

Read and Learn

Main Idea

GLE 0409.8.1
SPI 0407.8.1

In the water cycle, water changes form as it moves between Earth's surface and atmosphere.

Vocabulary

freeze, p. 213

melt, p. 218

evaporation, p. 212

condensation, p. 213

precipitation, p. 213

water cycle, p. 214

LOG ON  Glossary

at www.macmillanmh.com

Reading Skill

Sequence

First

Next

Last

 Check For Understanding


How does water change state?

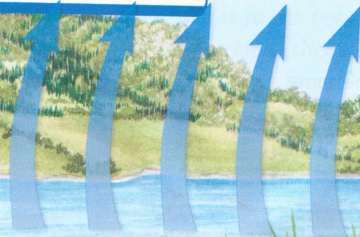
Water moves from Earth's surface into the atmosphere. Then it moves back to the surface. Water changes form as it moves.

Evaporation

Water seems to disappear when it evaporates (ee•VAP•uh•rayts). **Evaporation** is the term for a liquid changing to a gas without boiling. Liquid water doesn't really disappear. It just changes to a gas. *Water vapor* is water in the gas form. You cannot see water vapor, but it is part of the air around you. *Humidity* (hyew•MI•duh•tee) is a measure of how much water vapor is in the air.

Water is always evaporating from oceans, streams, lakes, rivers, and ponds. The Sun's energy causes particles of water at the surface to move rapidly. The more energy they take in, the faster and farther apart they move. Some of the particles rise into the air as a gas—water vapor.

 1 The Sun's energy heats the surface of the water.

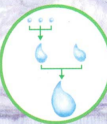
 2 Particles of water evaporate from the surface. They rise into the air as water vapor.

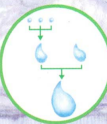
Condensation

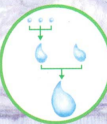
As particles of water vapor rise into the air, they cool. The particles lose energy. They move more slowly. High in the atmosphere, the water vapor *condenses* (kuhn•DEN•sez) to liquid water. **Condensation** is when a gas changes to a liquid.

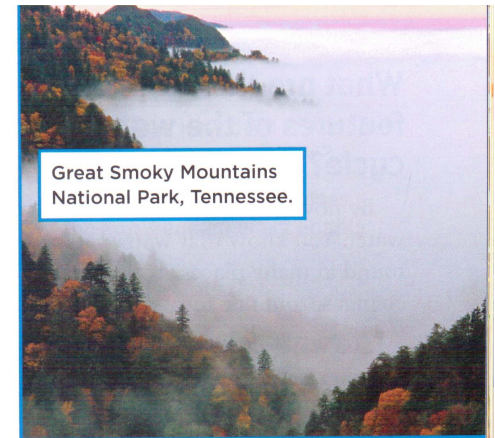
Dew is a familiar kind of condensation. Dew forms when water vapor cools and condenses onto a surface. Have you ever seen drops of water cover the grass on a cool morning? Those drops are dew.

Water vapor can also condense onto dust particles in the air. The tiny drops, or *droplets*, form clouds. A cloud is a group of water droplets in the atmosphere. The droplets are pure water in liquid form.

 3 As they rise higher, the particles of water vapor cool and condense.

 4 Clouds form from droplets of liquid water.

 5 When droplets in the clouds grow large and heavy, they fall to Earth.



Great Smoky Mountains National Park, Tennessee.

Cool temperatures early in the morning can condense water vapor.

Precipitation

Inside a cloud small water droplets may join together and form larger ones. If it is very cold, some droplets freeze into ice. To **freeze** is to change from a liquid to a solid.

The droplets and bits of ice grow larger and heavier. When they are too heavy, they fall to Earth's surface. **Precipitation** (pri•si•puh•TAY•shuhn) is the term for water that falls from clouds down to Earth.

Quick Check

Sequence Explain the steps in evaporation and condensation.

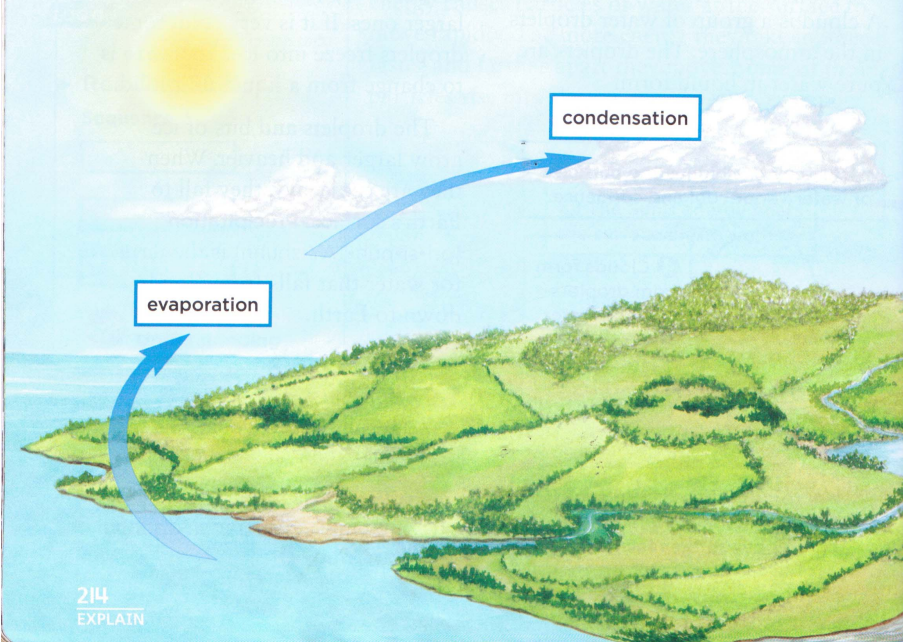
Critical Thinking What happens to a puddle of water on a sunny day? Why?

What are the basic features of the water cycle?

By now you know a lot about water. You know that water can be found in many places. You know it changes from one form to another.

The **water cycle** is the movement of water between Earth's surface and the air. Evaporation, condensation, and precipitation help water move through the cycle. The diagram shows you how.

The Water Cycle



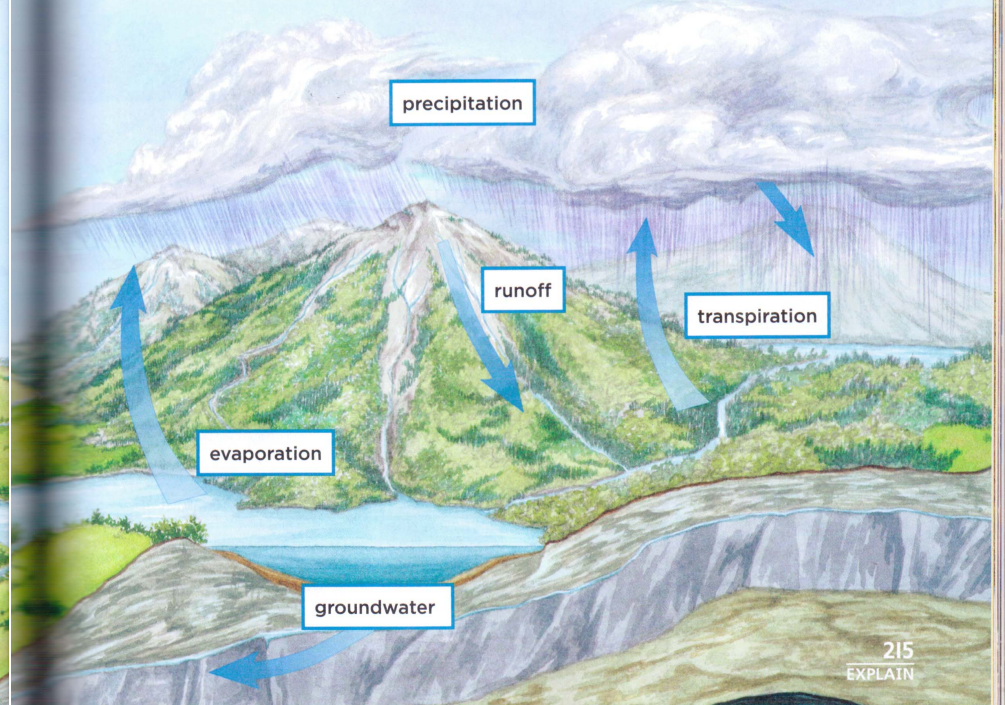
In the Air

In the water cycle, water changes form between liquid, gas, and solid. The Sun is the energy source for this cycle. The Sun's energy causes water to evaporate from lakes, oceans, and other bodies of water. Water also evaporates from the leaves of plants. This is called *transpiration* (trans•puh•RAY•shuhn). As it rises in the air, the water vapor condenses. Clouds form. During precipitation, water falls from the clouds over land and water.

On and Below the Ground

Precipitation can fall as rain, snow, sleet, or hail. When it rains, water flows over Earth's surface as *runoff*. Runoff gathers in lakes, oceans, rivers, and streams. Over time, water collects in glaciers and ice caps.

Rainwater also soaks into the ground. Plants take up some of the water from soil. The rest collects in small cracks and spaces below the ground. This groundwater can stay above the bedrock, flow, or slowly evaporate.



Quick Check

Sequence How does water enter and leave the atmosphere?

Critical Thinking How does the Sun's energy affect Earth's weather?

Read a Diagram

Describe one path through the water cycle.

Clue: Follow the arrows.

LOG ON Science in Motion

Watch how the water cycle works at www.macmillanmh.com

Quick Lab

Cloud in a Jar

- 1 Pour very warm water into a jar so that it is about 1 cm deep. Seal the jar tightly. Then shake it several times.
- 2 Open the jar and quickly place a plastic sandwich bag inside it. Using a rubber band, seal the bag tightly around the mouth of the jar.
- 3 **Observe** Reach into the bag. Gently pull it up. Then release the bag. Observe and describe what happens in the jar. Repeat this step several times.
- 4 **Interpret Data** When does the cloud form? When does it disappear? Why do you think this happens?



What are some types of clouds?

Clouds form at different heights above Earth's surface. Scientists classify clouds into three main types based on how and where they form.

Cumulus

Cumulus (KYEW•myuh•luhs) clouds are puffy, white clouds that look like cotton balls. They often have a flat bottom.

You have probably seen clouds become dark before a rainstorm. If a cumulus cloud becomes dark and thick, it is called a *cumulonimbus* (kyew•myuh•loh•NIM•buhs) cloud. This kind of cloud causes precipitation.

Cloud Types

cumulus



216
EXPLAIN

stratus



cirrus



Identify a Cloud



Read a Photo

Which type of cloud do you see in this photo?

Clue: Compare it with the cloud types on the previous page.

Stratus

Stratus (STRAY•tuhs) clouds form in layers. The layers look like sheets or blankets. Stratus clouds are often the lowest clouds in the sky. What we call fog is really a stratus cloud near Earth's surface. Like cumulonimbus clouds, stratus clouds can form precipitation.

Cirrus

Cirrus (SIR•uhs) clouds look thin, wispy, or feathery. They are made of tiny bits of ice. Cirrus clouds are usually found very high in the sky.

Quick Check

Sequence How might clouds change as a morning rain shower turns into a sunny day?

Critical Thinking Classify the types of clouds you see in the sky today.

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EXPLAIN

What are other forms of precipitation?

Rain is just one form of precipitation. Water can change form as it moves through the air. When this happens, other kinds of precipitation may fall.

Snow

When water reaches a temperature below 0°C (32°F), it freezes into ice. Remember, to freeze is to change from a liquid to a solid. Bits of ice can collect in a cloud. If they get too heavy, they fall as snow.

Snow may melt as it falls to the ground. To **melt** is to change from a solid to a liquid. Melting happens when sunshine or warm air heats the icy snowflakes. The heat can make the snow change to rain.



Most hailstones are small. Large ones can be dangerous! How wide is the hailstone on the left?

FACT Hail can fall in spring and summer.

Sleet and Hail

Sometimes rain falls from clouds as a liquid but freezes along the way. The rain turns into small chunks of ice. The ice that falls to the ground is called *sleet*.

Hail is made of ice, too. The ice chunks are much larger than sleet. Hail forms inside the tall clouds of a thunderstorm. Most hailstones are the size of peas. However, some are bigger than baseballs!

Quick Check

Sequence How does snow form?

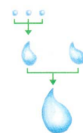
Critical Thinking Do all pieces of ice that fall to the ground come from icy clouds? Explain.

Lesson Review

Visual Summary



Water changes from a liquid to a gas during **evaporation**. It changes from a gas to a liquid during **condensation**.



In the **water cycle**, water travels by runoff, evaporation, condensation, and **precipitation**.



Clouds form at different heights above Earth's surface. They are classified by how and where they form.

Make a FOLDABLES Study Guide

Make a Layered-Look Book. Use it to summarize what you read about the water cycle.

The Water Cycle

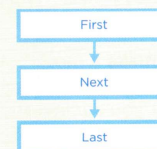
Evaporation and condensation

Precipitation

Clouds

Think, Talk, and Write

- Main Idea** How does water travel through the water cycle?
- Vocabulary** Water vapor becomes liquid water during _____.
- Sequence** Describe the path of water from the ocean to a raindrop.



- Critical Thinking** How are hail and sleet alike? How are they different?

TCAP

Test Prep

Clouds form when water vapor

- A** evaporates **C** precipitates
B condenses **D** transpires

Puffy, white clouds with flat bottoms are called

- F** cumulus **H** stratus
G cirrus **J** cirrostratus

SPI 0407.8.1



Writing Link

Write a Cloud Poem

Write a poem about clouds. Choose ones you have seen or ones you would like to see. Include several different cloud types in your poem.



Art Link

Water Cycle Diorama

Make a diorama that shows how the water cycle works. Label the places where water goes. Write captions to describe how water changes form. **0407.8.1**

