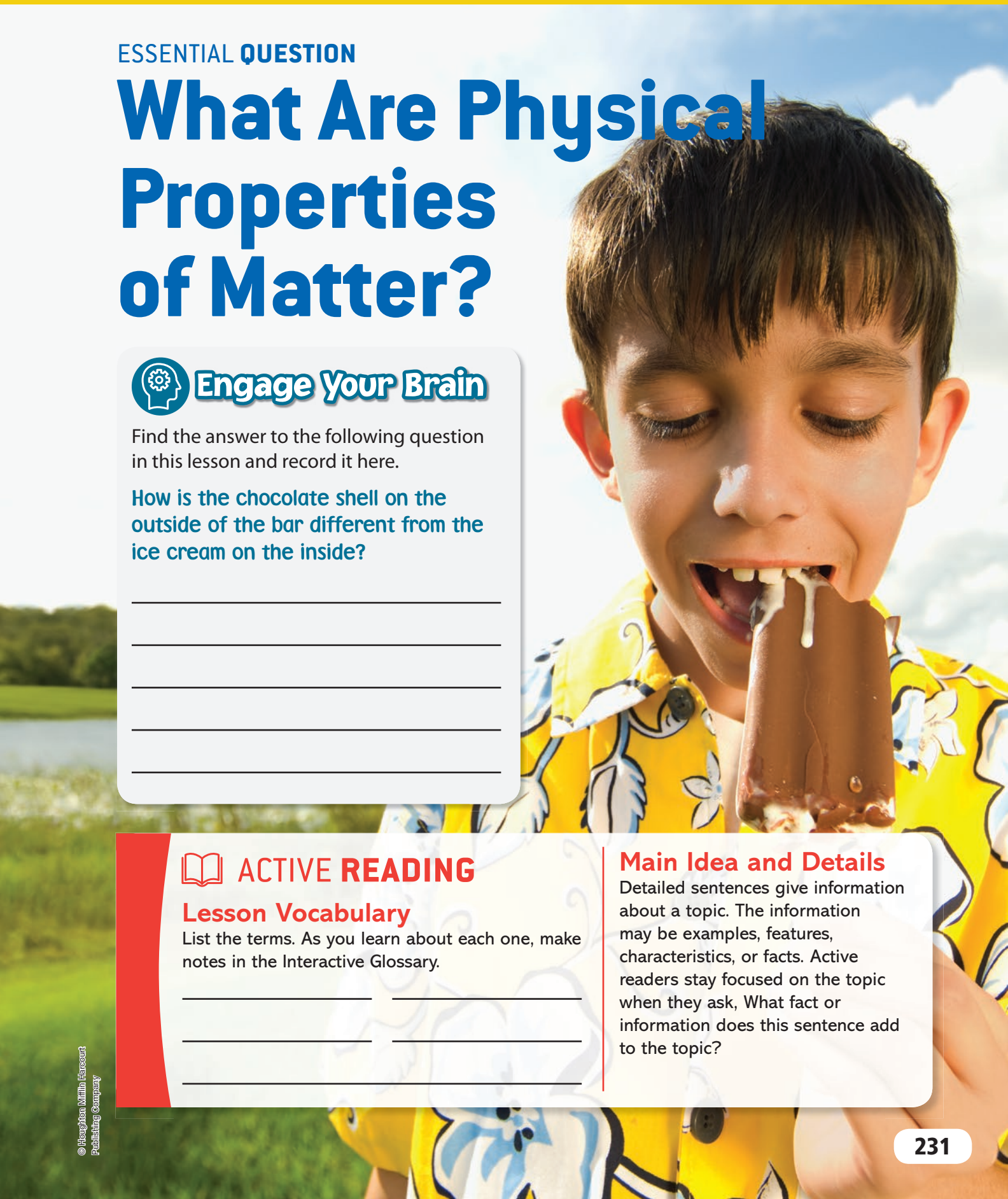
SC.4.P.8.1 Measure and compare objects and materials based on their physical properties including mass, shape, volume, color, hardness, texture, odor, taste…

LESSON 1

ESSENTIAL **QUESTION**

What Are Physical Properties of Matter?



Engage Your Brain

Find the answer to the following question in this lesson and record it here.

How is the chocolate shell on the outside of the bar different from the ice cream on the inside?

_____

_____

_____

_____

_____

ACTIVE **READING**

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

_____ _____

_____ _____

_____

Main Idea and Details

Detailed sentences give information about a topic. The information may be examples, features, characteristics, or facts. Active readers stay focused on the topic when they ask, What fact or information does this sentence add to the topic?

Use Your Senses

You can use your senses to describe a sandwich. What does it look, taste, and smell like?

See

You can see shapes in the sandwich. What other property can you see?

_____

Hear

When you bite into a sandwich, you might hear the crunch of the crust.

Matter

Is this sandwich made of matter? Anything that takes up space and has mass is **matter**. A characteristic of matter that you can observe or measure directly is a **physical property**.

The amount of matter in an object is its mass. You use a pan balance to measure **mass**. Less massive objects are measured in grams (g). More massive objects are measured in kilograms (kg).

Taste

You can taste sweet, sour, salty, and bitter. Which would you taste in this sandwich?

_____

_____

Smell

You may smell mustard, onion, or pepper. You may even smell the fresh bread.

Feel

The bread feels soft. The dressing may feel oily. Salt and pepper feel grainy.

You start by placing the object to be measured on one side of the balance. You add known masses to the other pan until the sides balance. You add up the masses to find the mass of the object.

Describe That!

You can use all the words you see here to describe matter. You can use your senses to find an object's hardness, color, taste, size, shape, odor, or texture.

ACTIVE READING As you read these two pages, circle words or phrases that signal a detail about physical properties.

Hardness

A walnut shell is hard. The grapes are soft. Hardness describes how easily something can bend or dent.

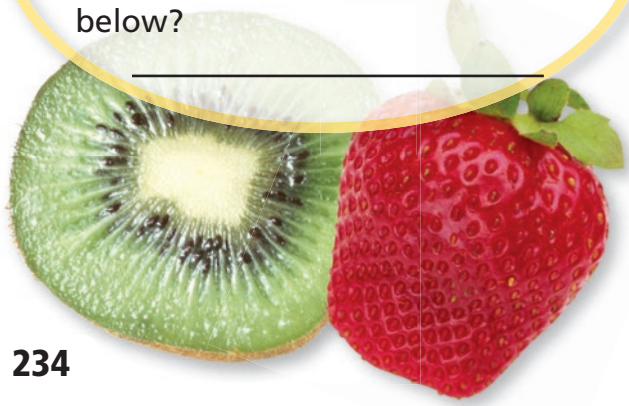
Size

A silver dollar takes up more space than other coins. Pennies are larger than dimes.

Color

The words we use for color describe the way light bounces off an object. What colors do you see below?

_____



Taste

Crackers are salty. Candy can taste sweet or sour. Can you think of something that tastes bitter?

_____

▶ List five properties that describe this banana.

_____

_____

_____

_____

Texture

Texture describes what something feels like. The pinecone has a rough texture. The leaf feels smooth.

Odor

These shoes are stinky! Perfume has a nice smell. How can odor tell you if milk has gone bad?

_____

Shape

Objects can be long, short, flat, tall, or irregular like these keys. Shape describes an object's form. How can you describe the cell phone?

_____

Pump Up the Volume!

You can measure mass with a pan balance. What is another property of matter that we can use tools to measure?

ACTIVE **READING** As you read these two pages, underline the definition of *volume*. Circle units used to measure volume.

Volume

Volume is how much space an object takes up. The beaker on the left measures the volume of water in milliliters (mL). The beaker on the right measures the volume of an object with an irregular shape plus the volume of the water. To find the volume of just the orange, you must use subtraction:

volume of water and orange
− volume of water
volume of orange

(bkgd) ©Ron Chapple Stock/Alamy

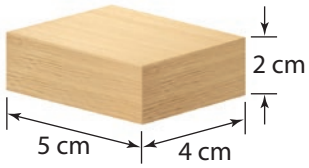
Displacement

The dog in this tub takes up space. To make room for him, water was pushed out of the tub.

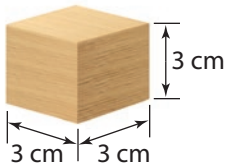
DO THE MATH

Measure the Volume of Objects

A



B



Find It!

The volume of a rectangular solid is found by multiplying the width by the length by the height. Find the volume for each box. The units are cubic centimeters.

Volume of Box A:

Volume of Box B:

To find the volume of both boxes together, you add their individual volumes.

A+B =

Don't Be So Dense!

Why does the hook sink? Why doesn't it float? You must use mass and volume to find the answers.

ACTIVE READING As you read these pages, underline the sentence that gives the main idea about density.

Density is a physical property of matter. It tells how much space (volume) a certain amount (mass) of matter takes up. In other words, **density** is the amount of matter present in a certain volume of a substance.

Density indicates how close together the particles in an object are. The density of a substance is always the same, no matter how much of the substance there is. A small piece of an eraser, for example, has the same density as a whole eraser.

This Part Floats

Objects that are less dense than water float. This fishing float is made of plastic.

This Part Sinks

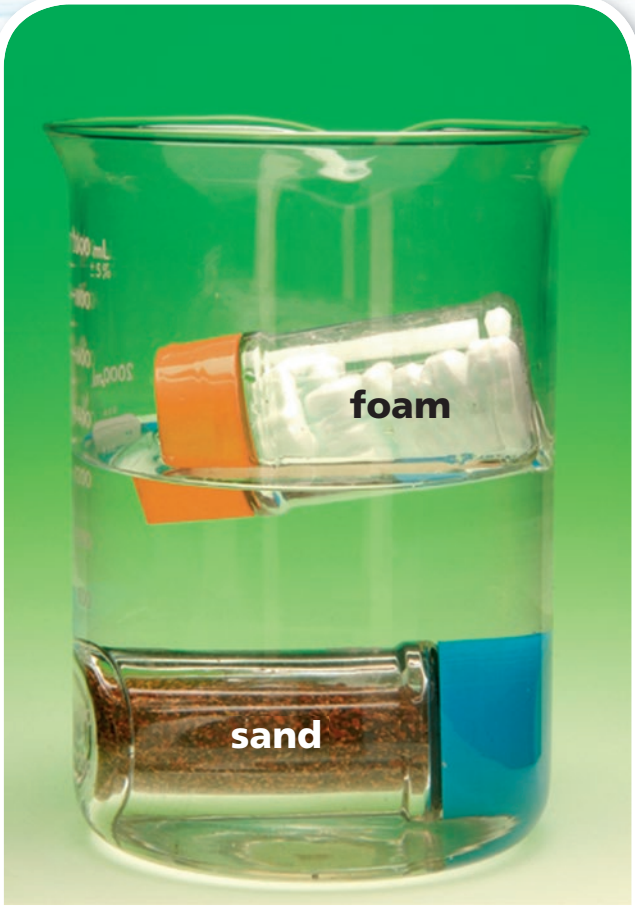
The hook and weights are metal. The density of metal is greater than water.

(bkgd) ©PIER/Getty Images

▶ **Name three objects that are more dense than water.**

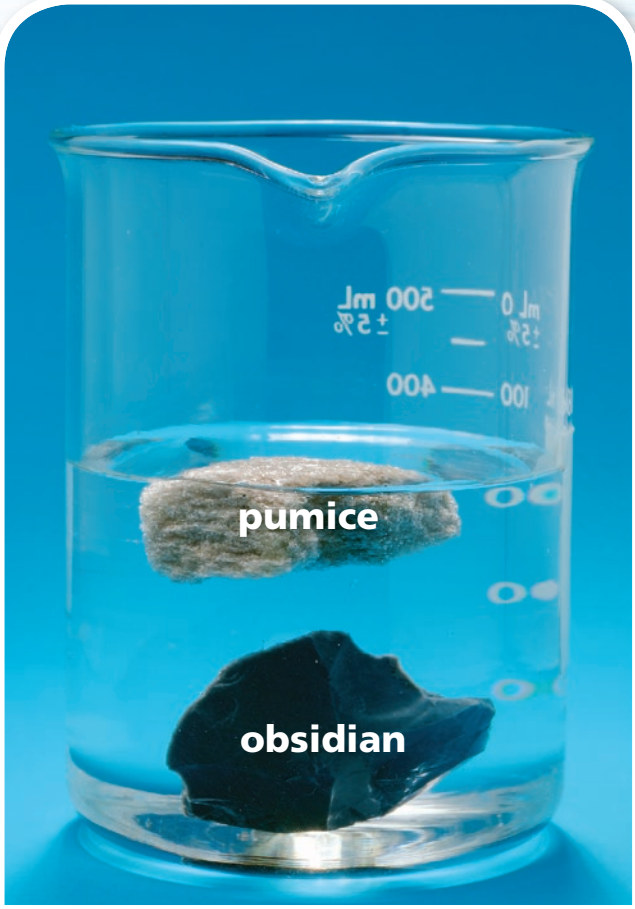
_____

_____



Different Densities

The density of the foam balls is different than the density of sand. Which is less dense? How do you know?



More About Density

These rocks have different properties. One rock is more dense than the other. Which rock has particles that are closer together? Which rock has the greater density?

Let's Sort Things Out

Shape

Study this example. Then sort using the other properties!

round

rectangular

other

Mass

Texture

Imagine going into a store or a library and finding that nothing is organized. How would you find anything? How can you find your homework in a messy backpack? Organizing makes life easier. Sorting things helps us find things faster.

We can use properties to sort everything, including food, books, and clothes. The items shown are at the bottom of a closet. Sort them by each of the properties listed.

▶ **Name another property you could use to sort these items.**

_____

Color _____

Odor _____

Hardness _____

Sum It Up »

Use the information in the summary to complete the graphic organizer.

All matter has physical properties. Physical properties can also be called characteristics. Some properties can be described by using your senses. You can feel hardness and see shape or color. You can feel texture and smell odor. Other properties can be measured using tools. You can measure volume with a graduated cylinder. You can measure mass with a pan balance. All matter has density. To measure an object's density, you must know its mass and volume.

[1] Main Idea: All matter has _____.

[2] Detail: Some properties can be

_____

_____

_____.

[3] An example of one of these properties is

_____

_____

_____.

[4] Other properties must be

_____

_____

_____.

[5] An example of one of these properties is

_____

_____

_____.

[6] To find an object's density, you divide its

_____

_____

_____.

[7] by its

_____

_____

_____.

Brain Check

Name _____

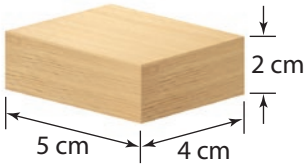
Vocabulary Review

1 Which word describes each photo best? Use each word only once.

mass	volume	density
hard	size	shape
texture	odor	taste

_____ _____ _____

_____ _____ _____



_____ _____ _____

Apply Concepts

2

Use the chart below to sort the objects into two groups. Label the groups at the top of the chart.

What properties did you use to sort the objects?

_____

_____

Can you sort the same objects into three groups?
Don't forget to label the groups at the top of your chart.

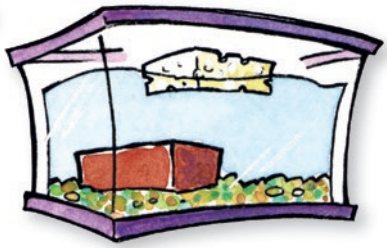
Did you use the same properties to sort the objects the second time?

_____

3 Look at each pair of objects. Tell which one has the greater mass, volume, or density.

greater mass?

greater volume?



greater density?

4 Choose a type of matter that you had for breakfast today. List as many physical properties as you can to describe it. Trade your list with a partner, and see if you can identify the matter your partner chose based on its properties.

5 Work with a group to make a list of ten favorite television shows, songs, or movies. Tell how you can sort them into groups.

_____

_____

_____

_____

6 How could you use physical properties to sort the objects in a desk drawer?

_____

_____

_____

_____

_____

_____

_____

Take It Home! See *ScienceSaurus*® for more information about matter.