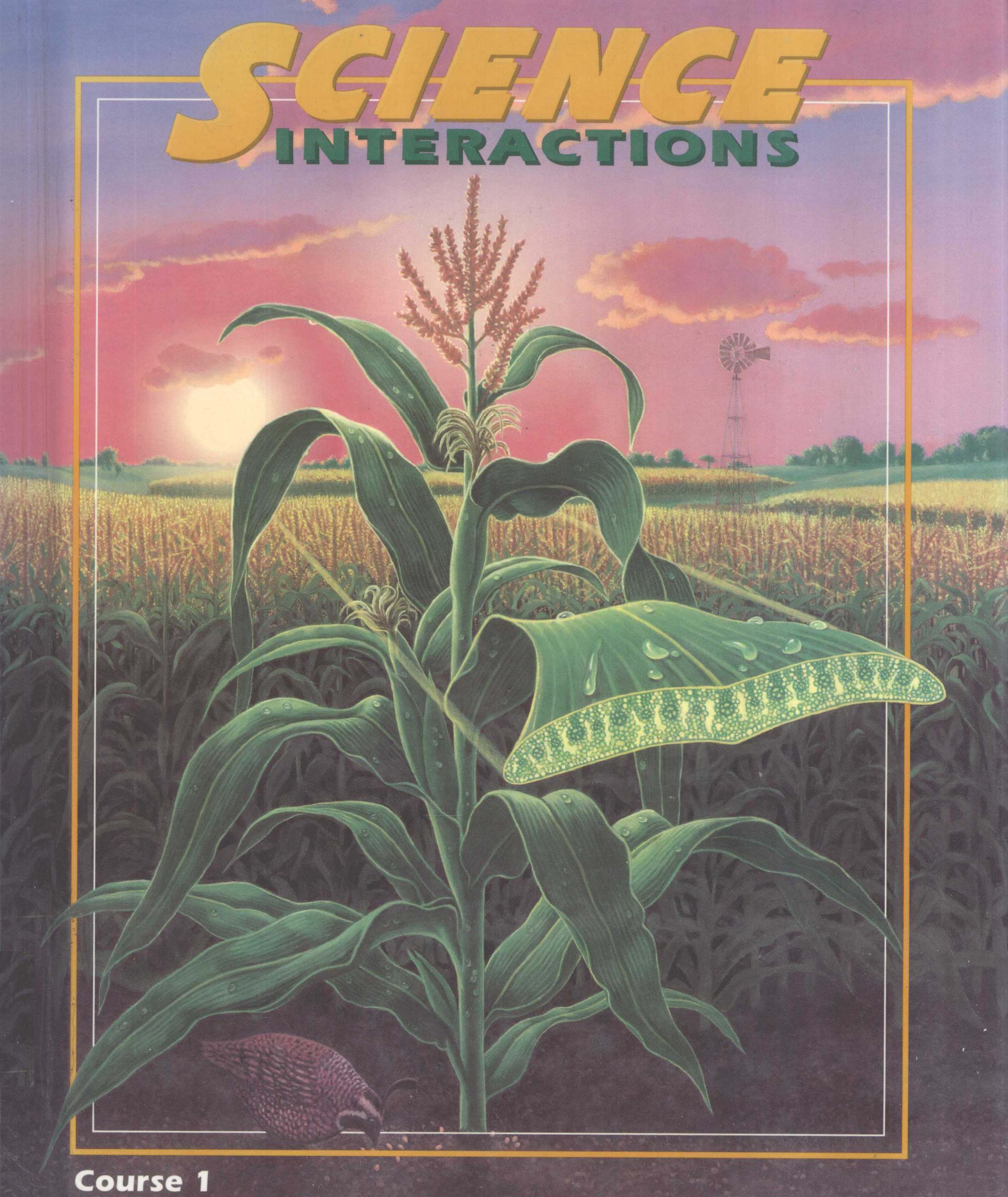
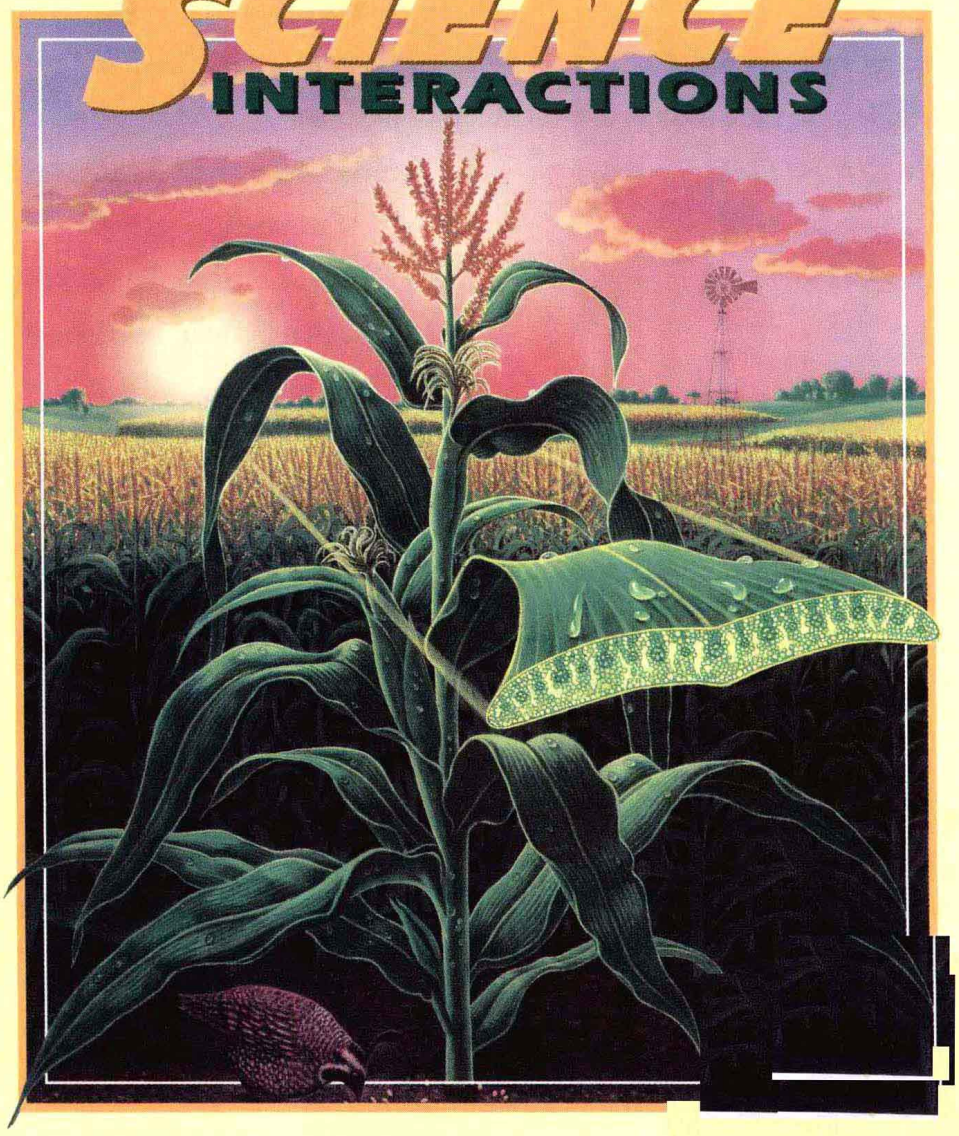
SCIENCE INTERACTIONS



Course 1

SCIENCE INTERACTIONS



Course 1

GLENCOE

Macmillan/McGraw-Hill

New York, New York Columbus, Ohio Mission Hills, California Peoria, Illinois

Science Interactions

Student Edition
Teacher Wraparound Edition
Teacher Classroom Resource Package
Laboratory Manual: SE
Laboratory Manual: TE
Study Guide: SE
Study Guide: TE
Transparency Package
Computer Test Bank
Spanish Resources
Science and Technology Videodisc Series
Science and Technology Videodisc Teacher Guide

Send all inquiries to:

Glencoe/McGraw-Hill
936 Eastwind Drive
Westerville, OH 43081

ISBN 0-02-826032-5

Printed in the United States of America

9 10 11 12 13 14 15 VH/LP 00 99 98 97 96 95

Authors

Bill Aldridge, M.S.
Executive Director
National Science Teachers Association
Washington, DC

Russell Aiuto, Ph.D.
Director of Research and Development
Scope, Sequence, and Coordination
National Science Teachers Association
Washington, DC

Jack Ballinger, Ed.D.
Professor of Chemistry
St. Louis Community College at
Florissant Valley
St. Louis, MO

Anne Barefoot, A.G.C.
Physics and Chemistry Teacher
Whiteville High School
Whiteville, NC

Linda Crow, Ed.D.
Assistant Professor
Baylor College of Medicine
Houston, TX

Ralph M. Feather, Jr., M.Ed.
Science Department Chairperson
Derry Area School District
Derry, PA

Albert Kaskel, M.Ed.
Biology Teacher
Evanston Township High School
Evanston, IL

Craig Kramer, M.A.
Physics Teacher
Bexley High School
Bexley, OH

Edward Ortleb, A.G.C.
Science Lead Supervisor
St. Louis Board of Education
St. Louis, MO

Susan Snyder, M.S.
Earth Science Teacher
Jones Middle School
Upper Arlington, OH

Paul W. Zitzewitz, Ph.D.
Professor of Physics
University of Michigan-Dearborn
Dearborn, MI

Consultants

CHEMISTRY

Richard J. Merrill
Director, Project Physical Science
Associate Director, Institute for Chemical Education
University of California
Berkeley, California

Robert Walter Parry, Ph.D.
Dist. Professor of Chemistry
University of Utah
Salt Lake City, Utah

EARTH SCIENCE

Janifer Mayden
Aerospace Education Specialist
NASA
Washington, DC

James B. Phipps, Ph.D.
Professor of Geology and Oceanography
Gray's Harbor College
Aberdeen, Washington

LIFE SCIENCE

David M. Armstrong, Ph.D.
Director
University of Colorado Museum
Boulder, Colorado

Joe Wiliam Crim, Ph.D
Associate Professor of Zoology
University of Georgia
Athens, Georgia

John J. Just, Ph.D.
Associate Professor of Biology
University of Kentucky
Lexington, Kentucky

Richard D. Storey, Ph.D.
Associate Professor of Biology
Colorado College
Colorado Springs, Colorado

PHYSICS

Karen L. Johnston, Ph.D.
Professor of Physics
North Carolina State University
Raleigh, North Carolina

Eugen Merzbacher, Ph.D.
Kenan Professor of Physics, Emeritus
University of North Carolina
Chapel Hill, North Carolina

READING

Barbara Pettegrew, Ph.D.
Director of Reading/Study Center
Assistant Professor of Education
Otterbein College
Westerville, Ohio

SAFETY

Robert Tatz, Ph.D.
Instructional Lab Supervisor
Department of Chemistry
The Ohio State University
Columbus, Ohio

MIDDLE SCHOOL SCIENCE

Thomas Custer
Coordinator of Science
Anne Arundel County
Ellicot City, Maryland

Gerald Garner
LA Unified
Van Nuys, California

Garland E. Johnson
Science and Education Consultant
Fresno, California

MULTICULTURAL

Carol Mitchell
Science Supervisor
Omaha Public Schools
Omaha, Nebraska

Karen L. Muir, Ph.D.
Department of Social and Behavioral Sciences
Columbus State Community College
Columbus, Ohio

LEP

Harold Frederick Robertson, Jr.
Science Resource Teacher
LAUSD Science Materials Center
Van Nuys, California

Ross M. Arnold
Magnet School Coordinator
Van Nuys Junior High
Van Nuys, California

Linda E. Heckenberg
Director, Eisenhower Program
Van Nuys, California

Barbara Sitzman
Chatsworth High School
Tarzana, California

COOPERATIVE LEARNING

Linda Lundgren
Bear Creek High School
Lakewood, Colorado

SPECIAL FEATURES

Timothy Heron, Ph.D.
Professor
Department of Educational Services & Research
The Ohio State University
Columbus, Ohio

Reviewers

Assunta Black
Life Science Teacher
Lindenhurst Junior High
Lindenhurst, New York

Jayne Brown
7th Grade Science Teacher
Valley Springs Middle School
Arden, North Carolina

Mitchell Kyle Carver, Sr.
Science Department Chairperson
Reynolds Middle School
Asheville, North Carolina

James Cowden
Science Teacher Specialist
Chicago Public Schools
Chicago, Illinois

Gloria M. Dobry
Departmental Science Teacher
Gunsaulus Academy
Chicago, Illinois

Daniel H. Domenigoni
Science Department Chairperson
Milwaukie Junior High
Milwaukie, Oregon

Cheryl B. Domineau
Science Department Chairperson
Vero Beach Junior High
Vero Beach, Florida

Alex Domkowski
Physics Teacher
Saint Mary's Hall
San Antonio, Texas

Nancy Donohue
General Science Teacher
Emerson Junior High
Yonkers, New York

Nancy Ann Drain
Teacher
Bell Junior High School
San Diego, California

Nancy Prevatte Dunlap
7th Grade Science Teacher
Central Middle School
Whiteville, North Carolina

Laraine 0. Franze
Life Science Teacher
Greenwood Lakes Middle School
Lake Mary, Florida

John A. George
Science Department Chairperson
Rivera Middle School
Miami, Florida

Corless Horne Goode
Teacher
New Hope School
Rutherfordton, North Carolina

Raymond Pat Hadd
Science Department Chairperson
Richbourg Middle School
Crestview, Florida

Karen Sue Hewitt
Teacher
Coldspring High School
Coldspring, Texas

Gordon N. Hopp
Environmental Science Teacher
Carmel Junior High School
Carmel, Indiana

Barbara D. Johnson
Life Science Teacher
Deep Creek Junior High School
Chesapeake, Virginia

Thomas E. Johnson
Life Science Teacher
Western Branch Junior High School
Chesapeake, Virginia

James R. Kimsey
Lead Science Instructor/Department Head
Plaza Park Middle School
Evansville, Indiana

Lonnie L. Lewis
Science Department Chairperson
Ramona Junior High School
Chino, California

William T. Martin
8th Grade General Science Teacher
Atkins Middle School
Winston-Salem, North Carolina

Vito Charles Mazzini, Jr.
Science Department Chairperson
H. D. McMillan Middle School
Miami, Florida

George Graham Ohmer
Teacher
Clay Junior High School
Carmel, Indiana

Thomas J. Pedersen
Graduate Research Assistant
North Carolina State University
Raleigh, North Carolina

Chuck Porrazzo
Science Department Chairperson
CJHS 145
New York City, New York

Allan G. Reisberg
6th Grade Teacher
Abraham Lincoln
Chicago, Illinois

Steven F. Rinck
Supervisor of Science
Pasco County School Board
Land O'Lakes, Florida

Ouida E. Thomas
Life Science Teacher
B. F. Terry High School
Rosenberg, Texas

Mary Coggins White
Science Department Chairperson
Sequoia Intermediate School
Newbury Park, California

Nedra A. Williams
Science Department Chairperson
Los Cerritos Intermediate School
Thousand Oaks, California

Introducing Science Interactions

What do you really know about yourself and your surroundings? Trying to make sense of the world is something that we struggle with from the very beginnings of our lives. Through our senses, we begin the process of gathering and sorting information, so that we can understand the world around us and our place in it. As you study Science Interactions, Course One, you'll use your senses to observe some everyday things and then collect and analyze your observations.

Mirror, Mirror, on the wall ...

Consider this problem. You want to buy a full-length mirror for your room to use as you get dressed each day. How tall does the mirror have to be for you to see your whole body from the top of your head to your feet? Does it have to be as tall as you? Do you have to stand in a certain place? If you stand further away, does the mirror have to be as tall? You can answer these questions yourself by looking at a mirror and finding out. Try it.

When you looked at yourself in a full length mirror and moved back and forth, what did you notice? Were you surprised that the mirror needed to be only half as tall as yourself? When you moved backward away from the mirror, what did you discover? You saw that it made no difference how close or how far away you were. The mirror could be the same height regardless of where you stood. This is an example of how observations can help you answer a question and make a decision. It also shows how our common ideas or beliefs are sometimes not correct. You are going to learn that there is a rather simple law in science that tells why you need a mirror only half your height to see yourself full-length.

Did you ever wonder how your ears, eyes, and nose help your brain gather information? In Science Interactions, you will use your senses to observe such things as the sun and moon in Chapter 1, plants and animals in Chapters 10 and 11, and in Chapter 18, waves. And, you'll learn how your senses work in Chapter 4. Hopefully, you'll never again take your senses for granted! Let's look at another example where you must do more than just observe what your senses seem to be telling you.

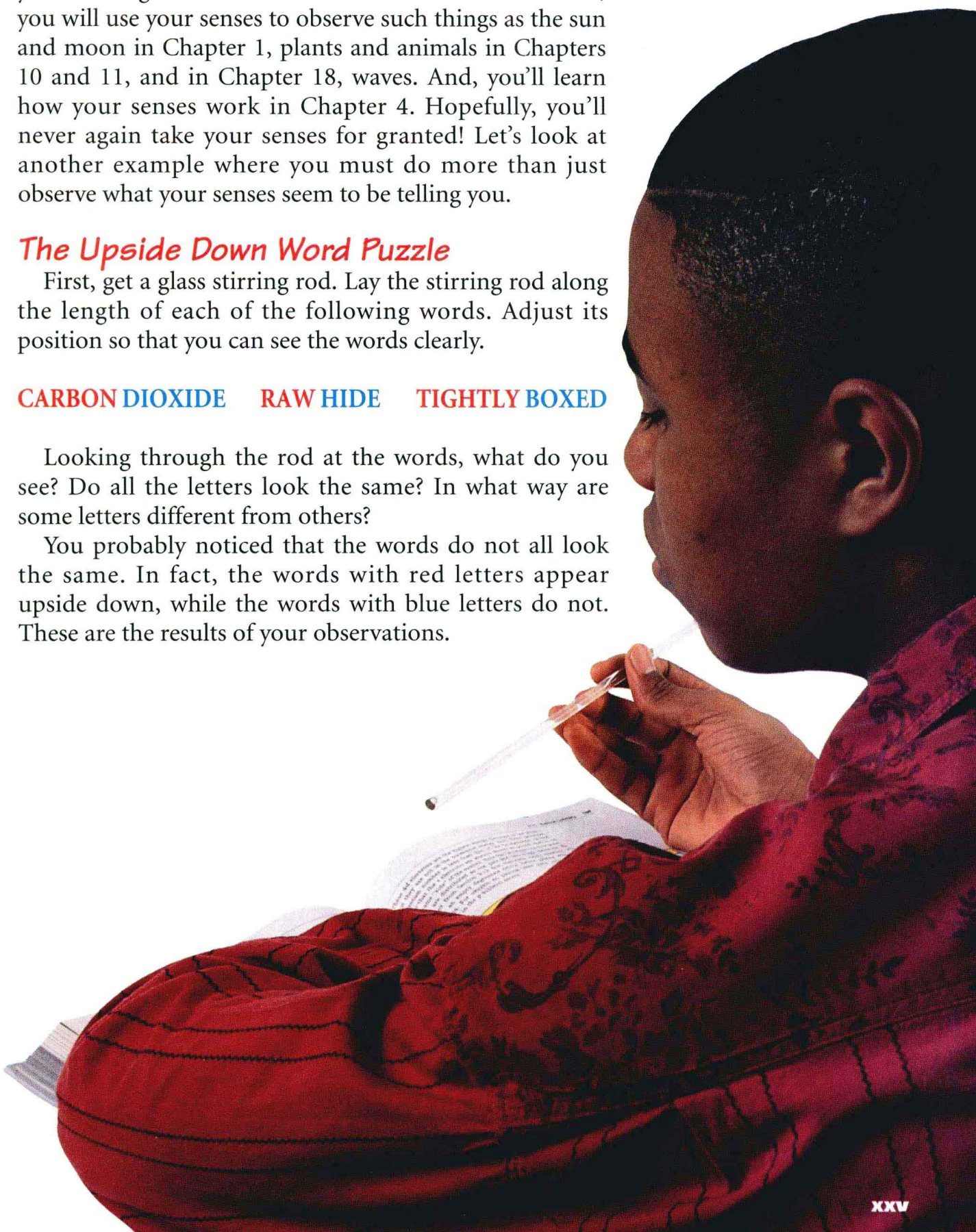
The Upside Down Word Puzzle

First, get a glass stirring rod. Lay the stirring rod along the length of each of the following words. Adjust its position so that you can see the words clearly.

CARBON DIOXIDE RAW HIDE TIGHTLY BOXED

Looking through the rod at the words, what do you see? Do all the letters look the same? In what way are some letters different from others?

You probably noticed that the words do not all look the same. In fact, the words with red letters appear upside down, while the words with blue letters do not. These are the results of your observations.

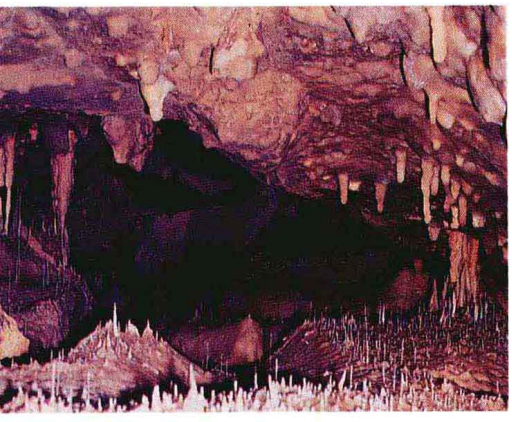


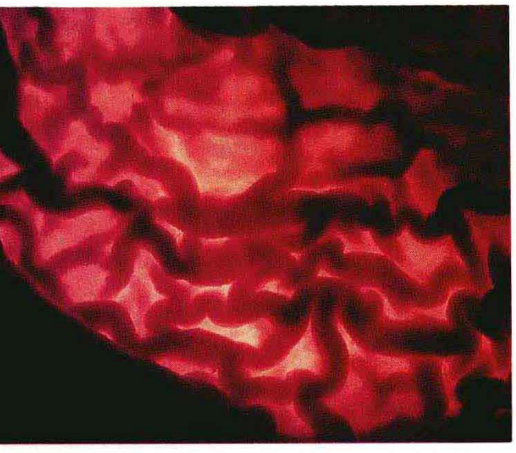
FIND OUT!

How can you solve the upside-down puzzle?

Do you see any pattern in the results? Can you make up an explanation for these results? Design an experiment that would test your explanation. For example, maybe you think that the color of the words affects whether the words appeared upside down or not. How could you test this? Find words in your book printed in different colors. Use your rod and see how these words appear. Do only red words turn upside down? What about other colors? Do black words invert?

The results of this experiment will either agree with your explanation or won't agree. If the results are not in agreement, then you may need to make other observations, and perform further experiments to test your new observations. Make a new explanation and test it.





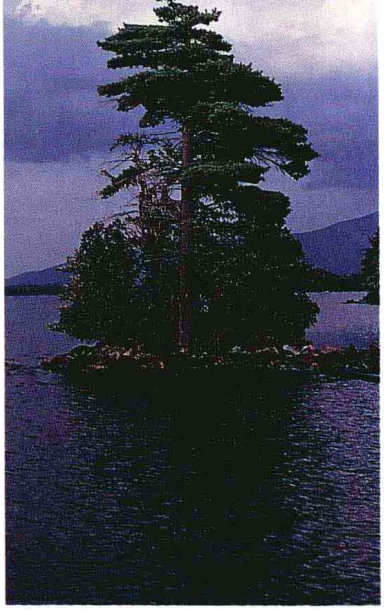
Acids help form caves in Earth and digest food in your stomach.

As you just saw, as much as we trust our senses, they often deceive us. Like you, scientists sometimes find that observations that they've made are not complete. Sometimes observations are measured. It is important to make careful and precise observations.

Solving the upside-down word puzzle involved discovering a pattern and figuring out relationships. As you make observations during the activities in Science Interactions and as you read the text, you will learn about each topic from several perspectives. For example, you could memorize a definition that says an acid is a compound that contains hydrogen, tastes sour, and is corrosive. But if you study about acids and perform tests that help you find out the properties of acids in several different settings, you will have a better understanding of what an acid is. In Chapter 8, you'll discover how the structure of an acid is related to the way it acts on living and non-living things. In Chapter 16, you'll discover a connection to Earth science when you see how acids affect rocks to help produce soil. And in a Science and Society lesson on acid rain, you'll learn that acids may have a much larger impact on a global scale.

By studying topics such as acids from the different perspectives of chemistry, Earth science, life science, and physics, you'll have a better, more complete idea of what an acid is. You will also see that, in many instances, you are already more familiar with the topic than you may have thought you were.

Science can help you find answers to all the marvelous, puzzling things you may have observed or wondered about. And as you complete the activities and study the chapters of this text, two things will happen for you. First, you will learn how to make observations that will lead you to gather useful scientific information. This skill will help you begin to make sense of the world. Second, you will begin to see and appreciate the patterns, the structure, and the amazing order of Earth.



Although they may look healthy, many lakes in the northeast have been affected by acid rain.

Fog over the Golden Gate Bridge, San Francisco

EXPERIENCE SCIENCE

HAVE FUN WHILE YOU LEARN SCIENCE

IN THE "EXPANDING YOUR VIEW" FEATURES, YOU'LL EXPLORE HOW SCIENCE CONNECTS TO ALL PARTS OF YOUR EVERYDAY WORLD

CONTENTS

An Overview

CONTENTS

In Depth