

2.1

KEY CONCEPT

Water continually cycles.

Sunshine State STANDARDS

SC.D.1.3.3: The student knows how conditions that exist in one system influence the conditions that exist in other systems.

SC.G.1.3.4: The student knows that the interactions of organisms with each other and with the non-living parts of their environments result in the flow of energy and the cycling of matter throughout the system.

SC.G.1.3.5: The student knows that life is maintained by a continuous input of energy from the sun and by the recycling of the atoms that make up the molecules of living organisms.

BEFORE, you learned

- The force of running water causes erosion
- Water can be solid

NOW, you will learn

- What makes water important
- How much of Earth's water is salt water
- How water moves throughout Earth and its atmosphere

EXPLORE Water Vapor

Where does the water come from?

PROCEDURE

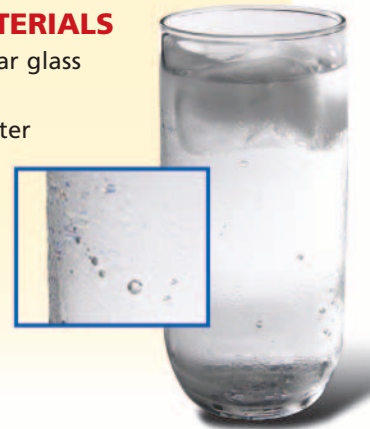
- 1 Put the ice in the glass and fill it with water.
- 2 Observe what happens to the outside of the glass.

MATERIALS

- clear glass
- ice
- water

WHAT DO YOU THINK?

- Where did the water on the outside of the glass come from?
- What does this activity tell you about the air surrounding you? What conclusion can you draw?



FCAT VOCABULARY

water cycle p. 52
evaporation p. 53
condensation p. 53

VOCABULARY

fresh water p. 51
salt water p. 51
precipitation p. 53

MAIN IDEA AND DETAILS

Make a two-column chart to start organizing information about water.

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Water is a unique substance.

Seen from outer space, Earth glistens like a beautiful blue and white marble. Welcome to the “water planet,” the only planet in our solar system with a surface covered by a vast amount of liquid water. Because of water, a truly amazing substance, life can exist on Earth.

What is so amazing about water? In the temperature ranges we have on Earth, it exists commonly as a solid, a liquid, and a gas. At a low temperature, water freezes. It becomes a solid, which is ice. At a higher temperature, it flows easily in liquid form. Liquid water can become a gas, especially at higher temperatures. If you have ever noticed how something wet dries out in the hot sunlight, you have observed the effect of liquid water changing into a gas. The gas form is the invisible water vapor in our atmosphere.

Liquid water can fit any container. It can hold its shape in a raindrop, then merge with other drops to flow down a hill or slow down and sit for centuries in a lake.

Water covers most of Earth.

Earth looks bluish from space because most of Earth's surface is ocean. If you look at a globe or a world map, you will see the names of four oceans—Atlantic, Pacific, Indian, and Arctic. If you look more closely or trace the four named oceans with your finger, you will see that they are connected to one another. Together they form one huge ocean. Any part of this ocean is called the sea.

The global ocean covers 71 percent, or almost three-quarters, of Earth's surface. Most of the ocean is in the Southern Hemisphere. The ocean is, on average, 3.8 kilometers (2.4 mi) deep. Although most of the water covering Earth is ocean, water also covers some land areas, as rivers, lakes, and ice.

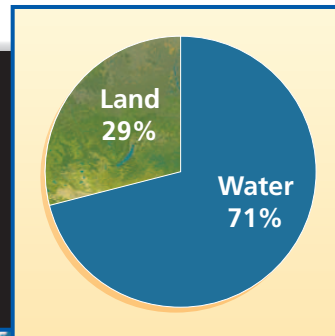


**CHECK YOUR
READING**

Where is most of Earth's water?

Water-to-Land Ratio

Almost three-quarters of Earth's surface is covered by water.



A flat map can make the percentage of land on Earth appear greater than it is.

**READING
VISUALS**

Look at the globe and the map. Where is the amount of land most exaggerated on the map?

Water and Life

Without water, nothing would live on Earth. Living things need water to function. Your own body is two-thirds water. In your body, your blood—which is mostly water—carries nutrients that give you energy and flushes wastes away. Many forms of life live in water. Oceans, lakes, and rivers are home to fish, mammals, plants, and other organisms. Even a single drop of water may contain tiny forms of life.

Fresh Water and Salt Water

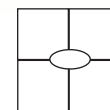
When you hear the word *water*, you might imagine a cool drink that quenches your thirst. The water that you drink and depend on for survival is fresh water. **Fresh water** is water that is not salty and has little or no taste, color, or smell. Most rivers and lakes are fresh water.

The water in the ocean is salt water. **Salt water** is water that contains dissolved salts and other minerals. Human beings and most other land animals cannot survive by drinking salt water, although many other forms of life can live in salt water.

You may be surprised to learn that even though fresh water is important for life, fresh water is actually scarce on Earth. Because most of Earth's water is in the ocean, most of the water on Earth is salt water. The illustration below compares the amounts of fresh water and salt water on Earth. Almost all—about 97 percent—of Earth's water is salt water in the ocean. Only about 3 percent of Earth's water, at any given time, is fresh water.

VOCABULARY

Remember to write the terms *fresh water* and *salt water* in four-square diagrams in your notebook.



CHECK YOUR
READING

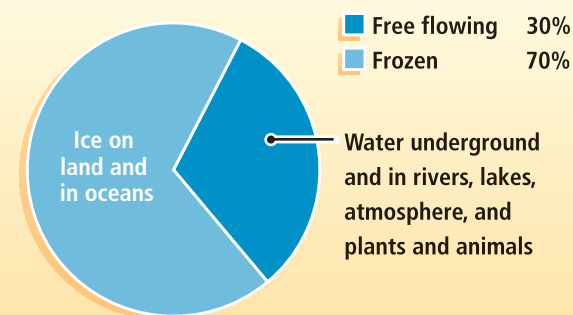
What is the difference between fresh water and salt water?

Salt Water vs. Fresh Water

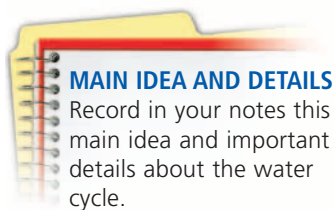
Most water on Earth is salt water.



Forms of Fresh Water



Imagine that this glass of water represents all of the water on Earth.

**MAIN IDEA AND DETAILS**

Record in your notes this main idea and important details about the water cycle.

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Water moves in a worldwide cycle.

Water continually moves and changes form. Water from clouds falls over the oceans and on land. Water flows in rivers and collects in lakes and under the ground. Water can be a solid in the form of ice, or it can be an invisible vapor in the atmosphere.

The Water Cycle

Water's movement on Earth is a cycle, or continually repeating process. The **water cycle** is the continuous movement of water through the environment of Earth. In the water cycle, water is constantly changing form, from a liquid on land, to a vapor in the atmosphere, and again to a liquid that falls to the surface. The flow of water on land and underground is also part of the water cycle. As water moves in the water cycle, the total amount of water in Earth's system does not change very much. The water cycle involves three major processes: evaporation, condensation, and precipitation.

INVESTIGATE The Water Cycle

How does water cycle through an environment?

DESIGN
— YOUR OWN —

PROCEDURE

- 1 Construct an environment in a jar with a lid. You can use plants, soil, water, and containers.
- 2 Find the mass of your closed jar after you construct it.
- 3 Draw a detailed, colored picture of your jar.
- 4 Let your jar sit for several days.
- 5 Find the mass of your jar again, and draw another picture of it.

WHAT DO YOU THINK?

- How did the jar's appearance change over several days?
- How did its mass change?
- What can you conclude about how water cycles through an environment?

CHALLENGE How could you change your environment so that the jar's appearance would change at a faster rate?


SKILL FOCUS

Modeling

MATERIALS

- jar with lid
- soil
- rocks or pebbles
- sand
- smaller containers
- water
- small plants
- triple-beam balance

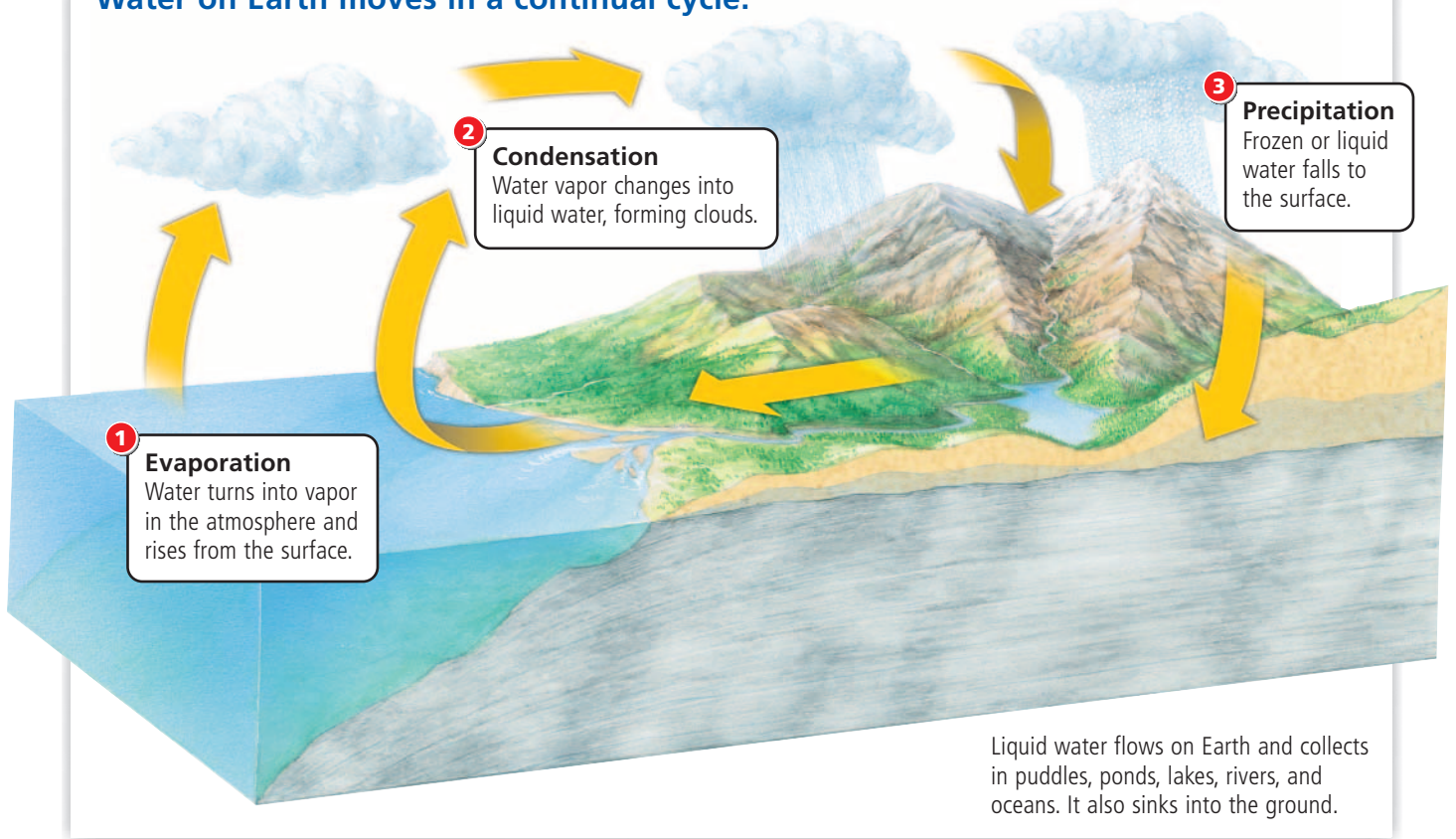
TIME

30 minutes 
(for construction;
20 minutes for
analysis)



The Water Cycle

Water on Earth moves in a continual cycle.



- 1** The process in which water changes from liquid to vapor is called **evaporation**. Heat energy from the Sun warms up the surface of the ocean or another body of water. Some of the liquid water evaporates, becoming invisible water vapor, a gas.
- 2** The process in which water vapor in the atmosphere becomes liquid is called **condensation**. Condensation occurs as air cools. Because cold air can have less water vapor than warm air, some of the vapor condenses, or turns into droplets of liquid water. These droplets form clouds. At high altitudes clouds are made of ice crystals. Unlike water vapor, clouds are visible evidence of water in the atmosphere.
- 3** Water that falls from clouds is **precipitation**. Inside a cloud, water droplets bump together and merge into larger droplets. They finally become heavy enough to fall as precipitation—such as rain or sleet. The water from precipitation sinks into the soil or flows into streams and rivers in the process called runoff. The force of gravity pulls the flowing water downward and, in most cases, eventually to the ocean.



See how water moves through Earth's system in the water cycle.



Why does water vapor in air condense into liquid droplets?

Most of the water that evaporates on Earth—85 percent of it—evaporates from the ocean. (About 75 percent of this condenses into cloud droplets and falls right back into the ocean.) The remaining 15 percent of evaporating water comes from such sources as damp ground, lakes, wet sidewalks, rivers, and sprinklers. Plants are also part of the water cycle. They pull up water from the ground and then release much of it into the air through their leaves.

Even though the water that evaporates into the atmosphere comes from both the salty ocean and from fresh water on land, all the precipitation that falls back to the surface is fresh water. When salt water evaporates, the salt is left behind. Through the water cycle the ocean water that human beings cannot drink becomes a source of fresh water for human beings and other life on Earth.



Flooding usually occurs during India's annual rainy season.

The Impact of the Water Cycle

The action of the water cycle is easy to spot. When it rains or snows, you can see precipitation in action. When you look at a flowing stream, you see the water cycle returning water to the sea. When a stream dries up, you know that the water cycle in the area has slowed down for a while.

Wet weather can fill reservoirs with drinking water and pour needed water on crops. Wet weather can also bring too much rain. For example, during the wet season in India, winds blow moist air inland from the Indian Ocean. Tremendous rains fall over the land for months. The rain is usually welcome after a long and hot dry season. However, these seasonal rains frequently cause devastating floods, covering acres and acres of land with water.

2.1 Review

KEY CONCEPTS

1. Name three things about water that make it unique or important.
2. How much of Earth's water is fresh water?
3. Explain the three processes that make up the water cycle.

CRITICAL THINKING

4. **Apply** How can a drop of salt water once have been a drop of fresh water?
5. **Compare and Contrast** What are two differences between salt water and fresh water?

CHALLENGE

6. **Infer** In 1996, the *Galileo* space probe sent back photographs that showed ice on the surface of one of the moons of Jupiter. Scientists suspected there was water under the ice. Why did this discovery excite some people who thought there was a chance of finding life on that moon?