



Matter Is Everything!



Photo Credits: Cover: Brian Hagiwara/Foodpix/Getty Images; 2 John A. Rizzo/Photodisc/Getty Images; 3 Jack Hollingsworth/Photodisc/Getty Images; 4 (l) Martin Harvey/Corbis, (r) Martin Harvey/Corbis; 5 Mark Edward Atkinson/Getty Images; 6 Carlos Dominguez/Corbis; 7 Jerry Kobalenko/Getty Images; 8 Creativ Studio Heinemann/Westend61/Corbis; 9 Medioimages/Photodisc/Getty; 10 Steve Cole/Photodisc/Getty Images; 11 Image Source/Corbis; 12 Joshua Ets-Hokin/Corbis; 13 BlueMoon Stock/Alamy; 14 Corbis; 15 Burke/Triolo Productions/Brand X/Corbis.

If you have received these materials as examination copies free of charge, Harcourt School Publishers retains title to the materials and they may not be resold. Resale of examination copies is strictly prohibited and is illegal.

Possession of this publication in print format does not entitle users to convert this publication, or any portion of it, into electronic format.



Matter Is Everything!

Copyright © by Harcourt, Inc.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher.

Requests for permission to make copies of any part of the work should be addressed to School Permissions and Copyrights, Harcourt, Inc., 6277 Sea Harbor Drive, Orlando, Florida 32887-6777. Fax: 407-345-2418.

HARCOURT and the Harcourt Logo are trademarks of Harcourt, Inc., registered in the United States of America and/or other jurisdictions.

Printed in Mexico

ISBN 978-0-15-362217-5

ISBN 0-15-362217-2

1 2 3 4 5 6 7 8 9 10 050 16 15 14 13 12 11 10 09 08 07

 **Harcourt**
SCHOOL PUBLISHERS

Visit *The Learning Site!*
www.harcourtschool.com

Matter: It Matters

Matter is anything that takes up space. You can see matter all around you. What are some examples of matter in your classroom? Your desk is matter. This book is matter. Your teacher is matter—and so are you!

What did you have for lunch today? Did it take up space? Then it is matter. Even a small pea is matter. The milk you drink is matter.

The air that you breathe is matter, too. You can't see it, but it is matter. Air takes up space. You can feel air on your skin. You can see air move leaves or pieces of paper.



Everything in this room is matter. The tables and chairs are matter. The food is matter. The air is matter, too.



We would need a very large balance to measure the mass of this elephant!

All matter has mass. **Mass** is the amount of matter in an object. Some objects have more mass than others. An elephant has more mass than a mouse. We can measure mass by using a balance.

We often measure mass in grams or kilograms.

All matter has volume. **Volume** is how much space matter takes up. For instance, it takes one liter of water to fill up a one-liter bottle. The water in that bottle has a volume of one liter.

Fast Fact

Size isn't important when it comes to mass. A small rock can have more mass than a big balloon! Use a balance, and try it!



MAIN IDEA AND DETAILS What is mass?

Does It Float?

Density is the mass of matter compared to the space it takes up.

Suppose you have a baseball and a foam ball. Which one do you think is denser? Both are about the same size. The baseball has more mass than the foam ball. Since both balls take up the same space, only the mass is important. The ball with more mass has the greater density. So, the baseball is denser than the foam ball.

The glass on the right has more mass. It has more orange juice in it than the glass on the left.





These objects float because they are less dense than the water.

Have you ever sailed a toy boat in a pond or stream? Density is the reason some objects float and others sink. Matter in water sinks when it is denser than water. Matter in water floats when it is less dense than water.

Put a few tablespoons of corn syrup into a glass. Then put in some water. The water will float above the syrup because it is less dense.



MAIN IDEA AND DETAILS Why does some matter float in water and other matter sink?

Three States of Matter

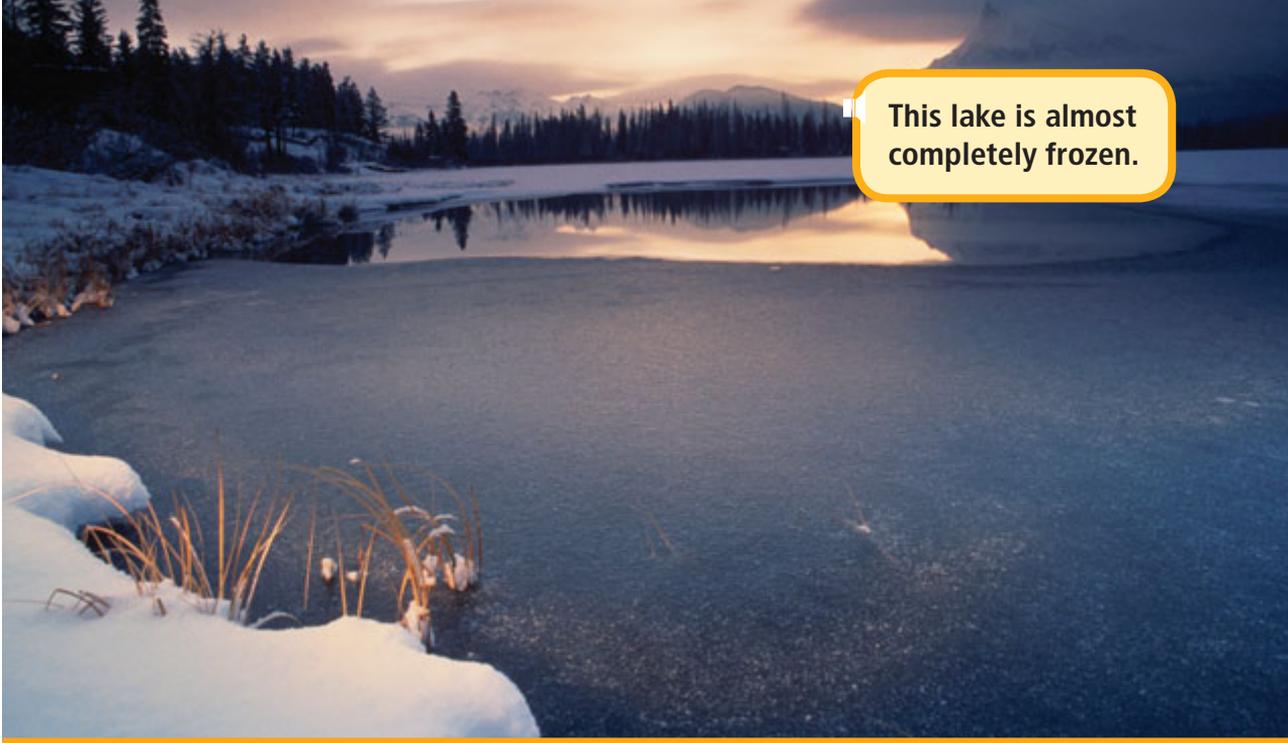
You know that this book is matter. You know air is matter. What you drink is matter, too. How can this be? Matter comes in three states. Matter can be a solid, a liquid, or a gas. Matter can even change its state. Think of an ice cube melting into liquid. It changes state.

■ This book is a solid. You can shake it, and it will not change shape or size. A **solid** is matter with a volume and shape that stay the same.

■ An ice cube is a solid, too. It has a shape that stays the same. It has a volume that stays the same. The particles in a solid move much slower than the particles in liquids. This is why solids stay the same shape.

All the objects in this room are solids.





This lake is almost completely frozen.

How do you make an ice cube change its state? You add thermal energy. When you heat it, it melts. It becomes a liquid. When you heat matter, its particles move faster. When you cool matter, its particles slow down.

Fast Fact

Solid water is less dense than liquid water. That's why ice floats.

If you remove enough thermal energy from water, it becomes a solid. In winter, lakes and rivers can get so cold that they freeze. The water turns into ice. If the ice gets thick enough, people can skate on it.



COMPARE AND CONTRAST What does adding or removing thermal energy do to water?

Liquids

Like a solid, a **liquid** has a volume that stays the same. However, it has a shape that can change. A liquid changes shape to match its container.

■ If you pour a liquid into a square cube, the liquid will be shaped like the cube. If you pour it into a tall vase, the liquid will be shaped like the vase. Its shape will change but not its volume.

■ If you pour juice into a tall glass, it will look tall. If you pour juice into a short glass, it will look short. However, that is just the shape of the glass. To know the volume of the liquid, you have to measure it.



A liquid takes the shape of its container—whatever that shape is.





Liquids are all around you.
You can swim in some liquids.



Liquids are all around you. Juice is a liquid. The shampoo you use to wash your hair is a liquid. Blood is a liquid, too. Some liquids are denser than others. Oil is a dense liquid. Water is not.



We use water for drinking, cleaning, and having fun. In summer, people swim in lakes, rivers, pools, and oceans.



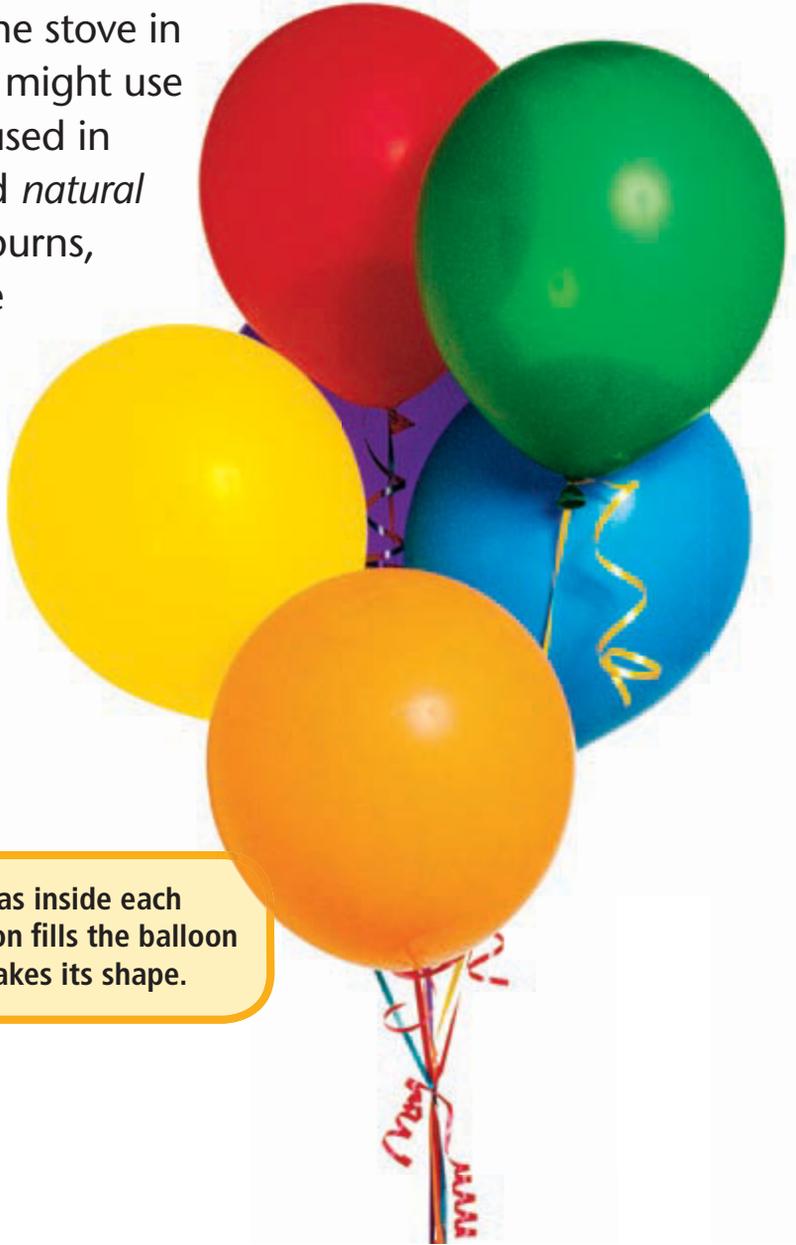
COMPARE AND CONTRAST What happens to liquids when you put them into containers? What happens to solids when you put them into containers?

What a Gas!

A gas does not have an exact shape or volume. A gas will take up all the space in a container. It will also take the shape of that container. Look at a balloon. The gas in the balloon fills all the space inside it and takes the balloon's shape.

The air we breathe is a gas. Look at the stove in your house. It might use gas. The gas used in stoves is called *natural gas*. When it burns, you see a blue flame. When the gas is not burning, you can't see it.

The gas inside each balloon fills the balloon and takes its shape.





All this rain was once in gas form. We can't see it until it changes back into a liquid.

When you heat water, particles start to move into the air. This process is called **evaporation**. When water boils, it changes from a liquid to a gas called *water vapor*.

When a gas cools, it becomes a liquid again. This is called **condensation**. Rain is an example of condensation. When water vapor in the air changes to a liquid, we have rain.

Fast Fact
Have you seen water on the outside of a cold glass of juice? That isn't a leaky glass. It's condensation. Gas in the air cools on your glass and turns back to liquid.



SEQUENCE Explain how water becomes a gas and then a liquid again.

Mixing It Up

Suppose you are hungry. You decide to make a salad. You start with lettuce. Then you add other vegetables. You have made a mixture. A **mixture** is any substance that has two or more kinds of matter. Your salad has many kinds of matter. It is a mixture.

When you make a mixture, you put different kinds of matter together. You do not make new matter. You can see the different vegetables in the salad. Can you see something you did not put in? No. There is no new matter in the mixture.

The salad is a mixture. It is made of different kinds of matter.



Now you want a drink. Have you ever made a drink using powder and water? The particles of drink powder mix with the water. When the drink powder dissolves, it is mixed with the water, but you can't see it.

The drink is a solution. A **solution** is a mixture in which different kinds of matter mix evenly. Suppose you put salt in water. What happens? The salt dissolves. That is why you can't see it. Oil does not dissolve in water. Oil and water make a mixture, not a solution.



MAIN IDEAS AND DETAILS How do you make a mixture?

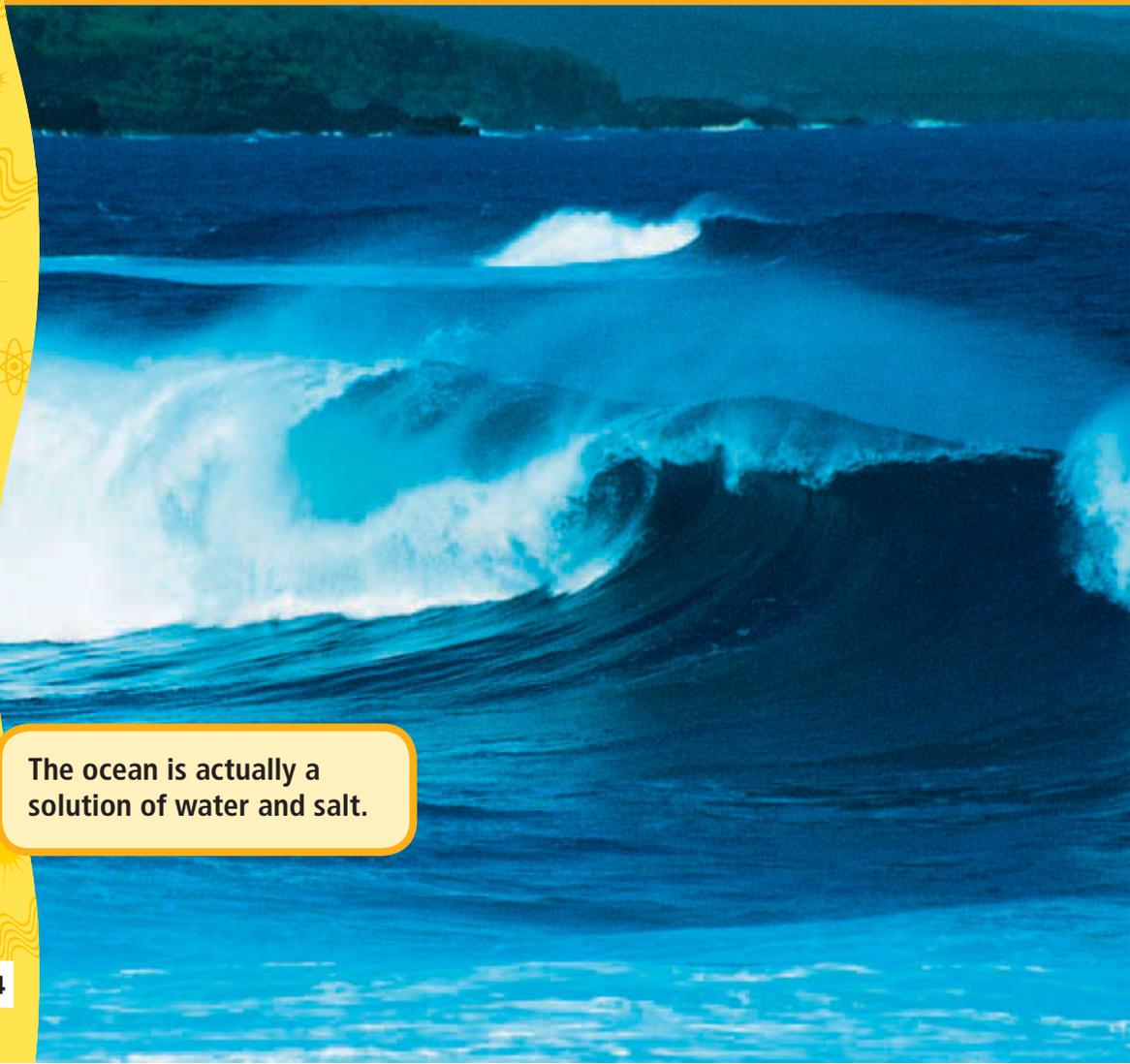


This lemonade is a solution made from lemon juice, water, and sugar. The lemon slices are added to make it look pretty.

More About Mixtures

You can separate the matter that is in mixtures. Think about your salad. You can take the different vegetables out. You can take the lettuce out. You can separate the matter in the mixture you made.

You can separate the matter in solutions, too. How can you separate the salt from the water in salt water? You can boil it. What happens? The water evaporates. You are left with just salt.



The ocean is actually a solution of water and salt.

When you have a mixture, you can observe it. You can count how many kinds of matter are in it. You can see the different kinds of matter in a mixture.



MAIN IDEA AND DETAILS Name some things you can observe about a mixture.

This simple device separates mixtures of food and water. You might use it when you cook spaghetti.



Summary

Liquids, solids, and gases are all matter. They all have mass, volume, and density. Solids keep their shape and volume. Liquids keep their volume but change their shape. Gases do not have an exact shape or volume.

Matter can change its state. Water can be solid, liquid, or gas. Adding heat to water can make it a gas. When the heated particles move into the air, the process is called evaporation. Freezing liquid water makes it ice. Ice is a solid.

Mixing two or more kinds of matter makes a mixture. When the matter in a mixture combines evenly, it is a solution.

Glossary

- || **density** (DEN•suh•tee) The mass of matter compared with its volume (4, 5, 15)
- || **evaporation** (ee•vap•uh•RAY•shuhn) The process by which liquid water changes into a water vapor (11)
- || **gas** (GAS) Matter that has no definite shape or volume (6, 10, 11, 15)
- || **liquid** (LIK•wid) Matter that has a volume that stays the same but a shape that can change (6, 7, 8, 9, 11, 15)
- || **mass** (MAS) The amount of matter in an object (3, 4, 15)
- || **matter** (MAT•er) Anything that takes up space (2, 3, 4, 5, 6, 7, 12, 13, 14, 15)
- || **mixture** (MIKS•chuhr) A substance that has two or more different kinds of matter (12, 13, 14, 15)
- || **solid** (SAHL•id) Matter with a volume and a shape that both stay the same (6, 7, 8, 9, 15)
- || **solution** (suh•LOO•shuhn) A mixture in which the different kinds of matter mix evenly (13, 14, 15)
- || **volume** (VAHL•yoom) The amount of space that matter takes up (3, 6, 8, 10, 15)

Think and Write

-  **1.** What is matter? Give an example of matter in each of the three states it can be in.
-  **2. MAIN IDEA AND DETAILS** Explain why some matter floats and other matter sinks.
-  **3. COMPARE AND CONTRAST** How are liquids and gases the same and different?
-  **4. Narrative Writing** Suppose you are a water particle in a kitchen. Write a journal entry about a day in your life.

Hands-On Activity

With a partner, collect solid matter from around the classroom. Put the materials into a container to make a mixture. Then, separate your mixture based on physical properties.

School-Home Connection

Discuss mixtures and solutions with a family member. Then make a fruit and gelatin dessert together. Is it a mixture or a solution?

GRADE 3

OL Book 11

WORD COUNT

1200

GENRE

Expository Nonfiction

LEVEL

See TG or go Online



Harcourt Leveled
Readers Online Database
www.eharcourtschool.com

ISBN 978-0-15-362217-5

ISBN 0-15-362217-2



9 780153 622175