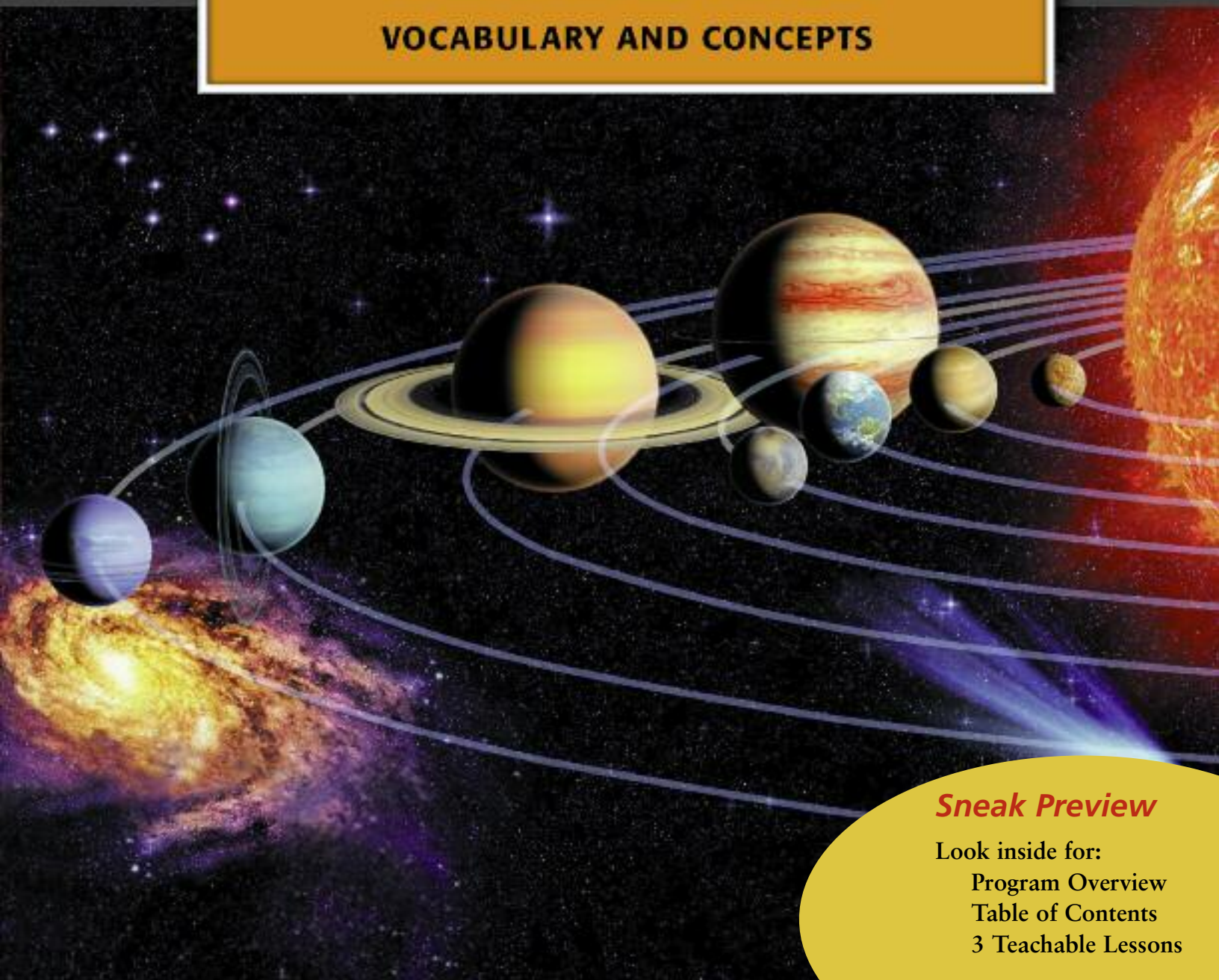


GATEWAY to SCIENCE

VOCABULARY AND CONCEPTS



Sneak Preview

Look inside for:

- Program Overview
- Table of Contents
- 3 Teachable Lessons

Give your students a **BOOST** to science success!

Gateway to Science

Grades 6-12
Beginning to Intermediate

Do your students need help meeting science content standards? *Gateway to Science* is the answer!

Gateway to Science is a unique program designed to introduce students to content-area knowledge and skills needed to meet the requirements of science programs and state assessments. Using picture dictionary and textbook formats, students acquire key vocabulary, concepts, and learning strategies that help **boost their success in science!**

Gateway to Science explores four major areas:

- ◆ Science Basics
- ◆ Life Science
- ◆ Earth Science
- ◆ Physical Science

Every lesson follows a four-page format.

The first two pages of the lesson illustrate topic-based vocabulary in a picture dictionary format. Easy-to-access artwork along with comprehension questions work together to teach science content words in context.

The last two pages of the lesson teach standards-based concepts related to the lesson vocabulary and topic. These concepts are accompanied by science skill practice, academic vocabulary, comprehension checks, research assignments, and writing activities.

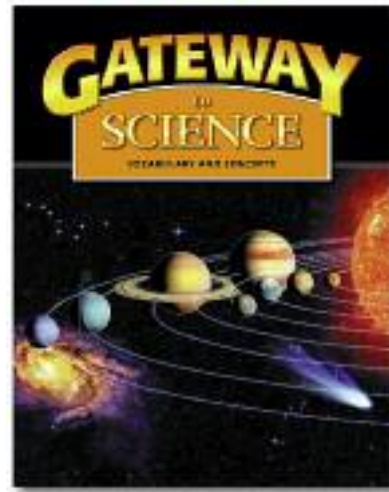
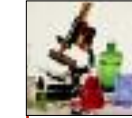
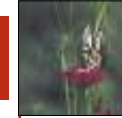


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Science Basics

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Extreme Weather
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Physical Science

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Energy Transformations
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Science vocabulary is introduced in a picture dictionary format.

Metric Units of Measurement

FOCUS QUESTION
What do scientists measure?

Every day we talk about measurements. "How tall is that building? How heavy is that box? How cold is it?" Scientists answer these questions with units. A unit is an amount that never changes. Scientists use different units to measure different things. They measure length or distance in millimeters, centimeters, meters, and kilometers. They measure how much space things occupy in cubic centimeters, milliliters, and liters. They measure mass, or how much matter is in an object, in grams and kilograms. Finally, they measure how hot or cold something is in degrees Celsius.

Vocabulary in Context

1. milliliter (mL)
2. liter (L)
3. meter (m)
4. centimeter (cm)
5. millimeter (mm)
6. kilometer (km)
7. cubic centimeter (cm³)
8. kilogram (kg)
9. gram (g)
10. degrees Celsius (C)

Word Study
Prefixes
A prefix is a letter or group of letters added to the beginning of a word. The prefix changes the word's meaning.

| Prefix | Meaning |
|--------|--------------------|
| kilo | thousand (1,000) |
| deci | tenth (0.1) |
| centi | hundredth (0.01) |
| milli | thousandth (0.001) |

The prefix **kilo** added to the word **meter** forms **kilometer**. A kilometer equals 1,000 meters.

Check Your Understanding

- Look at the pictures. How many centimeters are in a meter? How many grams are in a kilogram?
- What do scientists use units for?
- What do scientists measure?

Critical Thinking Classifying Information
4. What units do scientists use to measure (a) the length of a soccer field, (b) the mass of a bag of fruit, and (c) the amount of juice in a bottle?

Metric Units of Measurement

The Metric System

The metric system is a system for measuring. We use it to measure **mass**, **length**, and **volume**. The metric system works on a system of bases. The base unit for mass is the gram. The base unit for length is the meter. The base unit for volume is the liter. We use a system of prefixes to show smaller and larger units. The prefix **kilo** means "1,000." So a kilogram is 1,000 grams. The prefix **centi** means "one hundredth" (0.01). So a centimeter is one hundredth (0.01) of a meter.

The metric system was invented in France. Before the metric system, people in different cities and countries used different measurement systems. People often didn't understand each other's measurement system. After the metric system was invented, many countries began to use it. Scientists began to use it too. Today most countries use the metric system. A few countries do not. The United States uses feet, miles, inches, gallons, and pounds. But scientists in the United States use the metric system.

| Kind of Measurement | Base Measure | Other Measures |
|---------------------|--------------|--|
| length or distance | meter (m) | kilometer (km) = 1,000 meters centimeter (cm) = 0.01 meters millimeter (mm) = 0.001 meters |
| mass | gram (g) | kilogram (kg) = 1,000 grams |
| volume | liter (L) | centiliter (cL) = 0.01 liters |

Some Metric Units

Science Skill Contrasting
When you contrast, you tell how two things are different. Look at the temperature scales on the two thermometers.
1. At what temperature does water freeze on each scale?
2. At what temperature does water boil on each scale?
3. Which temperature scale has more degrees between the freezing point and boiling point of water?

Word Study
Word Origins
Thermometer is made from two word parts.
• **Therm** comes from the Greek word **therme**. **Therm** means "heat."
• **Meter** comes from the Latin word **metrum**. **Meter** means "to measure."
A **thermometer** is a tool used to measure the temperature of objects.

Check Your Understanding

- An abbreviation is a short way to write something. What are the abbreviations for the base units of the metric system?
- What measurement units are used in the United States?
- What tool do scientists use to measure temperature? What unit do they use?

Critical Thinking Analyzing Information
4. Why do scientists use meters and centimeters and not feet and inches?

Research and Inquiry Use the internet, the library, or your science book to answer these questions.
1. What measuring systems did early civilizations such as Egypt use? What standards were they based on?
2. What tools do scientists use to make measurements?
3. How much do a mile and a gallon measure in the metric system?

Writing You are on your way to school in the morning. Describe your trip. Include three examples of how you might use measurements during the trip. Write a paragraph.

Standards-based science concepts, directly related to the lesson vocabulary taught on the previous page, are introduced and assessed.

Each lesson begins with a **Focus Question** and a list of key **Vocabulary** related to the lesson topic to help direct student learning.

The **Vocabulary in Context** box contextualizes words from the vocabulary list in an informational reading that provides an overview of the topic.

The Cell

VOCABULARY

FOCUS QUESTION
What one part do all cells have?

1 cell
2 cytoplasm
3 cell membrane
4 chloroplast
5 vacuole
6 nucleus
7 endoplasmic reticulum
8 ribosome
9 golgi complex
10 lysosome
11 mitochondria
12 cell wall

1
A (Plant) Cell

1
An (Animal) Cell

Vocabulary in Context CD 1 TR 54

All living things are made up of one or more **cells**. Cells are the smallest unit of life. All cells have a **cell membrane**. It controls what moves into and out of a cell. Most cells have other parts, such as a **nucleus**, **vacuoles**, **ribosomes**, and **lysosomes**. The nucleus controls all activity in the cell. Vacuoles store water, food, and waste. Ribosomes build proteins. Lysosomes break down, or digest, material.

Word Study
Multiple-Meaning Words

The word **cell** has different meanings.

People in jail are kept in **cells**.

A **cell** is a small room locked from the outside.

Your body is made up of many **cells**.

A **cell** is the basic unit of living things.

▶ For information on living things made of single cells, see page 26.

Check Your Understanding

- Look at the plant cell and animal cell. Name five parts that both cells have.
- What does the nucleus do?
- What one part do all cells have?

Critical Thinking *Making an Inference*

- Why do cells have many different parts?

The **Word Study** box provides useful and important characteristics of key vocabulary like word families and words with multiple meanings.

Check Your Understanding questions assess vocabulary and reading comprehension and provide the opportunity to apply knowledge to **Critical Thinking** questions.

Easy-to-follow charts and graphics visually reinforce concepts.

Concise readings in each lesson contextualize related content vocabulary and define key science concepts.

What Do Organelles Do?



CD 1
TR 55

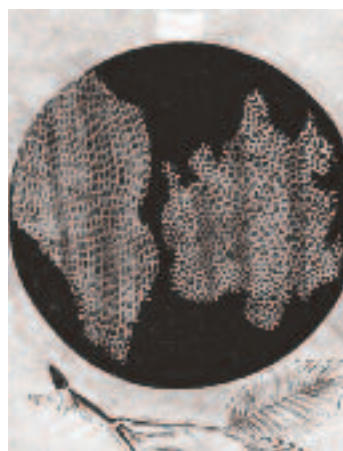
Cell parts are called **organelles**. Organelles perform life activities as seen below.

| head | column | Organelle | Job or Life Activity |
|------|--------|-----------------------|--|
| row | | chloroplast | Chloroplasts are responsible for making food from sunlight. |
| | | cytoplasm | This jelly-like material is inside the cell membrane, but outside the nucleus. It contains all the other cell parts. |
| | | lysosome | The lysosomes digest or break down material. |
| | | endoplasmic reticulum | The endoplasmic reticulum moves chemicals around the cell. |
| | | golgi complex | The golgi complex packages or processes proteins. |
| | | cell wall | The stiff cell wall holds up the plant. |
| | | mitochondria | Mitochondria make energy from food. |

■ What Organelles Do

The **Science Skill** section focuses on building graphic literacy skills like reading charts and graphs, or common science skills like making observations and organizing data.

The **Academic Vocabulary** box introduces vocabulary that is related to content words across all academic disciplines.



■ Robert Hooke's Drawing of a Cell

▶ For information about microscopes, see page 6.

Science Skill Reading a Table

First, look carefully at the heads of each column in the table above. They tell you what information is found in the table. Then look at the information in the table.

1. Which part of the cell contains all the other parts?
2. Which part of a plant cell makes food?
3. Which part of the cell provides energy for other cell activities?

Robert Hooke Sees Cells



CD 1
TR 56

The picture shows an early drawing of a cell. A scientist named Robert Hooke drew it. He studied cork from a cork oak tree under a **microscope**. He saw the empty cell walls. He invented the name *cell* for his discovery.



Academic Vocabulary

The cell membrane **controls** motion in or out of the cell.
is responsible for

Bacteria Cells



CD 1
TR 57

Bacteria are very simple cells. Like all cells, a bacteria cell has cytoplasm and a cell membrane. The cell membrane is very thick. A bacteria cell does not have a nucleus or other organelles. It still performs all the life activities of a cell.



■ A Bacteria Cell

Word Study

Word Roots

Chloroplast comes from two Greek words.

- **Chloros** means "green."
- **Plastikos** means "to form or mold."

Check Your Understanding

1. What do organelles do? Give a few examples.
 2. What did Robert Hooke see under the microscope?
 3. What does a bacteria have that all cells have?
- Critical Thinking Integrating Information**
4. Which kind of cell has the most kinds of organelles: a plant cell, an animal cell, or a bacteria cell?



Research and Inquiry Use the internet, the library, or your science book to answer these questions.

1. How large can cells become? What limits their size?
2. What scientist first studied living cells?
3. What did the botanist Robert Brown add to what we know about cells?



Writing How does a cell work? Write a short paragraph. Tell the role of the nucleus, cell membrane, cytoplasm, and mitochondria.

The **Research and Inquiry** section provides questions for students to research through the internet, the library, or their science textbook.

The **Writing** section gives students the opportunity to apply what they've learned while practicing writing skills.

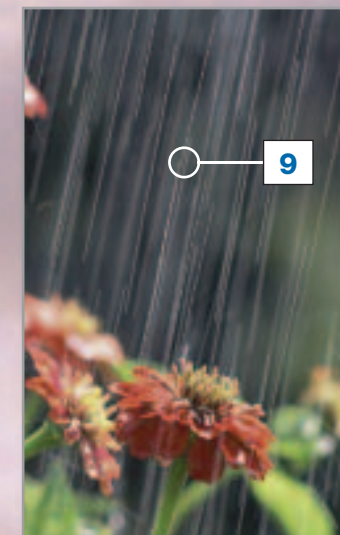
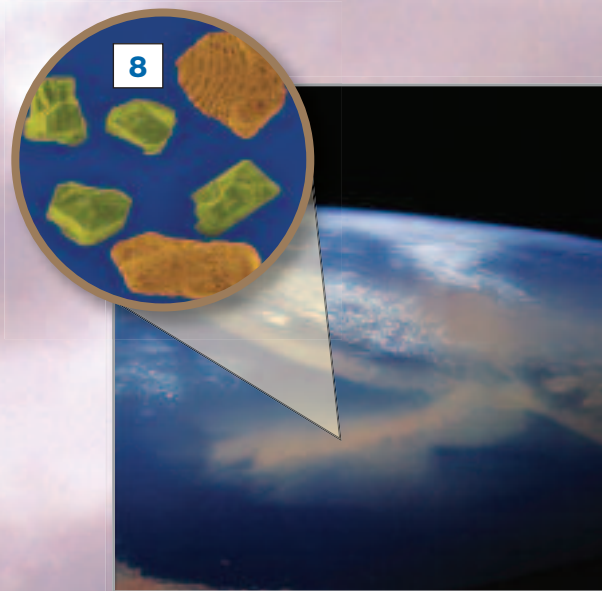
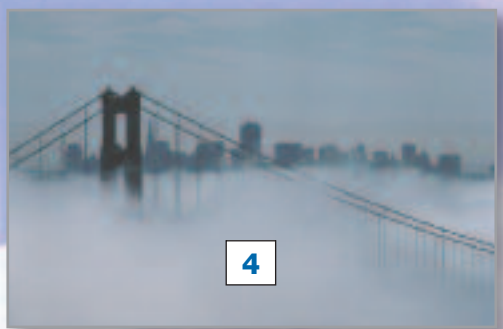


The Atmosphere

FOCUS QUESTION

What is the atmosphere made of?

- 1 cloud
- 2 air
- 3 atmosphere
- 4 fog
- 5 pollution
- 6 water vapor
- 7 gas
- 8 particles
- 9 rain
- 10 wind



1

2

6

7

8

9

10

Vocabulary in Context CD 1 TR 38

The **atmosphere** is the **air** around Earth. We find **rain**, **fog**, **clouds**, and **wind** in the atmosphere. Earth's atmosphere makes life possible.

Air is made of several **gases**. The atmosphere also contains **pollution**, **water vapor**, and **particles**.

Word Study

Multiple-Meaning Words

The word **gas** has different meanings.



Cars use **gas**.

Gas is short for **gasoline**.

Gasoline is a liquid, not a **gas**.



Earth's atmosphere is made of several **gases**.

Oxygen and nitrogen are **gases**.

▶ For information on solids, liquids, and gases, see page 162.

Check Your Understanding

1. Look at the pictures. What kind of weather do you see?

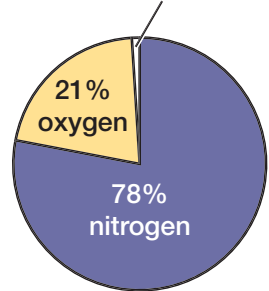
2. What do we find in the atmosphere?

3. What is the atmosphere made of?

Critical Thinking Applying Information

4. What causes air pollution? Think about your city or town. Is there much air pollution? Why?

1% carbon dioxide, water vapor, and other trace gases



■ Gases in the Atmosphere

Gases in the Atmosphere CD 1 TR 39

Air is composed of several gases. The most common gases are **oxygen** and **nitrogen**. There are small amounts of other gases in Earth's atmosphere. These gases are called **trace gases**.

Science Skill Reading a Pie Chart

A pie chart shows the parts of something. The pie is cut into several slices. The size of the slice shows the amount. A large slice shows a large amount. A small slice shows a small amount. Look at the pie chart to the left. It shows the atmosphere is made of gases.

1. What is the most common gas?
2. What percent of the atmosphere is oxygen?

Layers of the Atmosphere CD 1 TR 41

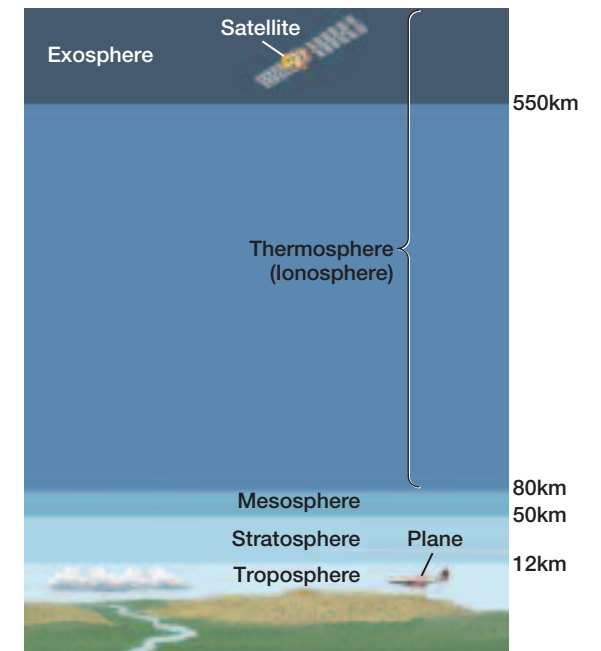
The atmosphere consists of several **layers**. The **troposphere** is closest to Earth. The troposphere is warm. The other layers of the atmosphere are very cold and the air is thin. Plants and animals can only live in the troposphere. Satellites fly in the **exosphere**. We often call the exosphere "space."

Word Study

Word Origins

Atmosphere is from two Greek words.

- **Atmos** means "gases."
- **Sphere** means "round" or "a ball."

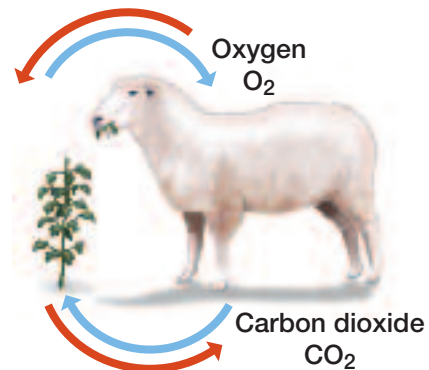


■ Layers of the Atmosphere

The Oxygen-Carbon Dioxide Cycle CD 1 TR 40

Animals and plants need gases to live. Plants need **carbon dioxide**. They get it from the air or the water. Plants make oxygen as waste.

Animals need oxygen. They get it from the air or the water. Animals make carbon dioxide as waste.



■ The Oxygen-Carbon Dioxide Cycle



Academic Vocabulary

| | | |
|----------------|-----------------------|----------------|
| The atmosphere | is made of | several gases. |
| | is composed of | |
| | consists of | |

▶ For information on gases, see page 162.

Check Your Understanding

1. What are the two most common gases in the atmosphere? Write a list from most common to least common.
2. What gas do people need? What gas do plants need?
3. Describe the troposphere. Describe the exosphere.

Critical Thinking Making an Inference

4. Can people live in the stratosphere? Why or why not?



Research and Inquiry Use the internet, the library, or your science book to answer these questions.

1. What are the effects of pollution on the atmosphere?
2. What will happen if the carbon dioxide in the atmosphere increases?
3. Who discovered oxygen? How did he discover it?



Writing Imagine that there are no plants on Earth. Explain what would happen. Write a paragraph.



Measuring Matter

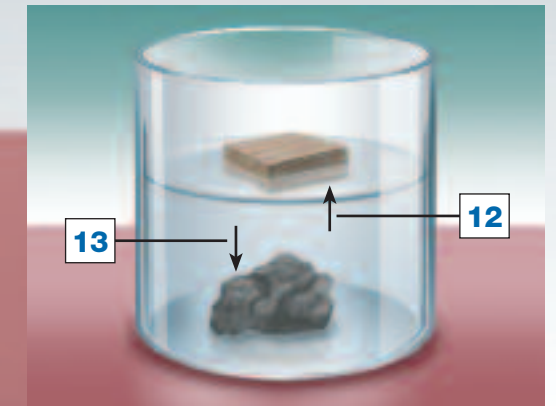
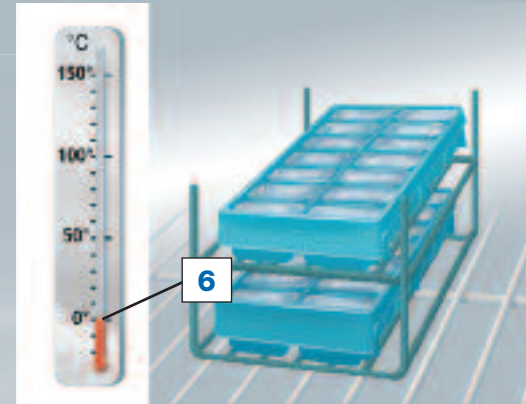
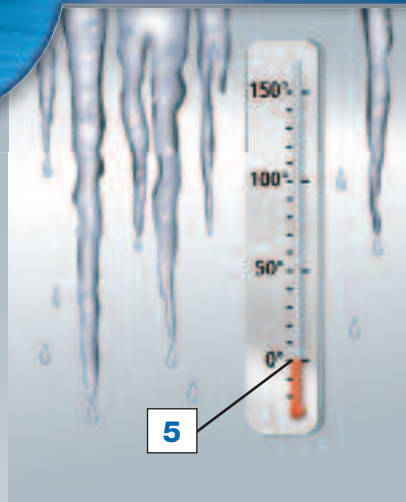
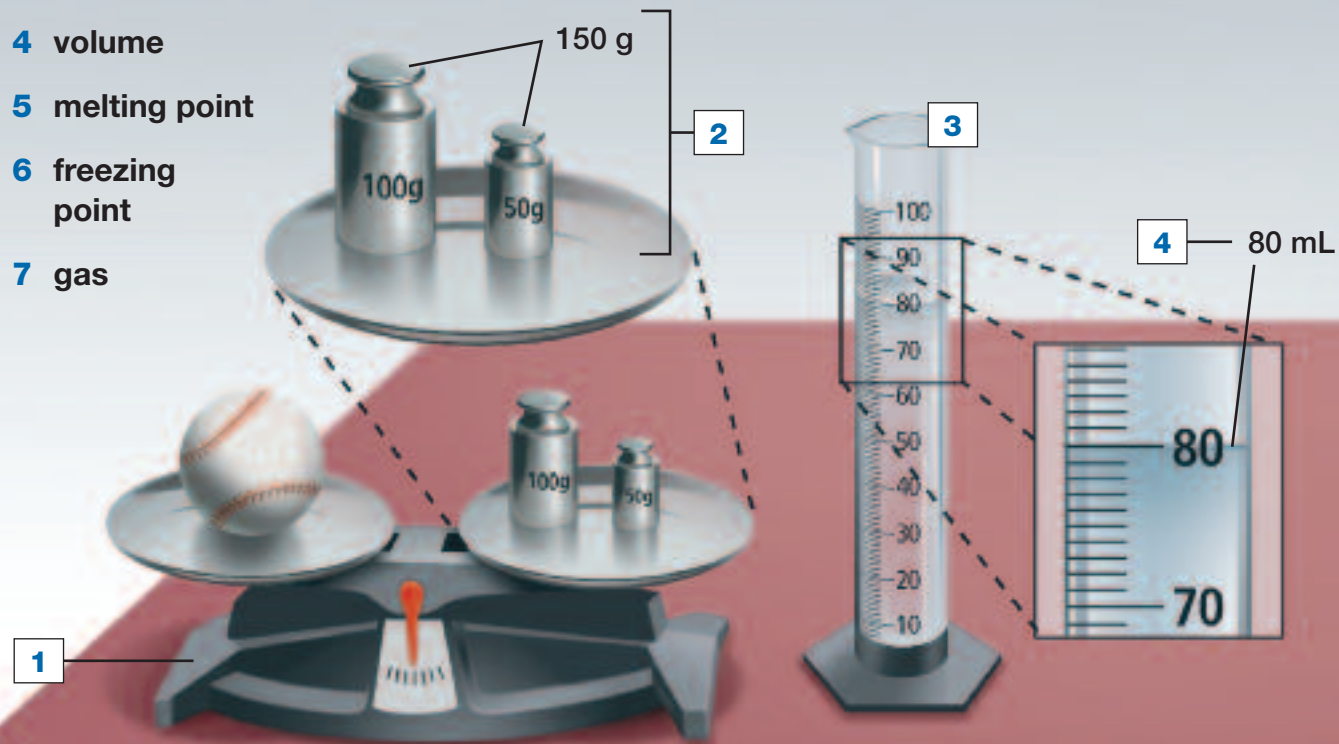
FOCUS QUESTION

How can we measure matter?



CD 1
TR 41

- 1 balance
- 2 mass
- 3 graduated cylinder
- 4 volume
- 5 melting point
- 6 freezing point
- 7 gas
- 8 thermometer
- 9 boiling point
- 10 liquid
- 11 solid
- 12 float
- 13 sink



Vocabulary in Context



CD 1
TR 42

We can measure many properties of matter. **Mass** is the amount of matter in an object. We measure mass with a **balance**. **Volume** is the amount of space something occupies. We measure the volume of a **liquid** or a **solid** with a **graduated cylinder**. Matter also has **boiling points**, **melting points**, and **freezing points**. We measure these with a **thermometer**.

Word Study

Multiple-Meaning Words

The word **volume** has different meanings.



I can't hear the radio. Please turn up the **volume**.

Here, **volume** means "loudness."



The **volume** of lemonade in the pitcher is 2 liters (about 0.5 gallons).

Here, **volume** means "the amount of space the lemonade occupies."

▶ For information on measurements and measuring tools, see pages 10 and 14.

Check Your Understanding

1. Look at the pictures. What do you notice about the freezing point and melting point of water?
 2. What properties of matter can we measure?
 3. How can we measure matter?
- Critical Thinking Applying Information**
4. What kinds of matter have you seen melt, freeze, or boil? Where did you see them?

Changes of State CD 1 TR 43

An ice cube is a **solid**. If you heat an ice cube, it melts and changes to water. Water is a liquid. The temperature at which this happens is the melting point of ice. If you heat the water, it boils and becomes steam. Steam is a gas. The temperature at which this happens is the boiling point of water.

| Substance | Melting point | Boiling point |
|-----------|---------------|---------------|
| water | 0°C | 100°C |
| salt | 801°C | 1,413°C |
| oxygen | -218°C | -189°C |

■ Melting Points and Boiling Points

Science Skill Using Numbers to Compare

We can use math to compare the numbers in the table. Look at the Melting Points and Boiling Points table. Find the largest number and the smallest number.

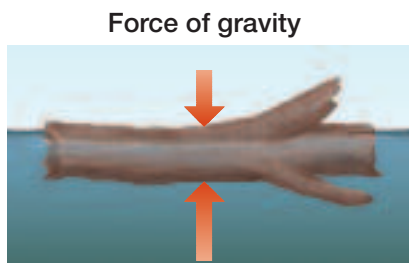
1. Which substance has a higher melting point than water?
2. Which substance has a lower boiling point than water?

Academic Vocabulary


At its melting point, ice **changes to becomes** water.

Buoyancy CD 1 TR 44

When you put a solid in a liquid, a **buoyant force** pushes upward on the solid. The **force of gravity** pushes down on the solid. If the upward force is greater than the downward force, the solid floats. If the downward force is greater than the upward force, the solid sinks.



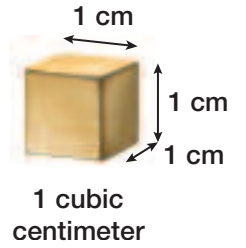
■ Buoyancy

 For information on gravity, see page 186.


Mass, Volume, and Density CD 1 TR 45

All objects have mass and volume. The comparison of an object's mass to its volume is **density**. Density is the mass ÷ (divided by) its volume. We express density in grams per cubic centimeter (g/cc or g/cm³). Different materials have different masses for the same volume. The density of gold is 19.3 g/cc (grams per cubic centimeter).

$$D = \frac{M}{V}$$



■ Finding Density

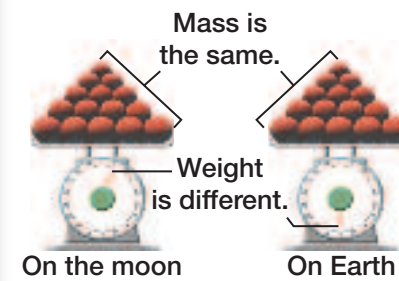
 For more information on metric units of measurement, see page 11.

Word Study

Frequently Misused Words

Mass is the amount of matter in an object.


Weight is the force on an object caused by gravity.




An object's **mass** is the same on the moon as it is on Earth. The object's **weight** is less on the moon because the moon's gravity is weaker.

Check Your Understanding

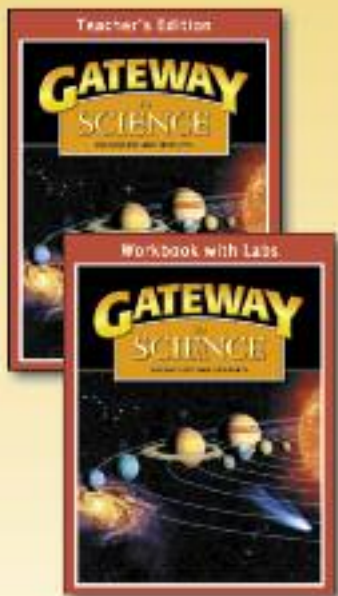
1. What happens when you heat ice? What happens when you heat water?
 2. A rock sinks in water. Why?
 3. A rock has a mass of 84 g and a volume of 12 cc. What is its density?
- Critical Thinking Analyzing Evidence**
4. You have two objects. One sinks in water. The other one floats. Which one has a greater density?

 **Research and Inquiry** Use the internet, the library, or your science book to answer these questions.

1. A robot used to explore the moon weighs 80 pounds on Earth. How much does it weigh on the moon?
2. Why does a helium-filled balloon float in the air?
3. What is the density of aluminum? How is this related to its use in building airplanes?

 **Writing** You start to heat an ice cube. You continue heating until the temperature reaches 100°C. What happens? Write a paragraph.

The complete **Gateway to Science** package offers the materials needed to **introduce, practice, and assess** content standards found on state exams.



Teacher's Edition

The *Gateway to Science* Teacher's Edition provides instructors with teaching suggestions and highly accessible descriptions of science content introduced in every lesson. The Teacher's Edition features:

- ◆ Point-of-use instruction and teaching tips for each lesson presented in a wraparound format
- ◆ Warm-up activities that assess students' prior knowledge of topics
- ◆ Multi-leveled activity suggestions at the end of each lesson
- ◆ Internet-based research assignments

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| Teacher's Edition | 978-1-4240-0333-4 |
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