

Science Standards**S 8.3.b, 8.5.b, 8.5.c, 8.9.a**

In this chapter, students will focus on using physical and chemical properties to describe matter. They will see how chemical changes in matter are related to changes in energy.

Other Subjects**Math:** 6NS1.2 p. 64

7AF1.5 pp. 72, 75

E-LA: Reading 8.1.0 pp. 67, 77

Reading 8.2.4 p. 72

Writing 8.2.0 p. 81

Writing 8.2.4 p. 72

PRENTICE HALL

PresentationEXPRESS**Assess Prior Knowledge****Check What You Know**

This question assesses students' understanding of conservation of matter. (S 8.5.a)

Possible Answers and Explanations

Correct Answer: The weights of the whole cookie and the total weight of all the cookie crumbs are the same. *Possible Explanation:* You changed only the shape of the cookie by breaking it—not the amount of matter in the cookie.

Possible Incorrect Answer: The whole cookie weighs more than the total weight of all the cookie crumbs. *Possible Explanation:* You always lose some pieces of matter when you break or divide matter into smaller pieces.

Identify Misconceptions If students think that the weight of the crumbs is less than that of the whole cookie, they may be confusing volume and mass or weight.

Remediation Have students review “Weight and Mass” and “Volume” in Chapter 1, Section 3. Re-emphasize this concept when you teach Section 2, page 71.

S 8.3 Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:

b. Students know that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.

S 8.5 Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:

b. Students know the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.

c. Students know chemical reactions usually liberate heat or absorb heat.

S 8.9 Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

a. Plan and conduct a scientific investigation to test a hypothesis.

This “junk sculpture” of an armadillo is made entirely of metal can lids. ▶

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The Nature of Matter**Additional Questions**

- An element is made up of
 - one kind of atom.
 - two kinds of atoms.
 - one kind of compound.
 - two kinds of compounds.

(A; S 5.1.d)

- Heat moves in a predictable flow

- from light objects to heavy objects.
- from heavy objects to light objects.
- from warmer objects to cooler objects.
- from cooler objects to warmer objects.

(C; S 6.3.a)



Focus on the **BIG Idea** **S 8.3**

What is chemistry?

Check What You Know

Suppose you have a whole cookie. You break the cookie into tiny pieces and crumbs. Then, you weigh all the pieces and crumbs. How do you think the weight of the whole cookie compares to the total weight of all the cookie crumbs?



Chapter 2 ♦ 53

Video Preview

Introduction to Matter

Show the Video Preview to introduce the chapter and provide an overview of chapter content. Discussion question: **What makes seawater undrinkable?** (*It has too much salt.*)

Focus on the **BIG Idea**

Use the Big Idea question as a way to engage interest and activate prior knowledge.

Present the Idea Read aloud the Big Idea question. Ask students what they know about chemistry, which was defined in Chapter 1, Section 1.

Discussion Questions Ask students questions such as the following. **What do you learn when you study chemistry?** (*Sample answer: You learn about the particles that make up matter and why different forms of matter have different properties. You find out how matter can change and why.*) **What kinds of particles make up matter?** (*Atoms and molecules*)

Follow Up For an instruction strategy on Focus on the Big Idea, see Section 2 in this chapter.

Teaching Resources

Teaching Resources, Unit 1

- Chapter 2 Pre-Assessment

3. Which unit can be used to express the density of a substance?

- A. g/cm^2
- B. cm^3
- C. kg
- D. kg/m^3

(D; **S 8.8.b**)

4. The mass of an object can be measured using a

- A. meter stick.
- B. balance.
- C. graduated cylinder.
- D. thermometer.

(B; **S 5.6.f**)

Vocabulary Skill

Prefixes

E-LA: Reading 8.1.0

Instruct Call attention to the word *interspace*. Point out that it contains the prefix *inter-*, which can mean between or among. From this students should be able to deduce that *interspace* is the space between things. Point out that knowing the meaning of prefixes can help you figure out the meanings of unfamiliar words.

Use the table on the student page to review other prefixes and words made from them. The meaning of each example is a combination of the prefix and the meaning of the root word. Ask: **Which word means having different parts or features?** (*Heterogeneous*) **Which word means giving out heat?** (*Exothermic*) **Knowing the meaning of the prefix *exo-*, what would you say is the meaning of the word *exoskeleton*?** (*It is a skeleton on the outside of the body.*)

Apply It! Have students answer the question and read Section 1 to see if their predicted definition was accurate. Encourage them to tell how they found the word in Section 3 of the text. (*Sample: I looked for the subheading "Thermal Energy" and found the boldfaced words "endothermic change."*)

Sample answer: Students should figure out that *endothermic* means a change in which heat is taken in.

Reinforce the Skill Ask volunteers to look up other words in the dictionary that use one or more of the prefixes in the table.

Teaching Resources

Teaching Guidebook
for Universal Access

Teaching Resources, Unit 1

- Chapter 2 Vocabulary Skill

The images shown here represent some of the key terms in this chapter. You can use this vocabulary skill to help you understand the meaning of some key terms in this chapter.

Vocabulary Skill

Prefixes

A prefix is a word part that is added at the beginning of a root word to change its meaning. For example, the prefix *com-* means "with," or "together." In the word *combine*, the prefix *com-* is added to the root word *bind* to form *combine*, meaning "to bind together."

com + *bind* = *combine*
together tie bind or tie together

The following prefixes will help you learn new words in this chapter.

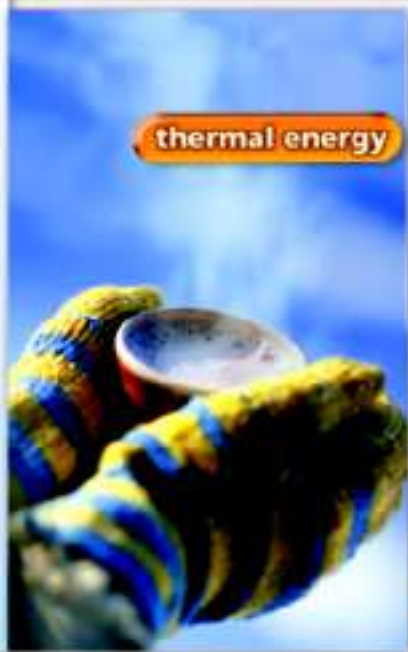
Prefix	Meaning	Example Word
<i>com-</i>	With, together	Compound
<i>hetero-</i>	Different	Heterogenous
<i>homo-</i>	Same	Homogenous
<i>endo-</i>	In, within	Endogenous
<i>exo-</i>	Out	Exothermic

Apply It!

The Greek root *therm* means "heat." Use the table to learn the meaning of the prefix *endo-*. Then predict the meaning of the adjective *endothermic*. Read Section 1 to see if your predicted definition is accurate or needs to be changed.



Chapter 2 Vocabulary



Section 1 (page 58)

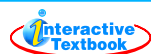
matter
substance
physical property
chemical property
element
atom
chemical bond
molecule
compound
chemical formula
mixture
heterogeneous mixture
homogeneous mixture
solution

Section 2 (page 68)

physical change
chemical change
law of conservation of matter

Section 3 (page 73)

energy
temperature
thermal energy
endothermic change
exothermic change
chemical energy
electromagnetic energy
electrical energy
electrode



Build Science Vocabulary
Online

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Chapter 2 ◆ 55

Chapter 2 Vocabulary

You can use the strategies on page T45 to teach vocabulary words at the beginning of each section.

Illustrated Vocabulary

Have students examine each photograph as you pronounce the Key Term. Have students say the word after you. Then have a volunteer read the definition. Point out how the photograph reinforces the meaning of the term.

matter Anything that has mass and takes up space. *The sandcastles in the photograph are made of matter.*

thermal (THUR mul) **energy** The total energy of all of the particles in an object. *The person's hands in the photograph are warmed by the thermal energy in the cup of hot chocolate.*

physical (FIZ uh kul) **change** Any change that alters the form or appearance of matter but does not make any substance in the matter into a different substance. *Powder dissolving in a glass of liquid is undergoing a physical change.*

endothermic (end doh THUR mik) **change** A change in which energy is taken in. *An iceberg melting as it absorbs thermal energy around it is an example of endothermic change.*

chemical (KEM uh kul) **property** A characteristic of a pure substance that describes its ability to change into different substances. *The chemical property in burning wood turns it from wood to ash.*

Teaching Resources

Vocabulary Flashcards

Color Transparencies

- Transparency 8.17



Build Science Vocabulary
Online

Visit: PHSchool.com; Web Code: cxj-1020

Students can use interactive flashcards and complete a Puzzleview[®] crossword online.

Universal Access

English Learners

Science Glossary Pronounce and define aloud each pictured word for students. As you define each word, point to the corresponding picture or photograph. Have students then write the definitions of each term in their own science glossaries. To help remember the meanings, they might draw and label their own pictures.

Less Proficient Readers

Independent Reading Opportunity

Have available in the classroom independent reading materials such as trade and reference books that use at least some of the pictured vocabulary words. Have students read these materials, giving them the opportunity to see the words used in a fresh context. Have them read aloud the sentence containing the word and give its meaning.

Reading Skill

Create Outlines

E-LA: Reading 8.2.4

Instruct Encourage students to tell what the main idea of a paragraph is. They should understand that it is the most important idea in the paragraph and that all the other sentences should support it. Explain that sometimes the main idea is contained in the first sentence of the paragraph. Other times it can be found elsewhere. Learning to find the main idea in a paragraph or selection will help students better understand a text and better organize the information it contains.

Let students work individually to do the activity in the book. As they work, ask: **What text features help guide you to the main idea of the paragraph?** (Example: *Italics, boldface*) **What should each detail be about, based on your main idea?** (Example: *Matter*)

Apply It! Have students use complete sentences as they answer the questions. Sample answers:

1. You yourself are matter.
2. Things made of plastic, metal, wood, glass and other materials are all matter.

Reinforce the Skill Encourage students to read page 59 of the text and use other features beyond the text, including the boldfaced words and sentences, to find the main ideas and supporting details. (They can find useful information by reading and examining the boldfaced words, the picture, and the two boxed texts.)

Teaching Resources

Color Transparencies

- Transparency 8.18

How to Read Science

Reading Skill



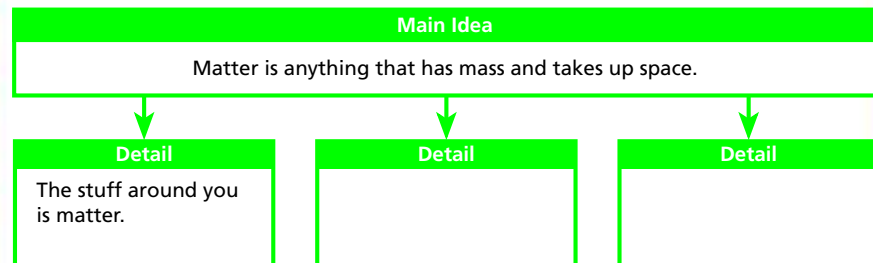
Identify the Main Idea

The main idea is the most important—or biggest—idea in a passage of text. Sometimes the main idea is stated directly. At other times, you must identify the main idea yourself.

Here are some tips.

- Look at the heading or subheading.
- Distinguish the important information.
- Identify a few important details about the topic.
- State the main idea of the passage.

Read the paragraph on page 58. Identify the main idea and supporting details. You can keep track of this information by using a graphic organizer like the one below.



Apply It!

In your notebook, copy and complete the graphic organizer.

As you read the chapter, look for the main ideas and supporting details in paragraphs.

Classify Changes in Matter

Look around. All sorts of changes are taking place. You might observe a fence rusting or a puddle of water evaporating. As you will learn in this chapter, changes in matter can be physical or chemical. In this investigation, you will keep a log of the changes that occur around you.

Your Goal

To identify and observe physical and chemical changes in your daily life and to record evidence for those changes

To complete the investigation, you must

- determine what evidence indicates that a change has taken place
- record observations of the different changes you notice in your life during one week
- classify the changes you observe as physical or chemical
- follow the safety guidelines in Appendix A

Plan It!

Preview the chapter to learn what physical and chemical changes are. With a group, discuss some changes you observe regularly. Try to decide if each change is a physical or chemical change.



Classify Changes in Matter

Timeline 2 weeks

Objectives

In this investigation, students will keep a record of physical and chemical changes that they observe in their daily lives. They will use the signs of changes in matter discussed in Section 2 to classify physical and chemical changes. They will also design their own record-keeping format. After completing this investigation, students will be able to:

- form operational definitions about physical and chemical changes
- pose questions and make inferences based on observations of chemical reactions
- create tables to record observations

Skills Focus

Observing, forming operational definitions, posing questions, inferring, classifying, creating data tables

Developing a Plan

In the first week, have students survey the chapter to learn what physical and chemical changes are. Then, have students list the signs of a chemical reaction and discuss their lists in pairs. Finally, have students prepare data tables. In the second week, have students make their observations and complete their tables.

Launching the Investigation

To illustrate physical and chemical changes, cut a piece of paper into smaller parts and point out that the small pieces are still paper. Then burn a piece of paper and show students the ash. Point out that the key difference between chemical and physical changes is that chemical changes produce substances that were not there before. Explain that sometimes it is difficult to tell if a new substance is produced. For example, chemical changes that are not visible or obvious occur inside batteries.

Performance Assessment

See page 83 for suggestions for assessing students' work. Consider giving students the Scoring Rubric from the Laboratory Manual in advance so they know what is expected.

Teaching Resources

Laboratory Manual TE

- Standards Investigation Teacher Notes
- Standards Investigation Worksheet 1
- Standards Investigation Worksheet 2
- Standards Investigation Scoring Rubric