



ESSENTIAL QUESTION

What Are the States of Water?



Engage Your Brain

Find the answer to the following question in this lesson and record it here.

How is the snow in this picture like an ice cube?



ACTIVE READING

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

| | |
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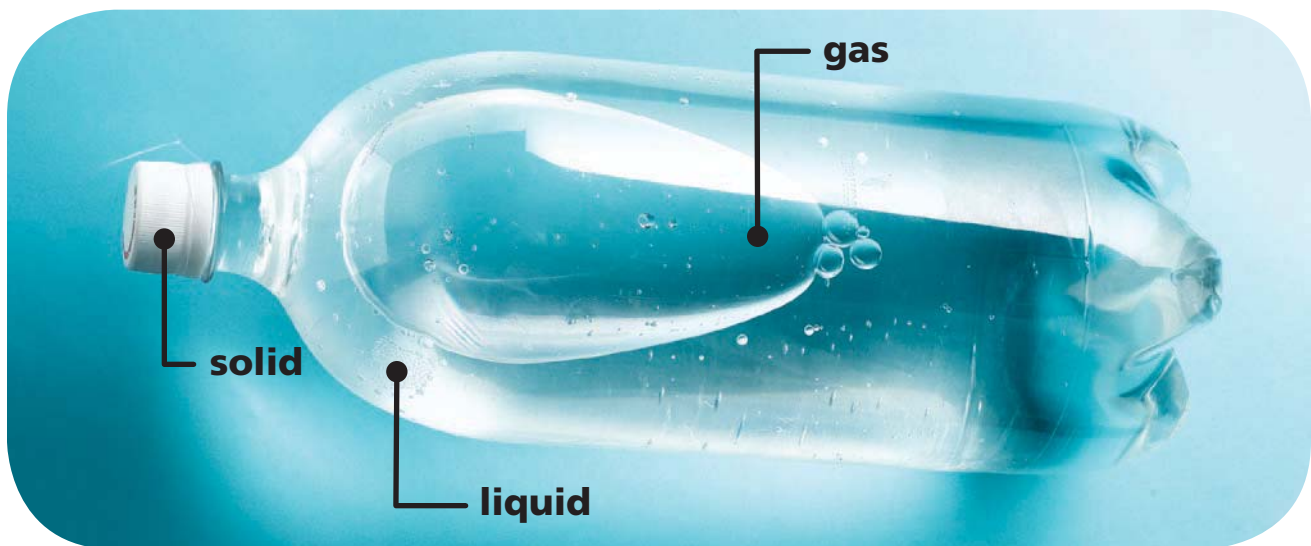
Compare and Contrast

Many ideas in this lesson are connected because they explain comparisons and contrasts—how things are alike and how they are different. Active readers stay focused on comparisons and contrasts when they ask themselves, How are these things alike? How are they different?

Solids, Liquids, and Gases

Matter exists in different forms. The air around us is a gas. The water we drink is a liquid. Your book is a solid.

ACTIVE READING As you read these two pages, underline the contrasting characteristics of each state of matter.



Solids, liquids, and gases are three **states of matter**. Most matter on Earth is classified as one of these forms.

A **solid** has a definite volume and shape. Your desk, book, pencil, and chair are all solids. Solids stay solid unless something, such as heat, changes them.

A **liquid** has a definite volume but not a definite shape. A liquid takes the shape

of whatever container holds it. Water, shampoo, and fruit juice are liquids.

A **gas** doesn't have a definite volume or shape. It expands to take up all the space in a container. If you blow up a balloon, you can see that air spreads out to fill the space. The air we breathe is a mixture of gases.

► Label each item as a solid, a liquid, or a gas.

helmet

sweat

breath

teeth

outside of ball

inside of ball

outside of bottle

water inside bottle

bone

muscle

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You are nearly 70% water! The rest of your body is made of gases such as oxygen and solids such as fats.

Water's Forms

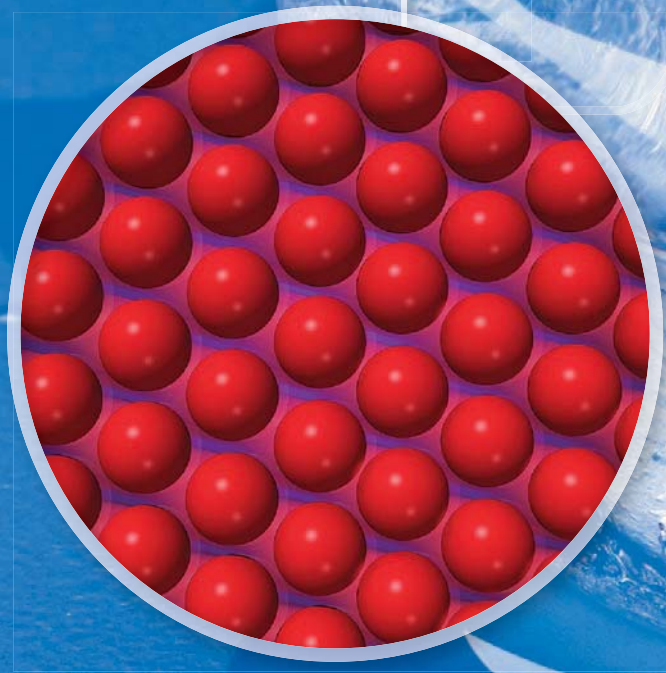
Water can be a solid, a liquid, or a gas. This ice cube is solid water. It melts into a liquid. When water is a gas, it is called water vapor.

Water is made of tiny particles. We can learn what state water is in by knowing how fast the particles in it move.

Solid

Water in the solid state has a definite volume and shape. You can make square or round ice cubes. You can make big ones or little ones.

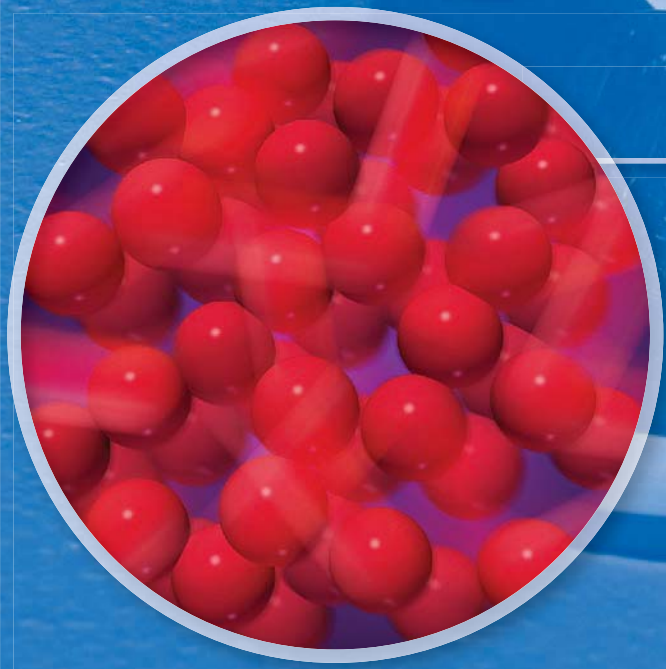
The particles in solids are close together. They are moving, but stay in the same spot, much like the strings of a guitar vibrating back and forth.

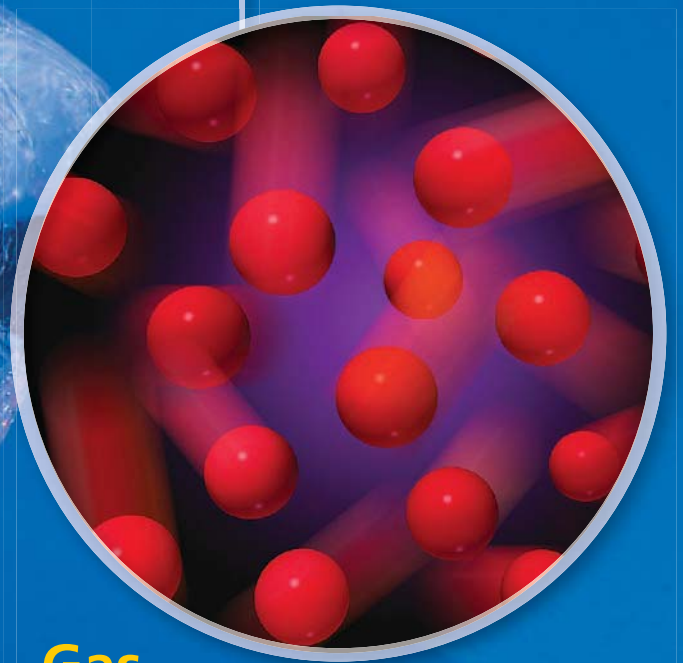


Liquid

Liquid water has a definite volume but not a definite shape. Pouring water from a glass into a bowl changes its shape, but not its volume.

Generally, particles are a bit farther apart in a liquid than in a solid. They move around more, too. The particles slide past each other.





Gas

The air around the ice cube has water vapor in it. We can't see the water vapor, but it's there. A gas doesn't have a definite volume or shape.

Particles in a gas are far apart. They are much farther apart than the particles in a liquid. They move very quickly in all directions.

► Use what you have learned to fill in the chart.

| | Physical Properties | How We Use It |
|--------------|-----------------------------|----------------|
| ice | | |
| liquid water | | |
| water vapor | no definite volume or shape | steam cleaning |

Freezing

At a certain temperature, water can freeze as heat energy is removed. Particles slow down and get closer together. They begin to lock into place. Water changes from a liquid to a solid. A **change of state** occurs when matter changes from one state to another.

Melting

Adding heat energy causes ice to melt. Particles speed up until they overcome the attractions that hold them in place. Water melts when it changes from a solid to a liquid.



Water Changes Form

Anything made out of snow will melt if it gains enough heat energy. Energy from the sun causes the snow to change to a liquid.

ACTIVE READING As you read these two pages, compare changes of state. Draw a circle around changes that happen when heat is added.

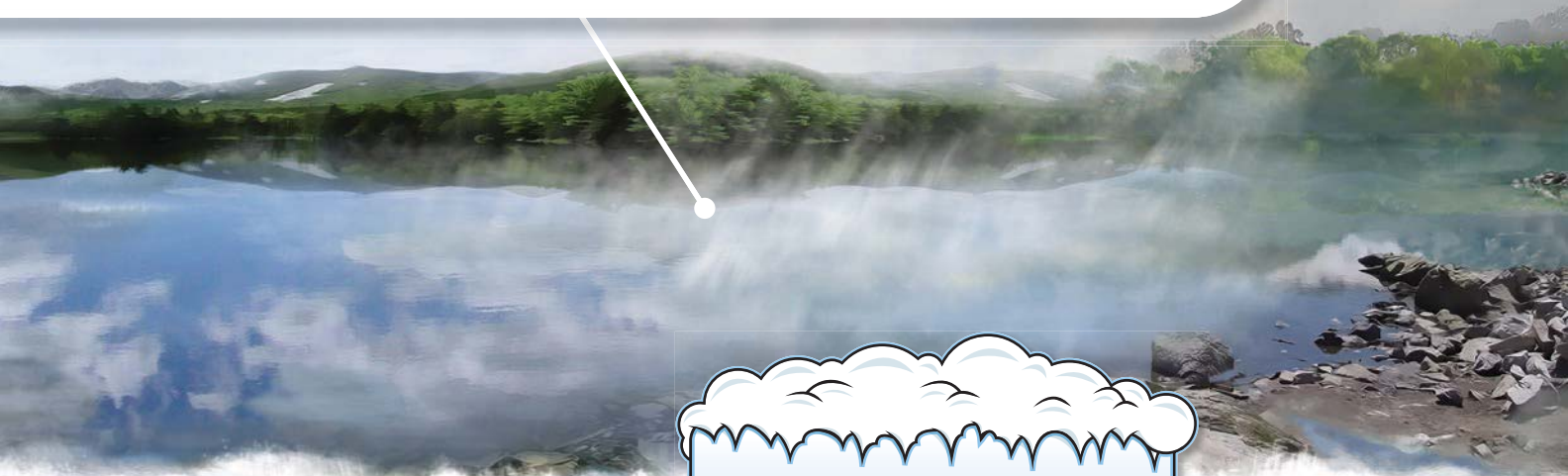
Evaporation

When heat energy is added to water, its particles speed up. Particles that gain enough energy enter the air as water vapor. **Evaporation** is the process by which a liquid changes into a gas. Water evaporates from oceans, lakes, and rivers every day.

Condensation

When heat energy is removed from a gas, its particles slow down and clump together.

Condensation is the process by which a gas changes into a liquid. Clouds form when water vapor condenses on particles of dust in the air.



Gas to liquid

Liquid to solid

Energy removed

► Fill in the missing information to describe each change of state.

Liquid to gas

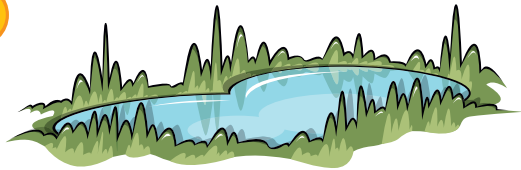
Energy added

Energy added

Sum It Up »

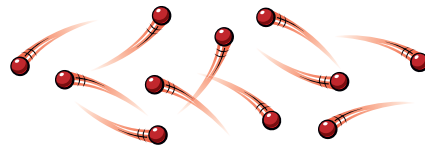
Write the vocabulary term that matches each photo and caption.

1



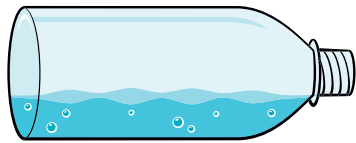
The sun's heat will make this water change to a gas.

2



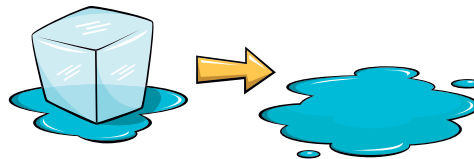
These particles move very quickly and spread out in all directions.

3



The water in this bottle has a definite volume and takes the shape of its container.

4



This happens when water changes form.

Fill in the missing words to tell about the states of matter.

Water as a solid has a definite [5] _____ and [6] _____.

The particles vibrate in place. Liquid water does not have a definite [7] _____. The particles [8] _____ past each other.

The air around ice has water [9] _____ in it. Since it's a gas, its particles are very far apart.

Water's changing from a liquid to a solid is [10] _____.

Adding [11] _____ can make ice melt. It also can make water change from a liquid to a gas. This is called [12] _____. Water's changing from a gas to a liquid is called [13] _____.



Name _____

Vocabulary Review

1 Unscramble these words. Use the highlighted letters to find the answer below.

sag

disol

qiludi

stianodocnne

rvapnotieao

ngecha fo ttase

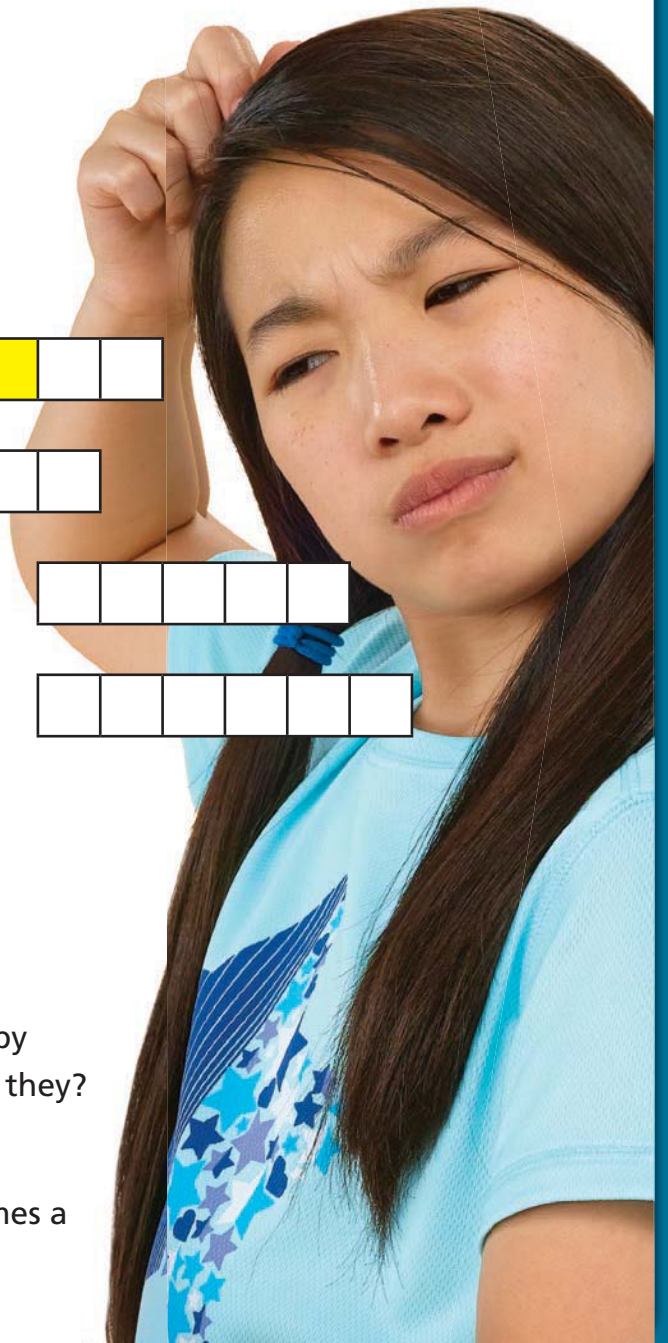
ttases fo tmaert

tware

povra

We can find out what state water is in by finding how fast these move. What are they?

Draw a star next to each word that names a state of matter.



Apply Concepts

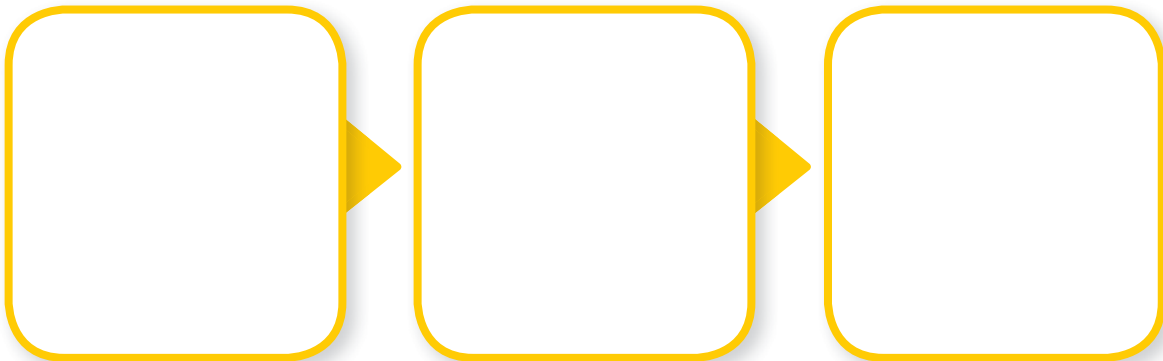


- 2** Make a menu for a meal. The meal will have 3 solids and 3 liquids.

Solids

Liquids

- 3** Draw and label a diagram to show what happens to the particles of a substance as it changes from a solid to a liquid to a gas.



- 4** Name an example of condensation.

- 5** Name an example of evaporation.

Take It Home!

Make "Sunshine on a Stick"! Put an ice cube tray filled with orange juice into the freezer. When partly frozen, place a toothpick in each section. When the juice is a solid, you can eat it off the toothpicks!