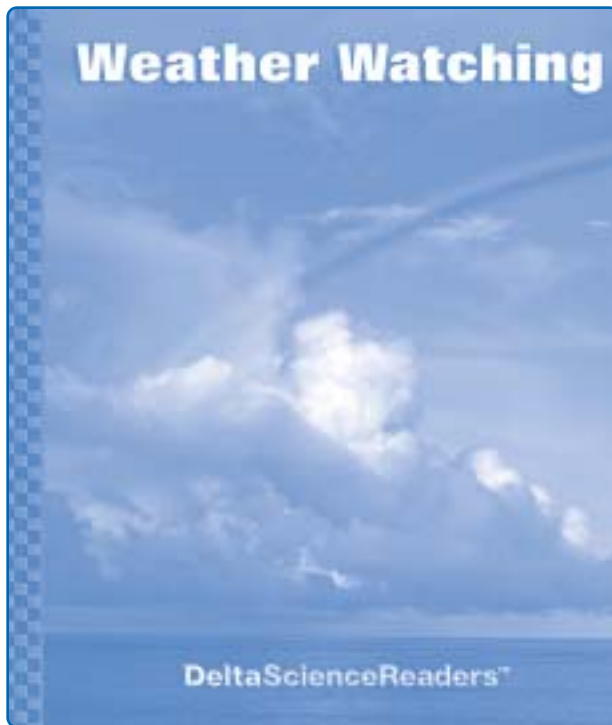


Weather Watching



Delta Science Readers are nonfiction student books that provide science background and support the experiences of hands-on activities. Every **Delta Science Reader** has three main sections: *Think About . . .*, *People in Science*, and *Did You Know?*

Be sure to preview the reader Overview Chart on page 4, the reader itself, and the teaching suggestions on the following pages. This information will help you determine how to plan your schedule for reader selections and activity sessions.

Reading for information is a key literacy skill. Use the following ideas as appropriate for your teaching style and the needs of your students. The After Reading section includes an assessment and writing links.

OVERVIEW

In the Delta Science Reader *Weather Watching*, students discover what weather is and what causes it to change. They read about the water cycle and explore various weather tools. The book explains how weather changes with the seasons. Tornadoes, hurricanes, blizzards, and thunderstorms are also discussed. The book presents a biographical sketch of Ben Franklin, who conducted an important experiment with lightning, and describes the work of a meteorologist. Students explore how weather satellites collect weather data from space.

Students will

- ▶ discover facts about weather and seasons
- ▶ discuss the water cycle
- ▶ learn about and discuss a variety of weather instruments
- ▶ understand different types of severe weather
- ▶ discuss the function of a table of contents, headings, and a glossary
- ▶ interpret photographs and graphics—diagrams and illustrations—to answer questions
- ▶ complete a KWL chart

READING IN THE CONTENT AREA SKILLS

- Recognize cause and effect relationships having to do with the seasons and the weather
- Compare and contrast types of weather
- Categorize information about weather tools
- Demonstrate critical thinking
- Interpret graphic devices
- Summarize

NONFICTION TEXT ELEMENTS

Weather Watching includes a table of contents, headings, photographs and illustrations, captions, diagrams, boldfaced terms, and a glossary.

CONTENT VOCABULARY

The following terms are introduced in context and defined in the glossary: *air pressure, anemometer, atmosphere, axis, barometer, blizzard, cloud, condense, evaporate, forecast, front, hurricane, lightning, meteorologist, orbit, precipitation, rain gauge, season, temperature, thermometer, thunder, thunderstorm, tornado, water cycle, water vapor, weather, weather map, weather satellite, wind, wind vane.*

BEFORE READING

Build Background

Assess students' prior knowledge of weather by displaying the cover, reading the title aloud, and inviting students to share what they know about the topic from personal experiences and hands-on explorations in science. Point out the rainbow and invite students to share what they know about rainbows. Ask what kind of weather is associated with rainbows.

(rainy weather) Explain that rainbows are caused by sunlight passing through raindrops, which reflect and bend the light.

To stimulate further discussion of weather, ask questions such as these: *What season is it? What type of weather do we usually have during this season? How would you describe the weather today? About what temperature is it outside?*

Begin a class KWL chart by recording facts students know about weather in the K column. You may wish to copy the KWL chart and ask students to maintain their own charts as they read.

K What I Know	W What I Want to Know	L What I Learned	+ What I Want to Explore Further

Preview the Book

Take a few minutes to have students look through the book. Remind them of the steps involved in previewing nonfiction: read and think about the title; think of what they already know about the topic; read the table of contents, headings, and boldfaced words; and examine photographs, diagrams, charts, and other illustrations.

Call attention to the various nonfiction text elements and explain how they can help students understand and organize what they read. Point out that the table of contents lists all the headings in the book and their page numbers. Ask, *How do the headings help you know what you will learn about?* Point to some of the illustrations and ask questions such as: *What does this picture show you? How do you think it will help you understand the text?* Explain that the words in boldface type are important words related to the weather. Point out that these words are defined in the glossary. Choose one word

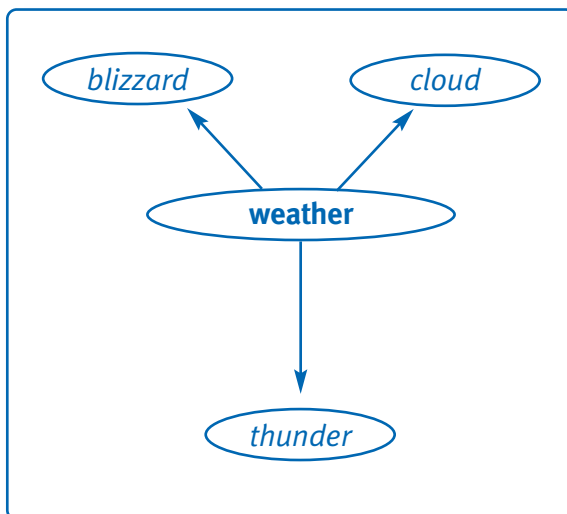
and have students find its definition in the glossary.

After the preview, ask, *What questions do you have about weather that you hope this book will answer?* Record students' responses in the second column of the KWL chart. Explain that they will complete the chart after they finish reading.

Preview the Vocabulary

You may wish to preview some of the vocabulary words before reading, rather than waiting to introduce them in the context of the book. Possibilities include creating a word wall, vocabulary cards, sentence strips, or a concept web.

For example, develop with students a concept web such as the following, based on points made in the Build Background discussion and in the preview.



▲ A concept web for **weather**.

Set a Purpose

Discuss with students what they might expect to find out from the book, based on their preview. Encourage them to use the questions they suggested for the KWL chart to set their own purpose for reading.

GUIDE THE READING

Preview the book yourself to determine the amount of guidance you will need to give for each section. Depending on your schedule and the needs of your class, you may wish to consider the following options:

- **Whole Group Reading** Read the book aloud with a group or the whole class. Encourage students to ask questions and make comments. Pause as necessary to clarify and assess understanding.
- **Shared Reading** Have students form pairs or small groups and read the book together. Ask students to pause after each text section to clarify as needed and to discuss any questions that arise or have been answered.
- **Independent Reading** Some students may be ready to read independently. Have them rejoin the class for discussion of the book. Check understanding by asking students to explain in their own words what they have read.

Tips for Reading

- If you spread out the reading over several days, begin each session by reviewing the previous day's reading and previewing what will be read in the upcoming session.
- Begin each text section by reading or having a volunteer read aloud the heading. Discuss what students expect to learn, based on the heading. Have students examine any illustrations or graphics and read accompanying captions and labels.
- Help students locate context clues to the meanings of words in boldface type. Remind them that these words are defined in the glossary. Provide help with words that may be difficult to pronounce.
- As appropriate, model reading strategies students may find helpful for nonfiction: adjust reading rate, ask questions, paraphrase, reread, visualize.

Think About . . . (pages 2–12)

Pages 2, 3 *Watching the Weather*

- Have students read the heading and the body text. Then have them look at the photograph and read the caption. Ask, *Why do you think the boy in the photograph looks disappointed?* (He had probably hoped for nice weather, but it's raining instead.) *When have you had to change your plans because of the weather?*
- Point out that the boy is checking on the weather by looking out the window. Ask, *Besides looking out the window, how else do people find out about the weather?* (They watch weather forecasters on television. They read weather reports in the newspaper. They look at weather sites on the Internet.)
- Have students read the body text on page 3. If necessary, provide help with the pronunciation of *atmosphere* (AT-muh-sfir). Ask, *If the Sun warms water and land, what do you think happens at night?* (Water and land cool off.)
- Then have students look at the photograph and read the caption. If you have access to a globe, let students compare the photograph of Earth to the globe. Invite them to try and locate the part of the planet pictured in the photograph.

You may wish to point out that Earth's atmosphere has layers. Most weather occurs in the layer closest to Earth, the troposphere, which extends about 12 kilometers (7 miles) above Earth's surface.

Pages 4, 5 *What Is the Water Cycle?*

- Have students read pages 4 and 5, including the graphics and captions, to learn about the water cycle. Ask, *How does the illustration on page 5 help you understand the water cycle?* (It

helps to be able to see in a picture exactly what the words describe.) If necessary, provide help with the pronunciation of *evaporate* (I-VAP-uh-rate), *condense* (kuhn-DENSS), and *precipitation* (pri-sip-i-TAY-shuhn).

- Then review the water cycle. Encourage students to refer to the illustration on page 5 as you ask, *What causes water in oceans, lakes, and rivers to warm up?* (heat from the Sun) *What happens to the water when it gets warm?* (It evaporates, or turns into a gas called water vapor.) *What happens to the water vapor?* (It rises.) *What happens to the water vapor when it rises?* (It cools off.) *What happens to the water vapor when it cools off?* (It condenses, or turns back into drops of water and forms clouds.) *What happens when the drops in clouds get heavy?* (They fall to Earth as rain or snow.)
- Write the words *evaporate* and *condense* on the board. Ask students to find words on the water cycle chart on page 5 that are related to these words. (*evaporation* and *condensation*) Discuss how the words are alike and different.
- Ask students whether they have ever seen anything close to the ground that reminded them of a cloud. If necessary, point out that a cloud that is close to the ground is called fog.
- Extend the learning by pointing out that students have already seen examples of evaporation in their everyday lives. Ask, *What happens to puddles after it rains?* (The water disappears.) Lead students to conclude that the water might evaporate into the air or seep into the ground.

Pages 6, 7 *Weather Tools*

- Brainstorm with students some different kinds of weather, such as rainy, sunny, cold, hot, windy, stormy, and snowy. Have students read pages 6 and 7 to

find out about tools used to measure and forecast these and other kinds of weather. Encourage students to discuss weather tools they have at their homes and how they are used.

- Ask students to look at the photograph of the thermometer and read the caption. Ask, *As the air gets warmer, does the temperature go up or down?* (up)
- Have students look at the picture of the wind vane and read the caption. Ask, *What direction does the wind vane show the wind is coming from?* (from the west)
- Have students look at the picture of the rain gauge and read the caption. Ask, *What do you think would be a good way to measure how much snow has fallen?* (perhaps a ruler)
- Have students look at the picture of the anemometer and read the caption. Ask, *How are an anemometer and a wind vane alike?* (They both measure wind.) *How are they different?* (One measures wind speed, and the other shows wind direction.) Students may also know about another tool that shows wind direction, the wind sock.
- Help students make a two-column chart with the title *Weather Tools*. In the first column have them list each tool shown on page 7. In the second column they should list what the tool measures. If you wish, introduce the term *instruments* as another word for *tools*. If necessary, provide help with the pronunciation of *thermometer* (thur-MOM-uh-tur), *rain gauge* (rayn gayj), *barometer* (buh-ROM-uh-tur), and *anemometer* (an-uh-MOM-uh-tur).

Pages 8, 9 *Weather and the Seasons*

- Before they read, ask students if they think winter weather is the same all over the world. (no) Lead a discussion of what the weather is like from season to season where you live. Explain that the pages they are going to read describe the seasons in some parts of the world.

- Then have students read pages 8 and 9. Have them think about the weather where they live as they look at the photographs and read the captions. Have them look at the photograph of spring and read the caption. Ask, *What season comes before spring?* (winter) Talk about how spring is different from winter.
- Have students look at the photograph showing summer and read the caption. Encourage them to talk about their favorite summer activities. Ask, *Why do you think some parts of the country are popular vacation spots in summer?* (Places near the ocean or lakes are popular because people like to swim in the summer. People also go to places that have cooler weather to get away from the heat.) *Is it more likely to be cool in summer in the northern or southern part of the United States?* (in the northern part)
- Have students look at the photograph of winter and read the caption. Ask, *Why do you think some parts of the country are popular vacation spots in winter?* (Some people go to places with warmer weather to get away from the cold and snow. Other people like winter sports so they go where there is lots of snow.)
- Have students look at the word *cycle* in the last sentence on page 9. Remind them that earlier they read about another kind of cycle—the water cycle. Ask, *What is another word for cycle?* (circle)

Page 10 *Why Do We Have Seasons?*

- If possible, show students a globe. Let them look at the oceans and the United States on the globe.
- Have students read page 10 to find out what causes the seasons. Ask them to look at the diagram and read the labels. Help students locate the United States on the illustrations of Earth. Ask, *Is the United States in the northern or southern part of Earth?* (in the northern part)

- Check students' comprehension by asking, *Why is it warmer in the northern part of the planet during the summer?* (In summer the northern part of the planet tilts toward the Sun.) *In which direction does the northern part of the planet tilt during the winter?* (away from the Sun)
- Extend the learning by asking, *When it is summer in the northern part of the planet, what season is it in the southern part of the planet?* (winter) *Why?* (At this time, the southern part of the planet tilts away from the Sun.)
- If necessary, provide help with the pronunciation of *axis* (AK-sis). Tell students that the Sun is much bigger compared to Earth than the picture shows. This illustration shows how our planet moves around the Sun and why we have seasons. It does not show the sizes of Earth and the Sun.

Pages 11, 12 *Stormy Weather*

- Ask students to brainstorm the names of different kinds of stormy weather. Write their suggestions on the board. Then have them read pages 11 and 12 to find out about some of the storms.
- Check comprehension by asking, *Which of the storms has the strongest wind?* (a tornado) Have students refer to their chart of weather tools and ask, *Which weather tool would be used to measure the wind speed of a tornado?* (an anemometer) *Which storm brings the most rain?* (a hurricane) *Which weather tool would be used to measure the rain that falls during a hurricane?* (a rain gauge) *Which storm happens in the winter?* (a blizzard) *Which weather tool would you use to measure the temperature during a blizzard?* (a thermometer)
- Ask volunteers to relate their personal experiences with these or any other types of storms.

People in Science (pages 13–14)

Page 13 *Ben Franklin*

- Before students read, ask, *Which type of storm you just read about has lightning?* (a thunderstorm) *Why is it dangerous to be outside in the open during a thunderstorm?* (There is a danger of being hit by lightning.) *What do you think is lightning made of?* (electricity) Ask students if they know another name for a thunderstorm. (an electrical storm)
- Point out that in earlier times people did not know that lightning was made of electricity. Then have them read to find out about who discovered this fact.
- Point out that Franklin based his experiment on facts he already knew about electricity.
- Remind students that lightning and electricity can be dangerous. They should never try an experiment like Franklin's.
- Students may be interested to know that after proving that lightning and electricity are the same, Franklin went on to invent the lightning rod. A lightning rod is a metal stick mounted to the top of a house. A connecting metal cable leads to the ground. When the rod is struck by lightning, the cable leads the electricity safely into the ground.

Further Facts

Ben Franklin (1706–1790)

- Born one of 17 children in Boston, Massachusetts; died in Philadelphia.
- Worked in his brother's print shop from age 12 to 17, then moved by himself to Philadelphia.
- Set up a print shop in 1728, publishing the *Pennsylvania Gazette*,

which became the most successful newspaper in colonial America.

- Began printing *Poor Richard's Almanack* in 1733.
- Retired from printing in 1748, devoting his life to public service, inventing, and experimenting.
- Among his inventions were the Franklin stove, bifocal eyeglasses, and even swim fins!
- Founded the first public library, and helped organize the first fire department, first police department, and first city hospital in America.
- As a diplomat, represented the American colonies before the English Parliament; persuaded France to help the colonies win independence.
- As a statesman, helped draft and signed both the Declaration of Independence and the U.S. Constitution.

Page 14 **Meteorologists**

- Have students read the first paragraph on the page. If necessary, provide help with the pronunciation of *meteorologist* (mee-tee-ur-OL-oh-jist). Ask them to share their experiences with watching meteorologists forecast weather, such as on television. Ask, *Why do you think people are so interested in knowing what the weather will be?* (Accept reasonable responses. If necessary, point out that the work of a lot of people, such as builders and farmers, depends on the weather, and that travelers also need to know what the weather will be.)
- Have students read the rest of the page. Check comprehension by asking, *Where do meteorologists get some of the information they need to forecast the weather?* (weather balloons, ships, weather satellites) Some students may also suggest computers. *What is a*

weather front? (where two masses of air meet) *What often happens along a weather front?* (The weather changes.)

- Encourage students to discuss questions they would like to ask a meteorologist. They may want to add these questions to the W column of their KWL chart.

Did You Know? (page 15)

How Weather Satellites Work

- Have students read page 15 to find out how weather satellites work.
- Have students look at the photographs and read the caption. Ask, *How do you think warnings about storms like hurricanes help keep people safe?* (People can leave the area where the storm is going to hit, board up homes and stores, buy extra supplies, and so on.)
- Point out that even though meteorologists have many tools to help them forecast the weather, their forecasts are not always right. Ask, *Why do you think the weather is so hard to forecast correctly?* (Accept all reasonable answers. Point out that weather is very hard to predict because it can change very quickly. No one can be absolutely sure what the weather will be in the future.)

Further Facts

Kinds of Weather Satellites

There are two kinds of weather satellites—polar-orbiting satellites (POES) and geostationary satellites (GOES).

- A polar-orbiting satellite circles Earth in a north-south orbit, traveling over the polar regions. It passes over different areas of Earth with each orbit, covering the entire surface of Earth every 12 hours.
- A geostationary satellite's orbit keeps it above only one area of the equator. It travels eastward as Earth rotates and thus remains over the same spot.

- Because geostationary satellites orbit in space about 35,786 kilometers (23,236 miles) above Earth, the images they record cover a wide area. Images from lower polar-orbiting satellites are more detailed.
- The first operational satellite system of the United States was made up of polar-orbiting satellites. The first was launched in April 1960.
- The National Aeronautics and Space Administration (NASA) launches weather satellites. The National Oceanic and Atmospheric Administration (NOAA) oversees their day-to-day operations.

AFTER READING

Summarize

Have students summarize the book by completing the KWL chart they began before reading. Help them write in the L column the answers to the questions they wrote in the W column. Then ask volunteers to summarize the information in each section, referring to the book if necessary.

Discuss with students how using the KWL strategy helped them understand and appreciate the book. Invite them to share any other reading strategies that helped them understand what they read.

Direct students' attention to the fourth column on the chart. Ask, *What questions do you still have about weather and weather forecasting? What would you like to know more about?* Record students' responses. Then ask, *Where do you think you might find answers to your questions?* (an encyclopedia, a magazine article, science books, the Internet) Encourage students to conduct further research.

Review/Assess

Use the questions that follow as the basis for a discussion of the book or for a written or oral assessment.

1. What causes weather? (Heat from the Sun warms Earth's surface. Heat from Earth's surface warms the air above it. The Sun also warms the water in rivers, lakes, and oceans. The uneven heating and cooling of water and air cause weather.)
2. What is the water cycle? (The Sun heats the water in oceans, lakes, and rivers, causing it to evaporate. The resulting water vapor rises. As it rises, it cools and condenses, turning back into tiny drops of water. These form clouds. The drops in clouds get heavy and fall to Earth as rain or snow. The rain fills oceans, lakes, and rivers, and the cycle continues.)
3. Why does the weather in many places change from season to season? (No matter where Earth is in its orbit, its axis is tilted. At one part of its orbit, the northern part of the planet tilts toward the Sun, causing summer. At the opposite part of Earth's orbit, the northern part of the planet tilts away from the Sun, causing winter.)

Writing Links/Critical Thinking

Present the following as writing assignments.

1. Think about the many reasons why people want to know what the weather will be. Explain why weather forecasts are so important. (Accept all reasonable responses.)
2. Imagine that you are a meteorologist writing a weather report warning about the arrival of one of the kinds of storms you just read about. Describe the coming storm, including the amount of precipitation, wind speed, and temperature you expect. (Accept any responses consistent with the details found on pages 11 and 12.)

Science Journals: You may wish to have students keep the writing activities related to the reader in their science journals.

References and Resources

For trade book suggestions and Internet sites, see the References and Resources section of this teacher's guide.