



SCIENCE • GRADE 3

California Content Standards
Physical Sciences: 1.E
Physical Sciences: 1.F
Physical Sciences: 1.G
Physical Sciences: 1.H
Physical Sciences: 1.I

Below Level

What Is Matter?

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LOOK
INSIDE
FOR:

California's
Academic
Content Standards
Covered

•
Reproducible
Student Book

•
Reproducible
English-language
Arts Activities

What Is Matter?

California's Science Content Standards Met

GRADE 3 SCIENCE

PHYSICAL SCIENCES: 1—Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept:

- e. Students know matter has three forms: solid, liquid, and gas.
- f. Students know evaporation and melting are changes that occur when the objects are heated.
- g. Students know that when two or more substances are combined, a new substance may be formed with properties that are different from those of the original materials.
- h. Students know all matter is made of small particles called atoms, too small to see with the naked eye.
- i. Students know people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are more than 100 different types of atoms, which are presented on the periodic table of the elements.

GRADE 3 ENGLISH LANGUAGE ARTS

1.0 WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT

Vocabulary and Concept Development 1.6—Use sentence or word context to find the meaning of unknown words.

Vocabulary and Concept Development 1.7—Use a dictionary to learn the meaning and other features of unknown words.

2.0 READING COMPREHENSION

Comprehension and Analysis of Grade-Level-Appropriate Text 2.3—Demonstrate comprehension by identifying answers in text.

Comprehension and Analysis of Grade-Level-Appropriate Text 2.6—Extract appropriate and significant information from the text, including problems and solutions.



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Student Book

What Is Matter?

Print pages 5 – 18 of this PDF for the student book.

How to Make the Student Book

- The student book is contained on pages 5–18 of this PDF. It begins on the next page.
- To make one student book, or a two-sided master copy that can be photocopied, you will print on both sides of seven sheets of 8.5" x 11" paper.
- Do a test printout of one book first to familiarize yourself with the procedure.
- Follow these instructions carefully.

First—Select the Paper

Since you will be printing on both sides of the sheets of paper, select a good quality white paper. We recommend using at least a 22lb sheet.

Second—Check Printer Settings

Be sure you have the correct page setup settings for your computer and printer. You will print these pages in landscape format.

Third—Print EVEN Pages

Open the PDF of the book you want to print. Select print from your file menu. In your printer's dialogue box enter pages 5–18 to print. Then select EVEN pages only. It is important to print only the EVEN pages first. Click "Print" to print the even pages. (**Important note:** The first page that prints will be blank. DO NOT discard this page. It will be needed to print the cover in the next step.)

Forth—Print ODD Pages

When the even pages have printed, flip the stack of pages over to print the odd pages. Place the stack back in your printer. Select print from the file menu again. In your printer's dialogue box, select ODD pages. Click "Print" to print the odd the pages.

Fifth—Fold the Book

You now have a complete book. Check to be sure the pages are in the correct order with the book's cover as the top page. Then fold the stack of paper in half.

Sixth—Staple the Book

Use an extended-length stapler to staple the pages together. Place three staples in the spine of the book.

Please note that printers vary in how they output pages. Do a test printing with one book and adjust the procedure as necessary.

If you want to make a one-sided master copy, print ALL pages 5–18 at once. Then select "one-sided to two-sided" on the copy machine.

What Is Matter?
**California's Science
Content Standards Met**

BL

GRADE 3 SCIENCE

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- i. Students know people once thought that earth, wind, fire, and water were the basic elements that made up all matter. Science experiments show that there are more than 100 different types of atoms, which are presented on the periodic table of the elements.

GRADE 3 ENGLISH LANGUAGE ARTS

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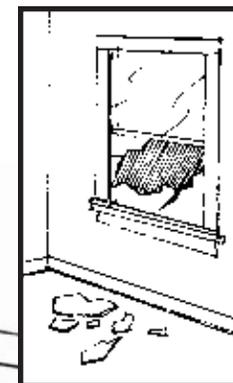
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What Is Matter?

by Charles Pederson





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What Is Matter?

Look around your classroom. You probably notice tables, desks, and books. You may see a plant or fish in a tank. You see other students, too. How are all these things alike?

They are all made up of matter. Matter is anything that takes up space.

Everything is made up of matter. People, animals, plants, water, air, and this book you are holding are made up of matter.

matter: anything with mass that takes up space

Forms of Matter

There are three types, or forms, of matter—solids, liquids, and gases.

Solids

Solids have a certain size and shape. Solids don't change size or shape unless something makes them change. Wood is a solid

Liquids

Liquids have size and take up space. They don't have a certain shape. Liquids can be poured and spilled. Unlike a solid, a liquid will take the shape of the container it is poured into. Milk is a liquid.

Gases

Gases have no shape or size of their own. Air is a mixture of gases. You can't see air, but you can feel it when the wind blows.

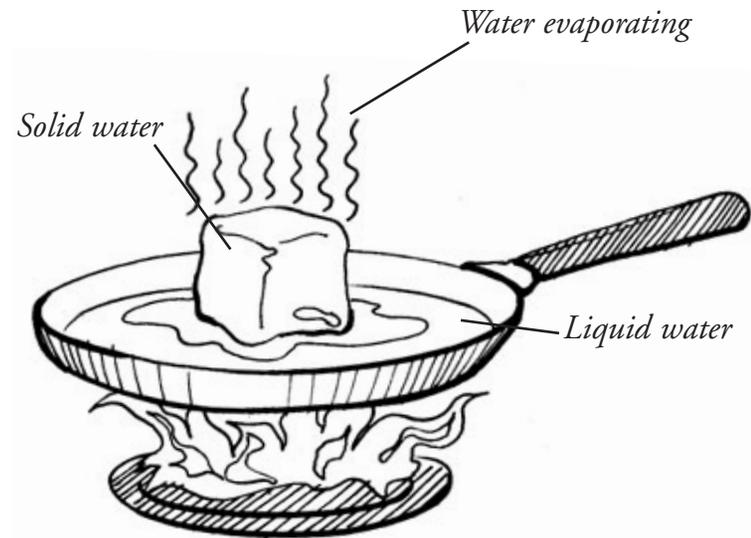
Water clearly shows the three forms of matter. Solid water is ice. For example, an ice cube is solid. It holds its own shape.

Liquid water can be poured and spilled. Liquid water takes the shape of any container that holds it. For example, liquid water takes the shape of a glass.

Water as a gas can be seen as steam. Water as a gas can also be **invisible**.

invisible: not able to be seen

Three Forms of Water



Solid water as ice holds its shape. Liquid water takes the shape of the container holding it. Water as gas spreads out into the air.

Atoms

Long, long ago, people thought that all the matter in the world was made up of four **elements**. These elements were earth, wind, fire, and water. These four elements seemed to make up everything because earth, wind, fire, and water are what people could see.

However, later the Greeks had a different idea. They thought all matter was made up of tiny bits or particles. They called these tiny particles atoms. Today, the Greeks idea is known to be true. All matter is made up of atoms.

element: a substance that cannot be separated into simpler parts by ordinary means

Atoms are very, very small. They are so small that you can't see them. Millions of atoms could fit inside the dot on the letter *i*.

Atoms are the smallest particles of matter. They can not be divided or cut into something else.

Elements

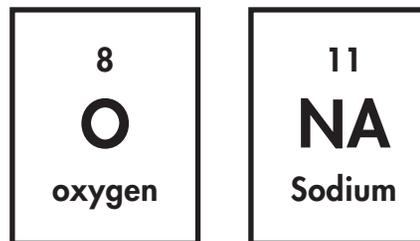
An element is made up of only one kind of atom. For example, gold is an element. It is made up of only gold atoms. The element iron is made up of only iron atoms.

Scientists have discovered that there over 100 different elements. These elements are listed on a special chart called The Periodic Table of Elements.

On The Periodic Table of Elements each element has a name and a symbol of one or two letters.

The symbol for oxygen is *O*.

The symbol for sodium is *Na*.

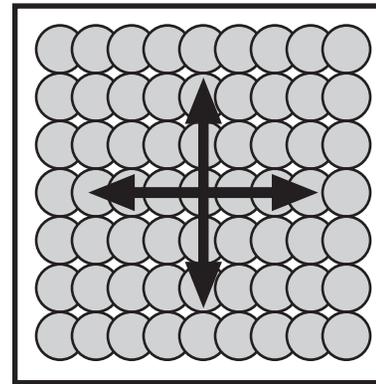


All molecules move. So all matter is made up of moving molecules. Look at the pictures of molecules on page 15.

In a solid, the molecules are close together. The molecules can only move a little.

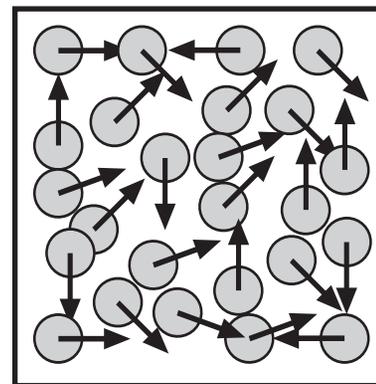
In a liquid, the molecules are farther apart. The molecules can move around each other.

In a gas, the molecules are far apart. The molecules move around quickly and spread out to fill space.



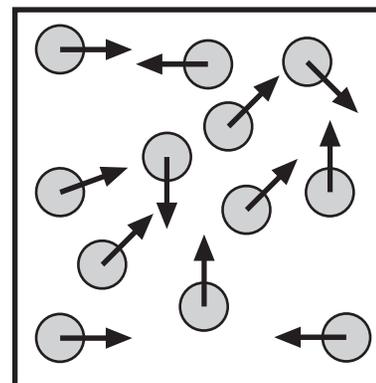
Solids

Solids have packed molecules. They move very little.



Liquids

The molecules in liquids are farther apart. The molecules are able to slide over each other.



Gases

The molecules in gases are farthest apart. The molecules can move in any direction.

Physical Changes in Matter

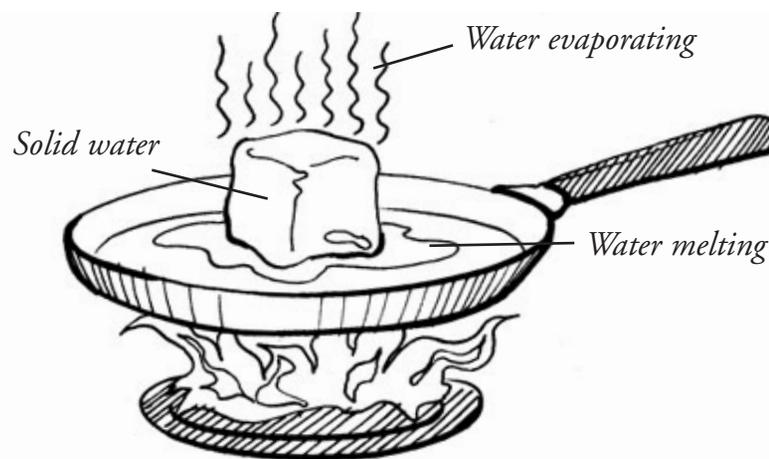
Matter is always changing. One type of change is physical change. Physical change happens when things change size, shape, or form.

Matter can change form when heat is added. For example, when a solid is heated, the molecules begin to move faster. They start to break away from their places. At the temperature where the solid melts, it becomes a liquid. This is a physical change.

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

If heating goes on, more molecules break away from the liquid. They move to fill all the space they can find. This is called **evaporation**. The liquid goes through a physical change. It changes from a liquid to a gas.

Look at the picture below. You can see that the heat creates a physical change. The ice cube changes from a solid to a liquid and then to a gas.



Heat makes solid water (ice) melt into liquid water. Heat makes the liquid water evaporate and change to a gas.

evaporation: to change from a liquid to a gas

You know that if heat is added, a solid may melt. But different kinds of solids have different melting points.

Think about steel. It is a hard metal. But if you add a lot of heat—much more heat than is needed to melt ice— steel will melt. It becomes a liquid. The liquid is still steel, even though its color, temperature, and shape have changed.

CHAPTER 6

Chemical Changes in Matter

Another type of change is chemical change. Chemical change happens when different molecules mix together to make new types of molecules.

For example, if you mix baking soda and vinegar, the mixture will bubble. The atoms that make up the baking soda molecules and the vinegar molecules are making a new kind of molecule. The bubbles of gas you see comes from this new molecule called carbon dioxide.

Look for chemical changes all around you. You see a chemical change when a candle burns or bread dough rises. A rusty nail shows chemical change. Chemical changes happen in your stomach, too. Without chemical changes, you would not be able to digest your food.

Matter is all around us. It makes up the world we can see and even what we can't see.

Matter is always changing. Some changes are physical. Some are chemical.

Without matter, nothing would exist. With matter, everything exists! Maybe you will become a scientist someday and discover something new about matter.

Write several sentences that summarize the main ideas in this book.

Glossary

element—a substance that cannot be separated into simpler parts by ordinary means

evaporate—to change into a gas or vapor

invisible—not able to be seen

matter—anything with mass that takes up space

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

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/physchg.htm](http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/physchg.htm)

Write for more information

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

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ENGLISH-LANGUAGE ARTS • GRADE 3

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Comprehension and Analysis of Grade-Level-Appropriate Text: 2.6

Below Level

English-language Arts Activities

What Is Matter?

Print pages 20–24 of this PDF for the reading activities.

Compare and Contrast

TRY THE SKILL

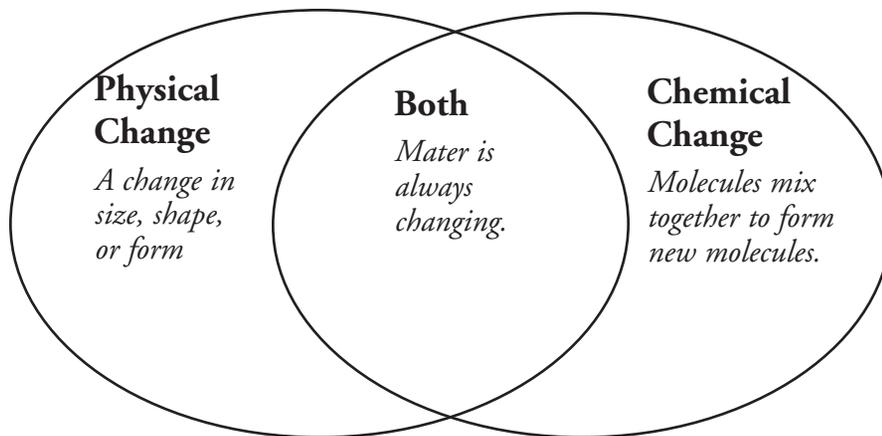
Comparing and contrasting can help you understand what you read.

- Comparing tells how things are alike.
- Contrasting tells how things are different.

Read these paragraphs from *What Is Matter?* Then, read the Venn diagram that compares and contrasts.

Matter is always changing. One type of change is physical change. Physical change happens when things change size, shape, or form.

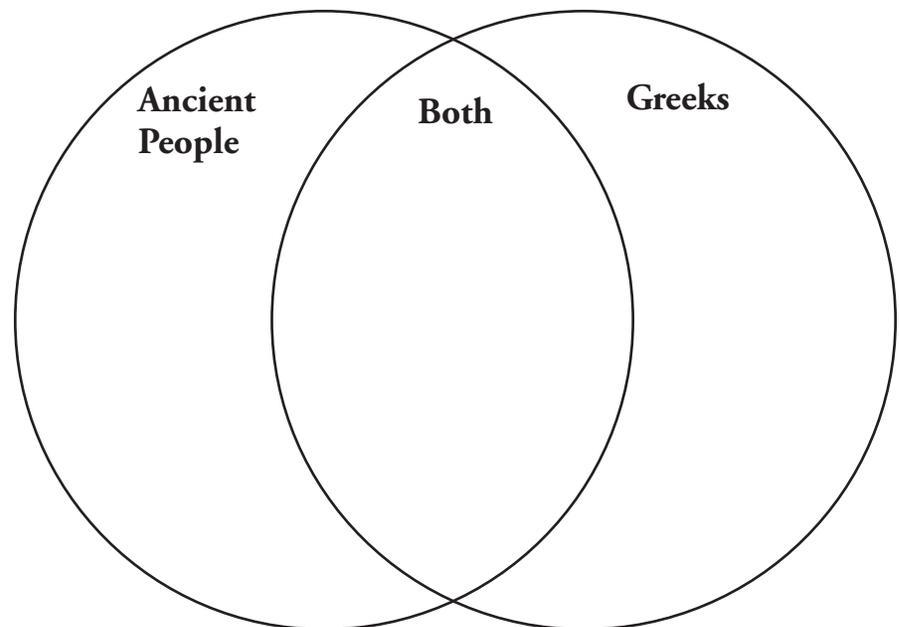
Another type of change is chemical change. Chemical change happens when different molecules mix together to make new types of molecules.



Read the passage. Think about comparing and contrasting. Then complete the Venn diagram.

Long, long ago, people thought that all the matter in the world was made up of four elements. These elements were earth, wind, fire, and water.

However, later the Greeks had a different idea. They thought all matter was made up of tiny bits or particles. They called these tiny particles atoms.



Context Clues

TRY THE SKILL

To figure out the meaning of an unknown word, look for words in the same sentence or nearby sentences that give you clues.

Read this paragraph. Try to figure out what *evaporation* means.

If heating goes on, more molecules break away from the liquid. They move to fill all the space they can find. This is called evaporation. The liquid goes through a physical change. It changes from a liquid to a gas.

What does the word *evaporation* mean?

Evaporation is when a liquid changes into a gas. The last sentence defines the word. The first two sentences also give you clues. They state that molecules break away from liquids and move to fill space.

Read this paragraph. Answer the questions.

Think about steel. It is a hard metal. But if you add a lot of heat—much more heat than is needed to melt ice—steel will melt. It becomes a liquid. The liquid is still steel, even though its color, temperature, and shape have changed.

1. What does the word *melt* mean in the selection?
Ⓐ to become hard
Ⓑ to become a liquid
Ⓒ to change shape
2. Write a sentence of your own that correctly uses the word *melt*.

Question and Answer

TRY THE SKILL

You can monitor your understanding of what you read by asking questions about the topic and then reading to find the answer. Sometimes authors will even write a question in the text and then answer it.

Read the passage.

Look around your classroom. You probably notice tables, desks, and books. You may see a plant or fish in a tank. You see other students, too. How are all these things alike?

They are all made up of matter. Matter is anything that takes up space.

Everything is made up of matter. People, animals, plants, water, air, and this book you are holding are made up of matter.

What is the question?

What is matter?

What is the answer?

Matter is anything that takes up space. Everything is made of matter.

Read the question. Write an answer in your own words.

What are molecules?

Now think of another question you could ask based on *What Is Matter?* Then, write the question and an answer in your own words.

Use a Dictionary or Glossary

TRY THE SKILL

What should you do if you don't know what a word means or if you do not know how to pronounce a word? You can look in the dictionary.

Read these words from *What Is Matter?* Draw a line to match each word with its meaning. If you don't know the meaning, look the word up in a dictionary.

Words

1	matter
2	invisible
3	evaporate
4	physical
5	element

Meanings

A	not able to be seen
B	having to do with things that can be seen or measured
C	anything with mass that takes up space
E	a substance that cannot be separated into simpler parts by ordinary means
F	to change into a gas or vapor

Answer Key

Compare and Contrast

Ancient People: Thought matter was four elements—earth, wind, water, and fire

Both: studied matter

Greeks: Thought matter was made up of tiny particles they called atoms.

Context Clues

1. B
2. Sentences will vary but should indicate that students understand the meaning of the word *resistance*.

Question and Answer

1. Molecules are atoms grouped in certain ways.

Use a Dictionary or Glossary

1. C
2. A
3. F
4. B
5. E