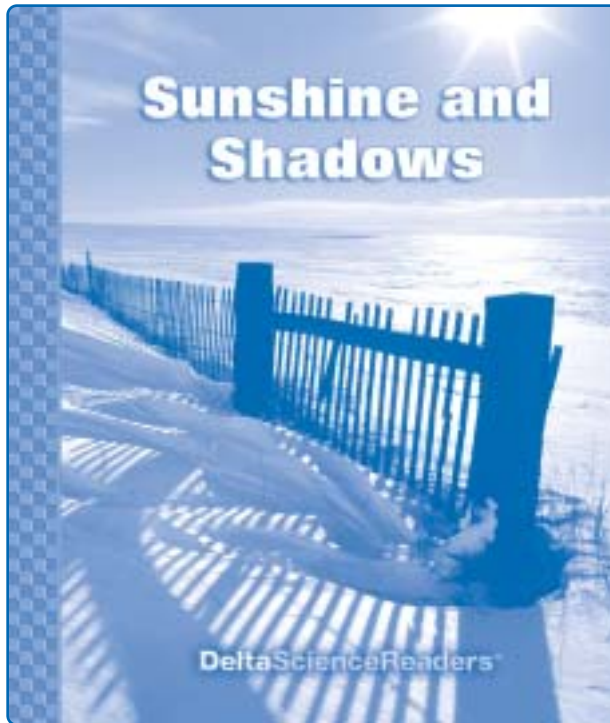


Sunshine and Shadows



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 link.

OVERVIEW

In the Delta Science Reader *Sunshine and Shadows*, students read about the world of light and shadows. They learn about how shadows are formed and why shadows change size and shape. They find out about different sources of light and identify kinds of objects that block light to make a shadow. They also read about the job of a meteorologist, a scientist who studies and forecasts weather—sunny and otherwise. Finally, students learn how sundials use sunlight and shadows to tell the time.

Students will

- ▶ identify sunshine and other types of light
- ▶ learn how a shadow is produced
- ▶ classify objects that block light and objects that allow light to pass through
- ▶ observe how shadows change as the sun's position changes
- ▶ find out how a sundial tells time
- ▶ examine nonfiction text elements such as table of contents, headings, and glossary
- ▶ interpret photographs and illustrations to answer questions

READING IN THE CONTENT AREA SKILLS

- Cause and effect
- Draw conclusions
- Critical thinking
- Interpret graphic devices
- Summarize
- Make predictions
- Classify and categorize

NONFICTION TEXT ELEMENTS

Sunshine and Shadows includes a table of contents, headings, photographs, illustrations, captions, boldfaced terms, and a glossary.

CONTENT VOCABULARY

The following terms are introduced in context and defined in the glossary: *block, light, object, shadow, sun, sunshine.*

Optional vocabulary: *opposite, surface*

BEFORE READING

Build Background

Access students' prior knowledge of shadows by displaying and discussing the cover. Read aloud the title and ask, *What do you see in this picture?* (fence and fence shadows on snow; sky; sun)

Invite students to share what they know about the topic from their personal experiences and hands-on explorations in science. To stimulate discussion, ask questions such as these: *Have you ever seen a shadow? Where?* (outdoors on a sunny day, indoors when lights are on) *Have you ever made a shadow yourself? What were you doing?* (standing in sunshine, placing a hand in front of a lamp)

Hold up several objects, such as a glass tumbler, a block, a clear plastic sandwich bag, and a coffee mug. Ask, *Do you think this object can make a shadow?* Follow the consensus of the class to sort the objects into two groups—those that make shadows and those that do not. Tell students that the book they are about to read will help them figure out if their predictions are correct.

Preview the Book

Show students the book cover again. Ask, *Where do you see the sun? Where do you see a shadow?* Ask volunteers to point to the sun and the shadow in the photo. Ask, *What is making the shadow?* Have a volunteer point to and name the object. (fence)

Tell students that one way to find out what a book is about is to *preview* the book. Explain that they can preview a book they are about to read by looking at its cover, chapter titles, pictures, and other important parts.

To preview the book with students, flip through the pages and briefly discuss the photographs and diagrams. Ask questions such as, *What objects do you see in this picture? Do you see any shadows in this picture? Where? What is making the light in this picture? How do you know?*

Have students turn to the table of contents. Explain that the table of contents is a list that tells what is written in the book. Ask, *What do you notice about this page?* Read aloud the headings and point to the page numbers listed after each heading. Explain that each number tells the page on which they will find information about each heading.

Point to and read aloud the word *Glossary* at the bottom of the page. Tell students that a glossary is a list of words and their meanings. Point out the words in boldface type on page 2 (*sun, light, sunshine*). Explain that words printed in dark print are important words related to *Sunshine and Shadows*. Tell students that they will find the meanings of these words in the glossary in the back of the book. Choose one word and model how to find its definition in the glossary.

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, on the board or chart paper, you might draw a simple diagram of a sun, a block, and its shadow. Have students help you use the words *sun*, *object*, and *shadow* from the glossary to label different parts of the diagram.

Set a Purpose

Discuss with students what they might expect to find out from the book, based on their preview. Ask, *What kinds of things would you like to learn about sunshine and shadows as you read this book?* List students' questions on chart paper to set a 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 work in pairs or small groups to read the book together. Ask students to pause after each text section. Clarify as needed and 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. Have students examine any illustrations or graphics and read accompanying captions and labels. Discuss what students expect to learn, based on the heading, illustrations, and captions.
- 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 2–11)

Pages 2, 3 *What Is Sunshine?*

- Have students look at the photograph on page 2. Ask, *Does this picture show daytime or nighttime? (daytime) How do you know? (You can see the sun.)*
- Read aloud the heading. Frame the word *sun* in *sunshine* and read it aloud. Ask, *What do you think makes sunshine? (the sun)* Read aloud page 2 to confirm students' predictions.
- Activate students' prior knowledge about the sun by asking questions such as, *When you are outside, where do you see the sun? What does the sun look like? How does sunshine feel on your skin?*
- Have students look at the picture on page 3. Ask, *What do you see coming through the window? (sunshine or light)*
- Read aloud the text on page 3. Ask, *Where do you think the sun is? (on the other*

side of the door) Explain that light can pass through some objects, like windows or the glass in eyeglasses. Have students trace the light from the window to the edge of the page. Ask, *Did your finger go in a straight line?* (yes)

- Direct students' attention back to the first sentence on page 2. Point to and read aloud the word *sun* and ask, *What do you notice about this word?* (It is printed in dark print.) Remind students that words printed in dark print are listed in the glossary. Have students turn to the glossary and find the word *sun*. Read aloud the definition. Follow the same procedure for the words *light*, *sunshine*, and *objects*.

Pages 4–7 *What Is a Shadow?*

Pages 4, 5

- Have students look at the photograph on page 5. Ask, *What do you see in this picture?* (a sea lion on a sandy beach) *What is the dark area next to the sea lion?* (the sea lion's shadow)
- Read aloud the text on page 4. Ask, *Why do you think the sea lion's shadow is darker than the area around it?* (The sun isn't shining on the area where the shadow is.) *What is blocking the sunshine?* (the sea lion's body) *Why doesn't the light go around the sea lion's body?* (Light goes in a straight line. It can not go around objects.)
- Help students make connections between the text and their own experience by asking questions such as, *Have you ever seen your own shadow? What did it look like? Where was the light coming from? What do you think blocked the light to make the shadow?*
- Direct students' attention to the vocabulary diagram you made before reading. Point out that three things are needed to produce a shadow: the sun or another source of light, an object, and the ground or other surface where the shadow

can be seen. If you have started a vocabulary diagram, add the labels *light* and *object* to the diagram. You may also wish to add a label for *surface*.

Page 6

- Help students identify the objects in the photographs on page 6. (toy pigs, polar bears, hot-air balloon) Ask, *What else do you see in each of these pictures?* (the objects' shadows)
- Read aloud the text on page 6. Help students brainstorm a list of other things that can make shadows, such as people, trees, and buildings.

Page 7

- Remind students that some objects allow light to pass through while others block light. Explain that when light passes through an object, it is possible to see things that are on the other side. Point to a window or other transparent object. Ask, *Can you see what is on the other side of this window? Do you think this window lets light pass through?* (yes)

(As appropriate you may wish to introduce the terms *opaque*, *transparent*, and *translucent*. *Opaque* objects are those that completely block the light. *Opaque* objects cast dark shadows. *Transparent* objects allow light to pass through so that things on the opposite side can be clearly seen. *Translucent* objects permit some light to pass through but diffuse the light so that things on the opposite side are not clearly visible.)

- Direct students' attention to page 7 as you read the text aloud. Have students help you identify the objects on the page. Then point to each object and ask, *Will this object block the light? Why do you think that?*
- Ask, *Which of these objects can make a shadow?* If necessary, remind students that objects make shadows when they

block the light. Help them conclude that the objects that will block the light—the cat, the watermelon, and the shell—will make shadows. The magnifier and the glass will let light pass through and will not make shadows.

- Direct students' attention to the objects they sorted before they began reading. Ask, *Which group of objects will block the light? Which group will not block the light?* Have students name other objects around the room that belong in each group.

Pages 8, 9 *How Do Shadows Change?*

- Have students think about times when they have seen their own shadows. Ask, *Does your shadow always look the same? Have you ever seen your shadow when it was very short? Have you ever seen your shadow when it was very long?*
- Direct students' attention to the pictures on page 9. Ask, *What do you notice about the shadows in these pictures? Are they all the same? (no) How are they different?* (They are different shapes and sizes. They are in different positions. They are on different sides of the animals.)
- Point to the shadows in each picture as you read the text on page 8. Then ask, *What do you notice about the sun in each picture?* (It is in a different place.) *What do you think made the shadows change?* If necessary, guide students to infer that the shadows changed because the sun's position in the sky changed.

(As appropriate, you may wish to point out that a shadow is always cast *opposite* its light source. This happens because light always travels in a straight line. When an object blocks the light, a shadow falls along that straight line on the opposite side from the light source.)

- Briefly discuss the relative positions of shadows and the sun (or other source of light). Ask questions such as, *When the*

sun is behind you, where will your shadow be? (in front of me) *When the sun is on your left, where will your shadow be?* (on my right) *If the light is above an object, where will its shadow be?* (below the object)

Page 10 *Other Kinds of Light*

- Read aloud the heading on page 10 and ask, *Is the sun the only thing that gives us light?* (no) *What else gives us light?* Briefly discuss students' responses. If necessary, point out that the moon, lamps, flashlights, streetlights, and car headlights also give us light.
- Read page 10. Then direct students' attention to each picture. Ask, *What is making the light in this picture?* (sun, flashlight, moon) Have volunteers point to any shadows they see in the pictures. Have them identify the object that is blocking light to make the shadow.

As appropriate, explain that the moon does not make its own light. Instead, the sun shines on the moon. The sunlight reflects off the moon. We see that reflected light as moonlight.

Page 11 *What Object Made the Shadow?*

- Point out to students that the shape of a shadow is usually similar to the shape of the object that makes it.
- Tell students that they are going to play a shadows game. Read aloud the heading on page 11. Then point to each picture and ask, *What do you think made this shadow?* (fence, tree, dog, airplane)

People in Science (pages 12, 13)

A Meteorologist

- Ask students to turn back to page 2 and look at the picture. Ask, *What kind of weather does this picture show?* (sunny) *How do you know?* (You can see the sun.) *Can you see shadows in this picture?* (yes)

- Ask, *If this picture showed a cloudy day, would you be able to see shadows?* (no) Remind students that sunshine or other light is needed to make a shadow.
- Have students look at the photograph on page 12. Ask, *What do you think this person is doing?* (Accept all responses at this time.)
- Read aloud page 12. Ask, *Have you ever seen a weather report on TV? What did the report tell you?*
- Write the word *meteorologist* on the board and help students pronounce the word (mee-tee-uh-ROL-uh-jist). Ask, *What does a meteorologist do?* (studies and tells us about weather) Explain that meteorologists are scientists who study clouds, winds, temperature, rain, snow, and other weather conditions so that they can predict what the weather will be like in a few hours, days, or even weeks. Ask, *Why might people need to know what the weather will be like?* (to know what clothes to wear, what activities to plan, whether to prepare for a storm, and so on)
- Point to each weather icon as you read aloud the first five questions. Encourage students to say with you the last word in each question.
- Read aloud the last two questions. Ask, *Which piece of clothing would you wear on a sunny day? on a rainy day? on a snowy day? Can you see your shadow if the weather is sunny?* (yes) *Can you see your shadow if it is rainy?* (no) *Can you see your shadow if it is snowing?* (no)

Did You Know? (pages 14–15)

About Time and the Sun

- Ask, *What do we usually use to tell what time it is?* (a clock) *What do you think people used to tell time before we had clocks?* (Accept all answers at this time.) Tell students that they will learn the answer on the next two pages.
- Have students turn back to pages 8 and 9. Remind them that the pictures show shadows at different times of the day. Reread the text on the page. Have students point to the picture that shows what shadows look like in the morning, at midday, and in the afternoon.
- Have students look at the picture on page 14. Ask, *Does anyone know what this object is? Have you ever seen something like this? Where?* Tell students that the object in the picture is called a *sundial*. Explain that a sundial uses the sun and shadows to tell the time.
- Have students point to the shadow shown on the sundial. Ask, *Is the shadow long or short?* (short) *What part of the day do you think it is?* (near the middle of the day; noon) *What would the shadow look like if it were at the end of the day?* (It would be long.)
- Point out the numbers on the face of the sundial. Ask, *What do you think these numbers stand for?* (times of the day; hours) *Who can read the time on this sundial?* (about 11 o'clock)
- Ask, *Can you use a sundial to tell time on a cloudy day?* (no) *Why not?* (You need sunshine to make a shadow on the sundial.)

Further Facts

- The sundial is one of the oldest known devices for measuring time. The Babylonian, Egyptian, Greek, Roman, and ancient Chinese civilizations are all known to have used forms of the sundial.
- A sundial measures the time by casting a shadow from a rod or flat piece of metal onto a surface that is marked off in time intervals.
- A sundial consists of a *plane* (the calibrated dial face) and a *gnomon* (pronounced NO-muhn; the rod or pointer that casts the shadow). The

gnomon is mounted so that it is parallel with the axis of the Earth.

- Have students look at the photograph on page 15. Ask, *What do you see in this picture?* (sun, chairs on a deck, shadows) *What objects are making shadows?* (chairs) *Are the shadows of the chairs long or short?* (long)
- Read aloud the text on page 15. Ask, *What time of day do you think it is? Why?* (Students should suggest either very early or very late in the day. Students should be able to tell from the length of the shadows that the sun is low in the sky, as it is early in the morning and late in the afternoon or in the evening.) Ask, *How would the shadows of the chairs be different in the middle of the day?* (They would be short. They would be under the chairs.)
- Review students' understanding of changing shadows by asking, *Why do shadows change position during the day?* (because the position of the sun in the sky changes)

AFTER READING

Summarize

Flip through the book one more time. Use the headings, photographs, and boldfaced terms to help students use the vocabulary and summarize their learning. For example, *Where do you see a shadow on this page? What is making the shadow? Will all these objects block the sun? Which ones will not?*

Read through the questions students listed before reading. Ask students to think about what they have read and answer the questions if they can. Ask, *What questions do you still have about shadows? What would you like to know more about?* Record students' responses. Then ask, *Where do you think you might be able to find this information?* (Students might mention an encyclopedia, science books, and the Internet.)

Review/Assess

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

1. Why is the sun important? (It gives us light and heat.)
2. Can you point to an object in this room that light passes through? (Students might point to windows, a glass tumbler, a sheet of clear plastic, and so on.)
3. Hold up an opaque object, such as a book. Ask students if the object will make a shadow if you shine light on it. (The object will block the light and make a shadow.)
4. Can you see shadows outside on a cloudy day? Why not? (There is no sunshine.) Is sunshine the only light that can make shadows? (no) What other kinds of light can make shadows? (moonlight, lamplight, flashlights)
5. Pretend you are outside on a sunny day. How might you figure out if it is time to eat lunch? (Look at the sun and shadows. If the sun is high in the sky and shadows are short, then it is the middle of the day and time for lunch.)
6. Which do you think is more useful, a sundial or a clock? Why? (A clock is more useful. Sundials only work outdoors during the day, and they only work on days when the sun is shining. Clocks can work indoors, at night, and in any kind of weather.)

Writing Links/Critical Thinking

Present the following as writing assignments. Provide help as needed.

1. Have students draw a picture of themselves playing outside on a sunny day. As they draw, ask, *Would you be able to see your shadow on a day like this? Where in the sky is the sun? Where should your shadow be? What would it look like?* Have students label the objects and shadows in the picture.

2. Suggest that students make pairs of “shadow cards.” Have them draw a common object on one card and the object’s shadow on the other. Show students how to use the cards to play matching games such as “Concentration.”
3. Ask, *Have you ever seen a funny or scary shadow? What did the shadow look like? What was really making the shadow?* Help students write stories about a scary or silly experience they have had with shadows.

Science Journals: You may wish to have students keep the writing activities related to the Delta Science 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.