

California

Focus on **Life** Science

Prentice Hall

# Safety Symbols

These symbols appear in laboratory activities. They warn of possible dangers in the laboratory and remind you to work carefully.



**Safety Goggles** Wear safety goggles to protect your eyes in any activity involving chemicals, flames or heating, or glassware.



**Lab Apron** Wear a laboratory apron to protect your skin and clothing from damage.



**Breakage** Handle breakable materials, such as glassware, with care. Do not touch broken glassware.



**Heat-Resistant Gloves** Use an oven mitt or other hand protection when handling hot materials such as hot plates or hot glassware.



**Plastic Gloves** Wear disposable plastic gloves when working with harmful chemicals and organisms. Keep your hands away from your face, and dispose of the gloves according to your teacher's instructions.



**Heating** Use a clamp or tongs to pick up hot glassware. Do not touch hot objects with your bare hands.



**Flames** Before you work with flames, tie back loose hair and clothing. Follow instructions from your teacher about lighting and extinguishing flames.



**No Flames** When using flammable materials, make sure there are no flames, sparks, or other exposed heat sources present.



**Corrosive Chemical** Avoid getting acid or other corrosive chemicals on your skin or clothing or in your eyes. Do not inhale the vapors. Wash your hands after the activity.



**Poison** Do not let any poisonous chemical come into contact with your skin, and do not inhale its vapors. Wash your hands when you are finished with the activity.



**Fumes** Work in a ventilated area when harmful vapors may be involved. Avoid inhaling vapors directly. Only test an odor when directed to do so by your teacher, and use a wafting motion to direct the vapor toward your nose.



**Sharp Object** Scissors, scalpels, knives, needles, pins, and tacks can cut your skin. Always direct a sharp edge or point away from yourself and others.



**Animal Safety** Treat live or preserved animals or animal parts with care to avoid harming the animals or yourself. Wash your hands when you are finished with the activity.



**Plant Safety** Handle plants only as directed by your teacher. If you are allergic to certain plants, tell your teacher; do not do an activity involving those plants. Avoid touching harmful plants such as poison ivy. Wash your hands when you are finished with the activity.



**Electric Shock** To avoid electric shock, never use electrical equipment around water, or when the equipment is wet or your hands are wet. Be sure cords are untangled and cannot trip anyone. Unplug equipment not in use.



**Physical Safety** When an experiment involves physical activity, avoid injuring yourself or others. Alert your teacher if there is any reason you should not participate.



**Disposal** Dispose of chemicals and other laboratory materials safely. Follow the instructions from your teacher.



**Hand Washing** Wash your hands thoroughly when finished with the activity. Use antibacterial soap and warm water. Rinse well.



**General Safety Awareness** When this symbol appears, follow the instructions provided. When you are asked to develop your own procedure in a lab, have your teacher approve your plan before you go further.

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Focus on **Life**  
Science



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- Reading and Note Taking Guide Level B
- Inquiry Skills Activity Books I–III
- Vocabulary Flashcards
- Laboratory Manual
- Laboratory Manual, Teacher's Edition
- Probeware Lab Manual
- Standards Review Transparencies
- Progress Monitoring Assessments
- Chapter Tests Level A and B
- Teaching Guidebook for Universal Access

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- Lab zone™ Easy Planner
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- TeacherExpress™ CD-ROM
- ExamView® Computer Testbank
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- Spanish Reading and Note Taking Guide
- Spanish Teacher's Guide with Answer Keys
- Spanish Student Edition MP3

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## Program Authors



**Michael J. Padilla, Ph.D.**  
Professor of Science Education  
University of Georgia  
Athens, Georgia

Michael Padilla is a leader in middle school science education. He has served as President of the National Science Teachers Association and as a writer of the National Science Education Standards. As lead author of Science Explorer, Mike has inspired the team in developing a program that meets the needs of middle grade students, promotes science inquiry, and is aligned with the National Science Education Standards.



**Ioannis Miaoulis, Ph.D.**  
President  
Museum of Science  
Boston, Massachusetts

Originally trained as a mechanical engineer, Ioannis Miaoulis is in the forefront of the national movement to increase technological literacy. As dean of the Tufts University School of Engineering, Dr. Miaoulis spearheaded the introduction of engineering into the Massachusetts curriculum. Currently he is working with school systems across the country to engage students in engineering activities and to foster discussions on the impact of science and technology on society.



**Martha Cyr, Ph.D.**  
Director of K-12 Outreach  
Worcester Polytechnic Institute  
Worcester, Massachusetts

Martha Cyr is a noted expert in engineering outreach. She has over nine years of experience with programs and activities that emphasize the use of engineering principles, through hands-on projects, to excite and motivate students and teachers of mathematics and science in grades K-12. Her goal is to stimulate a continued interest in science and mathematics through engineering.

## Book Authors

**Elizabeth Coolidge-Stolz, M.D.**  
Medical Writer  
North Reading, Massachusetts

**Jan Jenner, Ph.D.**  
Science Writer  
Talladega, Alabama

**Jay M. Pasachoff, Ph.D.**  
Professor of Astronomy  
Williams College  
Williamstown, Massachusetts

**Donald Cronkite, Ph.D.**  
Professor of Biology  
Hope College  
Holland, Michigan

**Michael Wyession, Ph.D.**  
Associate Professor of Earth  
and Planetary Sciences  
Washington University  
St. Louis, Missouri

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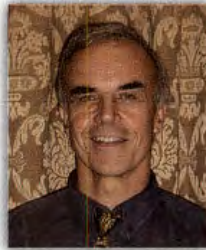
## Reading Consultants



### **Kate Kinsella**

Kate Kinsella, Ed.D., is a faculty member in the Department of Secondary Education at San Francisco State University. A specialist in second-language acquisition and adolescent literacy, she teaches coursework

addressing language and literacy development across the secondary curricula. Dr. Kinsella earned her master's degree in TESOL from San Francisco State University and her Ed.D. in Second Language Acquisition from the University of San Francisco.



### **Kevin Feldman**

Kevin Feldman, Ed.D., is the Director of Reading and Early Intervention with the Sonoma County Office of Education (SCOE) and an independent educational consultant. At the SCOE, he develops, organizes,

and monitors programs related to K-12 literacy. Dr. Feldman has a master's degree from the University of California, Riverside, in Special Education, Learning Disabilities, and Instructional Design. He earned his Ed.D. in Curriculum and Instruction from the University of San Francisco.

---

## Mathematics Consultant



### **William Tate, Ph.D.**

Professor of Education and Applied Statistics and Computation  
Washington University  
St. Louis, Missouri

---

## Contributing Writers

### **Douglas E. Bowman**

Health/Physical Education Teacher  
Welches Middle School  
Welches, Oregon

### **Jorie Hunken**

Science Consultant  
Woodstock, Connecticut

### **Evan P. Silberstein**

Science Instructor  
The Frisch School  
Paramus, New Jersey

### **Patricia M. Doran**

Science Instructional Assistant  
State University of New York at Ulster  
Stone Ridge, New York

### **James Robert Kaczynski, Jr.**

Science Instructor  
Jamestown School  
Jamestown, Rhode Island

### **Joseph Stuke, Ph.D.**

Department of Biology  
Hope College  
Holland, Michigan

### **Fred Holtzclaw**

Science Instructor  
Oak Ridge High School  
Oak Ridge, Tennessee

### **Andrew C. Kemp, Ph.D.**

Assistant Professor of Education  
University of Louisville  
Louisville, Kentucky

### **Thomas R. Wellnitz**

Science Instructor  
The Paideia School  
Atlanta, Georgia

### **Theresa K. Holtzclaw**

Former Science Instructor  
Clinton, Tennessee

### **Beth Miaoulis**

Technology Writer  
Sherborn, Massachusetts

# Reviewers

## California Master Teacher Board

**Joel Austin**

Roosevelt Middle School  
San Francisco, California

**Donna Baker**

Riverview Middle School  
Bay Point, California

**Luz Castillo**

Prairie Vista Middle School  
Hawthorne, California

**Laura Finco**

Stone Valley Middle School  
Alamo, California

**Tawiah Finley**

Central Middle School  
Riverside, California

**Glen Hannerman**

San Lorenzo Middle School  
King City, California

**Al Janulaw**

Sonoma State University (retired)  
Rohnert Park, California

**Sharon Janulaw**

Sonoma County Office of Education  
Santa Rosa, California

**Cindy Krueger**

Washington Middle School  
La Habra, California

**Diane Maynard**

Vineyard Junior High  
Alta Loma, California

**Catherine Nicholas**

Rio Norte Junior High School  
Santa Clarita, California

**Susan Pritchard Ph.D.**

Washington Middle School  
La Habra, California

**Ingrid Salim**

Harper Junior High School  
Davis, California

**Tia Shields**

Nicolas Junior High School  
Fullerton, California

**Mimi Wentz**

TeWinkle Middle School  
Costa Mesa, California

**Jocelyn Young**

El Dorado High School  
Placentia, California

## California Content Reviewers

**Richard Berry, Ph.D.**

Department of Geological Sciences  
San Diego State University  
San Diego, California

**Londa Borer-Skov, Ph.D.**

Department of Chemistry  
California State University Sacramento  
Sacramento, California

**Eugene Chiang, Ph.D.**

Department of Astronomy  
University of California Berkeley  
Berkeley, California

**Susan Collins, Ph.D.**

Department of Chemistry and Biochemistry  
California State University Northridge  
Northridge, California

**Debra Fischer, Ph.D.**

Department of Physics and Astronomy  
San Francisco State University  
San Francisco, California

**James Hetrick, Ph.D.**

Department of Physics  
University of the Pacific  
Stockton, California

**Rita Hoots**

Department of Science  
Woodland College  
Woodland, California

**Janet Kruse**

Discovery Museum  
Sacramento, California

**Michael Mastrandrea, Ph.D.**

Center for Environmental  
Science and Policy  
Stanford University  
Stanford, California

**George Matsumoto, Ph.D.**

Senior Education and Research Specialist  
Monterey Bay Aquarium Research Institute  
Moss Landing, California

**Robert Mellors, Ph.D.**

Department of Geological Sciences  
San Diego State University  
San Diego, California

**Donald Merhaut, Ph.D.**

Department of Botany and Plant Science  
University of California Riverside  
Riverside, California

**Eric Norman, Ph.D.**

Lawrence Berkeley National Lab  
University of California Berkeley  
Berkeley, California

**John Platt**

Department of Earth Sciences  
University of Southern California  
Los Angeles, California

**James Prince, Ph.D.**

Department of Biology  
California State University Fresno  
Fresno, California

**Gerald Sanders, Sr.**

Department of Biology  
San Diego State University  
San Diego, California

**Susan Schwartz, Ph.D.**

Department of Earth Sciences  
University of California Santa Cruz  
Santa Cruz, California

**Lynn Yarris, M.A.**

Lawrence Berkeley National Lab  
University of California Berkeley  
Berkeley, California

## Content Reviewers

**Paul Beale, Ph.D.**

Department of Physics  
University of Colorado  
Boulder, Colorado

**Jeff Bodart, Ph.D.**

Chipola Junior College  
Marianna, Florida

**Michael Castellani, Ph.D.**

Department of Chemistry  
Marshall University  
Huntington, West Virginia

**Eugene Chiang, Ph.D.**

Department of Astronomy  
University of California – Berkeley  
Berkeley, California

**Charles C. Curtis, Ph.D.**

Department of Physics  
University of Arizona  
Tucson, Arizona

**Daniel Kirk-Davidoff, Ph.D.**

Department of Meteorology  
University of Maryland  
College Park, Maryland

**Diane T. Doser, Ph.D.**

Department of Geological Sciences  
University of Texas at El Paso  
El Paso, Texas

**R. E. Duhrkopf, Ph.D.**

Department of Biology  
Baylor University  
Waco, Texas

**Michael Hacker**

Co-director, Center for  
Technological Literacy  
Hofstra University  
Hempstead, New York

**Michael W. Hamburger, Ph.D.**

Department of Geological Sciences  
Indiana University  
Bloomington, Indiana

**Alice K. Hankla, Ph.D.**

The Galloway School  
Atlanta, Georgia

**Donald C. Jackson, Ph.D.**

Department of Molecular Pharmacology,  
Physiology, & Biotechnology  
Brown University  
Providence, Rhode Island

**Jeremiah N. Jarrett, Ph.D.**

Department of Biological Sciences  
Central Connecticut State University  
New Britain, Connecticut

**David Lederman, Ph.D.**

Department of Physics  
West Virginia University  
Morgantown, West Virginia

**Becky Mansfield, Ph.D.**

Department of Geography  
Ohio State University  
Columbus, Ohio

**Elizabeth M. Martin, M.S.**

Department of Chemistry and Biochemistry  
College of Charleston  
Charleston, South Carolina

**Joe McCullough, Ph.D.**

Department of Natural and  
Applied Sciences  
Cabrillo College  
Aptos, California

**Robert J. Mellors, Ph.D.**

Department of Geological Sciences  
San Diego State University  
San Diego, California

**Joseph M. Moran, Ph.D.**

American Meteorological Society  
Washington, D.C.

**David J. Morrissey, Ph.D.**

Department of Chemistry  
Michigan State University  
East Lansing, Michigan

**Philip A. Reed, Ph.D.**

Department of Occupational & Technical  
Studies  
Old Dominion University  
Norfolk, Virginia

**Scott M. Rochette, Ph.D.**

Department of the Earth Sciences  
State University of New York, College at  
Brockport  
Brockport, New York

**Laurence D. Rosenhein, Ph.D.**

Department of Chemistry  
Indiana State University  
Terre Haute, Indiana

**Ronald Sass, Ph.D.**

Department of Biology and Chemistry  
Rice University  
Houston, Texas

**George Schatz, Ph.D.**

Department of Chemistry  
Northwestern University  
Evanston, Illinois

**Sara Seager, Ph.D.**

Carnegie Institution of Washington  
Washington, D.C.

**Robert M. Thornton, Ph.D.**

Section of Plant Biology  
University of California  
Davis, California

**John R. Villarreal, Ph.D.**

College of Science and Engineering  
The University of Texas – Pan American  
Edinburg, Texas

**Kenneth Welty, Ph.D.**

School of Education  
University of Wisconsin–Stout  
Menomonie, Wisconsin

**Edward J. Zalisko, Ph.D.**

Department of Biology  
Blackburn College  
Carlinville, Illinois

## Safety Reviewers

**W. H. Breazeale, Ph.D.**

Department of Chemistry  
College of Charleston  
Charleston, South Carolina

**Ruth Hathaway, Ph.D.**

Hathaway Consulting  
Cape Girardeau, Missouri

**Douglas Mandt**

Science Education Consultant  
Edgewood, Washington



## Teacher Reviewers

**David R. Blakely**  
Arlington High School  
Arlington, Massachusetts

**Jane E. Callery**  
Two Rivers Magnet Middle School  
East Hartford, Connecticut

**Melissa Lynn Cook**  
Oakland Mills High School  
Columbia, Maryland

**James Fattic**  
Southside Middle School  
Anderson, Indiana

**Dan Gabel**  
Hoover Middle School  
Rockville, Maryland

**Wayne Goates**  
Eisenhower Middle School  
Goddard, Kansas

**Katherine Bobay Graser**  
Mint Hill Middle School  
Charlotte, North Carolina

**Darcy Hampton**  
Deal Junior High School  
Washington, D.C.

**Karen Kelly**  
Pierce Middle School  
Waterford, Michigan

**David Kelso**  
Manchester High School Central  
Manchester, New Hampshire

**Benigno Lopez, Jr.**  
Sleepy Hill Middle School  
Lakeland, Florida

**Angie L. Matamoros, Ph.D.**  
ALM Consulting, INC.  
Weston, Florida

**Tim McCollum**  
Charleston Middle School  
Charleston, Illinois

**Bruce A. Mellin**  
Brooks School  
North Andover, Massachusetts

**Ella Jay Parfitt**  
Southeast Middle School  
Baltimore, Maryland

**Evelyn A. Pizzarello**  
Louis M. Klein Middle School  
Harrison, New York

**Kathleen M. Poe**  
Fletcher Middle School  
Jacksonville, Florida

**Shirley Rose**  
Lewis and Clark Middle School  
Tulsa, Oklahoma

**Linda Sandersen**  
Greenfield Middle School  
Greenfield, Wisconsin

**Mary E. Solan**  
Southwest Middle School  
Charlotte, North Carolina

**Mary Stewart**  
University of Tulsa  
Tulsa, Oklahoma

**Paul Swenson**  
Billings West High School  
Billings, Montana

**Thomas Vaughn**  
Arlington High School  
Arlington, Massachusetts

**Susan C. Zibell**  
Central Elementary  
Simsbury, Connecticut

## Activity Field Testers

**Nicki Bibbo**  
Witchcraft Heights School  
Salem, Massachusetts

**Rose-Marie Botting**  
Broward County Schools  
Fort Lauderdale, Florida

**Colleen Campos**  
Laredo Middle School  
Aurora, Colorado

**Elizabeth Chait**  
W. L. Chenery Middle School  
Belmont, Massachusetts

**Holly Estes**  
Hale Middle School  
Stow, Massachusetts

**Laura Hapgood**  
Plymouth Community  
Intermediate School  
Plymouth, Massachusetts

**Mary F. Lavin**  
Plymouth Community  
Intermediate School  
Plymouth, Massachusetts

**James MacNeil, Ph.D.**  
Cambridge, Massachusetts

**Lauren Magruder**  
St. Michael's Country  
Day School  
Newport, Rhode Island

**Jeanne Maurand**  
Austin Preparatory School  
Reading, Massachusetts

**Joanne Jackson-Pelletier**  
Winman Junior High School  
Warwick, Rhode Island

**Warren Phillips**  
Plymouth Public Schools  
Plymouth, Massachusetts

**Carol Pirtle**  
Hale Middle School  
Stow, Massachusetts

**Kathleen M. Poe**  
Fletcher Middle School  
Jacksonville, Florida

**Cynthia B. Pope**  
Norfolk Public Schools  
Norfolk, Virginia

**Anne Scammell**  
Geneva Middle School  
Geneva, New York

**Karen Riley Sievers**  
Callanan Middle School  
Des Moines, Iowa

**David M. Smith**  
Eyer Middle School  
Allentown, Pennsylvania

**Gene Vitale**  
Parkland School  
McHenry, Illinois

## Looking at Cells

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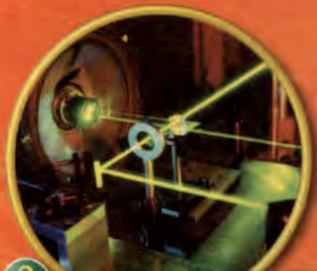
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Focus on the  
**BIG Idea**

How do scientists make progress in understanding the natural world?







Focus on the  
**BIG Idea**

How does light allow you to see?







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Focus on the **BIG Idea**

What is the structure of a cell?



Focus on the **BIG Idea**


How do cells obtain the energy they need to carry out all their functions?

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Focus on the  
**BIG Idea**

How are traits passed from parents to offspring?




Focus on the  
**BIG Idea**


How are traits inherited in people?

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Focus on the  
**BIG Idea**

What factors  
have caused the  
evolution and  
diversity of  
organisms?



Focus on the  
**BIG Idea**

How does  
evidence from  
rocks help  
scientists  
understand  
Earth's history?

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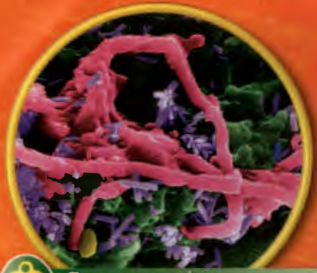
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Focus on the **BIG Idea**

How do structure and function vary among organisms in different domains and kingdoms?



Focus on the **BIG Idea**

How does the structure of a plant allow it to grow and reproduce?

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Focus on the **BIG Idea**

What major functions do animals' bodies perform?



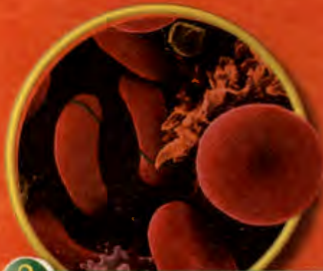
Focus on the **BIG Idea**

How does the structure of vertebrates help them to function?



Focus on the  
**BIG Idea**

How do the physical principles of forces and machines relate to the functions of your muscles and skeleton?



Focus on the  
**BIG Idea**

What are the major functions of the circulatory and respiratory systems?

## Structure and Function in the Human Body



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Focus on the  
**BIG Idea**

How do organs  
and other  
structures  
enable the  
nervous system  
to function?



Focus on the  
**BIG Idea**

How do the  
endocrine and  
reproductive  
systems work  
together to  
contribute to  
reproduction?

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Lab  
zone

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zone**

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zone**

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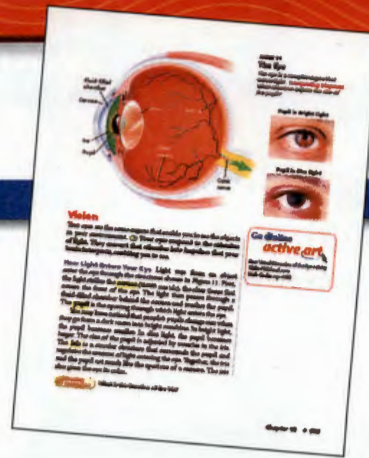
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**Video Field Trip**  
 Discovery Channel School

**VIDEO**

Enhance understanding through dynamic video.

**Preview** Get motivated with this introduction to the chapter content.

**Field Trip** Explore a real-world story related to the chapter content.

**Assessment** Review content and take an assessment.

**Go Online**  
 Web Links

Get connected to exciting Web resources in every lesson.

**SCILINKS** Find Web links on topics relating to every section.

**Active Art** Interact with selected visuals from every chapter online.

**Planet Diary** Explore news and natural phenomena through weekly reports.

**Science News** Keep up to date with the latest science discoveries.

**Interactive Textbook**

Experience the complete textbook online and on CD-ROM.

**Activities** Practice skills and learn content.

**Videos** Explore content and learn important lab skills.

**Audio Support** Hear key terms spoken and defined.

**Self-Assessment** Use instant feedback to help you track your progress.

This textbook is organized to support your learning of the California Science Content Standards. Understanding this organization can help you master the standards.



Focus on the  
**BIG Idea**

S 8.5

### How do cells obtain the energy they need to carry out all their functions?

Every chapter begins with a Focus on the Big Idea question that is linked to a California Science Standard. Focus on the Big Idea poses a question for you to think about as you study the chapter. You will discover the answer to the question as you read.

CALIFORNIA

**Standards Focus**

**S 7.1.d** Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.

- How does the sun supply living things with the energy they need?
- What happens during the process of photosynthesis?

Each section begins with a Standards Focus. You will learn about these California Science Standards as you read the section.

The Standards Focus is broken down into two to four Key Concept questions. You will find the answers to these questions as you read the section.

### Standards Key

Grade Level      Standard Set and Standard

**S 7.1.d**

Content Area

**S** for Science  
**E-LA** for English-Language Arts  
**Math** for Mathematics

The next several pages will introduce you to the California Science Content Standards for Grade 7. Seven sets of standards cover the material you will be learning this year. Each standard set contains several specific standards that tell what you need to know. For Grade 7, these standards focus mainly on life science. Some of the standards also help you learn about relationships between life science and other branches of science.

## STANDARD SET 1

### Cell Biology

- 1. All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept:**
  1. a. *Students know* cells function similarly in all living organisms.
  1. b. *Students know* the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
  1. c. *Students know* the nucleus is the repository for genetic information in plant and animal cells.

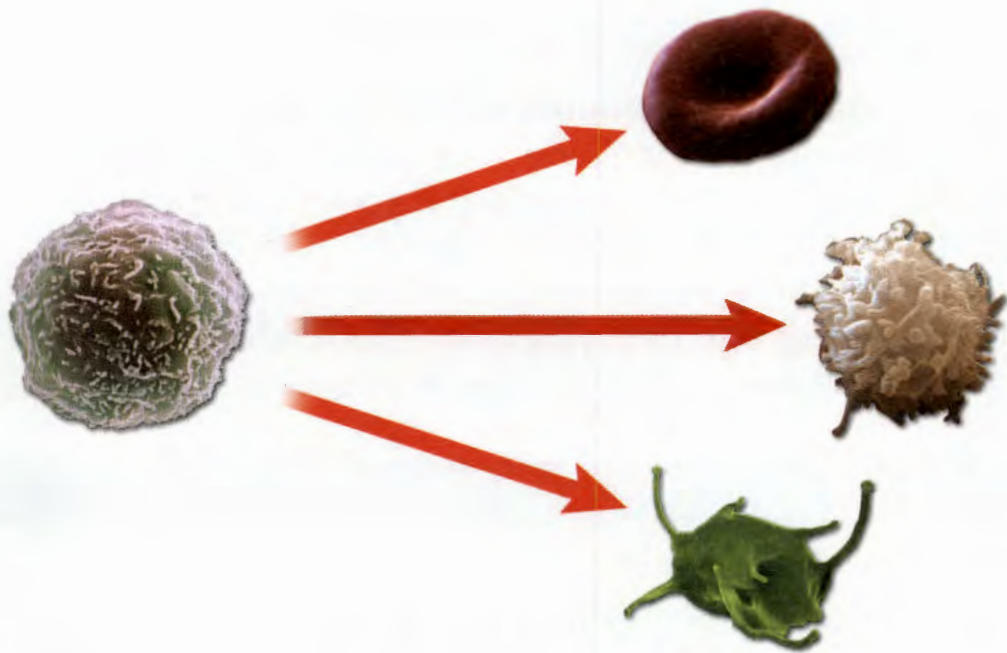
#### *What It Means to You*

You will learn that all organisms are made up of cells. These cells have many functions and structures in common, but there are differences between cells from different organisms. You will learn about the important differences between plant and animal cells. You will also learn that cells have a nucleus that holds the cell's genetic information and controls the cell's functions.

#### *Where You Will Learn It*

Chapters 3 and 9



**STANDARD SET 1, continued**

1. d. *Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.*
1. e. *Students know cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes.*
1. f. *Students know that as multicellular organisms develop, their cells differentiate.*

***What It Means to You***

You will learn how cells get the energy they need to perform their functions. Some cells, such as those in plants, have chloroplasts that capture energy from sunlight and use it to produce food that the cell can use. You will learn that both plant and animal cells have mitochondria that release energy from food. Cells use this energy to carry out many functions. You will also learn how cells divide to produce new cells. In multicellular organisms, cells may develop specialized structures that allow them to perform different functions.

***Where You Will Learn It***

Chapters 4, 10, and 16



## STANDARD SET 2

### Genetics

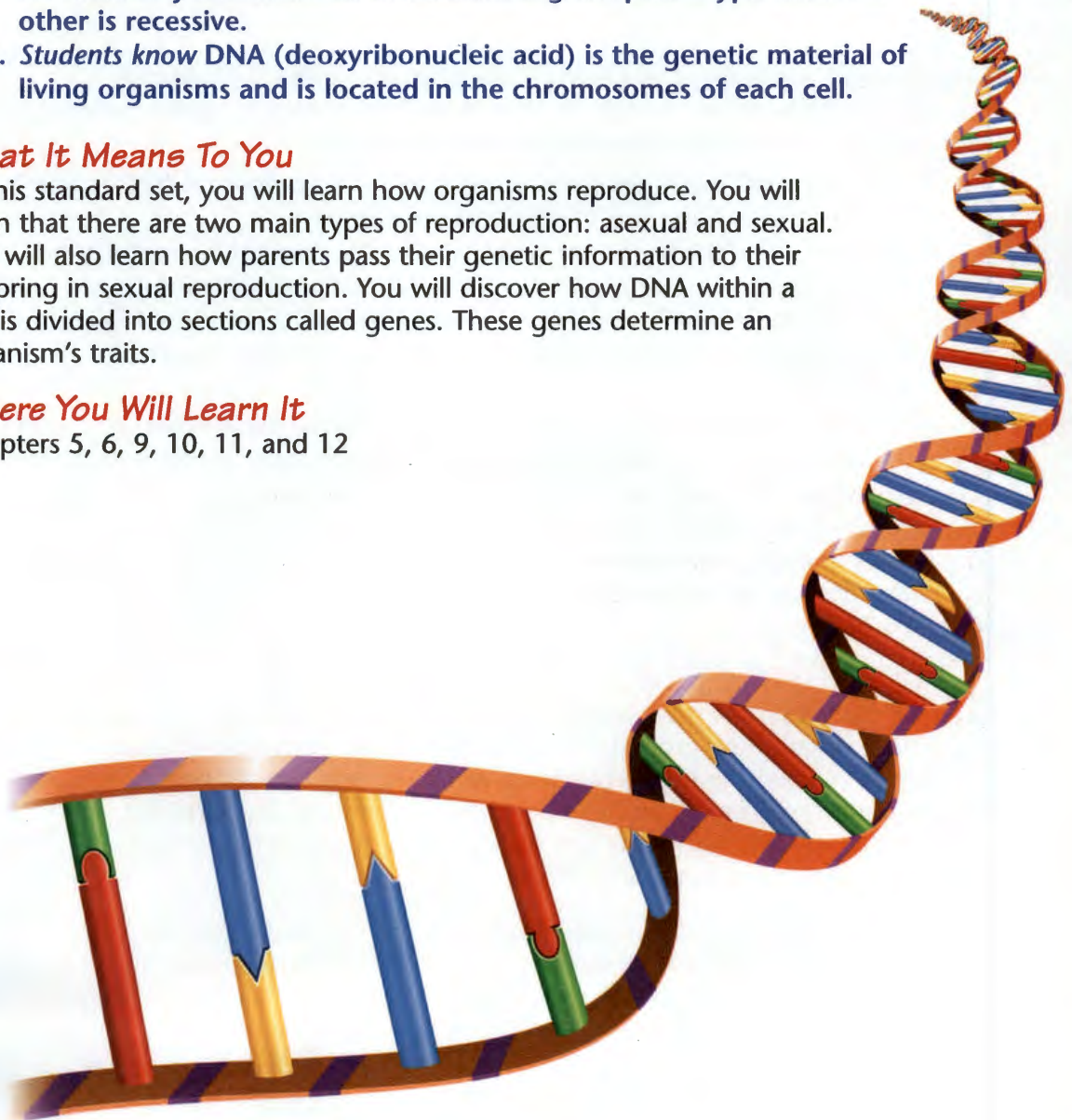
- 2. A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:**
2. a. *Students know* the differences between the life cycles and reproduction methods of sexual and asexual organisms.
  2. b. *Students know* sexual reproduction produces offspring that inherit half their genes from each parent.
  2. c. *Students know* an inherited trait can be determined by one or more genes.
  2. d. *Students know* plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
  2. e. *Students know* DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

#### *What It Means To You*

In this standard set, you will learn how organisms reproduce. You will learn that there are two main types of reproduction: asexual and sexual. You will also learn how parents pass their genetic information to their offspring in sexual reproduction. You will discover how DNA within a cell is divided into sections called genes. These genes determine an organism's traits.

#### *Where You Will Learn It*

Chapters 5, 6, 9, 10, 11, and 12





## STANDARD SET 3

### Evolution

- 3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept:**
3. a. *Students know* both genetic variation and environmental factors are causes of evolution and diversity of organisms.
  3. b. *Students know* the reasoning used by Charles Darwin in reaching his conclusion that natural selection is the mechanism of evolution.
  3. c. *Students know* how independent lines of evidence from geology, fossils, and comparative anatomy provide the bases for the theory of evolution.
  3. d. *Students know* how to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics and how to expand the diagram to include fossil organisms.
  3. e. *Students know* that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

#### *What It Means to You*

You will learn that the great diversity of organisms on Earth has developed over time through the process of evolution. You will learn how Charles Darwin developed the theory of natural selection, and how evidence from fossils, Earth's rock layers, and comparisons of organisms supports this theory. You will also learn how genetic variations and environmental changes interact in natural selection.

You will practice creating diagrams that show the relationship among living organisms and fossils. You will also learn that when a species of organisms cannot adapt to a change in the environment, the species may die out, or become extinct.

#### *Where You Will Learn It*

Chapters 7, 11, and 12

## STANDARD SET 4

### Earth and Life History

#### 4. Evidence from rocks allows us to understand the evolution of life on Earth. As a basis for understanding this concept:

4. a. *Students know* Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
4. b. *Students know* the history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impacts of asteroids.
4. c. *Students know* that the rock cycle includes the formation of new sediment and rocks and that rocks are often found in layers, with the oldest generally on the bottom.

#### *What It Means to You*

You will learn how scientists use evidence found in layers of rock to study the evolution of life on Earth. You will learn how scientists study processes that occur on Earth today, such as the rock cycle, to understand what happened in earlier times. You will also learn how sudden events (such as volcanic eruptions and asteroid impacts) have changed the history of life on Earth.

#### *Where You Will Learn It*

Chapter 8



## STANDARD SET 4, continued

- 4. d. *Students know* that evidence from geologic layers and radioactive dating indicates Earth is approximately 4.6 billion years old and that life on this planet has existed for more than 3 billion years.
- 4. e. *Students know* fossils provide evidence of how life and environmental conditions have changed.
- 4. f. *Students know* how movements of Earth's continental and oceanic plates through time, with associated changes in climate and geographic connections, have affected the past and present distribution of organisms.
- 4. g. *Students know* how to explain significant developments and extinctions of plant and animal life on the geologic time scale.

### *What It Means to You*

You will learn how scientists have determined the age of Earth and of early life forms by using radioactive dating and by comparing materials found in different rock layers. Fossils found in rock layers show how Earth's organisms and environments have changed over time. You will also learn how the movement of Earth's plates has changed Earth's environments, and how those changes have affected life on Earth. You will learn about the geologic time scale and how scientists determine when important events occurred.

### *Where You Will Learn It*

Chapters 7 and 8





## STANDARD SET 5

### Structure and Function in Living Systems

- 5. The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept:**
5. a. *Students know* plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
  5. b. *Students know* organ systems function because of the contributions of the individual organs, tissues, and cells. The failure of any part can affect the entire system.
  5. c. *Students know* how bones and muscles work together to provide a structural framework for movement.

#### ***What It Means to You***

You will learn about the structures found in organisms. These structures are organized into cells, tissues, organs, organ systems, and whole organisms. You will learn how different body parts work together to ensure that the whole organism survives. For example, you will explore how bones and muscles work together to allow animals to move. You will learn about a variety of structures in both plants and animals and how each structure helps the organism to carry out its life functions.

#### ***Where You Will Learn It***

Chapters 1, 9, 10, 11, 12, 13, 14, 15, and 16



### **STANDARD SET 5, continued**

- 5. d. *Students know* how the reproductive organs of the human female and male generate eggs and sperm and how sexual activity may lead to fertilization and pregnancy.
- 5. e. *Students know* the function of the umbilicus and placenta during pregnancy.
- 5. f. *Students know* the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
- 5. g. *Students know* how to relate the structures of the eye and ear to their functions.

#### ***What It Means to You***

You will learn how humans reproduce, beginning with the production of egg and sperm cells. You will see how structures in the female reproductive system protect a developing fetus and transfer nutrients and other materials between the mother and the fetus. You will also learn how different plants reproduce. Finally, you will explore how the human eye and ear enable people to see and hear.

#### ***Where You Will Learn It***

Chapters 10, 15, and 16

## STANDARD SET 6

### Physical Principles in Living Systems

#### **6. Physical principles underlie biological structures and functions. As a basis for understanding this concept:**

6. a. *Students know* visible light is a small band within a very broad electromagnetic spectrum.
6. b. *Students know* that for an object to be seen, light emitted by or scattered from it must be detected by the eye.
6. c. *Students know* light travels in straight lines if the medium it travels through does not change.
6. d. *Students know* how simple lenses are used in a magnifying glass, the eye, a camera, a telescope, and a microscope.
6. e. *Students know* that white light is a mixture of many wavelengths (colors) and that retinal cells react differently to different wavelengths.
6. f. *Students know* light can be reflected, refracted, transmitted, and absorbed by matter.
6. g. *Students know* the angle of reflection of a light beam is equal to the angle of incidence.

#### *What It Means to You*

This standard set includes some ways that concepts from physical science are important in life science. You will learn how light behaves and how your eye reacts to different kinds of light. You will explore tools, such as telescopes and microscopes, that allow people to observe objects that cannot be seen without these tools.

#### *Where You Will Learn It*

Chapters 1, 2, 3, and 15





### **STANDARD SET 6, continued**

- 6. h. *Students know how to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).*
- 6. i. *Students know how levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.*
- 6. j. *Students know that contractions of the heart generate blood pressure and that heart valves prevent backflow of blood in the circulatory system.*

#### ***What It Means to You***

You will learn how the bones, muscles, and joints in your body are similar to machines such as levers. By exploring how simple machines work, you will learn how your own muscles and bones function. You will also learn how your heart moves blood through your body.

#### ***Where You Will Learn It***

Chapters 13 and 14



## STANDARD SET 7

### Investigation and Experimentation

- 7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:**
7. a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
  7. b. Use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
  7. c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
  7. d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
  7. e. Communicate the steps and results from an investigation in written reports and oral presentations.

#### *What It Means to You*

You will learn how scientists gather, interpret, and communicate information. You will perform your own experiments and investigations and learn to draw conclusions from the data you collect. For instance, you will explore what conditions allow the stomach to digest protein. You will learn to find accurate information in print and electronic resources, and to create models and diagrams to communicate the information you learn.

#### *Where You Will Learn It*

This material is covered in Chapters 1, 3, and 9, and in the labs and activities in all chapters.





# Your Keys to Success

## Read for Meaning

This textbook has been developed to fully support your understanding of the science concepts in the California Science Standards. Each chapter contains built-in reading support.

### Before You Read

Use the Standards Focus to preview the California Science Standards that are covered, the key concepts, and key terms in the section.

#### Standards Focus

The California Science Standards that you will learn are listed at the beginning of each section.

#### Key Concepts

Each science standard is broken down into smaller ideas called Key Concepts.

**Key Terms** Use the list of key terms to preview the vocabulary for each section.

**Section 2 The Study of Life**

**CALIFORNIA Standards Focus**

**S 7.5** The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.

**S 7.6** Physical principles underlie biological structures and functions.

➤ How are the branches of life science related?

➤ What are some big ideas in life science?

**Key Terms**


- life science
- biology
- organism
- development
- structure
- function
- complementary

**Lab zone Standards Warm-Up**

**How Is Structure Related to Function?**

1. Study the photo of the bird and list its characteristics.
2. Next, study the photos of the three food items below.

**Think It Over**  
**Inferring** Based on your observations, which of the food items do you think the bird feeds on? Explain your reasoning.



In a laboratory, detectives are solving a crime by comparing the genetic makeup of different suspects. On a beach, a scientist studies the nesting behavior of sea turtles. Deep in a tropical rain forest, another scientist discovers a new kind of beetle. In a hospital laboratory, doctors study a deadly form of bird flu. At a cancer research institute, a team of scientists develops new treatments for a rare form of cancer. What do all of these people have in common? All these people are working in the field of life science.

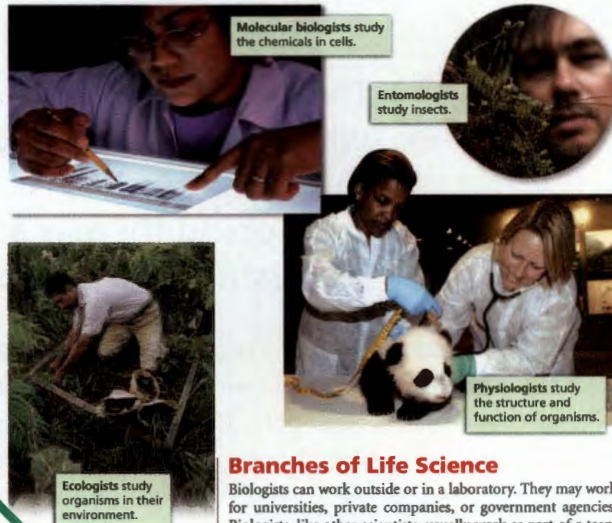
**Life science** is the study of living things. Another name for life science is biology. The word biology comes from two Greek words. *Bios* means “life” and *logos* means “reason” or “the study of.” Thus **biology** is the study of life. Biologists are scientists who study living things.

Biologists study all kinds of living things. The general term for a living thing is an **organism**. An organism may be an animal, a plant, a fungus or a microbe.

## As You Read

Key Concepts in boldface sentences allow you to focus on the important ideas of the chapter.

Look for the green and yellow keys to find the key concepts in each section.



Molecular biologists study the chemicals in cells.

Entomologists study insects.

Ecologists study organisms in their environment.

Physiologists study the structure and function of organisms.

**Figure 9**  
**Life Scientists at Work**  
You can find life scientists at work in such diverse places as forests, laboratories, zoos, and museums.

### Branches of Life Science

Biologists can work outside or in a laboratory. They may work for universities, private companies, or government agencies. Biologists, like other scientists, usually work as part of a team studying a common topic.

Life science includes many different branches, or fields of study. Molecular biology, genetics, physiology, and ecology are just some fields of life science. Molecular biology is the study of the chemical building blocks of cells. Genetics is the study of how information about organisms is passed from parent to offspring. Physiology is the study of the structures and functions of organisms. Ecology is the study of how organisms interact with each other and with their surroundings. Other branches of life science include cell biology, plant biology, and microbiology. What do you think these fields involve?

Though life science can be divided into branches, the different fields of study often overlap. For example, understanding what controls plant development relies on concepts from molecular biology and plant biology. Progress in one field of life science often contributes to progress in another field.



For: Links on careers in life science  
Visit: [www.SciLinks.org](http://www.SciLinks.org)  
Web Code: cn-1012

The principles of physics also help explain life processes. Consider, for example, the relationship between the physics of light and the way that eyes function. To understand how eyes function, scientists must know what light is and how light travels. Scientists can compare the structure of an eye to that of a camera. Like a camera, an eye uses a lens to focus light and form an image. The principles that allow a camera to take a picture also allow an eye to see.

Compare the variety of eyes in Figure 9. Although each of the animals may see slightly differently, all of the eyes operate on similar physical principles.

If you can't answer these items, go back and review the section.

## Section 2 Assessment

S 7.5, 7.6 E-LA: Reading: 7.2.0

**Target Reading Skill Preview Text**  
**Structure** When you took notes on Section 2, what question did you ask for the heading Change Over Time? What was your answer?

### Reviewing Key Concepts

- Defining** What is life science?
  - Describing** List three branches of life science and describe what is studied in each.
  - Making Judgments** Your friend wants to be a plant biologist and says she only needs to take courses in plant biology. Why might it be a good idea for your friend to study other branches of life science as well?
- Listing** What are four big ideas in life science?
  - Comparing and Contrasting** What are some ways that a cat and a tree are similar? What are some ways they are different?

### At-Home Activity

**It's Complementary** Explain to a family member what "complementary structure and function" means. Then look through books or magazines for photos of organisms that illustrate this concept. Find five examples to show your family member. Describe how a structure on each of the organisms is adapted to its function.

## After You Read

The Section Assessment tests your understanding of the Key Concepts. Each bank of Reviewing Key Concept questions here focuses on one of the Key Concepts.



# Your Keys to Success

## How to Read Science

### Reading Skill

The target reading skills introduced on this page will help you read and understand information in this textbook. Each chapter introduces a reading skill. Developing these reading skills is key to becoming a successful reader in science and other subject areas.

**Preview Text Structure** By understanding how textbooks are organized, you can gain information from them more effectively. This textbook is organized with red headings and blue subheadings. Before you read, preview the headings. Ask yourself questions to guide you as you read. (Chapter 1)

**Preview Visuals** The visuals in your science textbook provide important information. Visuals are photographs, graphs, tables, diagrams, and illustrations. Before you read, take the time to preview the visuals in a section. Look closely at the titles, labels, and captions. Then ask yourself questions about the visuals. (Chapter 2)

**Sequence** Many parts of a science textbook are organized by sequence. Sequence is the order in which a series of events occurs. Some sections may discuss events in a process that has a beginning and an end. Other sections may describe a continuous process that does not have an end. (Chapters 10 and 14)

**Compare and Contrast** Science texts often make comparisons. When you compare and contrast, you examine the similarities and differences between things. You can compare and contrast by using a table or a Venn diagram. (Chapters 9 and 12)

**Analyze Cause and Effect** A cause makes something happen. An effect is what happens. When you recognize that one event causes another, you are relating cause and effect. (Chapter 16)

**Identify Main Ideas** As you read, you can understand a section or paragraph more clearly by finding the main idea. The main idea is the most important idea. The details in a section or paragraph support the main idea. Headings and subheadings can often help you identify the main ideas. (Chapters 3, 6, and 15)

**Identify Supporting Evidence** Science textbooks often describe the scientific evidence that supports a theory or hypothesis. Scientific evidence includes data and facts, information whose accuracy can be confirmed by experiments or observation. A hypothesis is a possible explanation for observations made by scientists or an answer to a scientific question. (Chapter 7)

**Create Outlines** You can create outlines to help you clarify the text. An outline shows the relationship between main ideas and supporting details. Use the text structure—headings, subheadings, key concepts, and key terms—to help you figure out information to include in your outline. (Chapters 4 and 8)

**Take Notes** Science chapters are packed with information. Taking good notes is one way to help you remember key ideas and see the big picture. When you take notes, include key ideas, a few details, and summaries. (Chapters 5, 11, and 13)

# Target Reading Skills

Each chapter provides a target reading skill with clear instruction to help you read and understand the text. You will apply the skill as you read. Then you will record what you've learned in the section and chapter assessments.

## Before You Read

Each chapter introduces a target reading skill and provides examples and practice exercises.

## As You Read

As you read, you can use the target reading skill to help you increase your understanding.

## After You Read

You can apply the target reading skill in the Section Assessments and in the Chapter Assessments.

### How to Read Science

Reading Skill

**Preview Text Structure**  
The information in this textbook is organized with red headings and blue subheadings. You can preview these headings to help you take notes about what you read. Organize your notes by dividing a sheet of paper into three columns.

- Write the heading in the first column.
- Write a question in the second column. Look for important words in the heading to guide you in asking a question.
- Answer your question in the third column.

The partially completed notes below are based on the first heading of Section 2 in this chapter.

Section 2: The Study of Life		
Heading	Question	Answer
Branches of Life Science	What are the branches of life science?	There are many branches of life science, but the branches overlap. Molecular biology—study of the building blocks of cells Genetics—how information is passed from parents to offspring Ecology—organisms and environment Physiology—functions of organisms

**Apply It!**  
Review the notes above. Then answer the questions.

1. What are the key words in the heading in the first column?
2. What question has been asked about the heading?
3. The answer says that the branches of life science overlap. What does this mean?

When you read Section 2, take notes for all the headings. Also use this method to preview and take notes on Section 4.

## Section 2 Assessment

S 7.5, 7.6 E-LA: Reading: 7.2.0

**Target Reading Skill Preview Text Structure** When you took notes on Section 2, what question did you ask for the heading *Change Over Time*? What was your answer?

### Reviewing Key Concepts

1. **a. Defining** What is life science?  
**b. Describing** List three branches of life science and describe what is studied in each.  
**c. Making Judgments** Your friend wants to be a plant biologist and says she only needs to take courses in plant biology. Why might it be a good idea for your friend to study other branches of life science as well?
2. **a. Listing** What are four big ideas in life science?  
**b. Comparing and Contrasting** What are some ways that a cat and a tree are similar? What are some ways they are different?

### At-Home Activity

**It's Complementary** Explain to a family member what "complementary structure and function" means. Then look through books or magazines for photos of organisms that illustrate this concept. Find five examples to show your family member. Describe how a structure on each of the organisms is adapted to its function.



# Your Keys to Success

## Build Science Vocabulary

### Vocabulary Skill

Studying science involves learning a new vocabulary. Here are some vocabulary skills to help you learn the meaning of words you do not recognize.

**Word Analysis** You can use your knowledge of word parts—prefixes, suffixes, and roots—to determine the meaning of unfamiliar words.

**Prefixes** A prefix is a word part that is added at the beginning of a root or base word to change its meaning. Knowing the meaning of prefixes will help you figure out new words. You will practice this skill in **Chapters 3 and 9**.

**Suffixes** A suffix is a letter or group of letters added to the end of a word to form a new word with a slightly different meaning. Adding a suffix to a word often changes its part of speech. You will practice this skill in **Chapters 5 and 15**.

**Word Origins** Many science words come to English from other languages, such as Greek and Latin. By learning the meaning of a few common Greek and Latin roots, you can determine the meaning of new science words. You will practice this skill in **Chapters 2, 4, 12, and 13**.

### Use Clues to Determine Meaning

When you come across a word you don't recognize in science texts, you can use context clues to figure out what the word means. First look for clues in the word itself. Then look at the surrounding words, sentences, and paragraphs for clues. You will practice this skill in **Chapters 8 and 11**.

### Identify Multiple Meanings

To understand science concepts, you must use terms precisely. Some familiar words may have different meanings in science. Watch for these multiple-meaning words as you read. You will practice this skill in **Chapter 7**.

### Identify Related Word Forms

You can increase your vocabulary by learning related forms of words or word families. If you know the meaning of a verb form, you may be able to figure out the related noun and adjective forms. You will practice this skill in **Chapter 16**.

# Vocabulary Skills

One of the important steps in reading this science textbook is to be sure that you understand the key terms. Your book shows several strategies to help you learn important vocabulary.

## Before You Read

Each chapter introduces a Vocabulary Skill with examples and practice exercises. Key terms come alive through visuals. The beginning of each section lists the key terms.

## Build Science Vocabulary

The images shown here represent some of the Key Terms in this chapter. You can use this vocabulary skill to help you understand the meaning of some Key Terms in this chapter.

### Vocabulary Skill

#### Prefixes

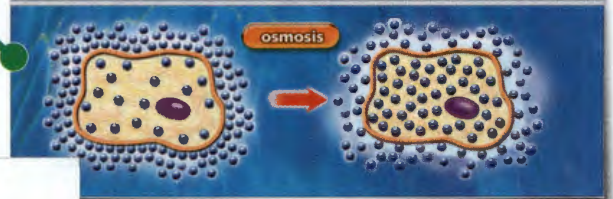
Words can sometimes be divided into parts. A root is the part of the word that carries the basic meaning. A prefix is a word part that is placed in front of the root to change the word's meaning. In the word *multicellular*, for example, *-cellular* is the root and *multi-* is the prefix. The prefix *multi-* means "many." *Multicellular* means "having many cells."

The prefixes below will help you understand some Key Terms.

Prefix	Meaning	Example Word
chlor-	green	chloroplast A cellular structure that captures energy from sunlight
cyto-	cell	cytoskeleton The framework inside a cell
multi-	many	multicellular Having many cells
uni-	one	unicellular Having one cell

#### Apply It!

1. A **chloroplast** is a structure in plant cells. What color do you think a chloroplast is?
2. What clue within the word **cytoplasm** lets you know that the word has something to do with cells?



## Unicellular and Multicellular

Organisms may be composed of only one cell or many trillions of cells. **Unicellular**, or single-celled, organisms include bacteria (bak TIR ee uh), the most numerous organisms on Earth. **Multicellular** organisms are composed of many cells.

In multicellular organisms, cells are often organized into **tissues**, **organs**, and **organ systems**. A **tissue** is a group of similar cells that work together to perform a specific function. For example, your brain is mostly made up of nervous tissue, which consists of nerve cells. An **organ**, such as your brain, is made up of different kinds of tissues that work together. In addition to nervous tissue, your brain contains other kinds of tissue that support and protect it. Your brain is part of your nervous system, an **organ system** that directs body activities and processes. An **organ system** is a group of organs that work together to perform a major function.

**Reading Checkpoint** What is an organ?



Unicellular



Multicellular

**Figure 4**  
**Cellular Organization**  
This dog is multicellular. The bacteria that live naturally on its teeth are unicellular. Each green sphere is a bacterial cell.

## Section 1 Assessment

S.1.E-LA: Reading 7.1.2, Writing 7.2.4

**Vocabulary Skill** **Prefixes** Complete the following sentences with Key Terms. Because bacteria each have only one cell, they are \_\_\_\_\_ organisms. Animals have many cells. Therefore, animals are \_\_\_\_\_ organisms.

### Reviewing Key Concepts

1. a. **Defining** Define *structure and function*.  
b. **Explaining** Explain this statement: Cells are the basic units of structure and function in organisms.  
c. **Applying Concepts** In what important function are the cells in your eyes involved?
2. a. **Reviewing** What does a microscope enable people to do?  
b. **Summarizing** Summarize Hooke's observations of cork under a microscope.  
c. **Relating Cause and Effect** Why would Hooke's discovery have been impossible without a microscope?

3. a. **Listing** What does the cell theory state?  
b. **Explaining** What did Virchow contribute to the cell theory?  
c. **Applying Concepts** Use Virchow's ideas to explain why plants and animals are not alive.
4. a. **Reviewing** How do multicellular organisms differ from unicellular organisms?  
b. **Explaining** What is the relationship among cells, tissues, and organs?  
c. **Inferring** Would a tissue or an organ have more kinds of specialized cells? Explain.

### Writing in Science

**Writing an Award Speech** Suppose you are a member of a scientific society that is giving an award to one of the early cell scientists. Choose the scientist, and write a speech that you might give at the award ceremony. Be sure to describe the scientist's accomplishments.

## As You Read

Each key term is highlighted in yellow, appears in boldface type, and is followed by a definition.

## After You Read

You can practice the Vocabulary Skill in the Section Assessments. You can apply your understanding of the key terms in the Chapter Assessments.



# Your Keys to Success

## Build Science Vocabulary

### High-Use Academic Words

High-use academic words are words that are used frequently in classroom reading, writing, and discussions. They are different from key terms because they appear in many subject areas.

#### Learn the Words

Each unit contains a chapter that introduces high-use academic words. The introduction describes the words, provides examples, and includes practice exercises.

#### Practice Using the Words

You can practice using the high-use academic words in Apply It! and the Section Assessments.

### Build Science Vocabulary

The images shown here represent some of the Key Terms in this chapter. You can use this vocabulary skill to help you understand the meaning of some Key Terms in this chapter.

#### Vocabulary Skill

#### High-Use Academic Words

High-use academic words are words that are used frequently in classrooms. Look for the words below as you read this chapter.

Word	Definition	Example Sentence
concept (KAHN sept) pp. 14, 15	<i>n.</i> An idea or thought, especially a general idea or understanding	Each section in this textbook contains key <b>concepts</b> , which are the section's most important ideas.
process (PRAH ses) pp. 10, 15, 16	<i>n.</i> A series of actions or events; a particular way of doing things	Science is an ongoing <b>process</b> of discovery.
evidence (EV uh dums) p. 18	<i>n.</i> Facts, figures, or signs to show that something exists or is true	Scientists propose explanations based on <b>evidence</b> they gather.
research (REE surch) p. 21	<i>n.</i> Careful study of a subject to discover new facts or test new ideas	<b>Research</b> into the causes of cancer may lead to a cure.

#### Apply It!

Choose the word that best completes each sentence.

- Laboratory safety is an important \_\_\_\_\_ in this chapter.
- Jane Goodall conducted \_\_\_\_\_ on the behavior of chimpanzees.

### Focus on Life Science High-Use Academic Words

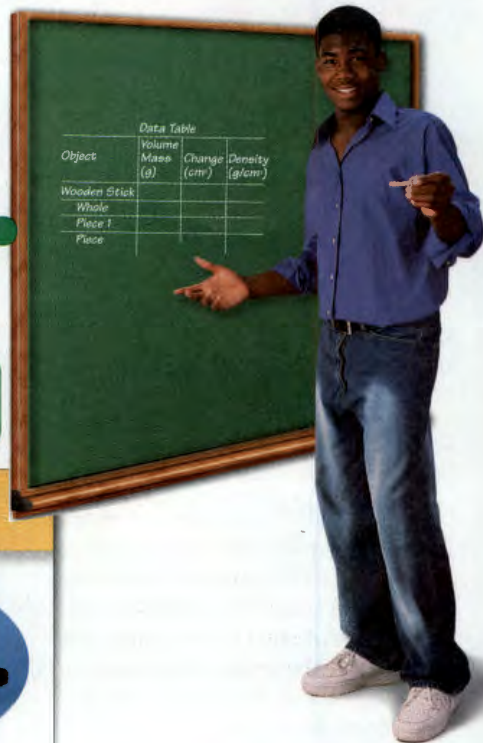
Learning the meanings of these words will help you improve your reading comprehension in all subject areas.

adjust	contract	flexible	normal	section
adult	contrast	focus	obvious	sequence
affect	contribute	function	occur	series
alter	convert	identical	percent	source
analyze	cycle	indicate	predict	specific
approach	detect	interact	process	stable
area	determine	interpret	range	structure
attach	device	involve	region	survival
communicate	distinct	label	regulate	technique
complex	diverse	layer	require	theory
concept	enable	locate	research	transport
conduct	environment	maintain	resource	unique
consist	evidence	mature	respond	vary
constant	expose	method	reverse	visible



# Investigations

You can explore the concepts in this textbook through inquiry. Like a real scientist, you can develop your own scientific questions and perform labs and activities to find answers. Follow the steps below when doing a lab.



**1** Read the whole lab.

**5** Record your data.

**2** Write a purpose. What is the purpose of this activity?

**3** Write a hypothesis. What is a possible explanation? Hypotheses lead to predictions that can be tested.

**4** Follow each step in the procedure. Pay attention to safety icons.

**Lab zone Skills Lab**

## Changing Colors

S 7.6.a, 7.7.c

**Problem**  
How do color filters affect the appearance of objects in white light?

**Skills Focus**  
observing, inferring, predicting

**Materials**

- shoe box
- scissors
- flashlight
- removable tape
- red object (such as a ripe tomato)
- yellow object (such as a ripe lemon)
- blue object (such as blue construction paper)
- red, green, and blue cellophane, enough to cover the top of the shoe box

**Procedure**

1. Carefully cut a large rectangular hole in the lid of the shoe box.
2. Carefully cut a small, round hole in the center of one of the ends of the shoe box.
3. Tape the red cellophane under the lid of the shoe box, covering the hole in the lid.
4. Place the objects in the box and put the lid on.
5. In a darkened room, shine the flashlight into the shoe box through the side hole. Note the apparent color of each object in the box.
6. Repeat Steps 3–5 using the other colors of cellophane.

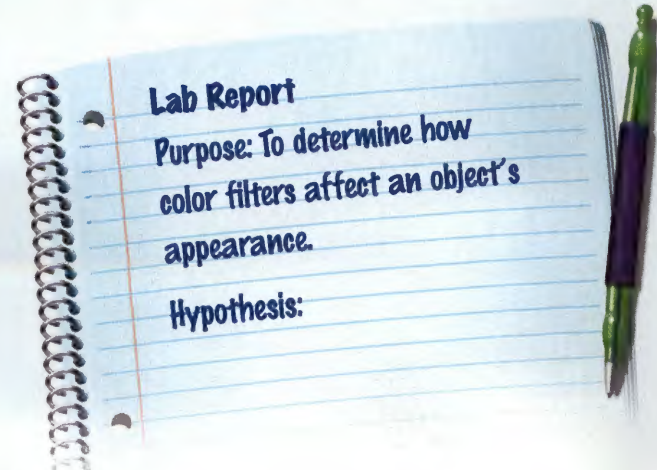
**Analyze and Conclude**

1. **Observing** What did you see when you looked through the red cellophane? Explain why each object appeared as it did.
2. **Observing** What did you see when you looked through the blue cellophane? Explain.
3. **Inferring** What color(s) of light does each piece of cellophane allow through?
4. **Predicting** Predict what you would see under each piece of cellophane if you put a white object in the box. Test your prediction.
5. **Predicting** What do you think would happen if you viewed a red object through yellow cellophane? Draw a diagram to support your prediction. Then test your prediction.
6. **Communicating** Summarize your conclusions by drawing diagrams to show how each color filter affects white light. Write captions to explain your diagrams.

**Design an Experiment**

Do color filters work like pigments or like colors of light? Design an experiment to find out what happens if you shine a light through both a red and a green filter. Obtain your teacher's permission before carrying out your investigation.

**6** Analyze your results. Answering the questions will help you draw conclusions.



**7** Communicate your results in a written report or oral presentation. Your report should include

- ◆ a hypothesis
- ◆ a purpose
- ◆ the steps of the procedure
- ◆ a record of your results
- ◆ a conclusion

For more information on Science Inquiry, Scientific Investigations, and Safety refer to the Skills Handbook and Appendix A.