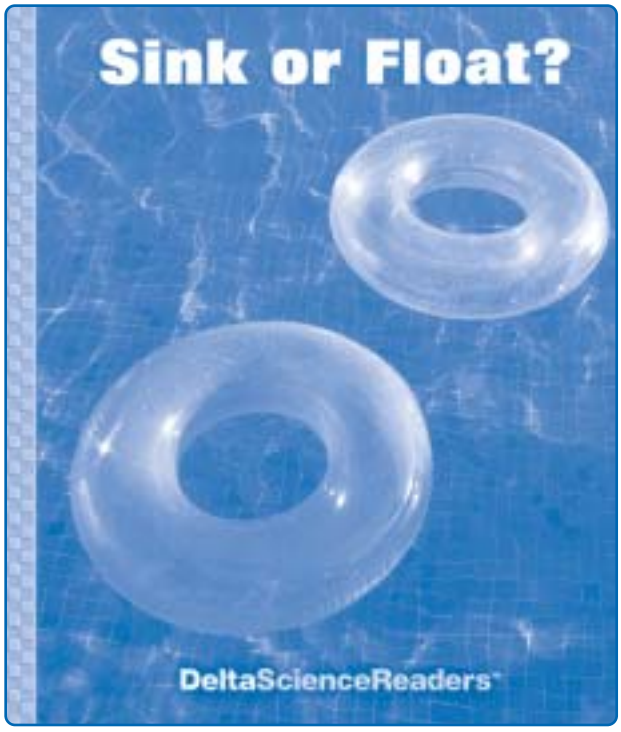
DELTA SCIENCE READER

Sink or Float?



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 *Sink or Float?* students explore why different objects sink or float. They read about the concept of buoyancy. They find out about matter and the tiny atoms that make up everything. They learn about the physical properties of solids, liquids, and gases and discover which properties allow different solids, liquids, and gases to float. Finally, students learn that boat builders use this information to build boats of different sizes and shapes from different types of materials.

Students will

- discover facts about matter and atoms
- identify the properties of solids, liquids, and gases
- predict whether various objects will sink or float in water
- conclude that an object's physical properties affect its buoyancy
- infer why some liquids and gases can float
- discuss the function of a table of contents, headings, captions, and a glossary
- interpret photographs and diagrams to answer questions
- complete a KWL chart

READING IN THE CONTENT AREA SKILLS

- Preview and set a purpose for reading
- Make predictions
- Compare and contrast
- Classify and categorize
- Cause and effect
- Draw conclusions
- Critical thinking
- Interpret graphic devices
- Summarize

NONFICTION TEXT ELEMENTS

Sink or Float? includes a table of contents, headings, photographs, captions, boldfaced terms, diagrams, a chart, and a glossary.

CONTENT VOCABULARY

The following terms are introduced in context and defined in the glossary: *atoms, buoyancy, float, gas, liquid, mass, matter, physical property, sink, solid, state of matter.*

BEFORE READING

Build Background

Access students' prior knowledge of buoyancy by displaying and discussing the cover. Read aloud the title and ask, *What do you see in this picture?* (inflatable rings floating in a swimming pool)

Invite students to share what they know about floating and sinking from their personal experiences and hands-on explorations in science. To stimulate discussion, encourage students to share their experiences swimming or playing with toys in the bathtub or swimming pool. Ask questions such as these: *What kinds of toys float on top of the water? What kinds of toys sink? Do you float or sink?*

Place several classroom objects (such as a pencil, paperweight, scissors, rubber band, and ruler) on a table where students can see them. Ask, *Which of these objects do you think will float? Which ones will sink?* Follow the consensus of the class to sort the objects into two groups. Tell students that the book they are about to read will help them figure out if their predictions are correct.

Point to the two groups of objects. Ask, *Why do you think some things sink and other things float?* Begin a group KWL chart by recording students' responses in the K column. Then ask, *What* don't *you know about why different things sink or float? What would you like to find out?* If necessary, stimulate discussion by asking and recording several of your own questions. Record students' questions in the W column on the chart.

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

Preview the Book

Explain that when students preview a nonfiction book, they should look at the title, the table of contents, headings, boldfaced words, photographs, diagrams, and captions.

Then preview the book with students. Have students turn to the table of contents. Ask, *What do you notice about this page?* Give students a few minutes to share their observations. Point to the first three headings in boldface type and explain that the book is divided into three parts: Think About . . . , People in Science, and Did You Know? Read aloud the headings listed in the Think About . . . section. Ask students to use the table of contents to locate different types of information in the book, for example, *On*

what page might you find information about solids? (page 5)

Flip through the book, calling attention to the various nonfiction text elements and explaining how they can help students understand and organize what they read. Ask questions such as, *How does this heading help you predict what you will read about on this page? What do you see in this picture? How do you think it will help you understand what you are reading?* Explain that the words in boldface type are important words related to sinking and floating objects. Point out that these words and their definitions are listed in the glossary. Choose one word and have students 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, you may wish to have students complete the following chart to record their prior knowledge of each vocabulary word. Depending on students' prior knowledge, you may wish to preteach key words. Tell students that they will have the opportunity to learn more about each word and complete their charts as they read.

W Word	T What I Think It Means	M What It Means
atom	something little	
buoyancy	something to do with boats	
float	staying on top of the water	

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 find out as you read this book?* Add students' questions to the KWL chart and use them 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)

Page 2 *Why Do Some Things Float?*

- Have students identify the pictures on page 2. Tell students, *A sailboat and a marshmallow seem very different, but they have at least one thing in common. What do you think that is?* Accept all answers at this time and have them read page 2 to confirm their predictions.

- Have students point to the word *float* in dark print and ask them to define the word. Remind them that words in boldface type are listed with their definitions in the glossary. Have a volunteer find the word *float* in the glossary and read its definition aloud. Do the same for the word *sink*.

- Ask, *How are a sailboat and a marshmallow alike?* (They both float.) Have students suggest other objects that float.

- Reread the last paragraph aloud. Ask, *What do you know about matter?* Briefly discuss students' prior knowledge.

Pages 3, 4 *What Is Matter?*

- Have a student read aloud the heading on page 3. Ask, *What do you think you will find out about on this page?* (matter)

- Have students read page 3. Ask, *What is matter?* (anything that has mass and takes up space) Point to several items in the classroom and ask, for example, *Is this desk made of matter? Is this window made of matter? Are you made of matter?*

- Ask, *What are physical properties?* Have a volunteer point to and read aloud the sentence that contains the word's definition. (A *physical property* is how something looks, feels, smells, tastes, or sounds.)

- Point to one of the rubber ducks on page 3. Ask, *What are some physical properties of this duck?* (It is soft, smooth, yellow, and shaped like a duck. It has mass.)

- Ask, *What is mass?* (the amount of matter in an object) *Would an object with a large amount of mass be heavier or lighter than an object with a small amount of mass?* (heavier) *How do you know?* (The more mass an object has, the heavier it is.)

  (You may wish to discuss with students that mass is different from weight. Mass is the amount of matter in an object. Mass can be measured using a balance. Weight is the amount of gravity pulling on an object. Weight can be measured using a scale. An object's mass always stays the same. But an object's weight can vary, depending on how much gravity pulls on the object. The weight of an object would be greater on Earth than on the moon, but the object's mass would be the same.)

- Explain some other physical properties of matter. If you have a magnet available, hold it up and ask, *If I held this magnet close to the duck, would it pull the duck?* (no) Explain that whether or not an object can be pulled by a magnet is a property of that object.

- Ask, *What would happen if I dropped this duck into water?* (It would float.) Tell students that whether an object sinks or floats is another physical property.

- Have students turn to page 4 and ask them to identify the objects pictured. Point to two objects, such as the bowling ball and the feather. Ask, *Which of these objects do you think has more mass?* (the bowling ball) *Why?* (It's heavier.) Have students find and point to the word *atoms* in boldface print on the page. Ask, *What are atoms?* Briefly discuss students' prior knowledge.

- Read page 4. Ask, *Can we see atoms?* (no) *How do we know they are there?* (Accept all ideas.) *What do atoms have to do with matter?* (They are the building blocks of matter.) Point to each object shown on page 4 and ask, for example, *Is a bowling ball made of atoms? Is juice made of atoms?*

- If you started a vocabulary chart before reading, record the meanings of the words *matter, physical property, mass,* and *atoms* in the chart.

Page 5 *What Is a Solid?*

- Have students look at the photograph on page 5. Ask, *Is this table made of matter?* (yes) *What are some physical properties of this table?* (It is round, hard, light brown, and probably heavy.)

- Read aloud the heading on page 5. Ask, *What is a solid? Is the table in the picture a solid? How do you know?* (Accept all answers at this time.) Have students confirm their responses by reading the page.

- Ask, *What can you tell me about solids?* (They have a shape of their own. They usually keep their shape. They take up a certain amount of space. The atoms in a solid are packed together. Some solids sink in water, and some float.)

- Have students look again at the table in the picture. Ask, *If you moved that table from one side of the room to the other, would the table's shape change?* (no) *Would the table take up a different amount of space?* (no) *Is the table a solid?* (yes) Have students list other solids they see in the picture and around the room.

- Ask, *If you dropped this table in water, would it sink or float?* (Some students may think the table will sink because it is very heavy. Others may think it will float. Accept both suggestions.) Remind students that whether a solid sinks or floats is one of its physical properties.

Page 6 *What Is a Liquid?*

- Have students look at the picture on page 6. Ask, *What do you see in this picture?* (milk) *When milk is poured from the carton into a glass, does the milk change shape?* (yes) *Does the milk take up more space?* (Some students may assume that because the milk changes shape, the amount of space it takes up also changes. It does not, but accept all answers at this time.)

- Read aloud the heading on page 6. Ask, *Is milk a liquid?* (yes) Have students name other liquids. (water, juice, soft drinks, syrup)

- Read page 6. Ask, *What did you find out about liquids?* (They have no shape of their own. They fit the shape of their container. They take up a certain amount of space. They flow.)

- Point to the picture of the atoms on page 6 and have a volunteer read the caption aloud. Ask, *Where have you seen a picture like this one?* (on the previous page) Have students turn to page 5 and read the caption. Ask, *What is different about the atoms in these two pictures?* (The atoms in the solid are more closely packed together.) Ask students to imagine that the atoms in the diagrams on pages 5 and 6 are marbles in boxes. Ask, *If you gently moved the "box" on page 5 from side to side, would the "marbles" move around very much?* (no) *How about the "box" on page 6?* (yes) Point out that liquids do not hold their shape because their atoms can move around one another.

- Ask, *If you spilled a glass of milk on the floor, would the milk change shape?* (yes) *Would you end up with more milk?* (no) Point out that although the shape of the milk changes, the actual amount of space it takes up does not change.

- Ask, *Are water and honey both liquids?* (yes) Explain that when liquids move, we say that they *flow*. Ask, *Which liquid flows more easily, water or honey?* (water) Point

out that how easily a liquid flows is another physical property.

Pages 7, 8 *What Sinks? What Floats?*

- Point out the photograph of the aquarium on page 7 and ask a volunteer to read aloud the labels of the objects. Read aloud page 7.

- Ask students to point to the word *buoyancy*. Ask, *What does this word mean?* (Students may infer that it means being able to float.) If necessary, ask a volunteer to find the definition for *buoyancy* in the glossary and read it aloud.

- Tell students to think about objects they have seen float or sink in water. Ask, *Can you predict which of the objects on this page are buoyant and will float? Which are not buoyant and will sink?* Draw the following chart on the board. Use check marks or tallies to record students' predictions for each item. Then have students read page 8 to confirm their predictions.

OBJECT	FLOAT?	SINK?
cork		
spoon		
rock		
marble		
quarter		
pinecone		
boat		

Pages 9–11 *Why Do Boats Float?*

Page 9

- Remind students that all matter has physical properties. Have students identify the objects in the aquarium on page 9 and describe the physical properties of each item. Remind students that an object's physical properties include its size, shape, and mass. Students may also mention other properties such as color and texture.

- Read aloud the heading on page 9. Ask, *What is the same about the ball and the rock?* (They both have sort of a round shape.) *What is different?* (Students may suggest their color, their size, their mass, the material they are made of, and whether they sink or float.)

- Have students read page 9. Ask, *What does this page tell you about what makes something sink or float?* (Size does not make an object buoyant.)

Page 10

- Have students look at the pictures at the top of page 10. Ask, *Are these two objects the same size?* (yes) *Are they the same shape?* (yes) *Are they the same color?* (no) *Are they made of the same material?* (probably not) Have a volunteer read the labels to confirm that the objects are made of different materials. Add *brick* and *piece of wood* to the Sink or Float? chart on the board and have students predict the buoyancy of each object.

- Have students read the text on page 10. Remind students that the main idea of a section of writing is the most important idea. Ask, *What is the main idea of this paragraph?* (Mass helps make an object float or sink.) If necessary, remind students that an object's mass is the amount of matter in the object. Tell students that the main idea is sometimes stated in a sentence, called the *topic sentence*. Ask, *What is the topic sentence of this paragraph?* (the first sentence)

- Ask, *Suppose you had two forks, one made of plastic and one made of metal. Which fork would sink? Which one would float?* Have students confirm their responses by checking the chart on page 10.

- Point out that the kind of material an object is made of helps make it float or sink. For example, a piece of wood has less mass than a piece of metal that is the same size. The piece of wood floats, but the piece of metal sinks.

Page 11

- Have students look at the picture of the pieces of wood at the top of page 11. Ask, *How are these pieces of wood different?* (They have different shapes and sizes.)

- Have students look at the pieces of clay at the bottom of the page. Ask, *Imagine that you are holding a lump of clay in your hand. Now imagine that you shape the lump into a boat shape. Has the material that the clay is made of changed?* (no) *Has the mass of the clay changed?* (no) *What has changed?* (its shape) *Do you think that having a different shape will affect whether the clay will sink or float?* (Accept all reasonable responses at this time.) Have students read page 11 to confirm their predictions. Point out that the best way to test such a prediction would be to experiment with a piece of clay and water.

- Ask, *When you push a piece of wood down in the water, what does the water do?* (It pushes the wood back up.) *Does an object's shape affect how buoyant it is?* (yes) *What kinds of shapes are the most buoyant?* (Students may infer that the wider or more spread out a shape is, the more buoyant the object will be.)

- Have a volunteer read aloud the caption under the pieces of clay and discuss students' predictions.

People in Science (pages 12–13)

Boat Builders

- Help students brainstorm a list of different kinds of boats, such as sailboats, canoes, rowboats, motorboats, barges, cruise ships, ferries, and so on. Tell students that they will find out more about boats on page 12.

- Discuss the pictures on pages 12 and 13. To stimulate discussion, ask questions such as, *What is the person in the picture at the top of page 12 making? What material do you think this boat is made out of? What do you notice about the shape of this boat?* Have students read the captions to confirm their responses.

- Together, list some of the things a boat builder would have to decide before starting to build a boat. (the size of the boat, the shape of the boat, the kind of material to use, the mass of the boat)

Did You Know? (pages 14–15)

Page 14 *A Liquid Can Float*

- Have students look at the picture on page 14. Ask, *What do you see in this picture?* (Accept all reasonable responses.) Have a volunteer read the caption to confirm students' predictions.

- Ask, *Have you ever seen oil floating on water?* Students may have seen cooking oil floating on a liquid or automobile oil on a puddle. Briefly discuss students' experiences. Ask, *Why do you think oil floats on water?* Have students read page 14 to confirm their answers.

- Ask, *Which sentence tells why oil floats on water?* Have a student reread the last sentence in the paragraph.

Page 15 *A Gas Can Float*

- Briefly discuss the photograph on page 15. Ask, *Have you ever seen a hot-air balloon? Do you know anything about how hot-air balloons work?* Discuss students' previous knowledge.

- Ask, *What do you think hot-air balloons have to do with sinking and floating?* (Accept all reasonable responses.) Tell students that they will find out more about how hot-air balloons work by reading page 15.

- Have students read the text and captions on page 15. Point out the diagram of the atoms. Have students look again at the diagrams of atoms on pages 5 and 6. Ask, *How are the atoms in a gas different from the atoms in a solid or in a liquid?*

(They are farther apart.) *Does a gas have a shape of its own?* (no)

- Remind students that the amount of space that a solid or a liquid takes up never changes. Ask, *Can the amount of space a gas takes up change?* (yes) *How?* (If you heat a gas, the atoms move farther apart and the gas takes up more space.)

- Explain that the air inside most balloons is heated by burning a fuel called propane. The balloon pilot can make the flame larger, giving more heat. Ask, *What happens when the gas inside the balloon gets hot?* (The gas takes up more space. The hot air inside the balloon is lighter than the cold air outside the balloon. The balloon becomes buoyant and floats up into the sky.) *What do you think the pilot does when he or she wants to land the balloon?* Explain that when the pilot wants the balloon to descend, he or she can turn the heater down or off or pull open a parachute valve in the balloon to let some of the hot air escape. As the air inside the balloon cools, it takes up less space, and the balloon becomes less buoyant.

AFTER READING

Summarize

Complete the KWL chart you began with students before reading by asking them to share the answers to their questions. Call on volunteers to retell each text section. Then have students use the information in the KWL chart to write brief summary statements.

Discuss with students how using the KWL strategy helped them understand and appreciate the book. Encourage them to share any other reading strategies that helped them understand what they read. Direct attention to the last column in the chart and ask, *What questions do you still have about why different things sink or float? What would you like to explore further?* 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.) 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 is matter? (anything that takes up space and has mass) Where can you find matter? (Everywhere. Matter makes up everything in the world.) What are atoms? (the tiny bits that make up matter, or the building blocks of matter)

2. Hold up an object, such as a block or small ball. What are some physical properties of this object? (Students may describe how the object looks, including its color, shape, material, and texture; how heavy it is; or whether it might sink or float in water.)

3. Name two solids. Do solids have a shape of their own? (yes) What happens to the shape of a solid when you move it? (It stays the same.) Name two liquids. Does the shape of a liquid change when you pour it from one container to another? (yes) Does the amount of space that the liquid takes up change? (no)

4. What is buoyancy? (being able to float)

5. Imagine that you have two blocks. One block sinks and the other block floats. What are some reasons why the buoyancy of the blocks is different? (Their shape, material they are made of, or mass might be different.)

6. Imagine you are the pilot of a hot-air balloon. What do you need to do to make your balloon float up in the air? (Heat the gas inside the balloon.)

Writing Links/Critical Thinking

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

1. Have students imagine that they are a ship builder in charge of designing a new ship. Have them draw their design and list the parts of their design that improve the ship's buoyancy.

2. Suggest that students write an ad for a favorite toy for the bathtub, pool, or beach (real or imagined). Have them draw a picture of the toy and describe the properties that make it particularly good for water play.

3. Students can cut out magazine pictures to make sink-or-float playing cards. Have them find pictures of objects that either sink or float and glue each picture to an index card. Students can use the cards to play "Sinker or Floater." Have them write a paragraph telling how to play a sink-or-float card game. For example, players could turn over cards one at a time, following the rules for the classic card game War, with Floaters winning over Sinkers.

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.