

Above Level



SCIENCE • GRADE 5

California Content Standards
Earth Sciences: 3.A
Earth Sciences: 3.B
Earth Sciences: 3.C
Earth Sciences: 3.D
Earth Sciences: 3.E

# Earth's Water

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# Earth's Water

## California's Content Standards Met

### GRADE 5 SCIENCE

**EARTH SCIENCES: 3**—Water on Earth moves between the oceans and land through the process of evaporation and condensation. As a basis for understanding this concept:

- a. Students know most of Earth's water is present as salt water in the oceans, which cover most of Earth's surface.
- b. Students know when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
- c. Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
- d. Students know that the amount of fresh water located in rivers, lakes, underground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water.
- e. Students know the origin of the water used by their local communities.

### GRADE 5 ENGLISH LANGUAGE ARTS

#### 1.0 WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT

*Vocabulary and Concept Development 1.3*—Use knowledge of root words to determine the meaning of unknown words within a passage.

#### 2.0 READING COMPREHENSION

*Comprehension and Analysis of Grade-Level-Appropriate Text 2.2*—Ask questions and support answers by connecting prior knowledge with literal information found in, and inferred from, the text.

*Comprehension and Analysis of Grade-Level-Appropriate Text 2.6*—Distinguish between cause and effect and between fact and opinion in expository text.

#### 1.0 WRITING STRATEGIES

*Organization and Focus 1.3*—Use traditional structures for conveying information (e.g., chronological order, cause and effect, similarity and difference, posing and answering a question).

Above Level



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Earth Sciences: 3.A

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Earth Sciences: 3.E

# Student Book

*Earth's Water*

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.

# Earth's Water

## California's Content Standards Met

AL

### GRADE 5 SCIENCE

**EARTH SCIENCE: 1**—Water on Earth moves between the oceans and land through the process of evaporation and condensation. As a basis for understanding this concept:

- a. Students know most of Earth's water is present as salt water in the oceans, which cover most of Earth's surface.
- b. Students know when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
- c. Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
- d. Students know that the amount of fresh water located in rivers, lakes, under-ground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water.
- e. Students know the origin of the water used by their local communities.

### GRADE 5 ENGLISH LANGUAGE ARTS

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SCIENCE • GRADE 5

California Content Standards

Earth Sciences: 3.A, 3.B, 3.C, 3.D, 3.E

# Earth's Water

by  
Caitlin Scott





SCIENCE • GRADE 5

California Content Standards

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*What do you think you will  
learn from this book?*

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## INTRODUCTION

# The Blue Planet

Because water covers three-fourths of Earth's surface, our planet is sometimes referred to as the blue planet. Fresh water falls in many forms on land and oceans alike. When water falls on land, it dissolves salts and minerals found on the surface of Earth. Water then carries these salts and minerals to the oceans.

When water **evaporates** from the surface of the oceans, the salts remain behind. For this reason, the oceans have become salty. How salty? If this salt in the sea could be removed and spread evenly over the Earth's land surface it would form a layer more than 500 feet thick, about the height of a 40-story office building.

Did you know that water in the oceans is 220 times saltier than the water in fresh lakes and rivers? Why is that?

**evaporate:** to change from a liquid to a vapor or gas

---

Water in rivers and lakes is constantly moving. For example, water from rain and snow that falls on the Rocky Mountains flows into streams and lakes. The water from these streams and lakes then flows into the Colorado River. The Colorado River transports the water to the Gulf of California.

Because there is both an inflow of water and an outflow of water, salts and minerals are not trapped. Once the water reaches the ocean, the salts and minerals become trapped because there is no outflow from the ocean. Over millions of years, this salt and minerals built up.

Ninety seven percent of the water on Earth is found in the oceans and seas. It is too salty to drink. That is why it is important to protect and conserve the supply of fresh water. Fortunately, water is a renewable resource because of the water cycle. The water cycle is the continuous renewal of fresh water on Earth. Read on to learn more about this life-saving cycle.

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## CHAPTER 1

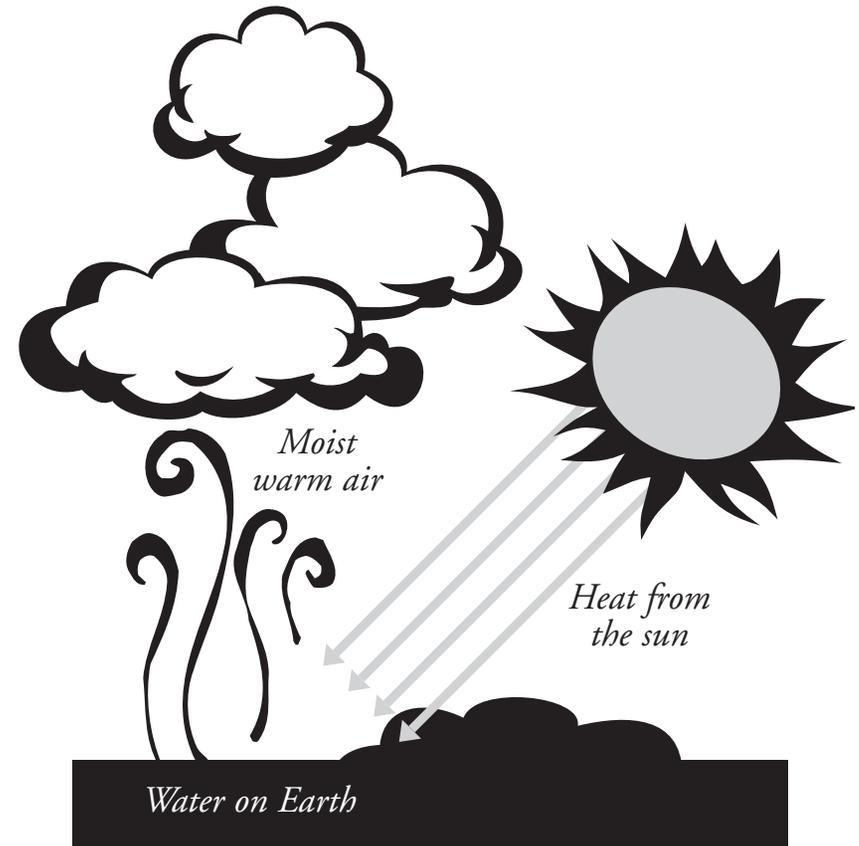
# The Water Cycle

Air surrounds us, filling every nook and cranny. Even though air is invisible, we know it exists because we breathe it every day. Air is made of **gases**, such as nitrogen, oxygen, argon, and carbon dioxide. Air also contains water **vapor**. How do we know this? When we notice clouds in the sky, we are really seeing water in the air.

When water is warmed by the sun, it evaporates and rises. As water vapor rises, it cools and, tiny water droplets form. When these droplets are packed closely together, they become visible and form a cloud. When too much water collects in a cloud, the cloud can no longer contain all the water, and it falls.

Water goes up into the air and falls back to Earth all the time. This process is called the water cycle.

**gases:** matter that has no shape; gases spread out to fill the space around them; most cannot be seen  
**vapor:** a gas formed from something that is usually a liquid



*Clouds form when warm, moist air rises off Earth's surface.*

---

The water cycle has four parts, each of which is essential to life on Earth.

**Evaporation**—The sun warms water on the surface of the Earth. Gradually, the water changes to a gas and rises.

**Condensation**—When the warm gas rises and moves over land, the air cools and the gas begins to change back to a **liquid**. Tiny water droplets form clouds.

**Precipitation**—More and more water collects in the cloud. Eventually, when there is enough water, it falls back to Earth's surface.

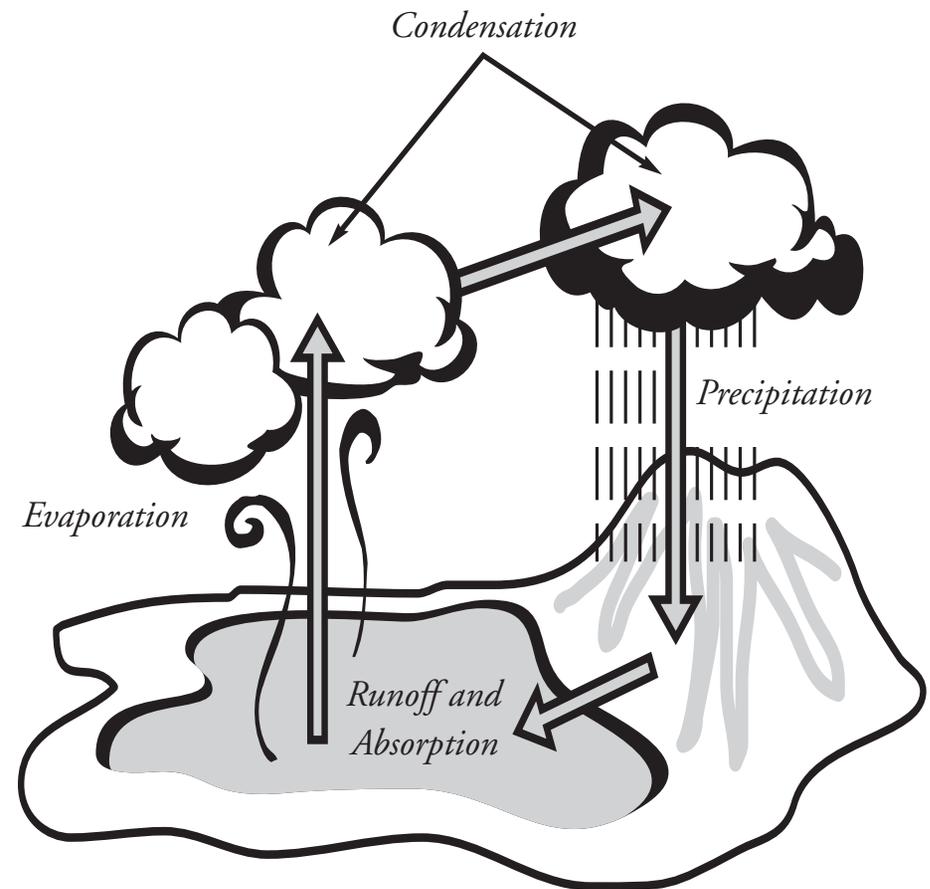
**Runoff and Absorption**—The water that falls from the cloud collects on Earth in lakes, rivers, oceans, and some is absorbed into the ground.

Can you guess what happens next?  
Evaporation. The cycle repeats itself endlessly.

**liquid:** a state in which matter flows freely when poured; liquids take the shape of whatever holds them

---

## Water Cycle



*Describe how water exists in the air in different forms.*

---

## Evaporation

Evaporation occurs when water on Earth's surface is warmed by the sun. The water is transformed from a liquid to a gas. As a gas, water travels up into the air.

Remember a time when you spilled water on your clothes? Eventually, the spot dried and disappeared. The liquid water was transformed into a gas through evaporation, even though you didn't see the water going into the air.

Why does the ground dry out? The ground becomes dry and dusty because the water evaporates. Even though you can't see it, water evaporates all the time.

Have you seen a pot of boiling water? You see steam rising out of the pot. First, water evaporates from a liquid to a gas. Then, a cloud forms through condensation. Read on to learn more about condensation.



*When water boils, it turns from a liquid to a gas.  
You can see the gas as steam.*

*Explain what causes evaporation.*

---

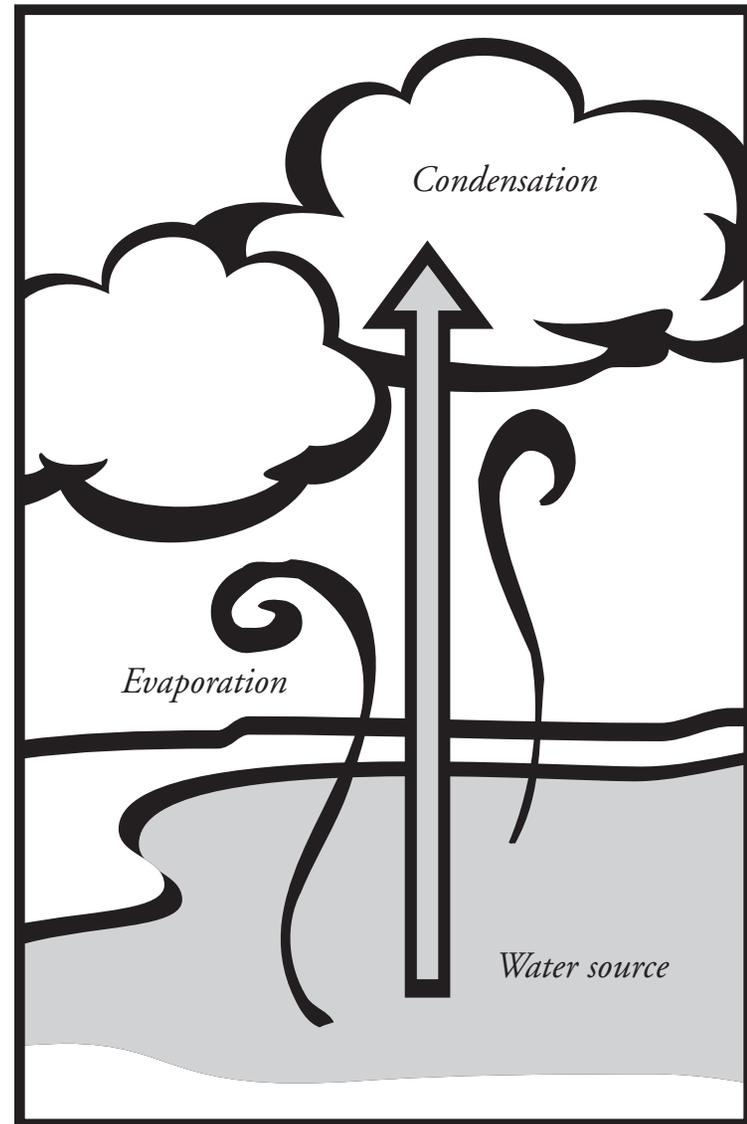
## Condensation

Have you ever exhaled gently on a cold window? Your warm breath created fog on the surface of the window. This happened through a process called condensation.

Have you noticed what happens when people with glasses go from the cold outside to the warm inside? Their glasses fog up, so that they can barely see. This is also an example of condensation.

Condensation occurs when water in the air forms tiny water droplets. The water is changing back from a gas to a liquid, which is an important part of the water cycle. First water evaporates; then, it condenses. Eventually, the condensation forms clouds.

What happens next in the water cycle? When the water in the clouds gets too heavy, the water falls back to Earth.



*Explain what happens when water condenses.*

---

## Precipitation

Water can't stay suspended in the air in clouds forever. As the clouds move higher, they get colder and more gas becomes liquid. The liquid water is heavier than water vapor. It falls back to Earth.

### Rain

If it is warm outside, the water, or precipitation, that falls is rain. Rain occurs at temperatures that are above freezing. This means greater than 32 degrees Fahrenheit or 0 degrees Celsius.

In some parts of the United States, it rains a lot, but in other parts, it is very dry. For example, Astoria, Oregon is one of the rainiest cities in the United States, while Las Vegas, Nevada is located in a desert and gets very little rain.

Average Rainfall in U.S. Cities	
City	Average Annual Rainfall in Inches
Astoria, Oregon	70
El Paso, Texas	8
Las Vegas, Nevada	4
Miami, Florida	60
New Orleans, Louisiana	60
Phoenix , Arizona	7

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## Snow

Snow is water that freezes while it is still in a cloud. As it falls to Earth's surface, it remains frozen. Because snow freezes in a cloud and stays frozen as it falls, each flake has a beautiful, unique pattern. The patterns are created by the air that mixes with the cloud when the snowflake freezes.

We have heavy snowfall in the northern parts of the United States. Snow can also be heavy in higher elevations, such as in the Sierra Nevada and Rocky Mountains.

Snowiest U.S. Cities	
City	Average Annual Snowfall in Inches
Blue Canyon, California	241
Marquette, Michigan	129
Sault Ste. Marie, Michigan	117
Syracuse, New York	112
Caribou, Maine	110

*Why do scientists keep track of precipitation records?*

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## Sleet

Sleet is also precipitation that freezes inside a cloud. However, unlike snow, sleet doesn't stay frozen. Instead, sleet travels through warmer air, gradually melting as it falls. Then, it goes through colder air again as it approaches the ground just above Earth.

Air is not captured in sleet the way it is in snow. Instead, sleet is a drop of ice.

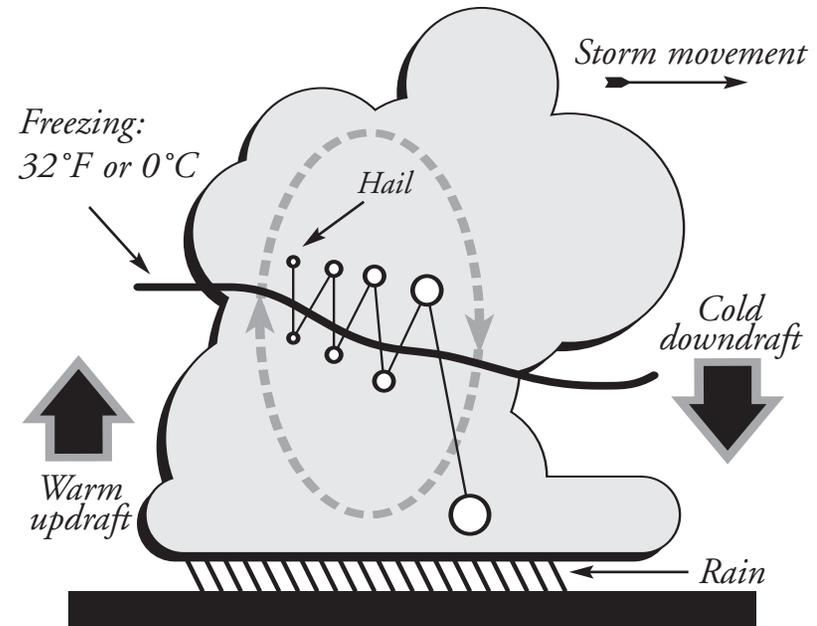
## Hail

Hail is somewhat like sleet in that it forms when water drops freeze inside a cloud and fall to warmer air. As the water falls, it starts to melt, but then, strong updrafts from a **thunderstorm** blow it back up to the colder air. It collects dust and ice from the cloud and freezes once again. The frozen water falls again, and another updraft may blow it up again. This melting and refreezing cycle can occur many times. Each time, the frozen water drop gets larger, until it gets too heavy to stay up and falls to Earth as hail.

**thunderstorm:** a rainstorm that has thunder and lightning

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## How Hail Forms



*Hail moves up and down in a storm cloud.  
It grows larger and larger each time it passes  
through air that is above and below freezing.*

*Describe how water changes from one state to another.*

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## Runoff and Absorption

The last step of the water cycle is runoff and absorption. When precipitation falls to the ground, it is collected and stored until it evaporates again.

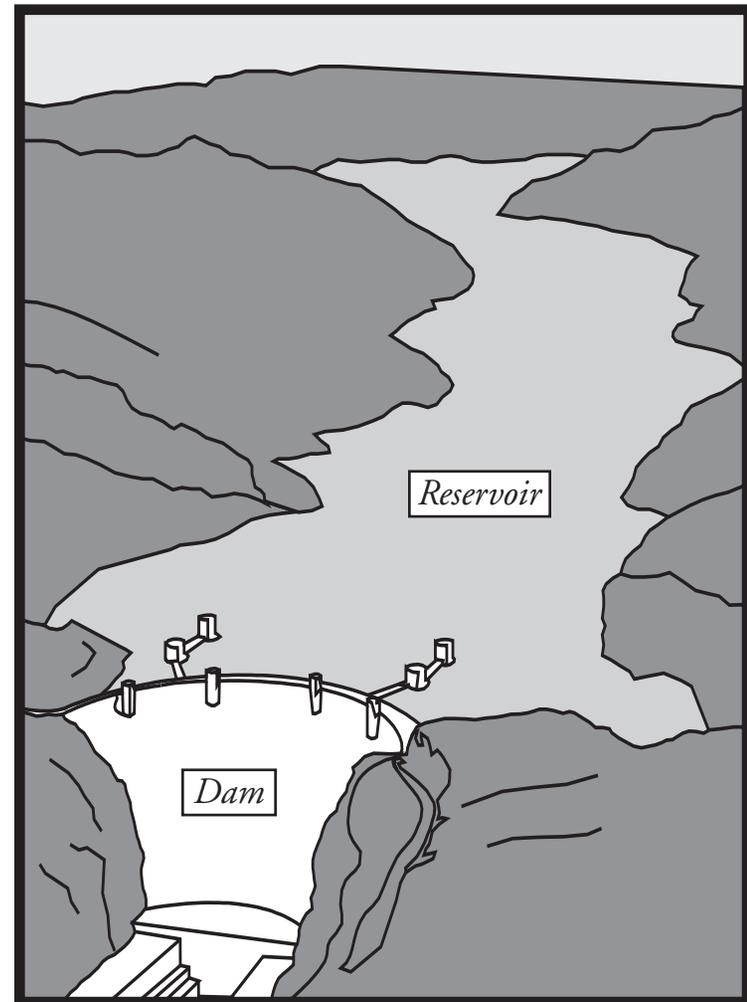
Where do you imagine you can see water stored on Earth? The first location you think of might be a lake, a river, a sea, or the oceans and would be a correct answer.

Water can also be stored underground. After an especially hard rain, the ground is damp and muddy because the ground is storing water. When the ground becomes saturated with water, the stored water can even form underground lakes or streams.

Sometimes engineers build **reservoirs** to collect and store water and purify the water for drinking, cooking, and cleaning. Lake Mead is the biggest man-made reservoir in the United States—about 110 miles long.

*Where does the water in your community come from? Where is it stored?*

**reservoirs:** places where water is stored



*Lake Mead in Nevada is a reservoir created by the Hoover Dam.*

## Protecting Our Water Supply

Evaporation, condensation, precipitation, and runoff and absorption are the four essential steps in the water cycle. Water has been moving through the water cycle as long as Earth has existed. This means that the water in your glass once fell as rain, and the rain that falls today has been around since the time of the dinosaurs. Water is a renewable resource because of the water cycle.

You've learned that Earth's water exists in the form of ice, snow, freshwater lakes, streams, and groundwater. It is these sources of water that offer life-supporting properties. Clean, fresh water is a basic need of life. Life cannot exist without it. That's why it is important to protect our water supply.

Even though water is a renewable resource, the quality of our water can be affected by our actions. We must be careful about what we put into our water and extend the supply of fresh water by recycling and decreasing our use of water.

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In California, the water supply depends on the annual rainwater and snowpack that collects in watershed districts, underground, and in lakes, rivers, and streams. Disturbances in these areas can affect the quality of our water. For example, runoff of chemicals used in farming near these water sources can pollute the water. Runoff of chemicals and other pollutants from city streets can also pollute the water.

The disturbance of land during construction projects, especially around wetlands, also greatly affects the quality of our water. Wetlands filter pollutants from water. When we destroy wetlands, we destroy a natural way of cleaning our water supply. In addition, wetlands are also an important storage area for water. When these storage areas are destroyed, flooding often occurs.

For these reasons, local, state, federal, and global laws have been passed to manage and protect water resources. These laws are an important step. However, preserving our water supply is the responsibility not only of governments, but also of each one of us.

*What does your community do to protect the water supply?*

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## Glossary

**evaporate:** to change from a liquid to a vapor or gas

**gases**—matter that has no shape; gases spread out to fill the space around them; most cannot be seen

**liquid**—a state in which matter flows freely when poured; liquids take the shape of whatever holds them

**reservoirs**—places where water is stored

**thunderstorm**—a rainstorm that has thunder and lightning

**vapor**—a gas formed from something that is usually a liquid

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## To Find Out More . . .

Want to learn more about Earth's water?

### Try these books

*The Florida Water Story: From Raindrops to the Sea* by Peggy S. Lantz. Pineapple Press, 1998.

*River and Stream* by April Pulley Sayre. 21st Century, 1997.

*Lake and Pond* by April Pulley Sayre. 21st Century, 1997.

### Access these Web sites

The National Weather Service  
<http://www.nws.noaa.gov/>

The Environmental Protection Agency,  
Office of Water  
<http://www.epa.gov/water/>

### Write for more information

The National Weather Service  
1325 East West Highway  
Silver Spring, MD 20910

U.S. Environmental Protection Agency  
Office of Water (4101M)  
1200 Pennsylvania Avenue, N.W.  
Washington, D.C. 20460

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ENGLISH-LANGUAGE ARTS • GRADE 5

California Content Standards
Vocabulary and Concept Development: 1.3
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.2
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.6
Organization and Focus: 1.3

# English-language Arts Activities

*Earth's Water*

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

# Cause and Effect

## TRY THE SKILL

A cause explains why something happens. An effect describes what happens as a result of a cause. Sometimes the cause is stated first in a sentence, but sometimes the effect is first.

The words *because*, *if*, *so*, and *when* are often used to state cause and effect. Read this sentence from *Earth's Water* and try to identify cause and effect. Notice that a comma separates the cause and effect.

When water is warmed by the sun, it evaporates and rises.

**Which is the cause?**

water is warmed by the sun

**This phrase tells why the water evaporates and rises.**

**Which is the effect?**

the water evaporates and rises

**This phrase tells what happens.**

Use the phrases in the table to form six sentences showing cause and effect. Be sure to begin at least one sentence with a cause and at least one with an effect.

Causes	Effects
when these droplets are packed close together	the cloud can no longer contain all the water, and it falls
as snow falls to Earth's surface	each flake has a beautiful, unique pattern
when enough water collects in a cloud	it remains frozen
because the water evaporates	the ground can become dry and dusty
his glasses fogged up	they become visible and form a cloud
because snow freezes in a cloud and stays frozen as it falls	so he could barely see

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# 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 paragraph from *Earth's Water*.

Snow is water that freezes while it is still in a cloud. As it falls to Earth's surface, it remains frozen. Because snow freezes in a cloud and stays frozen as it falls, each flake has a beautiful, unique pattern. The patterns are created by the air that mixes with the cloud when the snowflake freezes.

**What is the question?**

What is snow?

**What is the answer?**

Snow is water that freezes in a cloud. As it falls, it stays frozen. Each flake has a beautiful, unique pattern. The patterns are created by the air that mixes with the cloud when the snowflake freezes.

Read the question from *Earth's Water*. Write an answer in your own words.

Where do you imagine you can see water stored on Earth?

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Now think of another question you could ask based on *Earth's Water*. Then, write an answer in your own words.

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# Roots and Suffixes

## TRY THE SKILL

Understanding roots and suffixes can help you understand the meanings of words and increase your vocabulary. The following table shows the meaning of different suffixes.

Suffix	Meaning	Example
<i>-ed</i>	Makes a verb past tense	Evaporated—The water evaporated yesterday.
<i>-ing</i>	Makes a verb ongoing	Evaporating—Lakes are constantly evaporating.
<i>-tion</i>	Makes a verb a noun	Evaporation—Evaporation occurs when something wet dries.

What form of the word *condense* should you use in the following sentences?

\_\_\_\_\_ occurs when water in the air forms tiny water droplets. The water is \_\_\_\_\_ from a gas to a liquid, which is an important part of the water cycle. Water in a cloud is water that has \_\_\_\_\_.

**Suffixes show that the first word is a noun, the second is an ongoing verb, and the third is a past tense verb.**

Condensation occurs when water in the air forms tiny water droplets. The water is condensing from a gas to a liquid, which is an important part of the water cycle. Water in a cloud is water that has condensed.

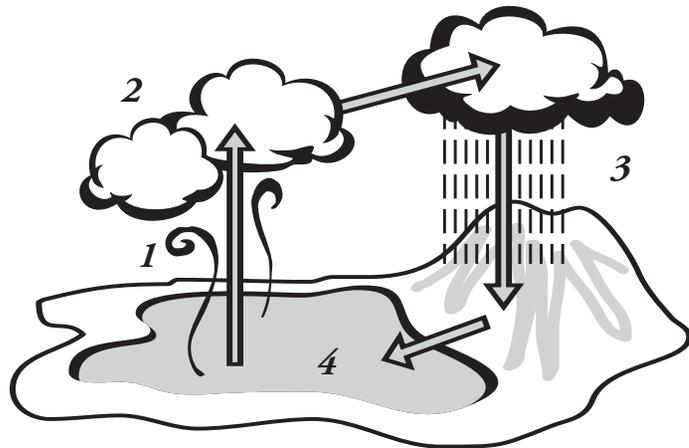
Read the roots and suffixes. Write sentences in the chart that combine the roots and suffixes. The first one is done for you.

Root	Suffix	Sentence
Precipitate	<i>-ing</i>	When it is raining, snowing, or sleeting, it is precipitating.
	<i>-ed</i>	
	<i>-tion</i>	
Collect	<i>-ing</i>	
	<i>-ed</i>	
	<i>-tion</i>	

# Interpret Graphic Information

## TRY THE SKILL

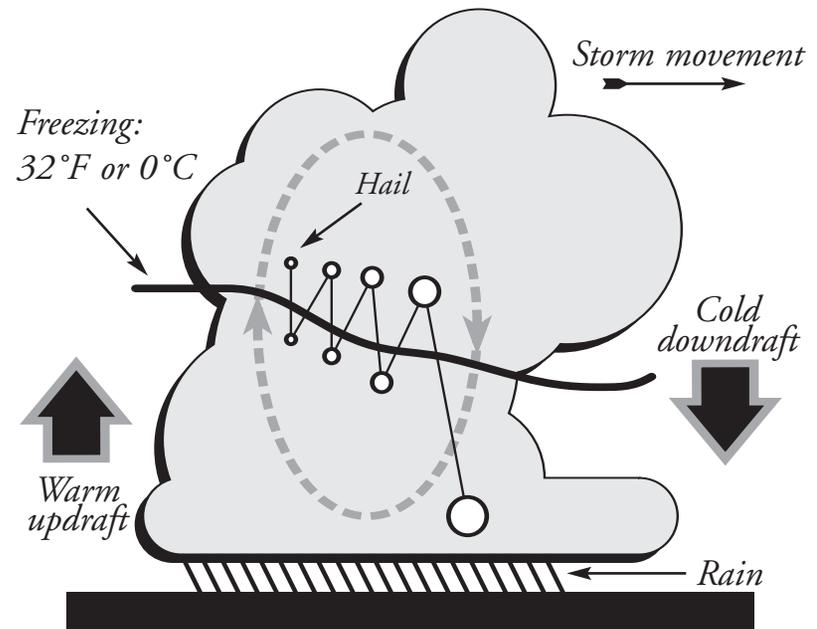
Graphic information can help you understand a process. The following illustration shows the water cycle. The steps in the process are numbered.



The picture can remind you of the steps in the water cycle. For example, you might look at this diagram and then write the following:

Water evaporates and rises into the air. Next, water cools and condenses. Then, water falls as precipitation. Then, water is collected in lakes, rivers, oceans, or underground. Finally, the water cycle repeats itself.

Look at the diagram and write about how hail forms.



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# Answer Key

## Cause and Effect

1. When these droplets are packed together, they become visible and form a cloud.
2. As snow falls to Earth's surface, it remains frozen.
3. When enough water collects in a cloud, the cloud can no longer contain all the water, and it falls.
4. Because the water evaporates, the ground can become dry and dusty.
5. His glasses fogged up, so he could barely see.
6. Because snow freezes in a cloud and stays frozen as it falls, each flake has a beautiful pattern.

## Question and Answer

Possible answer: Water might be found in lakes, rivers, oceans, underground, or in reservoirs.

## Roots and Suffixes

Sentences will vary.

## Interpret Graphic Information

Answers will vary, but should include the fact that hail moves up and down in a storm cloud. It grows larger and larger each time it passes through air that is above and below freezing.