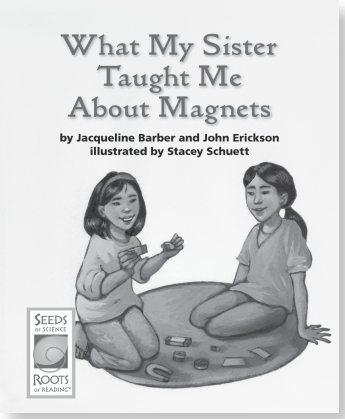
Making Sense of Data in Science Texts

with *What My Sister Taught Me About Magnets* from *Seeds of Science/Roots of Reading*®



Introduction

This strategy guide introduces an approach for teaching students to make sense of data presented in science books. The ability to interpret data is particularly important in science, where information is often communicated and summarized visually in tables, graphs, and diagrams. This guide includes an introductory section about the strategy of making sense of data, a general overview of how to teach this strategy with many science texts, and a plan for teaching students to make sense of data with the *Seeds of Science/Roots of Reading*® book, *What My Sister Taught Me About Magnets*.

Book Summary

What My Sister Taught Me About Magnets depicts a girl who teaches her older sister about magnets by conducting investigations. First, the girl investigates magnetic force by measuring the distance from which different magnets will attract a paper clip. Next, she investigates magnetic poles using different types of magnets. Finally, the girl investigates what magnets attract by testing objects made of different types of metal. In several places in the book, the girl records her observations in her scientist's notebook. As she conducts each investigation, the girl excitedly explains to her sister what she has discovered. This book models curiosity and scientific habits of mind and also demonstrates ways of organizing data.

About This Book

Reading Level

Guided Reading Level*: N

Text Features

book description, table of contents, glossary, headings, about the author, bold print, italic print, diagrams, illustrations, tables

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

Science Background

About Recording and Organizing Data

Scientists collect data in the course of their work and record and represent this data in many ways—in formats such as tables, narrative notes, graphs, or diagrams. Data can be recorded in different ways depending on the nature of the investigation and what the scientist is trying to learn. The way in which data are organized plays a significant role in interpreting and drawing conclusions from the data. Reorganizing data in a new way can often lead to new findings.

About Magnets

In magnetic materials, the magnetic fields of the atoms line up with each other in the same direction, so the material exerts magnetic force. Some magnetic materials occur naturally; others can become magnetized. Magnetic materials often contain iron. Some forms of cobalt and nickel are also magnetic. Most kinds of steel (which is an alloy of iron, carbon, and other metals) are magnetic. However, objects made from nonmagnetic steel (such as stainless steel sinks) are fairly common. Magnets of any size or shape have two poles—north and south—named for the direction in Earth's magnetic field to which each pole is drawn. Opposite poles of a magnet attract one another, and like poles repel.

About Making Sense of Data in Science Texts

Information in texts is often communicated using visual representations such as tables, graphs, maps, and diagrams. These representations are commonly used in content-rich texts to present large amounts of information in a concise manner. Visual representations organize information, draw attention to relationships, and explain information that is difficult to describe in words. The ability to make sense of visual representations of information is particularly essential for science since science texts often rely on the correct interpretation of this information.

Teaching Students to Make Sense of Data in Science Texts

The following guidelines can be used to teach students how to make sense of data in any content-rich text that contains visual representations of data.

- Begin by choosing one format of data representation on which to focus, such as tables, maps, graphs, or diagrams. Find texts that include data presented in the format you have chosen.
- Have students examine the data in the texts. Ask them to describe what they notice about the way the information is presented. For example, they may observe that tables have rows and columns. (See the box on this page for examples of common features of each format.)
- Demonstrate how to interpret data organized in the selected format. Think aloud as you interpret a graph, table, map, or diagram and refer to the features you have pointed out. Present some sample questions that can be answered with the data presented. Demonstrate how to use the table, graph, map, or diagram to answer the questions.
- Invite students to share conclusions that they can draw from the data. Ask questions such as "What do you notice?" and "What can you tell from this (graph, table, map, diagram)?"

Features of Data Representations in Science Texts

Tables: title, row labels, column labels, the way in which each cell refers to a column and a row

Graphs: title, axes, labels, key

Maps: title, key, scale, labels

Diagrams: title, labels, key, symbols (such as arrows)

Pose questions that encourage students to draw conclusions from the data presented. When eliciting responses, invite students to explain what information they considered in order to arrive at their answers.

- Discuss the purpose of organizing data in the chosen format. Ask students why authors (and scientists) might use this particular format to present information.
- Compare different representations of data. Once students have learned about several formats for representing data, guide them toward making comparisons between features that are similar or different across the various representations. For example, point out that both graphs and maps usually include a key to help the reader understand the meaning of colors or symbols.
- Guide students in creating their own representations of information based on data that you gather in class. For example, you might gather data on students' preferences for ice-cream flavors or about the weather over several days.
- You might also consider reorganizing data presented in a familiar text into a new format and talking about how the two representations are different.
- After students are familiar with several different ways data is represented in books (tables, diagrams, graphs, and maps), invite them to include these formats in their expository writing.

What Magnets Attract	
Object	**Kind of metal**
paper clip	steel (mostly made of iron)
nail	iron
nail	zinc and iron
steel wool	steel (mostly made of iron)
frying pan	iron

Making Sense of Data in *What My Sister Taught Me About Magnets*

What My Sister Taught Me About Magnets contains data (in the form of diagrams, notes, and tables) about magnets and magnetic materials. You can work with your students to make sense of these data using the following steps.

Getting Ready

1. Create a What Magnets Attract data table (shown above) on a piece of chart paper, with one column labeled Object and another column labeled Kind of metal. (You will fill in the rest of the table with students during class.)
2. Make one copy of the Data Table copymaster for each student.

During Class

1. Read the book in a way that is consistent with your classroom routines, giving students as much independence as possible.
2. After reading, call students' attention to the picture on page 7. Explain to students that the girl in the book collected data about the strength of different magnets. The picture compares the strength of three different magnetic forces. Explain that the author included a picture to make the information easier to understand.
3. Ask students to review the table on page 18. Point out that, like the picture on page 7, it provides information, but there is a lot more information in the table. Explain that when scientists have a lot of data, they often make sense of it by creating a table. Point out that tables are organized in rows (across) and columns (up and down).
4. Demonstrate how to find information in the table on page 18 by looking at the Object column. Point out that the row for each object listed under this column intersects with two other columns in the table (Kind of metal, Does a magnet attract it?). Ask students to find information for different objects. Ask, "Is a paper clip attracted by a magnet?" [Yes.] "What other objects are attracted by a magnet?" [Nails, steel wool, and a frying pan.]
5. Now ask students to find information using the row for a metal listed under the Kind of metal column. Ask, "Is copper attracted to a magnet?" [No.] "Is silver?" [No.]
6. Tell students the class will reorganize the data from the table on page 18 so that they can figure out what types of metals magnets attract. Post the What Magnets Attract class chart and distribute a copy of the Data Table student sheet to each student. Have students complete the title and column headings to match the class chart.
7. As a class, read the table on page 18 of the book to find all the objects and kinds of metals that magnets attract (all the rows with "yes" in the third column). Record these data on the class chart and have students fill in their own data tables (see completed table on this page).
8. Ask, "What can we now say about which materials are attracted by magnets?" [Materials made from metals with iron.] Have students write what they figured out from the data table in the lines provided beneath it on the Data Table student sheet.
9. Discuss how creating a table is useful for making sense of data. Ask, "How do tables help you understand information?" [They summarize key information. They make it easy to make comparisons.] Tell students that authors and scientists also organize their data in different ways, depending on what they want to find out from the data.

Independent Extension

Invite students to make sense of more data by creating a new data table. Direct students to use the table on page 18 to find all the objects and types of metals that magnets *do not* attract. Encourage students to discuss what they learned from looking at the data in this new way.

Name _____ **Date** _____

Data Table

Title of book: _____

Record your information in this table.

Title:	

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**).

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.

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

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**

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

SEEDS OF SCIENCE ROOTS OF READING®

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.

Published and Distributed by wireless generation®