2 shows how rocks in a river release salt as the river flows toward the ocean.

Figure 2: Rocks Releasing Salt into the River



A small amount of salt dissolves in each of Earth's rivers, but not enough to turn the rivers into salt water. The salt in all of Earth's rivers collects in the ocean over time, so the oceans become salty while river water stays fresh.

The students also learn that humans use river water for drinking, watering crops, generating electricity, and transportation.

3. Based on the information provided, complete this explanation about the source of the two rivers.

Circle one correct response from each box to complete the sentences.

The source of the two rivers is a _____ . This type of

glacier or ice cap
hot spring
waterfall

source is the _____ source of _____ on Earth.

biggest
smallest

groundwater
fresh water
salt water

4. A student claims that a force moves the water away from the source of the river. Based on the model in Figure 1, which statement describes the student's claim?

- (A) The claim is incorrect because forces do not affect the movement of the water.
- (B) The claim is correct because air pressure resists the movement of the water.
- (C) The claim is correct because the force of gravity pulls the water downward.
- (D) The claim is incorrect because the weight of the water pushes it upward.

5. Ocean water is considered to be salt water because ocean water has 3.5% salt.

Circle one correct response from each box to complete the sentences.

The amount of salt in the water at the source of the river is _____

more than
less than

the amount of salt in the water at the delta of the river. The source water is considered _____ because it has _____ salt.

fresh water
salt water

more than 3.5%
less than 3.5%

6. Rivers can carry trash just like they carry rocks in Figure 2. A planning committee wants to identify places where rivers might carry trash. Based on Figure 1, identify the places where rivers could carry trash.

Place a check mark (✓) in each row to identify the correct places. Select **one** box per row.

Place	Yes	No
Source of the rivers		
Delta		

7. A student wonders what force causes the water in the rivers to flow. Based on Figure 1, explain the force that helps the water travel from the source of the rivers toward the ocean. Your response should include:

- identification of the force that causes water to flow from the source of the rivers toward the ocean
- an explanation, based on Figure 1, of why this force affects the direction that the rivers take from their source to the ocean

Directions: Use the information to answer questions 8 through 13.

Part 1

Students observe a crew cleaning a metal fountain. They are curious about how the metal of the fountain is cleaned.

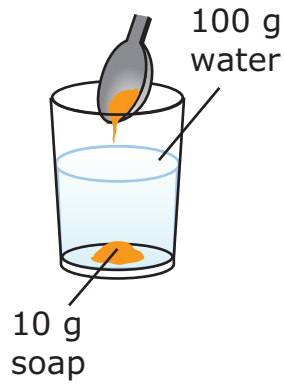
Crew Cleaning Metal Fountain



Part 2

The students gather products used in homemade cleaning solutions and test these solutions on dirty pennies. The mass of each substance is measured in grams (g). The investigation shows the effect these solutions have on the pennies after soaking them in each solution for 30 minutes and wiping down the pennies with a rag.

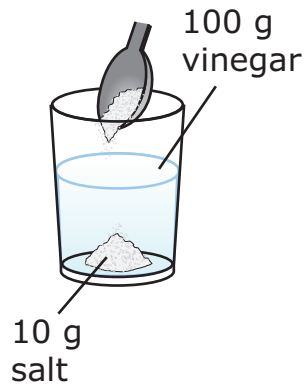
Investigation 1: Cleaning Pennies Test



Soap and water



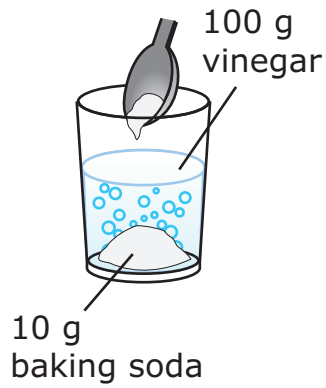
Soap and water



Salt and vinegar



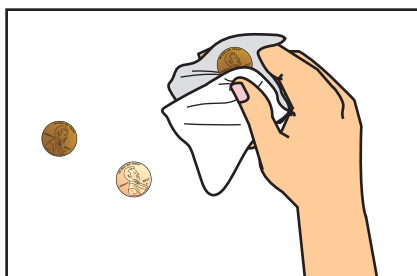
Salt and vinegar









Baking soda and vinegar



Baking soda and vinegar



Mixture	Before	After
Soap and water		
Salt and vinegar		
Baking soda and vinegar		

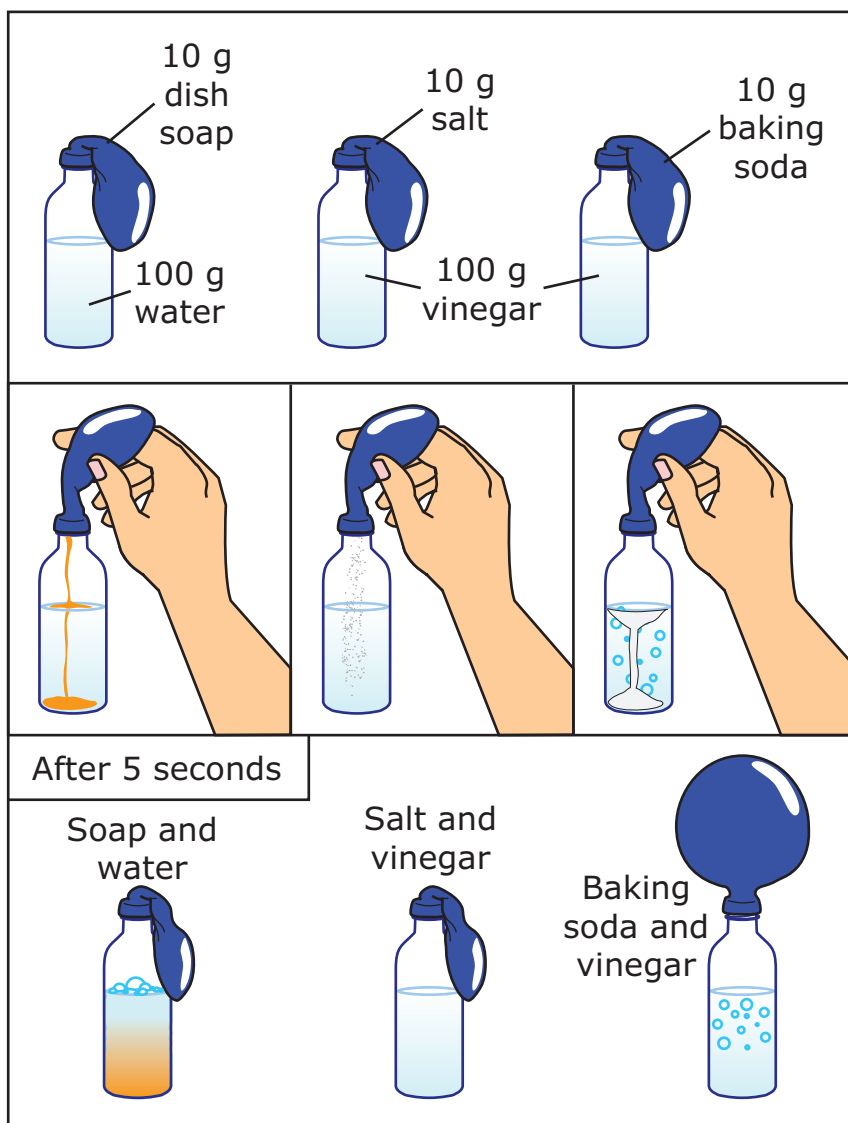
Observations of Penny Test

Mixture	Final Mass of Mixture	Observations	Penny Test
10 g soap + 100 g water	110 g	a few bubbles	penny a little cleaner
10 g salt + 100 g vinegar	110 g	no bubbles	penny completely clean
10 g baking soda + 100 g vinegar	105 g	many bubbles as soon as the substances touch	penny a little cleaner

Part 3

The students are surprised to observe that in one of the cleaning solutions, the final mass of the mixture is lower than the mass of the original mixture. They perform another investigation to study the reason for this change in mass. The figure and data table show the investigation.

Investigation 2: Balloon Test



Observations of the Balloon Test

Mixture	Final Mass of Mixture	Observations	Balloon Test
10 g soap + 100 g water	110 g	a few bubbles when stirred	balloon does not inflate
10 g salt + 100 g vinegar	110 g	no bubbles	balloon does not inflate
10 g baking soda + 100 g vinegar	110 g	many bubbles as soon as the substances touch	balloon inflates

8. A student claims that the force of gravity can be observed during the investigation. Based on the results in Part 2, which statement **best** provides evidence to support the student's claim?

- (A) The soap takes a different shape in the glass than it does in the spoon.
- (B) The baking soda and vinegar mixture produces bubbles.
- (C) The baking soda and vinegar mixture loses mass.
- (D) The soap sinks to the bottom of the glass.

9. A student claims that a new substance forms during the investigations. Based on the investigation, which observation **best** provides evidence that a new substance forms during the investigations?

- (A) The final mass of each mixture is the same as the total mass of the original substances.
- (B) The colored soap turns colorless because it was stirred in the water.
- (C) The balloon inflates because baking soda reacts with vinegar.
- (D) The penny becomes cleaner in each mixture.

10. A student wonders why the final mass of the baking soda and vinegar mixture changed in the table in Part 2.

Circle one correct response from each box to complete the sentences.

The mass in Part 2 seems to _____ g. But the student can

decrease by 5

increase by 5

use the results in Part 3 as evidence that mass _____ when

stays the same

decreases

increases

baking soda is added to vinegar.

11. The teacher provided the students with 100 g of vinegar and asked the students to add salt to the vinegar. Based on the results in Part 2, explain how the students could measure the amount of salt that was added if the final mass of the mixture is 120 g. Your response should include a description of:

- the likely amount of salt that was added to the vinegar
- the evidence from the investigation for the likely amount of salt added to the vinegar

12. A student claims that a new substance forms only with the mixture of baking soda and vinegar. Based on the results of Part 3, explain why the student's claim is correct. Your response should include:

- a description of the evidence from Part 3 that supports the student's claim
- an explanation of how this evidence supports the student's claim

13. A student has a sample of 10 g of cooking oil that looks similar to the soap in Part 2. Properties of cooking oil and soap are shown in the table.

Properties of Cooking Oil and Soap

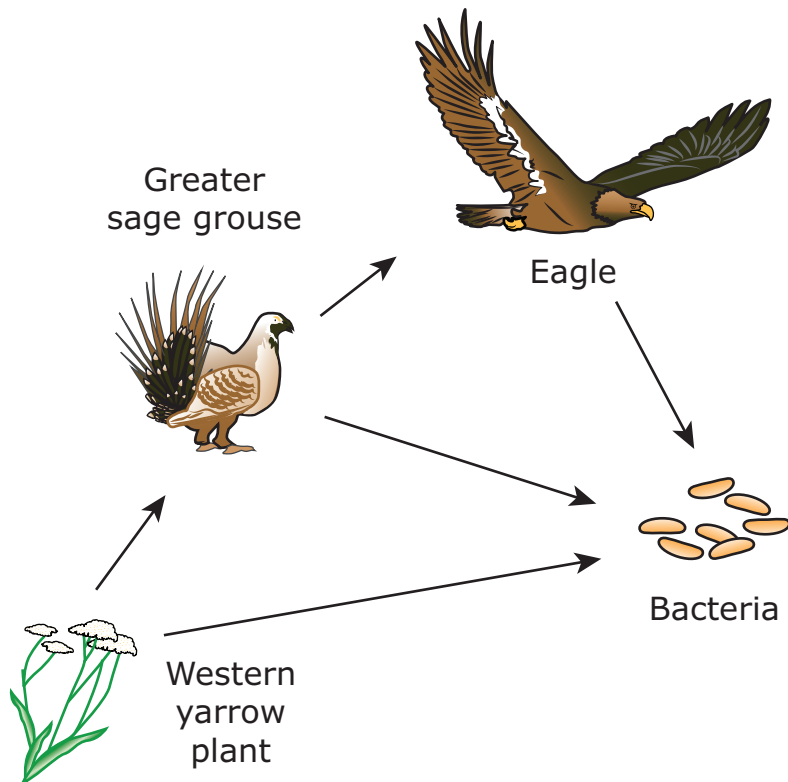
Material	Observation When Stirred in Water	Color in Water
cooking oil	forms drops that float	light tan
soap	disappears	light tan

Explain how a property of cooking oil would allow filter paper to separate the oil from water. Your response should include:

- identification of the property that causes the difference observed when the materials are stirred in water
- an explanation of why filter paper can only use this property to separate oil and water, not soap and water

14. Students learn that farmers often put fertilizer in the soil. Fertilizer helps the farmers grow the fruits and vegetables people use for food. The students wonder how wild plants grow without people adding fertilizer to the soil.

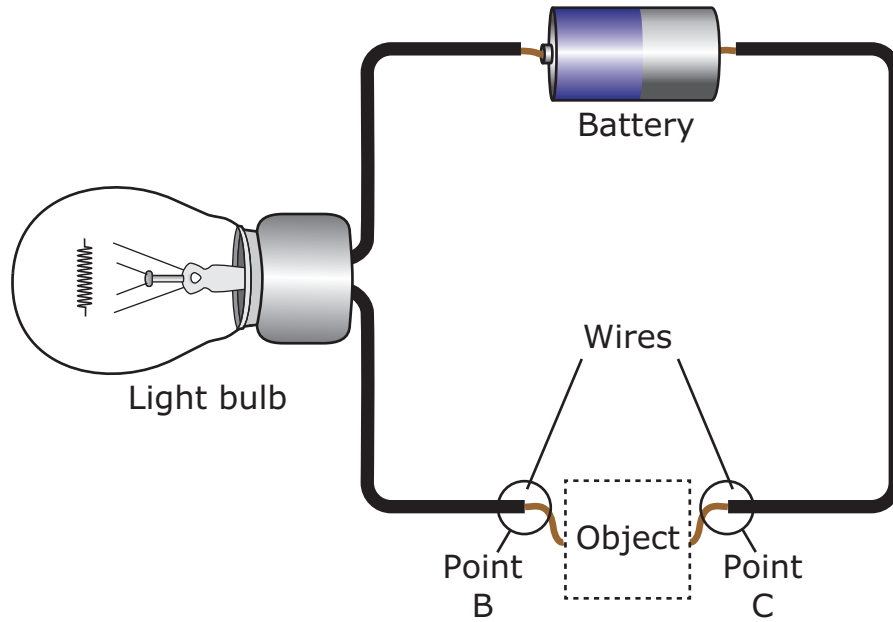
Circle **one** organism in the food web that would help the wild plants the same way the fertilizer helps the farmer's crops.



This is the end of Item Set 1.

ITEM SET 2

1. Students investigate a circuit. They observe that the light bulb only turns on when certain materials are placed between points B and C.



Using their observations, they separate the materials they are testing into two groups. The table shows their groupings.

Materials

Group A	Group B
iron nail	rubber eraser
copper penny	plastic button
steel paper clip	wood stick

Circle **one** correct response from each box to complete the sentence.

The property the students tested was whether each material _____.

conducts electricity
conducts heat
is magnetic

A comparison can be made between the penny and the paper clip to see which one is _____

the better conductor
more magnetic

by testing to see which one _____.

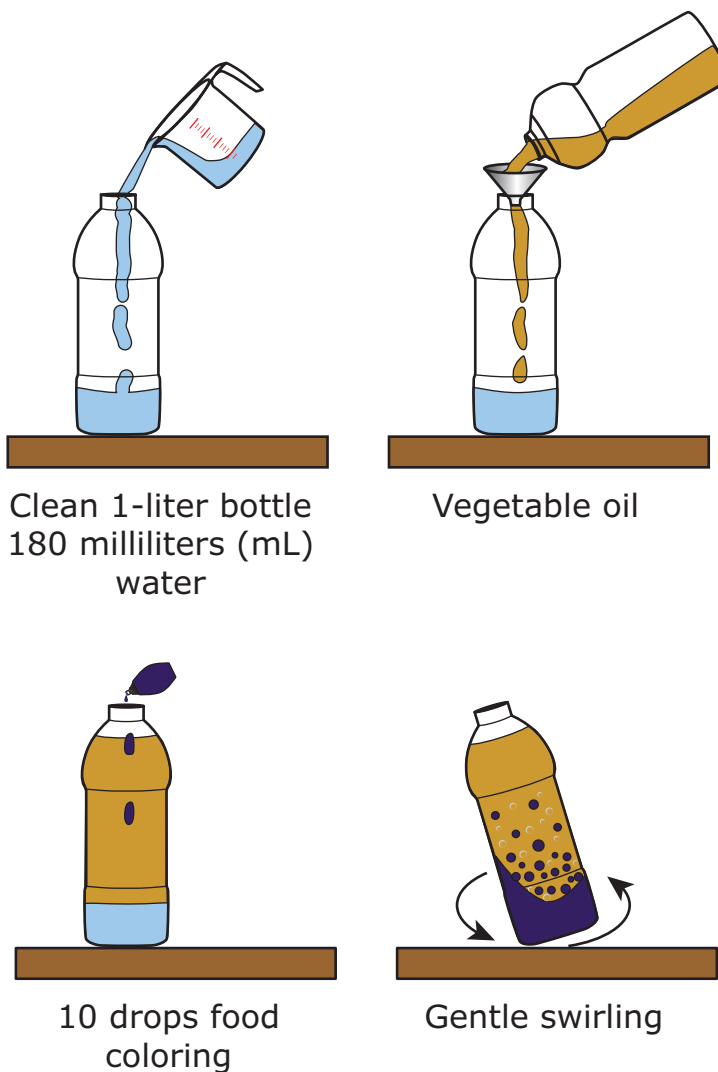
makes the light shine brighter
is more attracted to the wires

Directions: Use the information to answer questions 2 through 5.

Part 1

A group of students observes behaviors of matter using vegetable oil and vinegar salad dressing. The students perform an investigation using similar substances.

Figure 1: Science in a Bottle Setup

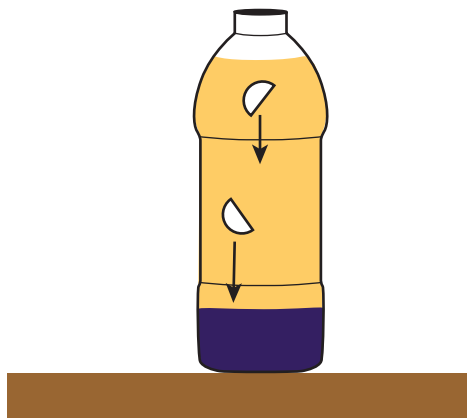


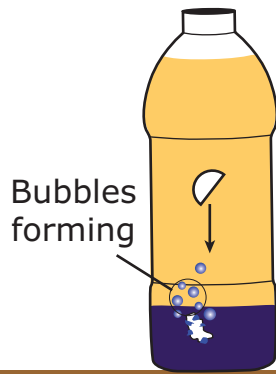
Part 2





After the vegetable oil and colored water sit for 10 minutes, the bottle is ready for the investigation. The students have a tablet that fizzes in water. They break the tablet in half and drop the pieces into the bottle one at a time. The students then screw on the cap to seal the bottle.

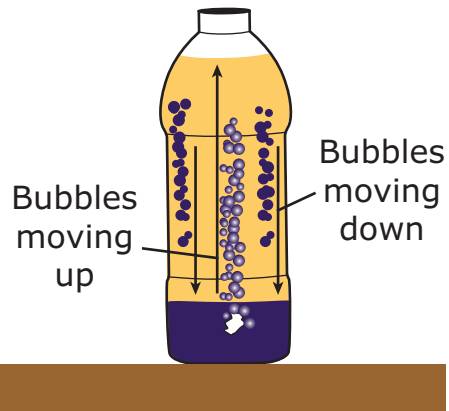
The students observe that the tablet pieces sink through the oil and dissolve in the colored water. As the pieces dissolve, bubbles form that move upward and rise to the top of the bottle. Some bubbles pop at the top, and then other bubbles move downward and sink.

Figure 2: Science in a Bottle Investigation





KEY	
	= vegetable oil
	= water and food coloring
	= broken piece of tablet
	= dissolving piece of broken tablet



2. When someone shakes a container full of different objects, they may mix together. Objects that are similar in size mix the most. When some objects are smaller than others, the smaller objects usually sink below the larger ones.

The students plan to use a different set of materials to be models for the behavior of the oil and water used in Part 1. Which materials, if shaken, would **most** accurately be models for the behavior of the water and vegetable oil in the bottle?

(A)

Science in a Bottle Setup	Model
water	clear marbles
vegetable oil	yellow marbles

(B)

Science in a Bottle Setup	Model
water	salt
vegetable oil	yellow marbles

(C)

Science in a Bottle Setup	Model
water	clear marbles
vegetable oil	pepper

(D)

Science in a Bottle Setup	Model
water	pepper
vegetable oil	salt

3. After the tablet in the investigation in Part 2 has completely dissolved, a student unscrews the cap to the bottle. As the cap loosens, the students hear a hissing sound. What is the **most likely** explanation for the hissing sound?

- (A) Small particles of gaseous matter exit the bottle.
- (B) Small bubbles in the bottle turn back into water.
- (C) The oil and water mix to form a single layer.
- (D) The food coloring dissolves into the oil.

4. Students repeat the investigation in Part 2, but this time they weigh the tablet as well as the bottle and its contents before and after the investigation. The students do not put the cap on the bottle after the tablet is added.

Which statement predicts what the students will observe in the investigation, and which description correctly explains their observation? Select **two** correct answer choices.

- (A) The mass of the bottle after the investigation was greater than the mass of the bottle and tablet before the investigation.
- (B) The mass of the bottle after the investigation was the same as the mass of the bottle and tablet before the investigation.
- (C) The mass of the bottle after the investigation was less than the mass of the bottle and tablet before the investigation.
- (D) This is evidence that no new substance was formed as the matter in the tablet was destroyed.
- (E) This is evidence that a new substance was formed and left the bottle as a gas.

5. A bottle of water and a bottle of clear oil are on a table. The students notice that the liquid in the bottles looks the same.

Use the information in Part 1 to explain how a student can use food coloring to correctly identify the oil and the water. Your response should include a description of:

- how a student can use the way that food coloring behaves in water to identify a substance as water
- how a student can use the way that food coloring behaves in oil to identify a substance as oil

Directions: Use the information to answer questions 6 through 11.

Students researching the Sun, Earth, and Moon system read about eclipses and find information on a total solar eclipse that will occur in 2024. During a total solar eclipse, the light from the Sun is about the same as the light from a full moon. Since stars can be seen during a full moon, the students wonder whether stars will be seen during the total solar eclipse. This information shows what they learn from doing more research.

Figure 1: Viewing Location and Path of the Total Solar Eclipse near the Center of the United States

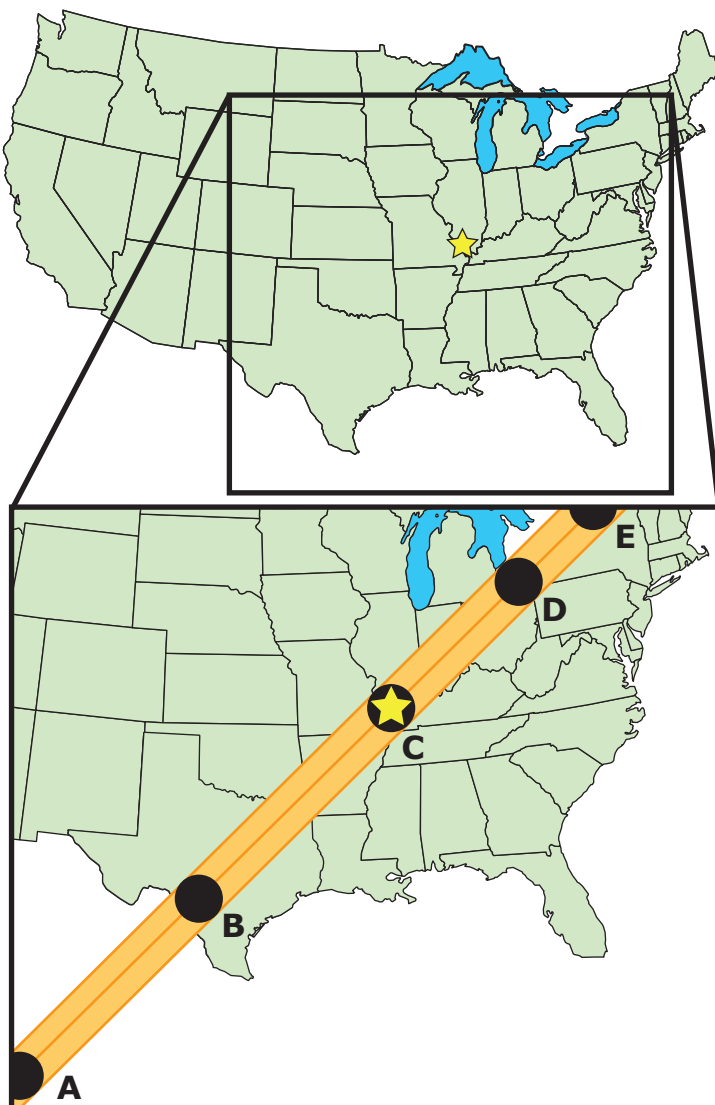
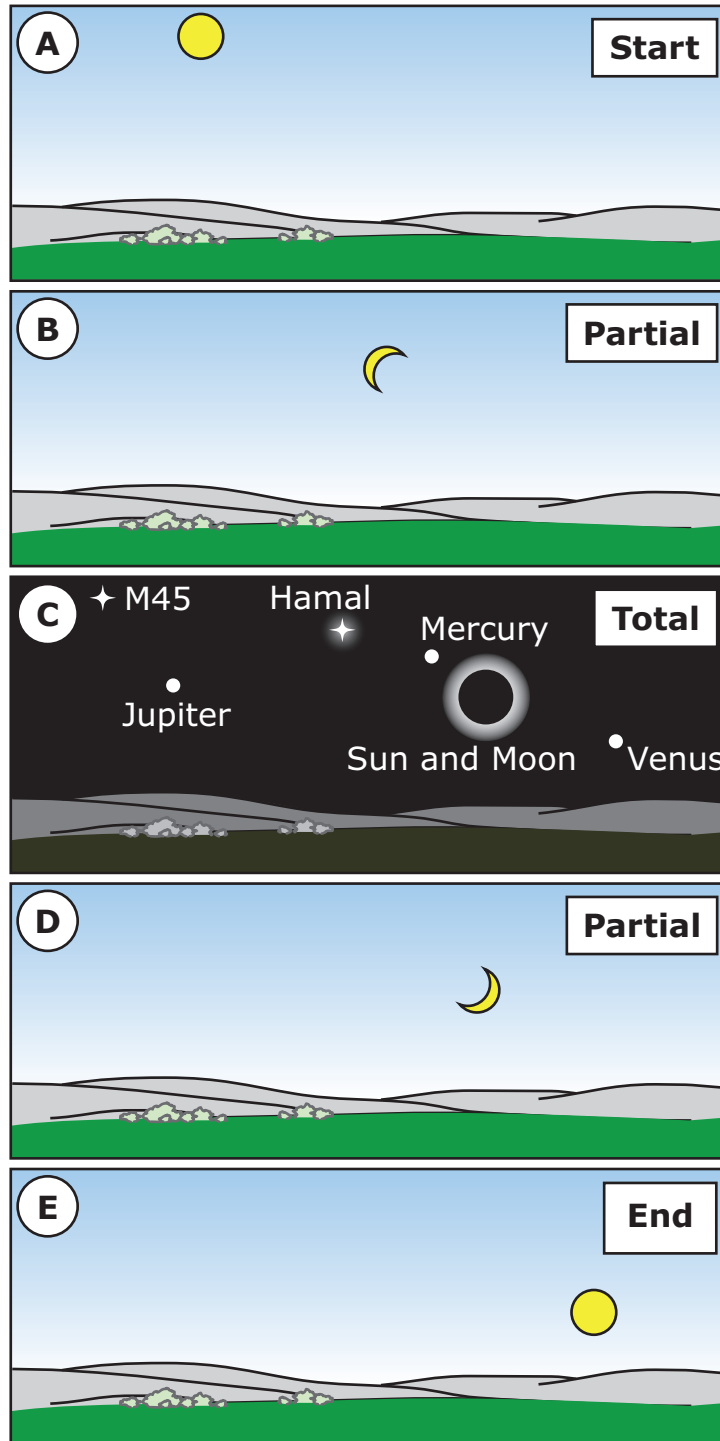


Figure 2: Appearance of the Sky When the Moon's Shadow Is at Each Location



Data Table

Event	Time	Stars Visible in Sky?
start	2:00 p.m.	no
partial eclipse begins	2:42 p.m.	no
total eclipse begins	3:58 p.m.	yes
maximum eclipse	4:00 p.m.	yes
total eclipse ends	4:02 p.m.	no
partial eclipse ends	5:17 p.m.	no

6. In the model of the eclipse, Jupiter, Mercury, and Venus are shown. Venus appears brighter than Mercury in the night sky. Using your knowledge of the factors that affect the brightness of objects, circle **one** correct response from each box to complete the sentences.

Objects that are _____ usually appear dimmer to a viewer

farther away
closer

than objects that are _____. This information supports the claim

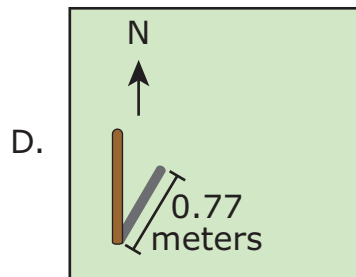
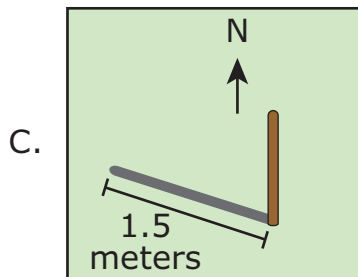
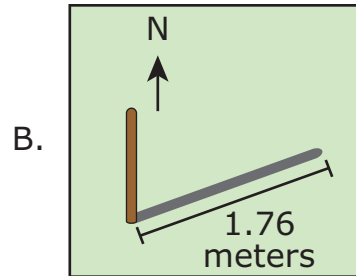
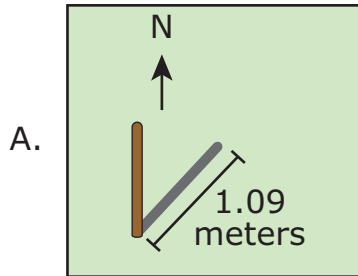
farther away
closer

that if Venus appears brighter than Mercury, then Venus is probably _____ Earth than Mercury is.

farther away from
closer to

7. Outside the path of the total solar eclipse, the pattern of shadows is the same as on any other day. Show how shadows change on the day of the eclipse for someone outside the path of the eclipse.

Based on the data table, write a letter from the list of shadow images in the correct box. Each shadow may be used once, more than once, or not at all.



Shadow when partial eclipse begins

Shadow during maximum eclipse

Shadow when partial eclipse ends

- 8.** In the Northern Hemisphere, M45 is visible during the total solar eclipse and also in the night sky. If the same total solar eclipse would occur during the summer, M45 would not be visible. Why would M45 not be visible in the summer?
- A because M45 changes the amount of light it gives off during different seasons
 - B because M45 moves closer to or farther from planets during different seasons
 - C because Earth revolves around the Sun
 - D because Earth rotates on its axis

9. After observing the model of the eclipse, a student claims that the Sun is the closest star to Earth. Compare the brightness of the objects in the sky during the partial eclipse and the total eclipse to explain why the student's claim is correct. Your response should include:

- a comparison of bright objects seen during the partial solar eclipse and bright objects seen during the total solar eclipse
- an explanation of why the differences in brightness support the student's claim

10. Use the model to observe and compare how each star looks during the total solar eclipse. Your response should include:

- how the appearances of the stars compare to each other
- how comparing the stars provides evidence for the distances of stars from Earth

11. A student wonders whether the stars he saw during the total solar eclipse in the model would be the same stars he could see twelve hours later. Explain how the sky and the stars that are seen would change over twelve hours. Your response should include:

- a description of how the sky and the stars the student could see would look different
- why the sky would look different

Directions: Use the information to answer questions 12 through 16.

Part 1

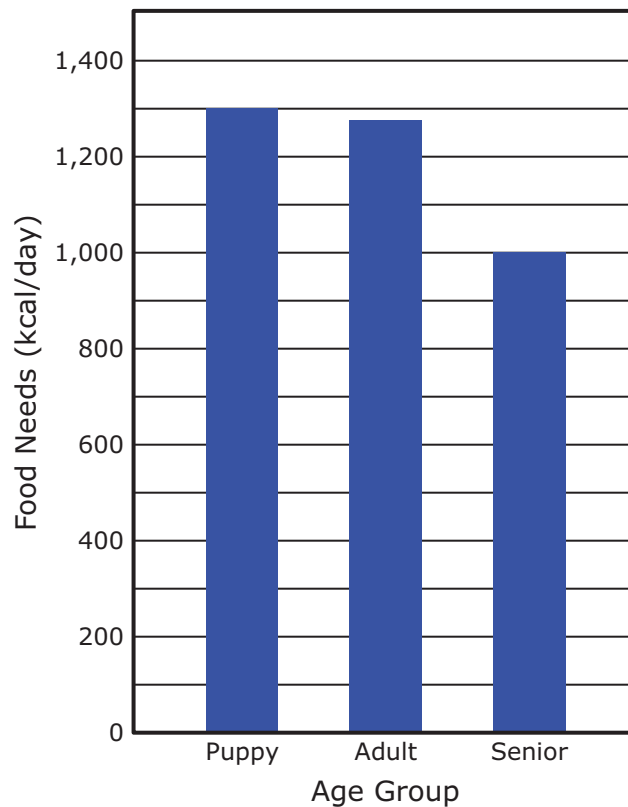
Two dogs eat different amounts of food. Dog 1 is larger than Dog 2, and Dog 1 eats less food than Dog 2. A student wonders why this happens. The student finds a scientific study about the amount of nutrients dogs need from food, measured in a unit called kilocalories (kcal), per day. The student finds this information for different sizes of dogs and different ages of dogs.

Table 1 and Figure 1 show the data the student finds.

Table 1: Different Dog Sizes and Food Needs

Size of Dog	Food Needs (kcal/day)
giant ≥ 40 kg	3,020
large 20–39 kg	1,784
medium 6–19 kg	1,036
small ≤ 5 kg	206

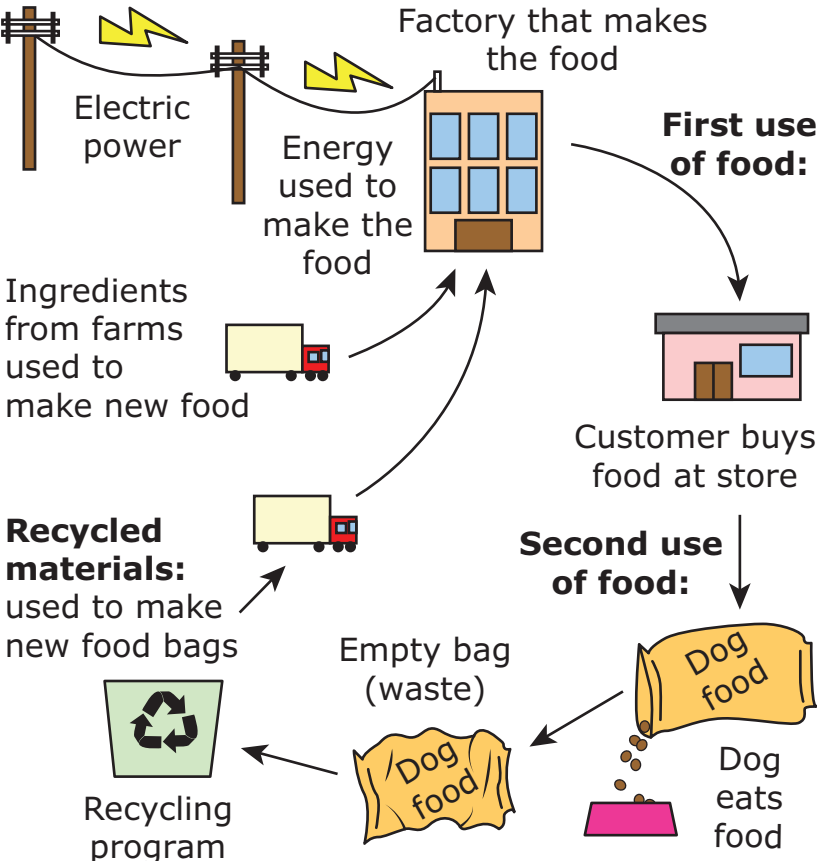
Figure 1: Food Needs Based on Age of Dog



Part 2

The student learns more about the way dog food is made and used. The information reminds the student of an ecosystem. A teacher begins to make a diagram using the information to model an ecosystem.

Figure 2: Model of an Ecosystem Using Dog Food



12. Based on the information in Table 1, which claim is supported?

- A Medium-sized dogs use more energy from the Sun than small-sized dogs use.
- B Medium-sized dogs use more energy from water than giant-sized dogs use.
- C Large-sized dogs use more energy from the Sun than giant-sized dogs use.
- D Large-sized dogs use more energy from water than small-sized dogs use.

13. The student finds that two medium-sized dogs require different amounts of food to maintain a healthy weight. Dog 1 requires 1,050 kcal/day, and Dog 2 requires 900 kcal/day.

Based on Figure 2, compare the energy use of the dogs. Circle one correct response in each box to complete the sentences.

Dog 1 consumes more kilocalories per day than Dog 2. The energy Dog 1 consumes from the food _____.

originally came from the Sun
was once matter in the soil
used to be electric power

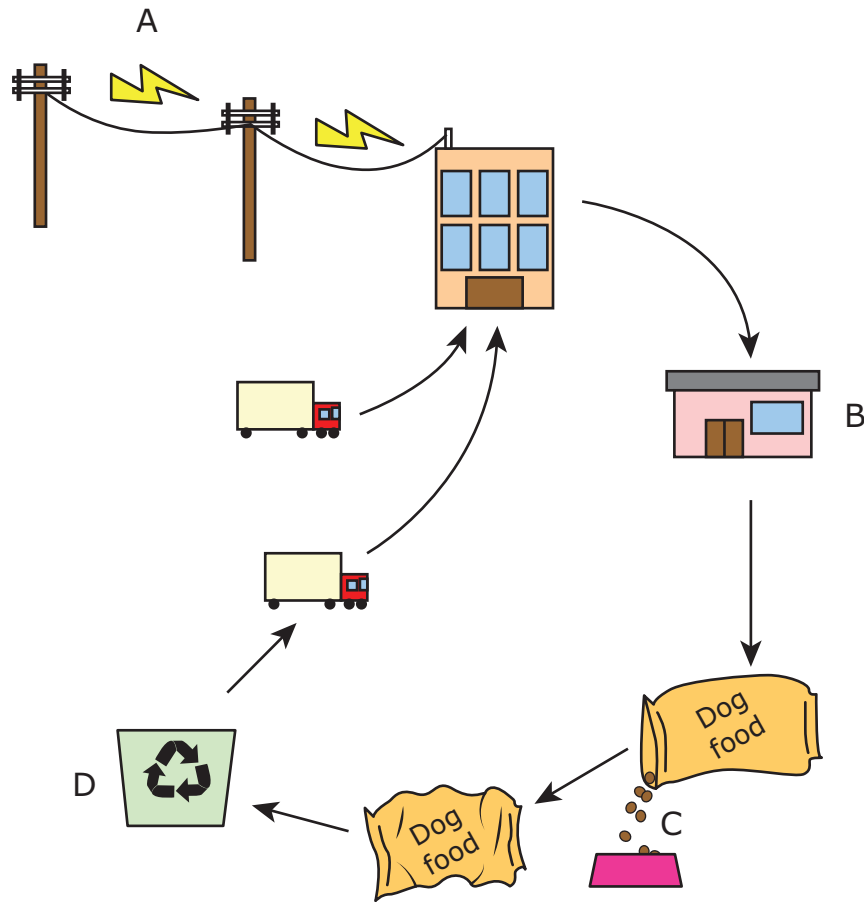
Dog 1 is most likely _____ than Dog 2.

older
younger

14. Which statement is one way the model in Part 2 shows matter moving in an ecosystem?

- A The truck moving ingredients from the farm is like decomposed matter moving from soil to plants.
- B The truck moving recycled materials is like decomposed matter moving from soil to plants.
- C The truck moving ingredients from the farm is like energy traveling from the Sun to plants.
- D The truck moving recycled materials is like energy traveling from the Sun to plants.

15. One part of the dog food ecosystem model represents the Sun's energy. Using the information in Part 2, circle the letter for the part of the model that represents the Sun's energy.



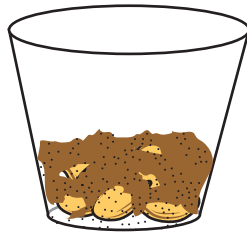
16. Using the information in Part 2, explain decomposition in the ecosystem model. Your response should include:

- which part of the ecosystem model represents decomposers
- an explanation of why this part of the model represents decomposers

17. A student wants to see where seeds grow best. The student puts seven seeds in each of three cups and places the cups near an open window. The seeds in Cup A are left to dry. The seeds in Cup B are in dry soil, and the seeds in Cup C are wrapped in a cloth soaked with water.



Cup A,
dry seeds



Cup B,
seeds put in
dry soil



Cup C,
seeds wrapped
in a cloth
soaked in water

Explain what the student will observe after four days. Your answer should include:

- the changes observed in each cup after four days
- the reason for the changes observed in each cup

This is the end of Item Set 2.

