



Earth Science

Water

Basic Level

Physical Changes in Water

FOCUScurriculum

866-315-7880 • www.focuscurriculum.com

LOOK
INSIDE
FOR:

Core Curriculum
Covered
•
Student Book
•
Assessments and
Reading Activities

Physical Changes in Water

What makes water so special?

CORE CURRICULUM STATEMENTS

Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Water is recycled by natural processes on Earth: evaporation: changing of water (liquid) into water vapor (gas); condensation: changing of water vapor (gas) into water (liquid)

Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

The material(s) an object is made up of determine some specific properties of the object (sink/float, conductivity, magnetism).

Properties can be observed or measured with tools such as hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders.

Objects and/or materials can be sorted or classified according to their properties.

Matter exists in three states: solid, liquid, gas: solids have a definite shape and volume; liquids do not have a definite shape but have a definite volume; gases do not hold their shape or volume

Temperature can affect the state of matter of a substance.

Changes in the properties or materials of objects can be observed and described.

Energy exists in many forms, and when these forms change energy is conserved.

Energy and matter interact: water is evaporated by the Sun's heat; a bulb is lighted by means of electrical current; a musical instrument is played to produce sound; dark colors may absorb light, light colors may reflect light.



Earth Science

Water

Basic Level

Student Book

Physical Changes in Water

To use Focus Curriculum materials
with your students, please purchase
a school license

To use FocusCurriculum materials
with your students, please purchase
a school license.

Physical Changes in Water

What makes water so special?

BL

CORE CURRICULUM STATEMENTS

Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Water is recycled by natural processes on Earth: evaporation: changing of water (liquid) into water vapor (gas); condensation: changing of water vapor (gas) into water (liquid)

Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

The material(s) an object is made up of determine some specific properties of the object (sink/float, conductivity, magnetism).

Properties can be observed or measured with tools such as hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders.

If Objects and/or materials can be sorted or classified according to their properties.

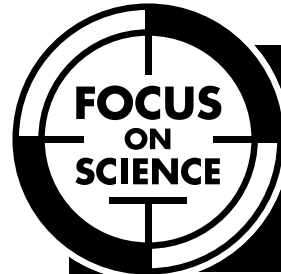
Matter exists in three states: solid, liquid, gas: solids have a definite shape and volume; liquids do not have a definite shape but have a definite volume; gases do not hold their shape or volume

Temperature can affect the state of matter of a substance.

Changes in the properties or materials of objects can be observed and described.

Energy exists in many forms, and when these forms change energy is conserved.

Energy and matter interact: water is evaporated by the Sun's heat; a bulb is lighted by means of electrical current; a musical instrument is played to produce sound; dark colors may absorb light, light colors may reflect light.

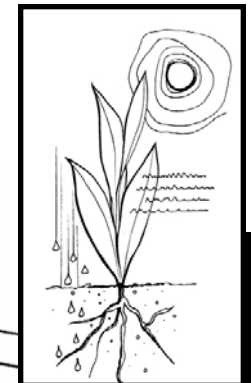
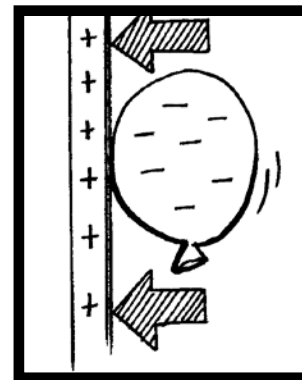


Earth Science

Water

Physical Changes in Water

by Chuck Pederson





Earth Science

Water

Physical Changes in Water

by Chuck Pederson

FOCUScurriculum

Curriculum materials for **your** content standards

Table of Contents

Introduction:

Things Change4

Chapter 1:

What Is Matter?5

States of Matter7

Chapter 2:

Particles in Matter.9

Chapter 3:

What Is Physical Change?13

Physical Versus
Chemical Changes14

Chapter 4:

Mixtures19

Glossary22

To Find Out More23

Index.24

– Predict –

*What do you think you will
learn from reading this book?*

INTRODUCTION

Things Change

Have you ever noticed that everything changes? A seed becomes a flower. A storm develops after a sunny day.

Other changes happen, too. A carpenter saws a board to build a house. You put water in the freezer, and it becomes ice. You mix sugar and lemon juice to create lemonade.

What do these changes have in common? They are **physical** changes.

physical: having to do with things that can be seen or measured

CHAPTER 1

What Is Matter?

Matter is everything around you. Matter includes paper, metal, glass, air, toenails, the farthest star, a waterfall, and your pet cat. Almost everything is made of matter. It also is changing all the time.

People describe the **properties** of matter in many ways such as size, shape, color, texture, and **volume**. All matter takes up space. All matter has mass. Mass is how much there is of an object.

properties: qualities that something has
volume: the amount of space something occupies or takes up

People also describe materials by the matter from which they are made. Here are a few examples.

Types of Materials	
Paper	newspaper, paper towels, books
Glass	bottles, windows, light bulbs
Plastic	keyboards, CDs, garbage cans
Metal	keys, doorknobs, belt buckles, wire

The physical properties of matter can be observed and measured. For example, you can heat water. Then you can measure the temperature of the water.

– Apply –

Describe other objects by the properties of the matter from which they are made.

States of Matter

Most matter on Earth exists in three states—solid, liquid, or gas.

Solids

Matter that is solid has a certain size and shape. It does not change its size or shape unless something causes it to change.

Liquids

A liquid has size and volume. It does not have a particular shape. It takes the shape of the container it is in. Liquids can flow, be poured, and be spilled. Solids cannot.

Gases

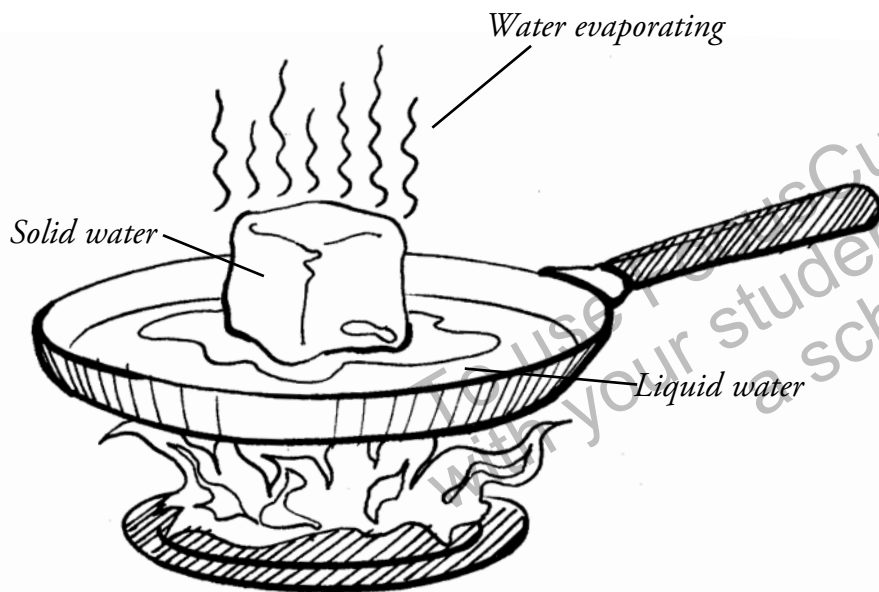
A gas is matter that has no shape or size of its own. The air around you is gas.

– Restate –

Explain the physical properties of different states of matter.

Particles in Matter

Matter can change from a solid to a liquid to a gas. For example, solid water is called ice. It has its own shape. Liquid water is what you can drink. It takes the shape of any container that holds it. When water **evaporates**, it can be seen as steam or water vapor. Water as a gas is invisible in the air.

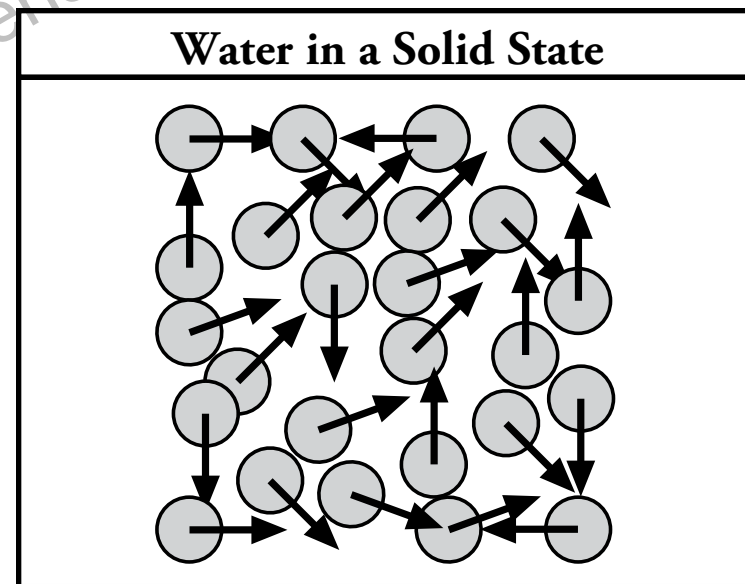


When a solid is heated, it begins to melt. If heated enough, the melted liquid turns into vapor.

evaporate: to change into a gas or vapor

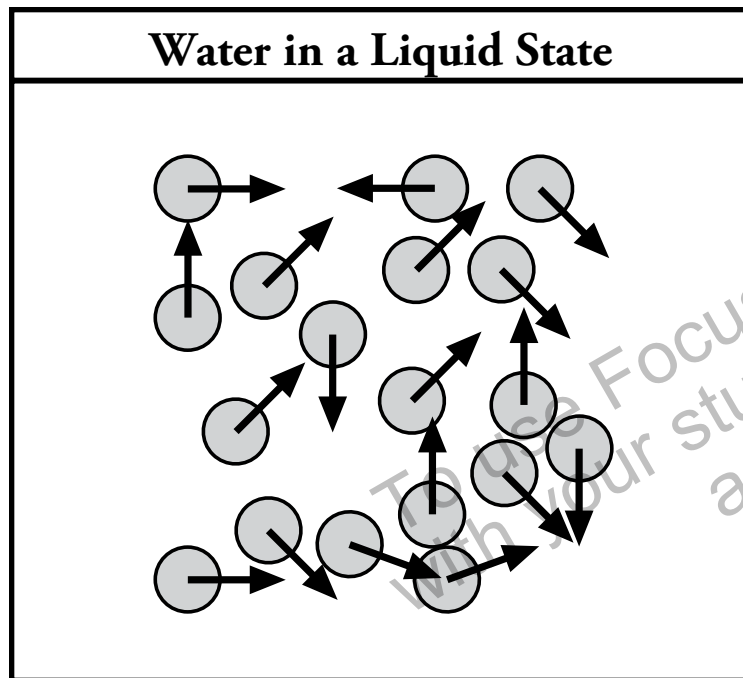
Matter is made of tiny particles. They are so tiny you cannot see them. The particles in matter can move around. How fast they move depends on the matter's state.

Particles in solid water can move only a little. They are packed together tightly.



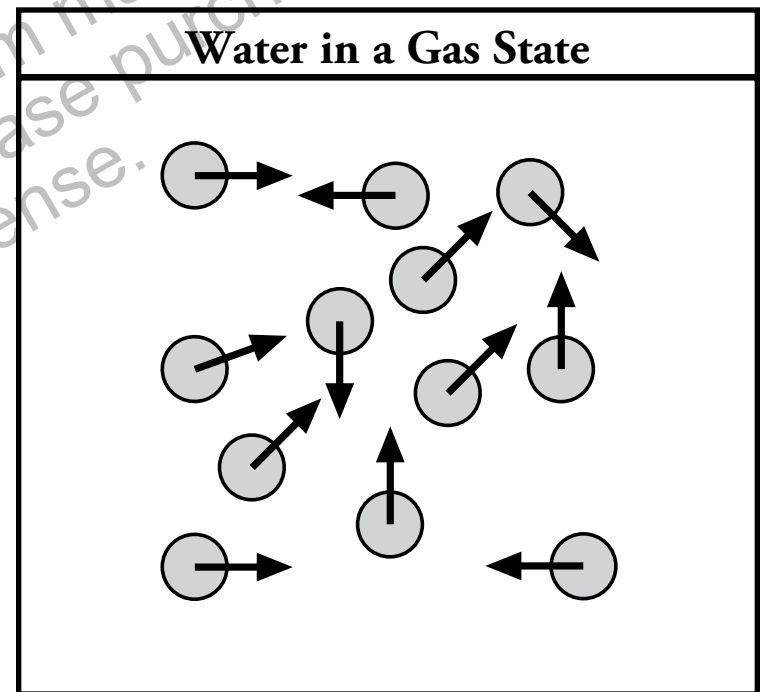
The particles in solid water are packed together. They can move very little and make a substance hard.

When solid water is heated, the particles in matter begin to move faster. The solid melts and becomes a liquid. This is called the melting point.



The particles in liquid water are able to move more.

If heating continues, some particles gain enough energy to break away from the liquid. They move into the air. This is called evaporation. With enough heat, the particles begin to bubble and escape as a gas. This is called boiling.



As a gas, the particles in water are furthest apart. They can move in all directions.

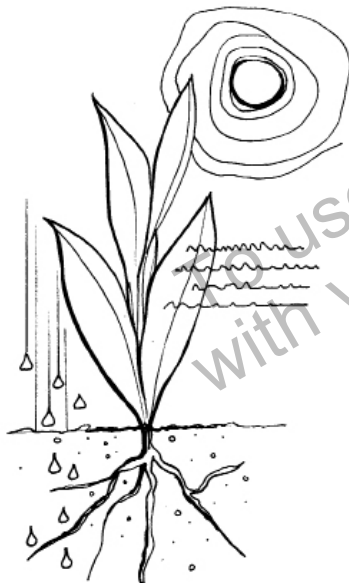
What Is Physical Change?

Physical change occurs when objects or substances change their state of matter. Some properties that might change when this happens are color, shape, size, temperature, and weight.

Think about an iron nail. It can be bent, but the nail is still iron, even though its shape has changed. You could use a hammer to straighten the nail again. Its shape has changed once more. But the nail is still iron.

Cooling will also change the state of matter. If a gas cools enough, it **condenses**. Have you ever had a cold drink on a hot day? If so, you have seen condensation. It forms the little water drops on the outside of your glass.

Continue to subtract heat, and the liquid becomes a solid. For water, this is the point at which it becomes ice.



Water condenses on the outside of a cold glass.

condense: to change from a gas to a liquid

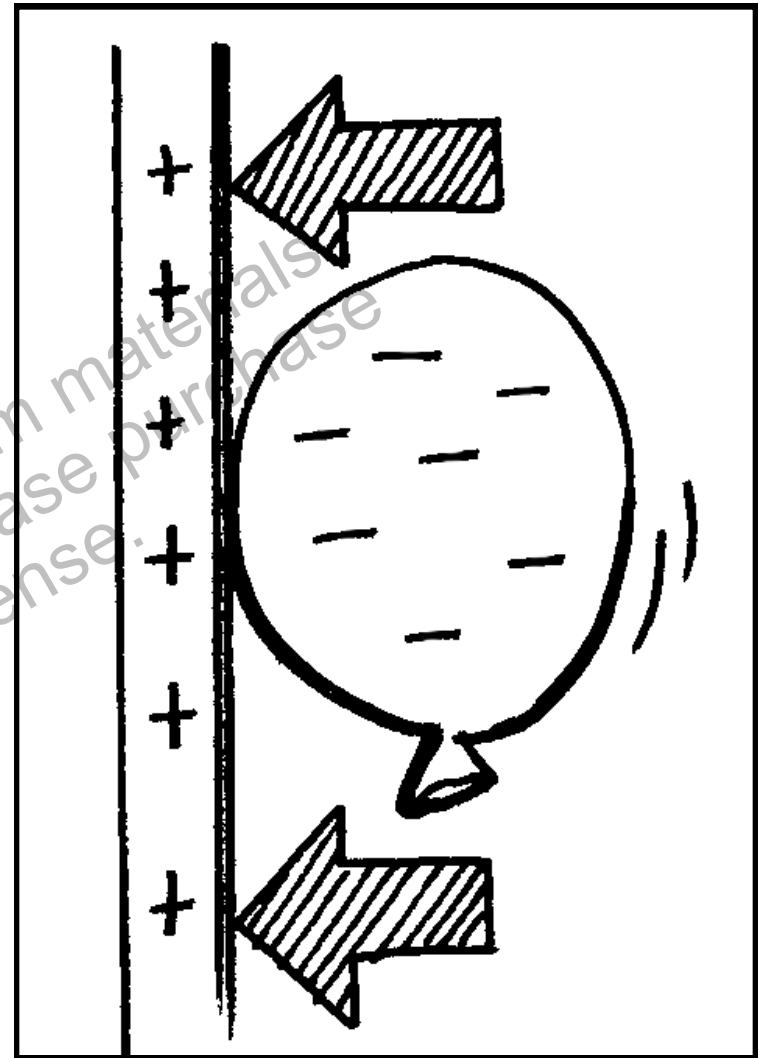
Physical Verses Chemical Changes

Another type of change is chemical change. Chemical changes are usually **permanent**. They change the way matter looks, feels, smells, or tastes. They also change the substance into something new.

So what is the difference between physical and chemical change? Sometimes, seeing the difference is easy. For example, a piece of paper may be folded. Its shape and size have changed. This is a physical change. You can unfold the paper to its original shape and size.

If you burn the paper, it changes to ash, smoke, and gases. It cannot be changed back. This is a chemical change.

permanent: unchanging



Fog swirling around a bridge is condensed water vapor. When the air temperature is cool enough, fog forms near the ground. This is a physical change. The water changes state, but it is still water, not a different substance.

How Can You Tell the Difference?

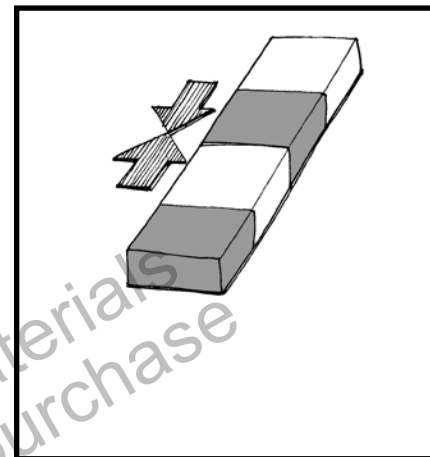
Read the two questions below. If you can answer yes to either question, then it is a physical change. If you answer no to both questions, it is a chemical change.

1. Are the physical properties the same after the change? For example, you bend a piece of wire. The shape has changed, but it is still wire. The answer is yes.

2. Can the substance go back to the way it was? If sugar is dissolved in water, the sugar seems to disappear. If the cup is left in the sun, the water will evaporate. The sugar will remain behind. The answer here also is yes.

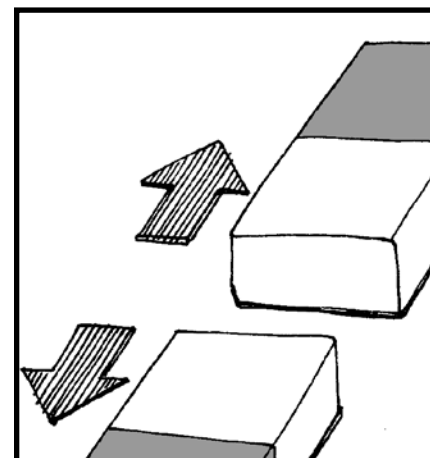
– Restate –

Explain the characteristics of a simple physical change.



Glass scatters when a window breaks.

Is this a physical change or chemical change?



Poor snowman! The sun is beginning to melt him.

Is this a physical change or chemical change?

Mixtures

Another type of physical change results in a mixture. In a mixture, two or more substances are physically combined. A force like shaking or stirring may combine them. There are several types of mixtures.

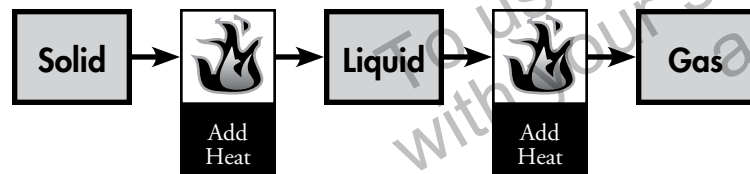
Diffusion

Diffusion occurs without shaking or stirring. For example, this happens when a drop of dye is added to a glassful of water. Eventually, the dye is evenly spread through the water. You cannot tell the dye from the water.

diffusion: a mixture with an even distribution of particles in a substance without shaking or stirring

Energy Flow

Understanding energy flow is helpful to understanding physical change. To change water from one state to another, thermal energy is either added or removed. Heating causes solid water to melt. Cooling, or removing heat, causes water vapor to become liquid. It condenses. Subtracting more heat causes liquid water to become solid. It freezes.



Heating adds thermal energy and causes matter to change states.

Suspension

Suspensions are mixtures in which you can still see the different parts. Suspensions are mixed by stirring or shaking. For example, a tossed salad is a suspension. The parts are easy to separate again.



A salad is a type of mixture called a suspension. You can still see the individual parts of it.

Solution

Solutions consist of one substance completely dissolved in another. Iced tea mixed with sugar is an example.

suspension: a mixture whose different parts are clearly visible
solution: a mixture in which one substance is completely dissolved in another

Physical Change Is All Around

Physical change causes the properties of a substance to become different. Physical change includes bending, cutting, folding, crushing, stretching, or melting anything.

Physical change can be useful. It allows us to create a bacon, lettuce, and tomato sandwich. Physical change can also be a problem. Global climate change seems to be causing some ice at the poles to melt. The melting ice could cause flooding.

What are some physical changes that are useful? What are some physical changes that cause problems?

– Summarize –

Write a paragraph that summarizes the main ideas in this book.

Glossary

condense—to change from a gas to a liquid

diffusion—a mixture with an even distribution of particles in a substance without shaking or stirring

evaporate—to change into a gas or vapor

permanent—unchanging

physical—having to do with things that can be seen or measured

properties—qualities that something has

solution—a mixture in which one substance is completely dissolved in another

suspension—a mixture whose different parts are clearly visible

volume—the amount of space something occupies or takes up

To Find Out More . . .

Want to learn more about physical changes?

Try these books

Physical Changes by Darlene R. Stille.
Compass Point, 2006.

States of Matter by Robert Snedden. Reed Educational and Professional Publishing, 2001.

Solids, Liquids, and Gases by Carol Ballard.
Heinemann, 2004.

Access these Web sites

Chem4Kids.com
http://www.chem4kids.com/files/matter_intro.html

Change Is Cool
<http://www.usoe.k12.ut.us/curr/Science/sciber00/8th/matter/sciber/physchng.htm>

Write for more information

Museum of Science and Industry
57th Street and Lake Shore Drive
Chicago, IL 60637-2093

Index

chemical change, 14
condensation, 12
diffusion, 19
energy flow, 18
evaporation, 8, 11, 16
gas, 7, 8, 11
liquid, 7, 8, 10
melting point, 10
mixtures, 19–20
properties, 5, 6, 13
solids, 7, 8, 9
solution, 20
suspension, 20

Published by FOCUScurriculum

866-315-7880

www.focuscurriculum.com

Copyright © 2019 FOCUScurriculum

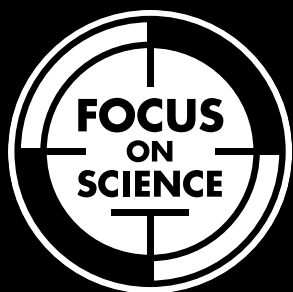
Order Number: ES-23BL

Created by Kent Publishing Services, Inc.

Designed by Signature Design Group, Inc.

No part of the book may be reproduced without purchasing a license from the publisher. To purchase a license to reproduce this book, contact FOCUScurriculum. The publisher takes no responsibility for the use of any of the materials or methods described in this book, nor for the products thereof.

To use FocusCurriculum materials
with your students, please purchase
a school license.



Assessments

Physical Changes in Water

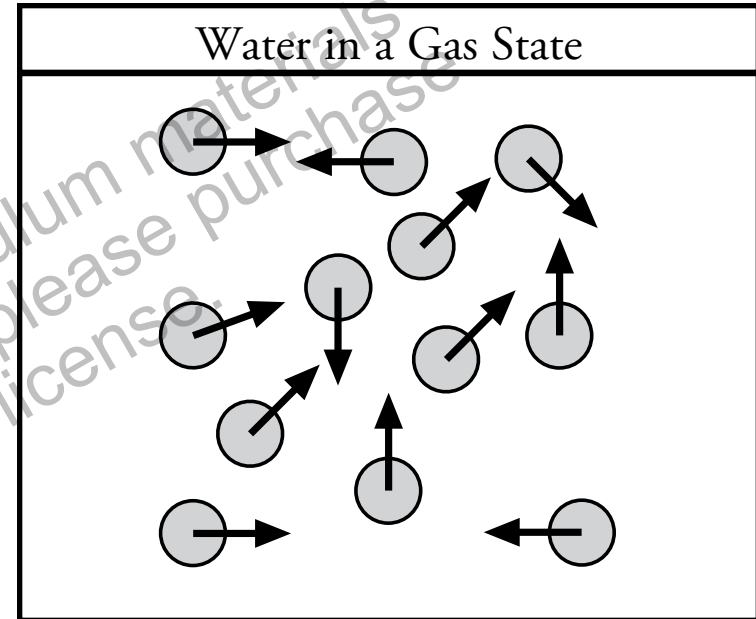
Print pages 20–22 of this PDF for the assessments.

Check Understanding

Shade the circle next to the correct answer.

1. Cutting bread and bending a paperclip are examples of physical changes. Which statement describes why these are physical changes?
 - Ⓐ The objects have changed state.
 - Ⓑ The objects are no longer useful.
 - Ⓒ The objects have changed shape.
 - Ⓓ The objects are made from new materials.
2. Students dissolve a spoonful of salt in a glass of water. They stir the mixture until they cannot see the salt anymore. What type of mixture is salt and water?
 - Ⓐ solution
 - Ⓑ diffusion
 - Ⓒ suspension
 - Ⓓ condensation

3. The diagram below shows particles of water in a gas state.



Which description is true of water in a gas state?

- Ⓐ It has no shape or size.
- Ⓑ It has size but no shape.
- Ⓒ It has shape but no size.
- Ⓓ It has a certain size and shape.

Check Understanding

Shade the circle next to the correct answer or write your answer on the lines provided.

4. We often describe materials by the matter from which they are made. Identify two types of matter.

1) _____

2) _____

Explain what types of materials each can make.

Note that question 5 has only three choices.

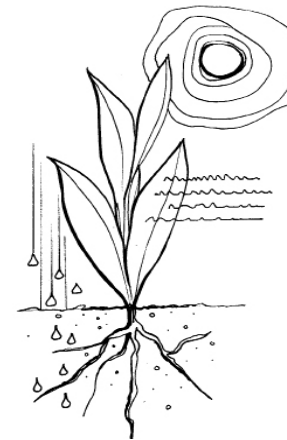
5. In which state of matter does water have a definite shape and volume?

Ⓐ solid

Ⓑ gas

Ⓒ liquid

Base your answer to question 6 on the diagram below. The diagram shows a glass containing ice and water.



6. The water in the glass represents which two states of matter?

Assessment Scoring Guidelines

1. Answer C is correct.
2. Answer A is correct.
3. Answer A is correct.
4. Paper
Paper can make newspaper, paper towels, and paper bags.

Glass
Glass can make light bulbs, windows, and bottles.
5. Answer A is correct.
6. Liquid and solid

To use FocusCurriculum materials
with your students, please purchase
a school license.



Earth Science

Water

Basic Level

English Language Arts Activities

Physical Changes in Water

Print pages 24–28 of this PDF for the reading activities.

Make Predictions

TRY THE SKILL

If you understand what you read, you should be able to predict what will happen in a certain situation.

For example, if an ice cube is left on the kitchen counter, you can predict that it will change from a solid into a liquid.

If this liquid is heated, you can predict that it will become a gas.

If you bend a piece of wire, it will undergo a temporary physical change.

If you burn a piece of wood, it will undergo a permanent chemical change.

Use the answer choices to make or support your predictions. Shade in the circle next to your choice.

1. As you make vegetable soup, you cut up some carrots and add them to the pot. What will happen next?
 - Ⓐ The carrots will dissolve in the soup, creating a solution.
 - Ⓑ The carrots will still be visible in the soup because it's a suspension.
 - Ⓒ The carrots will diffuse into the soup.
2. Early on a spring morning, the air temperature drops. Next, the water vapor in the air will—
 - Ⓐ freeze into snowflakes.
 - Ⓑ condense into fog.
 - Ⓒ evaporate.
3. As the day continues, the air temperature rises again. Now the water vapor in the air will—
 - Ⓐ turn into rain.
 - Ⓑ condense into fog.
 - Ⓒ evaporate.

Use an Index

TRY THE SKILL

An index tells readers where to find information in a book. It is located near the end of a book. Look at the following index entries from *Physical Changes in Water*.

chemical change, 14	melting point, 10
condensation, 12	mixtures, 19–20
diffusion, 19	properties, 5, 6, 13
energy flow, 18	solids, 7, 8, 9
evaporation, 8, 11, 16	solution, 20
gas, 7, 8, 11	suspension, 20

Which page has information about diffusion?

Page 19

What information appears on page 18?

Information about energy flow

How many pages contain information about mixtures?

Two

Reread the index entries from *Physical Changes in Water*. Then shade the circle next to the correct answer.

1. What information would you find on pages 19–20?
 (A) information about mixtures
 (B) information about matter
 (C) information about melting point
2. How many pages contain information about evaporation?
 (A) two
 (B) three
 (C) four
3. Which pages would you check to find information about solids?
 (A) pages 7, 8, and 11
 (B) pages 5, 6, and 13
 (C) pages 7, 8, and 9
4. Which information comes earliest in the book?
 (A) melting point
 (B) properties
 (C) mixtures

Suffixes and Prefixes

TRY THE SKILL

Suffixes are short syllables at the ends of words. Prefixes are short syllables added to the beginnings of words. Suffixes and prefixes usually change the meaning of words. If you know what suffixes and prefixes mean, you can easily learn new words.

Look at the prefixes and suffixes below.

Word	Suffix	Prefix	Meaning	Definition
coloration	-ation		“action or process of”	the process of gaining color
microcamera		micro-	“small”	a very small camera

Read the sentences. Then write the definition of each word. Use the information in the chart to help you.

1. Particles break away from the liquid into the surrounding air. This is called evaporation.
2. If a gas cools enough, it condenses. If you have ever had a cold drink on a hot day, you have seen condensation.
3. Particles are so tiny, you cannot see them with even the strongest microscope.

Word	Suffix	Prefix	Meaning
1. evaporation	-ation		“action or process of”
2. condensation	-ation		“action or process of”
3. microscope		micro-	“small”

Definition

1. _____
2. _____
3. _____

Cause and Effect

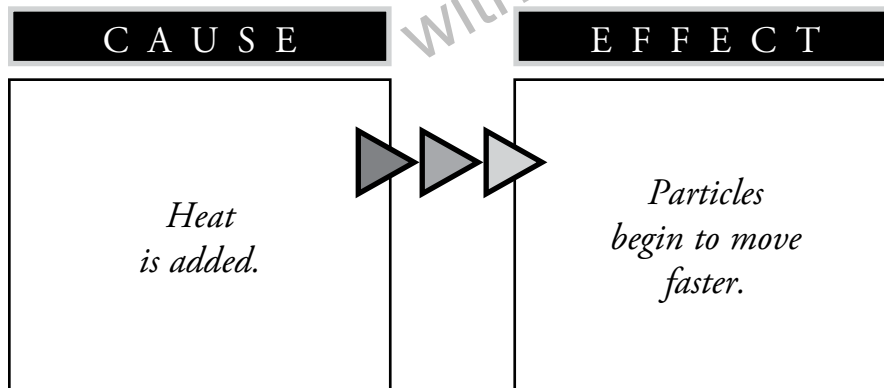
TRY THE SKILL

To find out an effect, you ask, "What happened?"
To find out a cause, you ask, "Why did that happen?"
Read this paragraph.

When solid water is heated, the particles in matter begin to move faster. The solid melts and becomes a liquid. This is called the melting point.

If heating continues, some particles gain enough energy to break away from the liquid. They move into the air. This is called evaporation. With enough heat, the particles begin to bubble and escape as a gas. This is called boiling.

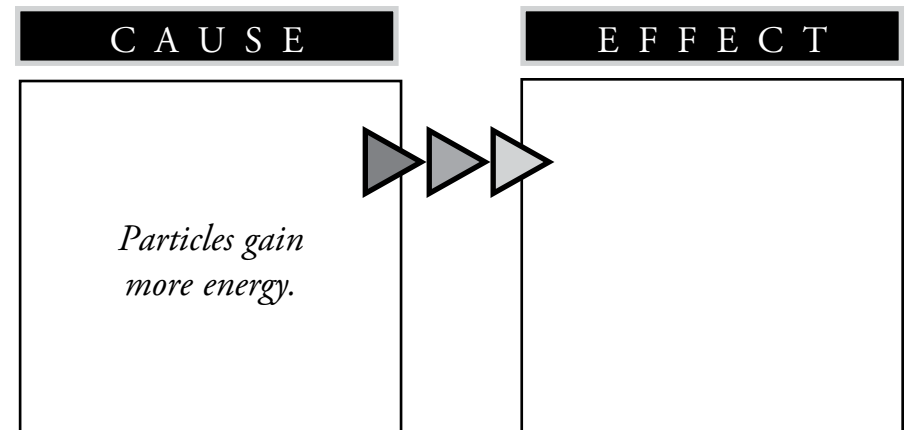
This graphic explains what happened.



Read the passage again. Then complete this graphic.
Tell what happens when a solid is heated.



Now complete this graphic. Tell what happens when a liquid is heated.



Answer Key

Make Predictions

1. B
2. B
3. C

Use an Index

1. A
2. B
3. C
4. B

Suffixes and Prefixes

1. the process of evaporating
2. the process of condensing
3. an instrument for looking at small objects

Cause and Effect

Effect: The solid becomes a liquid.

Effect: The particles begin to bubble and escape as a gas.