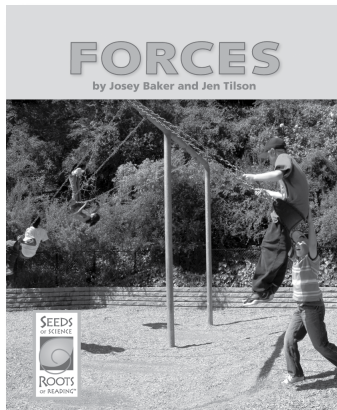


## Interpreting Visual Representations

with *Forces*

from *Seeds of Science/Roots of Reading*®



### Introduction

This strategy guide introduces an approach for teaching students how to use visual representations to enrich their understanding of text. The ability to make use of illustrations to help comprehend text is particularly important in science, where information is often too complex to explain using words alone. This guide includes an introductory section about using visual representations to enhance comprehension, a description of how to teach this strategy with many science texts, and a plan for teaching students how to interpret visual representations with the *Seeds of Science/Roots of Reading*® book, *Forces*.

### Book Summary

*Forces* introduces students to several foundational concepts about forces. These concepts include: 1) a force is a push or a pull, 2) there is evidence that forces can be felt, 3) forces can change the way things move, 4) forces act between two objects, and 5) some forces act at a distance between objects that aren't touching. By showing various playground scenarios and explaining the forces that are at work there, the book helps young readers view their everyday world through a scientific lens. Through the presentation of both pictorial and textual evidence, readers come to understand that forces are at work around them and are important in everyday situations.

### About This Book

#### Reading Level

Guided Reading Level\*: K

#### Text Features

book description, table of contents, glossary, headings, about the author, bold print, italic print, photographs

\*Guided Reading Levels based on the text characteristics from Fountas and Pinnell, *Matching Books to Readers*.

### Science Background

A force is a push or a pull that one object exerts on another when they interact. Forces always act between two objects. For example, when a child kicks a ball, the child's foot (one object) exerts a force on the ball (the other object). Forces also always come in pairs: the ball exerts an equal and opposite force on the foot. In most situations, as in the playground examples described in the book, there are multiple sets of forces acting at once. We can't see forces, of course, but we can see evidence of forces acting on objects. A force acting on an object can change the way it moves. For example, if an object slows down, speeds up, or changes direction, then we know there is a force at work on that object. However, if an object is moving, there is not necessarily a force acting on it; it is only when an object *changes* the way it is moving that there is evidence that a force is at work. Generally speaking, forces exerted by objects can be placed into two broad categories: those that require contact between objects, and those that can act at a distance, without contact between the two objects. For example, gravity is a force that acts upon us without contact. Magnetic force and electrostatic force are other examples of nontouching forces that cause objects to either attract or repel each other.

## About Interpreting Visual Representations

Information in science texts is often represented with illustrations as well as with words. Visual representations such as photographs, drawings, and diagrams are important sources of information for readers. Fictional texts use visual representations to enhance the written text. Science texts use visual representations to convey essential information that is not in the written text. They are used strategically by authors to communicate ideas or show relationships that cannot be captured by words alone. Visual representations offer models of events that occur in the natural world and illustrate processes and sequences. Visual representations in science texts aid understanding by affording students another modality from which to derive meaning and solidify understanding of science concepts. Visual representations serve several functions, as listed in the Roles of Visual Representations box on this page. However, not all books use visual representations in all of these ways. Asking students to think carefully about the roles visual representations play in relation to the written text can help them think critically about what they are reading.

## Teaching How to Interpret Visual Representations

The following guidelines can be used to teach the strategy of interpreting visual representations with any content-rich text.

- Select a text. Choose a text that relies on photographs, diagrams, and/or drawings as an important source of information. If you are working with a longer text, you may wish to choose just one section to focus on during class. Carefully consider the visual representations that accompany the text and think about which role(s) the illustrations play in conveying meaning. (See the box on this page.)
- Explain to the class that authors use visual representations to assist readers in understanding ideas presented in a text. Tell students they should pay close attention to photographs, drawings, and diagrams. It is important to carefully read the words, look at the illustrations, and consider the ways these elements work together.

## Roles of Visual Representations

1. **Exemplify:** Gives an example of something from the text
2. **Contextualize:** Helps you understand how something happens
3. **Clarify:** Shows something that is hard to explain with words
4. **Extend:** Adds new information

- Preview the text with students. Identify the roles visual representations play in the book to help readers better understand the text. You can use the Making Sense of Visual Representations copymaster included with this guide to name and define these roles.
- Model how to make sense of visual representations. Focus students on the section of text you selected before class. Model how to connect a visual representation with the written text. Ask, “Why did the author put this (picture, photograph, etc.) here?” Discuss how it provides information that enhances understanding of the ideas conveyed by the words.
- Reflect on each visual representation during reading. As students read, ask them to pause and consider the visuals on each page. They should think about how these visuals help them understand the text. Students can use their Making Sense of Visual Representations student sheets to record which role(s) the visuals play in the book, or they can simply discuss them with a partner during reading.
- Reflect on the strategy. After reading, lead a class discussion about what students noticed about the visual representations in relation to the words. Ask students to choose three visuals from the text and tell what role they think each played and why. Ask students to reflect on how thinking about visual representations helped them understand the ideas presented in the text.
- Continue practicing the strategy. As students read other content-rich texts, remind them to look carefully at visuals and think about how they are related to the words on the page.

## Interpreting Visual Representations with *Forces*

### Getting Ready

Make a copy of the Making Sense of Visual Representations copymaster for each student.

### During Class

1. Introduce the idea that the book *Forces* uses visuals and words to show and explain how different pushing and pulling forces work. Read the book in a way that is consistent with your classroom routines, giving students as much independence as possible.
2. Explain that the photographs, drawings, and diagrams an author includes in a book are also called visual representations. Visual representations are carefully chosen and placed on particular pages to help readers understand more about the ideas in the text. Explain that the authors of *Forces* used photographs to help explain what forces are and how they act.
3. Distribute a Making Sense of Visual Representations student sheet to each student. Explain that the photographs in this book work with the words in a variety of ways. This student sheet shows some of these different roles. Provide a general explanation of what each role is (using the description in the column labeled Role as a guide).
4. Ask students to turn to pages 4–5 in the book. Reread the text and explain how the photographs on these two pages provide examples that help explain the ideas in the text. Point out that the photographs help the reader see the effects of different forces and better understand which are pushing forces and which are pulling forces. Visuals in this case show what the text does not completely explain by itself.
5. Direct students to fill in the Example row on their student sheets. Tell them to write the page numbers on which the photographs that give examples are found. [Pages 4–5.] Ask students to help you explain how the photographs provide examples. [They show a force with pushing (a swing) and a force with pulling (a wagon).] Write this explanation on the board and ask students to write the information on their student sheets.
6. Ask students to turn to pages 10–11. Read the text aloud and explain that the photographs on these pages help the reader understand how something happens. The words state that forces change the way objects move. The photographs show forces changing the direction that a ball is moving and stopping a ball from moving. Ask students to record the page numbers of these photographs in the How row on their student sheets. [Pages 10–11.] Ask students to write a note, in their own words, about how the photographs add new information. [Kicking and catching a ball change the ball’s motion.]
7. Ask students to reread the book and think about the roles the photographs play. Have students choose one photograph for each of the remaining two roles. Explain that photos can play more than one role and that answers will vary. Ask them to record the page number and write a short description of how the photographs and the words work together. [Shows may include pages 8, 9, 12, 13, 16, 17; Adds may include pages 14, 15, 18, 19.]
8. Ask students to share with a partner ideas about the photographs in the book and the different roles they play. Have each partner show a photograph and explain what role it plays. Ask students to explain what they learned about how forces work by looking at the photographs and the words together.
9. Ask students to reflect on why it is important to pay attention to visuals when reading. Ask questions such as, “What did you learn when you looked more carefully at the photographs that you didn’t notice during your first reading?” “How do you think paying attention to photographs helps you better understand what you are reading?”

### Independent Extension

Ask students to imagine that they have been asked to redesign the cover of *Forces*. Have students respond to the question “What new photograph would you choose for the cover that would show an important idea from the book?” Ask students to write a description of their new photograph. Students can then explain (in writing or orally with a partner) how their new photograph illustrates an important idea from the text.

Name \_\_\_\_\_ Date \_\_\_\_\_

## Making Sense of Visual Representations

Title of book: \_\_\_\_\_

Role	Page number	How the visuals and words work together
Gives an <b>example</b> of something from the text		
Helps you understand <b>how</b> something happens		
<b>Shows</b> something that is hard to explain with words		
<b>Adds</b> new information		

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## About Strategy Guides

A six-page strategy guide is available for each *Seeds of Science / Roots of Reading*® student book. These strategies support students in becoming better readers and writers; they help students read science texts with greater understanding, learn and use new vocabulary, and discuss important ideas about the natural world and the nature of science. Many of these strategies can be used with multiple titles in the *Seeds / Roots* series. For more information, as well as for additional instructional resources, visit the *Seeds / Roots* Web site ([www.seedsofscience.org/strategyguides.html](http://www.seedsofscience.org/strategyguides.html)).

## Student Books for Grades 2–3

Twenty-seven engaging student books are now available, each with a corresponding strategy guide. The books are part of the *Seeds of Science / Roots of Reading*® curriculum program described on page 6.

<b>Soil Habitats</b>	
<b>Strategy</b>	<b>Student Book</b>
Using Discourse Routines with Science Texts	<i>Into the Soil</i>
Using the Cognates Strategy	<i>Walk in the Woods</i>
Connecting Science Words and Everyday Words	<i>What Are Roots?</i>
Teaching About the Nature of Science	<i>Talking with a Habitat Scientist</i>
Teaching Text Structure	<i>Handbook of Forest Floor Animals</i>
Using Text Features	<i>Earthworms Underground</i>
Taking Notes Based on Observations	<i>My Nature Notebook</i>
Making Sense of Data in Science Texts	<i>Snail Investigations</i>
Using Discourse Circles	<i>Without Soil</i>
<b>Shoreline Science</b>	
<b>Strategy</b>	<b>Student Book</b>
Teaching Vocabulary with Science Texts	<i>Beach Postcards</i>
Teaching Concept Mapping	<i>What Belongs on a Beach?</i>
Teaching Scientific Explanations	<i>Gary's Sand Journal</i>
Interpreting Visual Representations	<i>What's Stronger? The Forces That Cause Erosion</i>
Using Text Features	<i>What Lives on a Sandy Beach?</i>
Teaching About Multiple Meaning Words	<i>My Sea Otter Report</i>
Searching for Information in Science Texts	<i>Handbook of Sandy Beach Organisms</i>
Teaching Text Structure	<i>The Black Tide</i>
Teaching About the Nature of Science	<i>Shoreline Scientist</i>
<b>Designing Mixtures</b>	
<b>Strategy</b>	<b>Student Book</b>
Using Discourse Circles	<i>What If Rain Boots Were Made of Paper?</i>
Using Anticipation Guides	<i>Solving Dissolving</i>
Teaching Scientific Explanations	<i>Handbook of Interesting Ingredients</i>
Teaching Text Structure	<i>Jelly Bean Scientist</i>
Teaching About the Nature of Science	<i>Jess Makes Hair Gel</i>
<b>Gravity and Magnetism</b>	
<b>Strategy</b>	<b>Student Book</b>
Interpreting Visual Representations	<i>Forces</i>
Making Sense of Data in Science Texts	<i>What My Sister Taught Me About Magnets</i>
Using Anticipation Guides	<i>Gravity Is Everywhere</i>
Teaching Concept Mapping	<i>Mystery Forces</i>

## Extend Learning with *Seeds of Science/Roots of Reading*®

The strategy featured in this guide is drawn from the *Seeds of Science / Roots of Reading*® curriculum program. *Seeds / Roots* is an innovative, fully integrated science and literacy program.

The program employs a multimodal instructional model called “Do-it, Talk-it, Read-it, Write-it.” This approach provides rich and varied opportunities for students to learn science as they *investigate* through firsthand inquiry, *talk* with others about their investigations, *read* content-rich books, and *write* to record and reflect on their learning.

**Take advantage of the natural synergies between science and literacy instruction.**

- Improve students’ abilities to read and write in the context of science.
- Excite students with active hands-on investigation.
- Optimize instructional time by addressing goals in two subject areas at the same time.

To learn more about *Seeds of Science / Roots of Reading*® products, pricing, and purchasing information, visit [www.seedsofscience.org](http://www.seedsofscience.org)



***Soil Habitats Science and Literacy Kit***



Developed at Lawrence Hall of Science and the Graduate School of Education at the University of California at Berkeley.

*Seeds of Science/Roots of Reading*® is a collaboration of a science team led by Jacqueline Barber and a literacy team led by P. David Pearson and Gina Cervetti.

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