

**Red Edition**  
Grade 3–4  
reading level

**Purple Edition**  
Grade 4–5  
reading level

## Objectives

- Describe the composition of air, and list the layers of the atmosphere.
- Discuss air and weather.
- Explain the importance of water.
- Explore salt water and fresh water and where they are found.
- Explain how water changes state.
- Describe the water cycle.
- Discuss air pollution and water pollution, and compare methods of protecting and conserving air and water.

## Reading Comprehension Skills

Preview the Book ♦ How to Read Diagrams  
Main Idea and Details

**Skillbuilders are available for this title.**

## Supporting English Learners

**Develop Vocabulary** Create meaningful opportunities for English Learners to use new vocabulary in speaking, reading, and writing. Provide multiple exposures to science vocabulary such as *oxygen* and *tide*. Teach individual words and emphasize word-learning strategies such as using the word part *-tion* in words such as *evaporation* and *condensation*. Also emphasize the use of context clues, dictionaries, and thesauruses.

## Summary

The Delta Science Content Reader *Air and Water* begins by introducing students to the composition and importance of Earth's atmosphere. The book then explores Earth's water and where it is found. Students discover how water is integral to life on Earth. They learn how movements of water affect Earth's surface and weather and how water moves between Earth's surface and the atmosphere in the water cycle. The book concludes with a discussion of conservation strategies that help protect air and water.

## Science Background

Earth's air and water make it unique among the planets in our solar system. The atmosphere—the blanket of air around Earth—is important in many ways. It protects our planet by keeping the climate warm. It supports life because the gases in air are necessary for life. The atmosphere is also where weather happens.

Water, which is essential to most life, covers about 71 percent of Earth's surface. About 97 percent of Earth's water is salt water in the oceans and seas. Of the 3 percent or so that is fresh water, about two-thirds is frozen in glaciers and ice caps. Most of the remaining fresh water is on Earth's surface, underground, and in the atmosphere.

The oceans are constantly in motion. Breaking waves continually reshape coastlines. Huge rivers of warm or cold ocean water called currents are one of the main ways heat is distributed from one location on Earth to another, thus affecting weather and climate. At ocean shores, the water level rises and falls in the regular pattern of tides.

Water is the rare substance that can exist in all three states of matter—solid, liquid, and gas—at normal Earth temperatures. The water cycle is the continuous movement of water from Earth's surface to the atmosphere and back again. Energy from the Sun causes water to evaporate into the atmosphere from Earth's surface. As warm, moist air rises, it cools, and the water vapor in it condenses and forms clouds. In time, this water may fall back to Earth's surface as precipitation, and the cycle continues.



# What Is Earth's Atmosphere? (pages 2–7)

## Before Reading

### Discuss the Cover

**Cover Image** Discuss the photograph on the cover of *Air and Water*. Use the information on the inside front cover to support the discussion.

**Science Statement** Discuss the science statement. Ask: *Where in the picture is there water?* (Possible answers: river, clouds)

### Build Reading Skills (page 2)

**Preview the Book** Use Build Reading Skills on page 2 to review how to preview the book. Discuss the steps. Then model previewing captions and labels.

**Think Aloud** *I know a caption gives more information about a picture. The graph on page 4 shows amounts of gases in air. The caption tells me that air is mostly nitrogen, along with oxygen and small amounts of other gases. The labels tell me that 78 percent of air is nitrogen, 21 percent is oxygen, and 1 percent is other gases. As I read, I will pay attention to captions and labels to help me understand what the pictures show.*

Guide students as they finish previewing *Air and Water*. Focus on nonfiction text features.

- Prompt them to look at the headings, photographs, captions, and diagrams. Ask questions such as *Why do you think that feature is there? How will it help you understand what you read?*
- Prompt them to look at the bold Vocabulary words. Guide the class in looking up a Vocabulary word in the Glossary.

Students can apply the skill in the Reflect on Reading activity on page 7.

**K-W-L Chart** Have students begin a K-W-L chart. They should add to it after each section.

What I Know	What I Want to Learn	What I Learned
Rain falls from clouds in the air.	How does the water get up there?	

### Make a Connection (page 3)

**Make a Connection** Discuss the Make a Connection questions. Use this discussion to build background and activate prior knowledge about Earth's atmosphere. (Possible answers: We know air is there because we can feel the wind blow and can see it move things. I know we need oxygen to breathe, so air must be made partly of oxygen.)

**Find Out About** Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

**Vocabulary** Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a word web on the board with *Atmosphere* in the center. Have students add words and information to the web as they read.

## During Reading

### Air All Around Us (page 4)

- Discuss the photograph of the hot air balloon. Ask: *What is inside the balloon? (air) How can we tell from this picture that the gases in air take up space? (They fill up the balloon.)*
- Discuss the percentages in the chart on page 4. To help students relate percentages to fractions, review that  $25\% = \frac{1}{4}$ ,  $33\% = \frac{1}{3}$ ,  $50\% = \frac{1}{2}$ ,  $67\% = \frac{2}{3}$ , and  $75\% = \frac{3}{4}$ .
- Nitrogen makes up the largest portion of the atmosphere. The element nitrogen is a key ingredient in proteins, making it essential for life on Earth. Most organisms cannot use atmospheric nitrogen, however, and instead rely on nitrogen that is found in soil and living things.
- Ask: *Why do living things need the atmosphere? (Animals and plants need the oxygen in air to live. Plants need the carbon dioxide in air to make their own food.)*

✓ **Checkpoint** (page 4) (The atmosphere is the blanket of air around Earth. It is made mostly of nitrogen, along with some oxygen. The atmosphere also has small amounts of other gases, including carbon dioxide and water vapor, and bits of dust.)

## Layers of the Atmosphere (page 5)

- Point out the word part *-sphere* in the names of the layers of the atmosphere. Recall that a sphere is shaped like a ball. Ask: *Why do you think the layers of the atmosphere have -sphere in their names?* (Possible answer: because they surround Earth, and Earth is shaped like a sphere)

✓ **Checkpoint** (page 5) (Possible answers: Troposphere: closest to Earth, where most of the air is, where all living things are, where almost all weather happens; Stratosphere: above troposphere, has gas called ozone that absorbs harmful ultraviolet rays from the Sun and stops them from reaching Earth's surface; Mesosphere: coldest part of atmosphere, where meteors that fall toward Earth usually burn up; Thermosphere: top layer, where satellites circle Earth)

## Air and Weather (page 6)

- Ask: *How is Earth's air warmed?* (The Sun warms the land and water on Earth's surface. Then, heat from Earth's surface warms the air above it.)
  - Ask: *What is humidity?* (how much water vapor is in the air)
  - Point out that while we cannot see water vapor in the air, we can feel it when the air becomes damp and sticky on a humid day.
  - Discuss the photograph of the mountain climber on page 7. Ask: *What happens to the air pressure as you climb a mountain?* (It gets lower.)
  - Discuss that air pressure goes down as distance above sea level goes up because the higher up you are, the less air there is pressing down from above.
  - Discuss that cool air has greater air pressure than warm air because the particles in cool air are closer together than those in warm air. As a result, cool air is denser and heavier than warm air. It sinks and pushes down with greater pressure than warm air.
  - To emphasize that the uneven heating of Earth causes changes to the weather, point out that changes in temperature lead to changes in other weather factors.
- ✓ **Checkpoint** (page 7) (Weather is what is happening in the air at a certain time and place. Weather is caused by energy from the Sun.)

## After Reading

**Reflect on Reading** (page 7) Have students review the book features on pages 2–7 before answering.

**Apply Science Concepts** (page 7) This activity applies a concept from Find Out About on page 3. (Weather factors: air temperature, humidity, air pressure, wind, clouds, rain; Check marks will vary depending on the weather report, but most factors are named in most reports.)

## Where Is Earth's Water? (pages 8–19)

### Before Reading

#### Build Reading Skills (page 8)

**How to Read Diagrams** Use Build Reading Skills on page 8 to review how to read diagrams. Discuss the tips. Discuss with students that arrows, numbers, keys, legends, symbols, and color coding can be important features of diagrams. Then model reading the diagram of how a wave moves on page 12.

**Think Aloud** *First, I read the title, "How a Wave Moves." Then, I read the labels, "direction of wave" and "direction of water movement." I also see arrows with each label, so direction must be important to understanding how a wave moves. The big red arrow for "direction of wave" goes in a straight line. The small black arrows for "direction of water movement" go in circles. I think the diagram is showing that the water goes in a circle in one spot, but the wave goes forward in a straight line. When I read the caption, I find out I'm right. It says that energy moves forward in a wave, but the water itself does not.*

Guide students as they read the groundwater diagram on page 15. Students can apply the skill in the Reflect on Reading activity on page 19.

#### Make a Connection (page 9)

**Make a Connection** Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about where Earth's water is located. (Possible answer: I see a river behind the waterfall. The water must come from there. Maybe the water in the river comes from rain or melting snow.)

**Find Out About** Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

**Vocabulary** Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a Venn diagram on the board. Label one circle *Salt Water* and the other *Fresh Water*. Label the space where the circles overlap *Both*. Have students add words and information to the diagram as they read.

## During Reading

### The Blue Planet (page 10)

- Ask: *How does water help shape Earth's surface?* (Moving water breaks down and wears away rock. It carries rock pieces to new places.)
- Ask: *What are some ways people use water?* (Possible answers: drinking, washing, cooking, growing crops, putting out fires, making electricity)

✓ **Checkpoint** (page 10) (because almost three-fourths of Earth is covered by water)

### Salt Water (page 11)

- Ask: *What kind of water is most of the water on Earth?* (salt water) *Where is most of this water found?* (in the oceans)
- To help students understand the concept of energy, provide this simple definition: energy is what makes things go or grow.
- Ask: *How do currents affect weather patterns?* (Currents warm or cool the air above them.)
- Explain that gravity is the force that pulls objects toward each other. Gravity keeps us on the ground.

✓ **Checkpoint** (page 13) (Possible answer: Alike: They all move ocean water. Surface currents and most waves are caused by wind. Different: A wave is a movement of energy through a material such as water. Energy moves forward, but the water moves up and down in small circles. A current is like a river of warm or cold water that flows through the ocean. The tide is the regular rise and fall of the ocean level.)

### Fresh Water (page 14)

- Ask: *Where is most of Earth's fresh water found?* (frozen in glaciers and ice caps) *Can this water be used by most living things?* (no)
- Discuss the groundwater diagram on page 15. Ask: *Why are some cracks in the rock colored brown and some colored blue?* (Brown shows dry cracks, and blue shows cracks filled with groundwater.) *What is the name for the top of the water-filled cracks?* (water table)

✓ **Checkpoint** (page 16) (in glaciers, ice caps, lakes, ponds, rivers, streams, the ground, the atmosphere, and living things)

### How Water Changes (page 17)

- Ask: *In what three forms, or states, can water be found on Earth?* (solid, liquid, gas)
- Discuss the photograph of the puddle. Ask: *What happens to the water in the puddle when it evaporates?* (It changes to water vapor and becomes part of the air.)

✓ **Checkpoint** (page 17) (Water evaporates when it is warmed. It condenses when it is cooled.)

### The Water Cycle (page 18)

- Emphasize that it takes a very long time for the same water to travel through the whole water cycle. The water we drink today may have once rained on the dinosaurs!
- Ask: *How does the Sun's energy power the water cycle?* (The Sun warms Earth's surface, which causes water to evaporate.)
- Discuss the water cycle diagram. Ask: *Where does water that evaporates from Earth's surface come from?* (from oceans, plants, soil, rivers, and lakes) *Where does water go once it is in the air?* (Water drops group together to form clouds.) *Where does water go once it falls back to Earth?* (Some flows over the land as runoff. Some soaks into the ground and becomes groundwater.)

✓ **Checkpoint** (page 18 or 19) (Possible answer: The Sun warms water on Earth's surface. Some water evaporates. It becomes part of the air. Warm air rises and cools. Water vapor in the air condenses. Water drops group together to form clouds. Water drops join and get larger and heavier. They may fall to Earth as precipitation.)

## After Reading

**Reflect on Reading** (page 19) Possible connections forming one world ocean include: Southern to Atlantic, Indian, and Pacific; Atlantic to Arctic.

**Apply Science Concepts** (page 19) This activity applies a concept from Find Out About on page 9. (Possible answer: The water drops come from the air. There is water vapor in the air. When air touches the cold glass, some of the water vapor cools and condenses back to liquid. Water drops form on the glass.)

# How Can We Keep Air and Water Clean?

(pages 20–23)

## Before Reading

**Build Reading Skills** (page 20)

**Main Idea and Details** Use Build Reading Skills on page 20 to review main idea and details. Discuss the tips. Then model how to identify the main idea about air and water conservation on page 23.

**Think Aloud** *I see the heading “Air and Water Conservation,” so I know the main idea of this section must be about conservation. But what is conservation? The main idea is often in the first sentence of a paragraph. The first sentence of the first paragraph on this page explains that conservation is keeping resources safe and using them wisely. This must be the main idea.*

Guide students as they identify details that support the main idea. Students can apply the skill in the Reflect on Reading activity on page 23.

**Make a Connection** (page 21)

**Make a Connection** Discuss the Make a Connection question. Use this discussion to build background and activate prior knowledge about how we can keep air and water clean. (Possible answer: I know that sometimes ships carrying oil accidentally spill oil into the ocean. This harms plants and animals.)

**Find Out About** Read each statement to help students set a reading purpose. Explain that these are the important topics that they will learn about in this section.

**Vocabulary** Read the Vocabulary words aloud. Explain to students that they will see these words in bold in this section. Start a T-chart on the board for *air pollution* and *water pollution*. Have students suggest examples to add to the chart as they read.

## During Reading

**Air and Water Pollution** (page 22)

- Discuss that smog is a brownish haze that forms over cities. Smog and other air pollution can cause health problems such as breathing difficulties and scratchy, sore eyes and throats.
- Discuss that acid rain can damage buildings, destroy forests, and harm lakes and ponds.
- Discuss that water pollution spoils our fresh drinking water and can also harm the fish and other organisms that live in water.

✓ **Checkpoint** (page 22) (Possible answers: Air: burning fuels; Water: chemicals from farms and factories, wastes from landfills)

**Air and Water Conservation** (page 23)

- Ask: *If air and water are renewable, why do we need to protect them?* (They can be spoiled.)
- ✓ **Checkpoint** (page 23) (Possible answers: by making less pollution, using energy sources that do not pollute the air at all, cleaning water, and using less water)

## After Reading

**Reflect on Reading** (page 23) (Possible answers: Main idea: Pollution can make air unsafe to breathe and water unsafe to drink. Details: Air pollution is caused mainly by burning fuels in vehicles, power plants, and factories. Wastes in landfills can seep into groundwater.)

**Apply Science Concepts** (page 23) This activity applies a concept from Find Out About on page 20. (Possible answers: Water uses: drinking, washing dishes and clothes, showering, brushing teeth, watering plants; Ways to use less: take shorter showers, do only full loads of laundry)

➡ **Continued on last page**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Test: Air and Water

## Part A: Vocabulary

atmosphere	condensation	evaporation	fresh water
pollution	salt water	water cycle	wave

Choose the correct vocabulary word for each sentence. Write the word on the line.

1. The \_\_\_\_\_ is made of nitrogen, oxygen, and other gases.
2. Most of Earth's \_\_\_\_\_ is in the oceans.
3. The energy of the \_\_\_\_\_ moves forward, but the water itself moves up and down.
4. Two-thirds of Earth's \_\_\_\_\_ is frozen in glaciers and ice caps.
5. When liquid water changes to a gas, it is called \_\_\_\_\_.
6. When water vapor is cooled, \_\_\_\_\_ can happen.
7. Water moves from Earth's surface to the air and back again in the \_\_\_\_\_.
8. A natural resource can be spoiled by \_\_\_\_\_.

## Part B: Science Concepts

Mark the best answer to each question.

9. Which layer of Earth's atmosphere is where most weather happens?  

(A) mesosphere	(C) thermosphere
(B) stratosphere	(D) troposphere
10. Which movement of ocean water affects weather patterns by warming or cooling the air above it?  

(A) wave	(C) tide
(B) current	(D) tsunami

## Test: Air and Water (continued)

11. What is the top level of rock filled with groundwater called?

- (A) water table
- (B) ice cap
- (C) water vapor
- (D) runoff

12. You can conserve water by \_\_\_\_\_.

- (A) staying in the shower after you are done washing
- (B) watering the lawn on a rainy day
- (C) turning off the faucet while brushing your teeth
- (D) running the faucet until it is cold for a drink

Write the answer.

13. Explain what weather is and what causes weather. Tell at least three features that are part of weather.

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14. Describe at least two ways that water is important to Earth.

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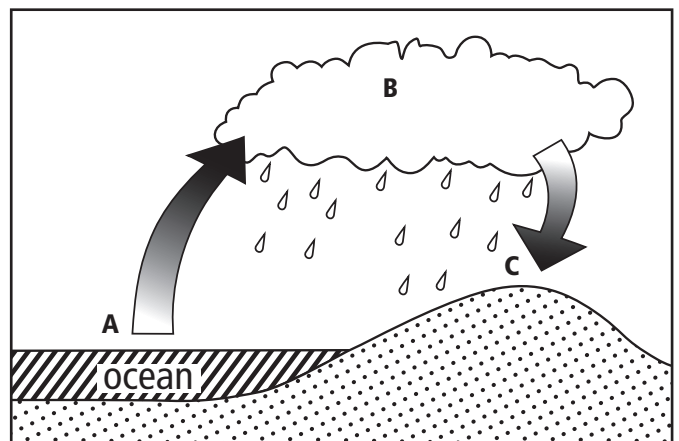
15. Look at this part of the water cycle. Label what is happening to water at A, B, and C. Use the words from the word box.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

condensation	evaporation	precipitation
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# Let's Review

## (inside back cover)

Have students complete their K-W-L charts before answering these questions. Possible answers are shown.

- Cover Connection** (The Sun's energy powers the water cycle. The Sun warms Earth's surface. Water evaporates and becomes part of the air, or the atmosphere. Warm air rises and cools. Water vapor condenses back to liquid. Water drops group together to form clouds. Water drops join and get larger and heavier. They may fall back to Earth's surface as precipitation.)
- (The atmosphere is the blanket of air around Earth. It is important because it keeps Earth from getting too hot or too cold. It blocks some harmful rays from the Sun. Animals and plants need the oxygen in air to live. Plants need the carbon dioxide in air to make their own food.)
- (Almost all of Earth's water is salt water. Only 3 percent is fresh water. Salt water: in oceans, seas, gulfs, and a few lakes; Fresh water: in glaciers, ice caps, lakes, ponds, rivers, streams, the ground, the atmosphere, and living things)
- (It is important to have clean air and water because all living things need them to live. One example of air pollution is burning fuels in cars. People could help solve this problem by making laws that limit how much waste cars can put into the air.)
- Main Idea and Details** (Main Idea: Almost all of Earth's water is salt water. Details: Most of Earth's

salt water is in the oceans. Some fish that people eat live in the ocean. Ocean water is always moving.)

- Write** (Stories will vary but should include all steps in the water cycle diagram on pages 18–19, from the perspective of a single drop of water.)

**Try It!** Students should observe that the mirror is covered with condensation, or very tiny water drops that together look like mist. This happens because warm, moist air from the shower or bath cools when it touches the mirror, causing water vapor to condense back to liquid. After an hour, students should observe that there is no longer condensation on the mirror. The water has evaporated back into the air.

**Science at Home** Have students do this activity at home with their families. Many municipalities include information about public water sources, water treatment, and related topics on their Web sites.

## Answers to Test

### (Teacher's Guide pages 6–7)

1. atmosphere 2. salt water 3. wave 4. fresh water 5. evaporation 6. condensation 7. water cycle 8. pollution 9. D 10. B 11. A 12. C 13. Weather is what is happening in the air at a certain time and place. Weather is caused by energy from the Sun. Weather features: air temperature, humidity, air pressure, wind, clouds, rain 14. All living things need water in order to live. Water helps shape Earth's surface. People use water in many ways, including for drinking, washing, cooking, growing crops, putting out fires, and making electricity. 15. A: evaporation; B: condensation; C: precipitation

**ADDITIONAL ASSESSMENT OPPORTUNITIES** Use the Checkpoints, Reflect on Reading, and Apply Science Concepts features and Let's Review questions as additional assessment opportunities.

*Delta Science Content Readers* are 24-page nonfiction student books with informative, engaging text and full-color photos and illustrations. The readers present key science content and vocabulary found on state tests, present key reading skills and strategies useful for reading informational text, support and extend the experiences and content of hands-on activities, promote scientific inquiry, and serve as a home-school link. They are available in two editions: Red Edition for Grades 3–4 and Purple Edition for Grades 4–5.

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