About the Consultant

Douglas Fisher, Ph.D., is a Professor in the Department of Teacher Education at San Diego State University. He is the recipient of an International Reading Association Celebrate Literacy Award as well as a Christa McAuliffe award for Excellence in Teacher Education. He has published numerous articles on reading and literacy, differentiated instruction, and curriculum design as well as books, such as *Improving Adolescent Literacy: Strategies at Work* and *Responsive Curriculum Design in Secondary Schools: Meeting the Diverse Needs of Students*. He has taught a variety of courses in SDSU’s teacher-credentialing program as well as graduate-level courses on English language development and literacy. He also has taught classes in English, writing, and literacy development to secondary school students.
# Table of Contents

**Note-Taking Tips** ........................................... v

**Using Your Science Notebook** ............. vi

**Chapter 1 The Nature of Science**
- Chapter Preview ................................ 1
- 1-1 ........................................ 2
- 1-2 ........................................ 5
- Wrap-Up .................................... 8

**Chapter 2 Matter**
- Chapter Preview ................................ 9
- 2-1 ........................................ 10
- 2-2 ........................................ 13
- 2-3 ........................................ 16
- Wrap-Up ................................... 20

**Chapter 3 Minerals**
- Chapter Preview ................................ 21
- 3-1 ........................................ 22
- 3-2 ........................................ 25
- 3-3 ........................................ 28
- Wrap-Up ................................... 32

**Chapter 4 Rocks**
- Chapter Preview ................................ 33
- 4-1 ........................................ 34
- 4-2 ........................................ 37
- 4-3 ........................................ 40
- 4-4 ........................................ 43
- Wrap-Up ................................... 46

**Chapter 5 Earth's Energy and Mineral Resources**
- Chapter Preview ................................ 47
- 5-1 ........................................ 48
- 5-2 ........................................ 51
- 5-3 ........................................ 54
- Wrap-Up ................................... 58

**Chapter 6 Views of Earth**
- Chapter Preview ................................ 59
- 6-1 ........................................ 60
- 6-2 ........................................ 63
- 6-3 ........................................ 66
- Wrap-Up ................................... 70

**Chapter 7 Weathering and Soil**
- Chapter Preview ................................ 71
- 7-1 ........................................ 72
- 7-2 ........................................ 75
- 7-3 ........................................ 78
- Wrap-Up ................................... 82

**Chapter 8 Erosional Forces**
- Chapter Preview ................................ 83
- 8-1 ........................................ 84
- 8-2 ........................................ 87
- 8-3 ........................................ 90
- Wrap-Up ................................... 94

**Chapter 9 Water Erosion and Deposition**
- Chapter Preview ................................ 95
- 9-1 ........................................ 96
- 9-2 ........................................ 99
- 9-3 ........................................ 102
- Wrap-Up ................................... 106

**Chapter 10 Plate Tectonics**
- Chapter Preview ................................ 107
- 10-1 ........................................ 108
- 10-2 ........................................ 111
- 10-3 ........................................ 114
- Wrap-Up ................................... 118

**Chapter 11 Earthquakes**
- Chapter Preview ................................ 119
- 11-1 ........................................ 120
- 11-2 ........................................ 123
- 11-3 ........................................ 126
- Wrap-Up ................................... 130

**Chapter 12 Volcanoes**
- Chapter Preview ................................ 131
- 12-1 ........................................ 132
- 12-2 ........................................ 135
- 12-3 ........................................ 138
- Wrap-Up ................................... 142

**Chapter 13 Clues to Earth's Past**
- Chapter Preview ................................ 143
- 13-1 ........................................ 144
- 13-2 ........................................ 147
- 13-3 ........................................ 150
- Wrap-Up ................................... 154
# Table of Contents

## Chapter 14 Geologic Time
- Chapter Preview ................................... 155
- 14-1 ................................................. 156
- 14-2 ................................................. 159
- 14-3 ................................................. 162
- Wrap-Up ........................................ 166

## Chapter 15 Atmosphere
- Chapter Preview ................................... 167
- 15-1 ................................................. 168
- 15-2 ................................................. 171
- 15-3 ................................................. 174
- Wrap-Up ........................................ 178

## Chapter 16 Weather
- Chapter Preview ................................... 179
- 16-1 ................................................. 180
- 16-2 ................................................. 183
- 16-3 ................................................. 186
- Wrap-Up ........................................ 190

## Chapter 17 Climate
- Chapter Preview ................................... 191
- 17-1 ................................................. 192
- 17-2 ................................................. 194
- 17-3 ................................................. 196
- Wrap-Up ........................................ 200

## Chapter 18 Ocean Motion
- Chapter Preview ................................... 201
- 18-1 ................................................. 202
- 18-2 ................................................. 205
- 18-3 ................................................. 208
- Wrap-Up ........................................ 212

## Chapter 19 Oceanography
- Chapter Preview ................................... 213
- 19-1 ................................................. 214
- 19-2 ................................................. 217
- 19-3 ................................................. 220
- Wrap-Up ........................................ 224

## Chapter 20 Our Impact on Land
- Chapter Preview ................................... 225
- 20-1 ................................................. 226
- 20-2 ................................................. 229
- 20-3 ................................................. 232
- Wrap-Up ........................................ 236

## Chapter 21 Our Impact on Water and Air
- Chapter Preview ................................... 237
- 21-1 ................................................. 238
- 21-2 ................................................. 241
- Wrap-Up ........................................ 244

## Chapter 22 Exploring Space
- Chapter Preview ................................... 245
- 22-1 ................................................. 246
- 22-2 ................................................. 249
- 22-3 ................................................. 252
- Wrap-Up ........................................ 256

## Chapter 23 The Sun-Earth-Moon System
- Chapter Preview ................................... 257
- 23-1 ................................................. 258
- 23-2 ................................................. 261
- 23-3 ................................................. 264
- Wrap-Up ........................................ 268

## Chapter 24 The Solar System
- Chapter Preview ................................... 269
- 24-1 ................................................. 270
- 24-2 ................................................. 273
- 24-3 ................................................. 276
- 24-4 ................................................. 279
- Wrap-Up ........................................ 282

## Chapter 25 Stars and Galaxies
- Chapter Preview ................................... 283
- 25-1 ................................................. 284
- 25-2 ................................................. 287
- 25-3 ................................................. 290
- 25-4 ................................................. 293
- Wrap-Up ........................................ 296

## Academic Vocabulary
- .................................................. 297

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_Academic Vocabulary_
Your notes are a reminder of what you learned in class. Taking good notes can help you succeed in science. These tips will help you take better notes.

- Be an active listener. Listen for important concepts. Pay attention to words, examples, and/or diagrams your teacher emphasizes.

- Write your notes as clearly and concisely as possible. The following symbols and abbreviations may be helpful in your note-taking.

<table>
<thead>
<tr>
<th>Word or Phrase</th>
<th>Symbol or Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>for example</td>
<td>e.g.</td>
</tr>
<tr>
<td>such as</td>
<td>i.e.</td>
</tr>
<tr>
<td>with</td>
<td>w/</td>
</tr>
<tr>
<td>without</td>
<td>w/o</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Word or Phrase</th>
<th>Symbol or Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
<td>+</td>
</tr>
<tr>
<td>approximately</td>
<td>≈</td>
</tr>
<tr>
<td>therefore</td>
<td>.:</td>
</tr>
<tr>
<td>versus</td>
<td>vs</td>
</tr>
</tbody>
</table>

- Use a symbol such as a star (★) or an asterisk (*) to emphasis important concepts. Place a question mark (?) next to anything that you do not understand.

- Ask questions and participate in class discussion.

- Draw and label pictures or diagrams to help clarify a concept.

**Note-Taking Don’ts**

- **Don’t** write every word. Concentrate on the main ideas and concepts.
- **Don’t** use someone else’s notes—they may not make sense.
- **Don’t** doodle. It distracts you from listening actively.
- **Don’t** lose focus or you will become lost in your note-taking.
This note-taking guide is designed to help you succeed in learning science content. Each chapter includes:

**Language-Based Activities**
Activities cover the content in your science book including vocabulary, writing, note-taking, and problem solving.

**Anticipation Guide/KWL Charts**
Think about what you already know before beginning a lesson and identify what you would like to learn from reading.

**Science Journal**
Write about what you know.

**Writing Activities**
These activities help you think about what you’re learning and make connections to your life.

**Vocabulary Development**
Vocabulary words help you to better understand your science lessons. Learning the Academic Glossary can help you score higher on standardized tests.
### Chapter Wrap-Up

This brings the information together for you. Revisiting what you thought at the beginning of the chapter provides another opportunity for you to discuss what you have learned.

#### Note-Taking Based on the Cornell Two-Column Format

Practice effective note-taking through the use of graphic organizers, outlines, and written summaries.

#### Review Checklist

This list helps you assess what you have learned and prepare for your chapter tests.

#### Graphic Organizers

A variety of visual organizers help you to analyze and summarize information and remember content.
Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>The Nature of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>• An important part of science is testing, or experimenting.</td>
<td></td>
</tr>
<tr>
<td>• Technology is useful only in the situation for which it was designed.</td>
<td></td>
</tr>
<tr>
<td>• People began studying weather in the 1800s.</td>
<td></td>
</tr>
<tr>
<td>• Science can answer all of the questions that can be asked.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

How do you think scientists could learn more about a clump of stone that could be a small dinosaur heart?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
**The Nature of Science**

**Section 1 Science All Around**

Scan Section 1 of your book, reading all section titles and bold words. Then write three facts that you have learned about the nature of science and scientific investigation.

1. 
2. 
3. 

**Define** analyze to show its scientific meaning.

**New Vocabulary**

Write a sentence that contains both terms from each pair.

<table>
<thead>
<tr>
<th>Pair</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>hypothesis/control</strong></td>
<td></td>
</tr>
<tr>
<td><strong>scientific methods/Earth science</strong></td>
<td></td>
</tr>
<tr>
<td><strong>variable/independent variable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>constant/dependent variable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>science/technology</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Academic Vocabulary**

Use a dictionary to define outcome to show its scientific meaning.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>outcome</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Mysteries and Problems
I found this information on page __________.

Scientific Methods
I found this information on page __________.

Details

Summarize why it was important for scientists to solve the mystery of the tsunami that struck Japan, on January 27, 1700.

Sequence the scientific methods used to solve a scientific problem by completing the graphic organizer below.

Gather information.

Test the hypothesis.

Distinguish topics that Earth scientists study by listing specific topics identified in this section.

1. ____________________________ 7. ____________________________
2. ____________________________ 8. ____________________________
3. ____________________________ 9. ____________________________
4. ____________________________ 10. ____________________________
5. ____________________________ 11. ____________________________
6. ____________________________ 12. ____________________________
Define the four types of factors in a science experiment. Identify and describe each of them below.

- **Independent Variable:** Variables that do not change
- **Dependent Variable:** The standard to which results can be compared

Summarize transferable technology by defining the term. Then provide examples by filling out the graphic organizer below.

**Transferable technology** is __________________________.

- **Radar and Sonar**
  - Originally developed for
  - Are now used to study
  - Study __________________________.

**SYNTHESIZE IT**

Identify three objects in your home or school that have not been affected by technology.

__________________________

__________________________

__________________________
The Nature of Science
Section 2 Scientific Enterprise

Skim through Section 2 of your book. Write three questions that come to mind from reading the headings and examining the illustrations.

1. ______________________________________________________________________
2. ______________________________________________________________________
3. ______________________________________________________________________

Define observation to show its scientific meaning.

observation

Use your book to define the following terms.

scientific theory

scientific law

ethics

bias

Use a dictionary to define objective as an adjective.

objective
Summarize how the manner in which people observe natural phenomena has changed over time.

Organize types of weather information that can be measured. Complete the graphic organizer below.

Distinguish between a scientific theory and a scientific law.
Complete the following paragraph by filling in the missing terms from the word bank.

- bad  - good  - scientific methods  
- ethics - limited - tested  
- explain  - observed  

Science is ______________ by what it can ______________.

For a question or problem to be studied through ______________, there must be variables that can be ______________, measured, and ______________. Questions that deal with ______________ or belief systems cannot be answered by science. Ethics is a system of understanding what is ______________ or ______________.

Contrast ethical behavior in science with scientific fraud. Create a table that lists three specific behaviors that are examples of each type of behavior.

<table>
<thead>
<tr>
<th>Ethical Behavior</th>
<th>Scientific Fraud</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe how fraud in scientific research could affect other scientists who research in ethical ways.
The Nature of Science  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>The Nature of Science</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• An important part of science is testing, or experimenting.</td>
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</tr>
<tr>
<td>• Science can answer all of the questions that can be asked.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about the nature of science.
Matter

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When different kinds of atoms combine, they form matter with properties that are different from those of the original atoms.</td>
<td></td>
</tr>
<tr>
<td>• There are about 900 naturally occurring elements on Earth.</td>
<td></td>
</tr>
<tr>
<td>• An atom is stable when it has six electrons in its outer energy level.</td>
<td></td>
</tr>
<tr>
<td>• An object that is less dense than water will float in water.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

What is matter made of, and how can it take such varied forms? Write what you know now, and compare it with what you learn after you read the chapter.
Matter
Section 1 Atoms

Scan the headings in Section 1 of your book. Identify three topics that will be discussed.

1. 

2. 

3. 

Define mass using your book or a dictionary.

mass 

New Vocabulary

Use your book or a dictionary to explain the differences between the vocabulary terms in each set.

matter atom element

proton neutron electron

atomic number mass number isotope

Academic Vocabulary

Use a dictionary to define sum to show its meaning in science and math.

sum
Section 1 Atoms (continued)

**Main Idea**

**The Building Blocks of Matter**

Identify the 2 characteristics that determine the properties of matter. List them below.

1. 
2. 

Complete the graphic organizer below to identify two characteristics of elements that make elements different from other kinds of matter.

**Characteristics of Elements**

<table>
<thead>
<tr>
<th>Characteristics of Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Modeling the Atom**

Define the 3 basic particles of an atom in the chart below.

**Basic Particles of an Atom**

<table>
<thead>
<tr>
<th>Name of Particle</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

I found this information on page ____________.

Details

Model the current atomic model of the atom.

Create models to illustrate an atom or ion with each of the following:
no charge or neutral; a positive charge; and a negative charge. Be sure to label the particles that make up each atom.

Counting Atomic Particles

I found this information on page ____________.

Connect It

Use a periodic table to find the element that has the atomic number 80. Identify the element, the number of protons the element has, and indicate whether the element is a metal, a nonmetal, or a metalloid.
Matter
Section 2 Combinations of Atoms

Skim Section 2 of your book. Write three questions that come to mind. Look for answers to your questions as you read the section.
1. 
2. 
3. 

Define force using your book or a dictionary.

Read each definition. Use your book to write the correct vocabulary term on the line next to each definition.

- negatively or positively charged atom
- composed of two or more substances that are not chemically combined
- a mixture that is evenly mixed throughout, also known as a homogeneous mixture
- atoms of more than one type of element that are chemically bonded together
- group of atoms held together by covalent bonds
- mixture that is evenly mixed throughout
- mixture that is not mixed evenly and each component retains its own properties

Use a dictionary to define formula to show its scientific meaning.
Interactions of Atoms

Organize information about the interactions of atoms by completing the outline below.

I. Interactions of Atoms
   A. Compounds
      1. 
      2. 
      3. 
   B. Chemical Properties
      1. 
      2. 

Predict how an atom with an unstable outer energy level will likely form a chemical bond with another atom.

Complete the graphic organizer below to identify the types of chemical bonds that form compounds.

Bonds That Form Compounds

are shared. attract.
A kitchen contains the following: lemonade, snack mix, mixed seasonings, vinegar, olives in water, and carbonated water. Classify each of these as a homogeneous mixture or a heterogeneous mixture.
Scan the What You’ll Learn statements in Section 3 of your book. Identify three topics that will be discussed in this section.

1. 
2. 
3. 

Define energy using your book or a dictionary.

energy

Use your book to define density. Then use the term in a sentence to show its scientific meaning.

density

Use a dictionary to define volume to show its scientific meaning. Then write a sentence that includes the word.

volume
Section 3 Properties of Matter (continued)

Main Idea

**Physical Properties of Matter**

*I found this information on page __________.*

States of Matter

*I found this information on page __________.*

Changing the State of Matter

*I found this information on page __________.*

Details

**Define** physical property. *Then write five examples of physical properties.*

Definition: ____________________________

______________________________

Examples: ____________________________

______________________________

**Classify** the different states of matter by completing the graphic organizer below.

[Diagram of a graphic organizer with States of Matter at the center and branches leading to different states]

**Predict** how each of the following conditions would affect the state of matter.

Liquid matter reaches its freezing point: ____________________________

______________________________

Liquid matter reaches its boiling point: ____________________________

______________________________

Pressure on liquid matter near its boiling point is decreased:

______________________________

______________________________
Contrast the way that the density of water changes when it freezes with the way the density of most other materials changes when those materials turn solid.

<table>
<thead>
<tr>
<th>Contrasting Density of Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Most other materials</td>
</tr>
</tbody>
</table>

Summarize three scientific explanations of where the water that once existed on Mars may have gone.

1. 

2. 

3. 

SYNTHESIZE IT

Predict whether a copper penny would float or sink when dropped into a pan of melted copper. Support your reasoning with information from this section.
Tie It Together

What’s the matter?

Analyze the two samples of matter below by answering the following questions:

1. What are the physical properties of each sample?
   - Sample 1:
   - Sample 2:

2. Identify each substance as either a mixture or a compound. Explain your reasoning.
   - Sample 1:
   - Sample 2:

3. Predict whether the matter that makes up each sample could be separated physically, chemically, or not at all. Support your reasoning.
   - Sample 1:
   - Sample 2:
Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Matter</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When different kinds of atoms combine, they form matter with</td>
<td></td>
</tr>
<tr>
<td>properties that are different from those of the original atoms.</td>
<td></td>
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<td>• An atom is stable when it has six electrons in its outer energy</td>
<td></td>
</tr>
<tr>
<td>level.</td>
<td></td>
</tr>
<tr>
<td>• An object that is less dense than water will float in water.</td>
<td></td>
</tr>
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</table>

Review

Use this checklist to help you study.

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☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, summarize three main ideas from the chapter.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

20 Matter
Minerals

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atoms in a mineral are arranged in an orderly pattern.</td>
<td></td>
</tr>
<tr>
<td>• Minerals are made in the lab from natural materials.</td>
<td></td>
</tr>
<tr>
<td>• Diamonds are so hard they cannot be broken.</td>
<td></td>
</tr>
<tr>
<td>• Minerals are a source of metals and other useful elements.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write two questions that you would ask a gemologist—one who studies gems and gemstones—about the minerals that he or she works with.
Minerals
Section 1 Minerals

**Skim** through Section 1 of your book. Read the headings and examine the illustrations. Write three questions that come to mind.

1. 
2. 
3. 

**Define** atoms using your book or a dictionary.

<table>
<thead>
<tr>
<th><strong>atoms</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**New Vocabulary**

Use your book to define the following terms.

<table>
<thead>
<tr>
<th><strong>mineral</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>crystal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>magma</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>silicate</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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</tbody>
</table>

**Academic Vocabulary**

Use a dictionary to define occur.

<table>
<thead>
<tr>
<th><strong>occur</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Main Idea

**What is a mineral?**

*Organize the four characteristics shared by all minerals in the concept web below.*

**The Structure of Minerals**

*Model the structure of minerals by using simple geometric shapes or dot patterns to represent atoms arranged in a crystalline pattern.*

**Summarize how atoms are arranged in minerals.**
Main Idea

The Structure of Minerals
I found this information on page _________.

Details

Sequence the two processes by which minerals form from solution by completing the diagram below.

Minerals dissolve in water to form a solution

Minerals precipitate from solution to form a mineral

Minerals crystallize from a melt

Minerals grow by chemical reaction with water

Minerals grow by solution and precipitation

Mineral Compositions and Groups
I found this information on page _________.

Analyze the chart of Elements in Earth’s Crust that is provided in your book, and complete the following sentences.

1. Most of Earth’s crust is made up of only __________ elements.

2. __________ and __________ are the most abundant elements, making up about __________ percent of Earth’s crust.

3. Six other common elements are __________________________________________.

Distinguish between a carbonate and a silicate. Then identify two carbonates and two silicates.

________________________________________

________________________________________

________________________________________

________________________________________

CONNECT IT

Critique the statement “Coal is an essential mineral for society.”

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Minerals
Section 2 Mineral Identification

**Predict** three things that you expect to learn based on the headings in Section 2.

1. 

2. 

3. 

**Define** physical property using your book or a dictionary.

physical property

**New Vocabulary**

Write the correct vocabulary term next to its definition.

- measure of how easily a mineral can be scratched
- describes the way a mineral reflects light from its surface; can be metallic or nonmetallic
- color of a mineral when it is in powdered form
- physical property of some minerals that causes them to break along smooth, flat surfaces
- physical property of some minerals that causes them to break with uneven, rough, or jagged surfaces

**Academic Vocabulary**

Use a dictionary to define obvious.

obvious

Summarize why attempting to identify a mineral by its color alone may sometimes be deceiving.

Compare and contrast mineral hardness with the hardness of common objects by completing the diagram below.

<table>
<thead>
<tr>
<th>Mineral Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mohs Scale</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Analyze the chart by completing the prompts.

Your fingernail can scratch the minerals ________ and ________. A streak plate is softer than the minerals ________, ________, and ________.
Main Idea

Physical Properties

I found this information on page ________.

Create a concept web that identifies six properties used to identify minerals.

Identify the unique properties of lodestone and calcite.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>lodestone</td>
<td>calcite</td>
</tr>
</tbody>
</table>

 CONNECT IT

Suppose you were given an assignment to scratch your name into a piece of glass on a special name plate. Identify which of the following minerals you could use. Which would work best? Support your choices with reasons and examples.

diamond  gypsum  apatite  quartz

Name ___________________________ Date ____________
Minerals
Section 3 Uses of Minerals

Predict three things that might be discussed in Section 3. Read the headings to help you make your predictions.

1. 
2. 
3. 

Define metal using your book or a dictionary.

metal

Use your book to define the following terms. Then use each term in a sentence that shows its scientific meaning.

gem

ore

Use a dictionary to define accurate.

accurate
Section 3 Uses of Minerals

Main Idea

Gems
I found this information on page __________.

Useful Elements in Minerals
I found this information on page __________.

Details

Summarize what distinguishes gems from common samples of minerals.

Complete the chart to list some gems and their uses.

<table>
<thead>
<tr>
<th>Gem</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruby</td>
<td>in cutting tools</td>
</tr>
<tr>
<td>Quartz</td>
<td>crystals</td>
</tr>
</tbody>
</table>

Sequence the stages from ore, to refined element, to manufactured product.

<table>
<thead>
<tr>
<th>Ore</th>
<th>Element</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauxite</td>
<td>iron</td>
<td>frying pans, nails</td>
</tr>
<tr>
<td>Ilmenite or rutile</td>
<td>zinc</td>
<td></td>
</tr>
</tbody>
</table>

Name ___________________________ Date ____________________
Section 3 Uses of Minerals

**Main Idea**

**Useful Elements in Minerals**

_I found this information on page ___________.

**Details**

**Complete** the flow chart to describe how vein minerals form.

1. Metallic elements dissolve in liquid.
2. Liquid forms mineral deposits called vein minerals.

**Synthesize It**

Infer why aluminum is more expensive than iron or steel.

Compare the availability of aluminum recycling to that of iron or steel. Explain your reasoning.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Tie It Together

Synthesize

Create a concept web to summarize what you have learned about mineral characteristics, composition, identification, and uses. (Hint: You may find it easier to write a list of facts to include, and then organize them into the web.)
Minerals  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Minerals</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atoms in a mineral are arranged in an orderly pattern.</td>
<td></td>
</tr>
<tr>
<td>• Minerals are made in the lab from natural materials.</td>
<td></td>
</tr>
<tr>
<td>• Diamonds are so hard they cannot be broken.</td>
<td></td>
</tr>
<tr>
<td>• Minerals are a source of metals and other useful elements.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your Science Notebook on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about minerals.
Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Rocks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Heat can melt rock.</td>
</tr>
<tr>
<td></td>
<td>• Rocks from lava form only under Earth’s surface.</td>
</tr>
<tr>
<td></td>
<td>• Rocks on Earth change slowly over time.</td>
</tr>
<tr>
<td></td>
<td>• Many rocks form in layers.</td>
</tr>
</tbody>
</table>

Are you a rock collector? If so, write two sentences about your favorite rock. If not, describe rocks that you have seen in enough detail that a non-sighted person could visualize them.
Rocks
Section 1 The Rock Cycle

**Skim** Section 1 of your book. Read the headings and examine the illustrations. Write three questions that come to mind.

1.

2.

3.

**Review Vocabulary** Define mineral using your book or a dictionary.

mineral

**New Vocabulary** Use your book to define the following terms. Then use each term in an original sentence to show its scientific meaning.

rock

rock cycle

**Academic Vocabulary** Use your book or a dictionary to define erode.

erode
Section 1 The Rock Cycle (continued)

**Main Idea**

**What is a rock?**

I found this information on page ___________.

**The Rock Cycle**

I found this information on page ___________.

**Details**

Complete the blanks in this description of rock.

Most common rock contains one or more ________________ such as __________________ or __________________.

Rock types may also contain __________________, __________________, or __________________.

Classify the three major types of rocks. Complete the graphic organizer.

![Types of Rocks Diagram]

Model the rock cycle. Draw a diagram showing the ways in which rock can change. Include the five types of rock and the processes through which they can change.

![Rock Cycle Diagram]
Organize ways that each form of rock can change in the rock cycle. Complete the flowcharts.

**Starting form** → **Process** → **Ending form**

- **magma** →

- **igneous, sedimentary, or metamorphic rock** →

- **sediment** →

Complete the blanks in the statements about the rock cycle.

In the rock cycle, matter is _______ lost or destroyed. It is _______ and used in other forms. Neither _______, weathering, nor _______ destroys matter.

**Summarize It**

Choose a form of rock. Then use the rock cycle diagram to describe all the possible ways that rock could form.

---

Name ___________________ Date ________________

Section 1 The Rock Cycle (continued)

**Main Idea**

The Rock Cycle

I found this information on page __________.

**Details**

**Organize** ways that each form of rock can change in the rock cycle. Complete the flowcharts.

- **Starting form** → **Process** → **Ending form**

  - magma →

  - igneous, sedimentary, or metamorphic rock →

  - sediment →

**Complete** the blanks in the statements about the rock cycle.

In the rock cycle, matter is _______ lost or destroyed. It is _______ and used in other forms. Neither _______, weathering, nor _______ destroys matter.

---

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Rocks
Section 2  Igneous Rocks

**Scan** the headings of Section 2. Identify three categories of formation of igneous rocks and three classification groups.

1. ____________, ____________, or ____________
2. ____________, ____________, or ____________

**Review Vocabulary**

Explain how an **element** is different from a compound or a mixture.

- __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________

**New Vocabulary**

Use your book to define the following terms.

- **igneous rock** __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________

- **lava** __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________

- **intrusive** __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________

- **extrusive** __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________

**Academic Vocabulary**

Use your book or a dictionary to define **infer**. Then explain why inferring is important to scientists.

- __________________________________________________________________________
- __________________________________________________________________________
- __________________________________________________________________________
Complete the flow chart about lava.

Identify two sources of heat that melt rocks beneath Earth’s surface.
1. 
2. 

Distinguish among the types of igneous rocks and the processes by which they form. Complete the chart.

<table>
<thead>
<tr>
<th>Type of Rock</th>
<th>Characteristics</th>
<th>Formation Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrusive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extrusive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volcanic Glass</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Main Idea**

**Classifying Igneous Rocks**

Sequence the three types of igneous rock. The arrows show how the density, silica content, and iron and magnesium content increase among the types of igneous rock.

- Density
- Silica
- Iron and Magnesium

I found this information on page ___________.

**Details**

Classify the following rocks on the basis of what you have learned from this section. Identify whether each is intrusive or extrusive, and identify its composition as basaltic, granitic, or andesitic.

- **Basaltic**: oozes out through cracks in ocean floor or spills out of volcanos
- **Granitic**
- **Andesitic**

**SYNTHESIZE IT**

- a) a dark-colored rock containing a high level of iron that formed from magma that cooled beneath Earth’s surface
- b) a light-colored rock with high silica content that formed from lava on Earth’s surface

I found this information on page ___________.
Scan the headings in Section 3. Predict two subjects that you expect will be discussed in this section.

1. ____________________________

2. ____________________________

Define pressure using your book or a dictionary. Then write a sentence that shows its scientific meaning.

pressure

Write the vocabulary term that matches each definition.

rock formed when heat, pressure, or fluids act on other rock to change its form, its composition, or both

describes metamorphic rock whose mineral grains line up in parallel layers

describes metamorphic rock whose mineral grains generally do not form layers

Use a dictionary to define transform.

transform
**Main Idea**

**Formation of Metamorphic Rocks**

I found this information on page _________.

**Details**

Organize information about the processes that can form metamorphic rock.

Heat and pressure change.

Sequence the types of rocks in the process from shale to gneiss.

Describe the formation of foliated rock.

Describe the growth of grains in sandstone to change it to quartzite, a nonfoliated rock.

Name ___________________________ Date ____________
Summarize the two textures of metamorphic rocks. Describe each texture and give two examples of rocks with that texture.

**Main Idea**

Classifying Metamorphic Rocks

I found this information on page ___________.

**Details**

Metamorphic Rock

Texture: ____________

Description: ____________

____________

____________

Examples: ____________

____________

____________

Texture: ____________

Description: ____________

____________

____________

Examples: ____________

____________

____________

**SYNTHESIZE IT**

A planner is designing a new office building. The building will have an open courtyard around it. Analyze what metamorphic rocks the planner might use. Explain why each rock would be useful.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Rocks

Section 4 Sedimentary Rocks

**Skim** Section 4. Write three questions you would like to answer. Find the answers to your questions as you read.

1. 

2. 

3. 

**Define** weathering using your book or a dictionary.

weathering

**New Vocabulary**

Write a sentence from Section 4 that uses each term.

sediments

sedimentary rock

compaction

cementation

**Academic Vocabulary**

Use a dictionary to define consist.

consist
**Main Idea**

**Formation of Sedimentary Rocks**

*I found this information on page ____________.*

**Classifying Sedimentary Rocks**

*I found this information on page ____________.*

**Detrital Sedimentary Rocks**

*I found this information on page ____________.*

---

**Details**

**Model** the relative ages of sedimentary rock layers. Draw a cross-section of undisturbed sedimentary rocks. Label the oldest and youngest layers.

---

**Identify and define** the three types of sedimentary rock in the graphic organizer below.

---

**Classify** types of detrital sedimentary rock by the size and shape (where shape is relevant) of the particles found in them.

<table>
<thead>
<tr>
<th>Type</th>
<th>Conglomerate</th>
<th>Breccia</th>
<th>Sandstone</th>
<th>Shale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size/shape</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sketch of rock</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Chemical Sedimentary Rocks
I found this information on page ____________.

Organic Sedimentary Rocks
I found this information on page ____________.

Details

Sequence the steps in the formation of chemical sedimentary rocks. Complete the graphic organizer.

1. Minerals are dissolved in water.
2. 
3. 
4. 

Identify two examples of chemical sedimentary rocks.
Examples: ____________________ ____________________

List three organic sedimentary rocks and explain how each forms.
Rock: ____________________
How It Forms: ____________________

Rock: ____________________
How It Forms: ____________________

Rock: ____________________
How It Forms: ____________________

CONNECT IT

Describe at least four uses for sedimentary rocks in your life.

[Blank lines for answers]
Rocks Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Rocks</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Heat can melt rock.</td>
<td></td>
</tr>
<tr>
<td>• Rocks from lava form only under Earth’s surface.</td>
<td></td>
</tr>
<tr>
<td>• Rocks on Earth change slowly over time.</td>
<td></td>
</tr>
<tr>
<td>• Many rocks form in layers.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

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☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SYNTHEZISE IT

The rock cycle is said to have no beginning and no end.
Discuss why this is true. Use an example to illustrate your answer.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
Earth’s Energy and Mineral Resources

Before You Read

Preview the chapter including section titles and the section headings. Complete the chart by listing at least one idea for each of the three sections in each column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What I know</strong></td>
<td><strong>What I want to find out</strong></td>
</tr>
</tbody>
</table>

Write three ways electricity may be generated at a power plant.

---

Construct the Foldable as directed at the beginning of this chapter.

---

Science Journal

Write three ways electricity may be generated at a power plant.

---
Scan Section 1 of your book, using the checklist below.

- Read all section titles.
- Read all boldface words.
- Look at all of the pictures.
- Think about what you already know about nonrenewable resources.

Write three facts that you discovered about nonrenewable resources as you scanned this section.

1. 
2. 
3. 

Define fuel.

New Vocabulary

resource

nonrenewable resource

conservation

Academic Vocabulary

extract

Use your book or a dictionary to define the vocabulary terms.

Use a dictionary to define extract.
Complete the paragraph below to describe resources and energy.

A _____________ is any material used to satisfy a need. Most energy resources used to generate electricity are _____________. Nonrenewable resources are ____________________________ _____________.

Organize information about fossil fuels by completing the outline.

I. Fossil Fuels
   A. Made of ________________________________
   B. Formed over _________________ of years
   C. Include:
      1. ________________________________
      2. ________________________________
      3. ________________________________
   D. Used to:
      1. Make gasoline for _____________
      2. Heat _________________
      3. Generate _________________

Complete the chart describing the stages of coal formation. Then identify the change in the amount of energy contained in the fuel.

Formation of Coal

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Energy Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>peat</td>
<td>contains ________ energy</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>contains ________ energy</td>
</tr>
</tbody>
</table>
Compare oil and natural gas by completing the Venn diagram with at least nine facts.

Create a graphic organizer to identify the ways fossil fuels are removed from the ground. Then complete the sentence below.

Fossil fuel __________ are the useable and cost-effective part of existing fossil fuel __________.

Sequence the steps in a nuclear chain reaction.

- Neutrons hit __________ atoms. The atoms split apart, releasing __________ and __________.
- More __________ atoms split, releasing more __________ and more __________.
Predict three things that might be discussed in Section 2 as you read the headings.

1. 

2. 

3. 

Define the scientific term energy using your book or a dictionary.

energy

renewable resource

Use your book or a dictionary to define the vocabulary terms.

governmental energy

biomass energy

Use a dictionary to define derive.

derive
Section 2 Renewable Energy Resources (continued)

Main Idea

Renewable Energy Resources

I found this information on page __________.

I found this information on page __________.

I found this information on page __________.

Details

Contrast passive and active solar energy by providing examples.

An example of passive solar energy is ______________________
______________________________________________________.

An example of active solar energy is ______________________
______________________________________________________.

Compare the advantages and disadvantages of generating electricity from wind energy.

<table>
<thead>
<tr>
<th>Wind Energy as Source of Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantages</td>
</tr>
<tr>
<td>__________</td>
</tr>
</tbody>
</table>

Model a hydroelectric power plant. Use the figure in your book.
Identify three problems associated with geothermal power.
1. 
2. 
3. 

Compare these examples of biomass that can be used to generate energy. List the advantages and disadvantages of each.

<table>
<thead>
<tr>
<th>Biomass Energy</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Skim through Section 3 of your book. Read the headings and look at the illustrations. Write three questions that come to mind.

1. ________________________________
2. ________________________________
3. ________________________________

**Define** metal using your book or a dictionary.

**(metal)**

**New Vocabulary** Use your book or a dictionary to define the vocabulary terms.

**(mineral resources)**

**(ore)**

**(recycling)**

**Academic Vocabulary** Use a dictionary to define obtain.

**(obtain)**
List the three things that are required for a mineral deposit to be considered an ore.

A mineral deposit is considered an ore when:

1. 

2. 

3. 

Sequence the steps in separating a useful mineral from its ore by completing the graphic organizer below. Then define smelting.

Ore

Concentrating: 

Gangue

Refining: 

Useful ore

Smelting: 

I found this information on page _________.

I found this information on page _________.

Metallic Mineral Resources

I found this information on page _________.

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Connect It

Describe specific ways you could practice each of the three ways to conserve mineral resources in your home.

- ___________
- ___________
- ___________
- ___________
- ___________
- ___________
- ___________
Tie It Together

Evaluate Energy Resources

*Identify which alternative energy resource you think could best serve your community.*

*Write a report explaining why you believe it would be the best choice. Discuss advantages and disadvantages for your community of using the alternative energy resource.*

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________
Earth’s Energy and Mineral Resources  Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I know</th>
<th>W</th>
<th>What I want to find out</th>
<th>L</th>
<th>What I learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your *Science Notebook* on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

**SUMMARIZE IT**

After reading this chapter, identify three things that you have learned about Earth’s energy and mineral resources.

---

58  *Earth’s Energy and Mineral Resources*
Views of Earth

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Views of Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All mountains form in the same way.</td>
<td></td>
</tr>
<tr>
<td>• Lines of longitude run parallel to the equator.</td>
<td></td>
</tr>
<tr>
<td>• All maps of Earth distort the shapes and sizes of landmasses.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Assume that you want to build a home and have a satellite photo to guide you. Describe where you would build your new home and why you would build at your chosen location.
Skim the headings in Section 1. Write three questions that come to mind from reading these headings.

1. __________________________
2. __________________________
3. __________________________

Define landform to show its scientific meaning.

large, flat area, often found in the interior regions of continents

flat, raised area of land made up of nearly horizontal rocks that have been uplifted by forces within Earth

mountain in which rock layers are folded

mountain formed when blocks of Earth’s crust are pushed up by forces inside Earth

mountain made of huge, tilted blocks of rock separated from surrounding rock by faults

mountain formed when molten material reaches the surface through a weak area of Earth’s crust

Use a dictionary to define expose.
Section 1 Landforms (continued)

Main Idea

Plains

I found this information on page ____________.

I found this information on page ____________.

Plateaus

I found this information on page ____________.

Details

Distinguish two reasons that plains are useful for agriculture.

1. __________________________________________

   __________________________________________

2. __________________________________________

   __________________________________________

Compare and contrast coastal plains and interior plains.

<table>
<thead>
<tr>
<th>Coastal Plains</th>
<th>Interior Plains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td></td>
</tr>
</tbody>
</table>

Summarize key characteristics of the Great Plains.

The Great Plains are an example of a(n) ________________.

They are located ________________________________

_______________________________. The area is ____________________________

and covered with ________________________________. The Great Plains

are made of _________________________________.

Compare and contrast plains and plateaus. Complete the Venn diagram with at least three facts.

Plateaus

Both

Plains
Main Idea
Mountains
I found this information on page _________.

Details
Model the four types of mountains. Draw a diagram of each type.

<table>
<thead>
<tr>
<th>Folded Mountain</th>
<th>Upwarped Mountain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault-Block Mountain</th>
<th>Volcanic Mountain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize how mountains form. Give an example of each.

Folded Mountain: ____________________________
________________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

Upwarped Mountain: __________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Fault-Block Mountain: ______________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Volcanic Mountain: ________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Connect It
Use a physical map to identify the landforms in your area.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Section 1 Landforms (continued)
Views of Earth
Section 2 Viewpoints

Preview the What You’ll Learn statements for Section 2. Predict three topics that will be discussed in this section.

1. 
2. 
3. 

**Review Vocabulary**

**Define** pole as it is used when describing Earth.

- pole
  
**New Vocabulary**

**Define** each vocabulary term.

- equator
  
- latitude
  
- prime meridian
  
- longitude
  
**Academic Vocabulary**

**Use** a dictionary to define parallel as an adjective. Then find a sentence in Section 2 that contains the term.

- parallel
Main Idea

Latitude and Longitude

Model the system used to measure position on Earth.

- Draw a view of Earth.
- Label important features on the diagram with the following terms.

Summarize how latitude and longitude are measured.

Latitude is measured ________________________________

______________________________

Longitude is measured ________________________________

______________________________

Degrees of latitude and longitude are divided into ____________

and ____________

I found this information on page ____________.

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Main Idea

Time Zones
I found this information on page _________.

Details

Organize information about time zones. Complete the outline.

Time Zones
I. Measuring time
   A. ____________________________________________
   B. ____________________________________________

II. Characteristics of time zones
   A. ____________________________________________
   B. ____________________________________________
   C. ____________________________________________

Summarize what a person should do when crossing the International Date Line. Complete the cause-and-effect diagrams.

Travel west across the International Date Line

Travel east across the International Date Line

Synthesize It

Look at the map of time zones in your book. Infer why the International Date Line does not follow the 180° meridian exactly.

Name ___________________________ Date _____________

Section 2 Viewpoints (continued)
Scan the section headings, bold words, and illustrations. Write two facts that you discovered as you scanned the section.

1. 
2. 

Define globe to show its scientific meaning.

globe

Use your book to define each vocabulary term.

conic projection

topographic map

contour line

map scale

map legend

Use a dictionary to define physical. Use physical in a sentence to show its scientific meaning.

physical
Define map. Then complete the statements below about map projections.

A map is ________________________________.

A map projection is made when ________________________________.

All map projections ________________ the shapes and sizes of landmasses to some extent.

Compare and contrast Mercator, Robinson, and conic projections.

<table>
<thead>
<tr>
<th>How is it made?</th>
<th>Mercator</th>
<th>Robinson</th>
<th>Conic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What does it show accurately?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How is it used?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Summarize the purpose of a topographic map.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
If you were going to map your classroom, which map scale would be better: 1 cm:1 m or 1 cm: 10 m? Explain your reasoning.
Tie It Together

Model

Create a two-dimension physical map of your state in the space provided below. Include the major landforms found in your state. Use symbols to indicate these landforms on the map. Be sure to explain the symbols you use in a map legend. Your map should be proportional to the actual size of your state. Include a map scale to help others determine distances.
Views of Earth  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Views of Earth</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All mountains form in the same way.</td>
<td></td>
</tr>
<tr>
<td>• Lines of longitude run parallel to the equator.</td>
<td></td>
</tr>
<tr>
<td>• All maps of Earth distort the shapes and sizes of landmasses.</td>
<td></td>
</tr>
</tbody>
</table>

Review
Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It
Identify three important ideas in this chapter.
Weathering and Soil

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Weathering and Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants can break apart rock.</td>
<td></td>
</tr>
<tr>
<td>Climate affects the rate at which soil forms.</td>
<td></td>
</tr>
<tr>
<td>Soil on steep slopes tends to be thicker than soil at the bottom of a slope.</td>
<td></td>
</tr>
<tr>
<td>Humans sometimes cause erosion to occur faster than new soil can form.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

A tor is a pile of boulders left on land after the surrounding, weakened rock is worn away. Write a poem about a tor. Use words in your poem that rhyme with the word tor.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Weathering and Soil

Section 1 Weathering

Scan the headings of Section 1 to determine two main types of weathering that will be discussed.

1. 
2. 

Define surface area, and use it in a scientific sentence.

Read the definitions below. Write the key term on the blank in the left column.

- surface processes that break rock into smaller and smaller pieces
- physical processes that break rock apart without changing its chemical makeup
- mechanical weathering process that occurs when water freezes in the cracks in rock and expands
- process in which chemical reactions dissolve the minerals in rock or change them into different minerals
- chemical weathering process that occurs as minerals are exposed to air and water
- the long-term pattern of weather that occurs in a particular area

Use a dictionary to define the term process as a noun.

Name __________________________ Date __________________________
Section 1 Weathering (continued)

Main Idea

Weathering and Its Effects
I found this information on page __________.

Mechanical Weathering
I found this information on page __________.

Details

Sequence the sediment grain types in order of size.

Coarsest

Finest

Organize information by completing the outline below as you read.

Mechanical Weathering

I. Plants and Animals

A. ______________________________________

B. ______________________________________

II. Ice Wedging

A. ______________________________________

B. ______________________________________

C. ______________________________________

III. Surface Area

A. ______________________________________

B. ______________________________________

C. ______________________________________
Main Idea

Chemical Weathering

I found this information on page ____________.

Sequence steps to explain how carbon dioxide causes chemical weathering.

<table>
<thead>
<tr>
<th>Chemical Weathering by Carbonic Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
</tr>
</tbody>
</table>

Synthesize the effects of climate and rock type on the rate of weathering in the table below.

Factors that Affect the Rate of Weathering

<table>
<thead>
<tr>
<th>Factor</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>climate</td>
<td>Chemical weathering</td>
</tr>
<tr>
<td></td>
<td>Mechanical weathering</td>
</tr>
<tr>
<td>rock type</td>
<td></td>
</tr>
</tbody>
</table>

Analyze how oxygen can cause chemical weathering. Discuss where you have seen oxidation around your home.

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________
Predict two things that might be discussed in this section on the basis of its title.

1. 

2. 

Define the term profile.

profile 

New Vocabulary: Use your book or a dictionary to define the following terms.

soil 

humus 

horizon 

soil profile 

litter 

leaching 

Academic Vocabulary: Use a dictionary to define indicate.

indicate
Section 2 The Nature of Soil (continued)

**Main Idea**

**Formation of Soil**
I found this information on page __________.

---

**Details**

Complete the graphic organizer to show the five factors that affect soil formation.

[Graphic organizer with five empty circles labeled: Factors Affecting Soil Formation]

Identify the five components of soil, and create a symbol to represent each.

<table>
<thead>
<tr>
<th>Component of Soil</th>
<th>My Soil Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare and contrast dry soil and moist soil. Create sketches in the top row, and write descriptions in the bottom row.

<table>
<thead>
<tr>
<th>Dry Soil</th>
<th>Moist Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 2 The Nature of Soil (continued)

Main Idea

Soil Profile

I found this information on page __________.

Soil Types

I found this information on page __________.

Details

Model a soil profile by drawing and labeling it below.

Organize information about soil structure in the concept map.

Types of Peds

Summarize information about how soil varies in different regions.

<table>
<thead>
<tr>
<th>Region</th>
<th>Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>desert</td>
<td></td>
</tr>
<tr>
<td>prairie</td>
<td></td>
</tr>
<tr>
<td>temperate forest</td>
<td></td>
</tr>
</tbody>
</table>

Connect It

Analyze relationships between organisms and soil. Describe how organisms use soil and how organisms affect soil.
Skim the headings and the boldfaced terms in Section 3. Identify three facts about soil erosion and ways to reduce its occurrence.

1. 
2. 
3. 

Use erosion in a scientific sentence.

Define the following terms. Then use each term in an original scientific sentence.

- no-till farming
- contour farming
- terracing

Define the term compensate as it refers to soil.
Evaluate why soil erosion is a serious problem for agriculture.

Organize information on the causes and effects of soil erosion by completing the diagram below.

I found this information on page _________.

Identify the causes and effects of excess sediment.

I found this information on page _________.

Excess sediment is caused by can affect
### Preventing Soil Erosion

I found this information on page ________.

#### Main Idea

**Preventing Soil Erosion**

I found this information on page ________.

#### Details

**Summarize methods of preventing soil erosion.**

<table>
<thead>
<tr>
<th>Preventing Soil Erosion</th>
<th>Strategy</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage crops</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>Reduce erosion on slopes</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>Reduce erosion on exposed soil</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

#### CONNECT IT

Identify ways to prevent erosion that are probably used in your community and explain why they are used.

---

80  *Weathering and Soil*
Tie It Together

Model

Recall evidence of erosion that you have seen in your community. Then create a model to demonstrate how the erosion probably occurred. You may make a working three-dimensional model that you can demonstrate for the class. You may represent your model with a labeled drawing. Describe how the model can be changed to prevent erosion.
Weathering and Soil  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Weathering and Soil</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plants can break apart rock.</td>
<td></td>
</tr>
<tr>
<td>• Climate affects the rate at which soil forms.</td>
<td></td>
</tr>
<tr>
<td>• Soil on steep slopes usually is thicker than soil at the bottom of a slope.</td>
<td></td>
</tr>
<tr>
<td>• Humans sometimes cause erosion to occur faster than new soil can form.</td>
<td></td>
</tr>
</tbody>
</table>

Review

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☐ Study the definitions of vocabulary words.
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☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about weathering and soil.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Erosional Forces

Preview

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Erosional Forces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glaciers can erode rocks and soil.</td>
<td></td>
</tr>
<tr>
<td>Human activity can increase erosion.</td>
<td></td>
</tr>
<tr>
<td>Steep slopes can be unsafe for structures such as houses.</td>
<td></td>
</tr>
<tr>
<td>Planting vegetation can increase erosion.</td>
<td></td>
</tr>
</tbody>
</table>

**Foldables**

Construct the Foldable as directed at the beginning of this chapter.

**Science Journal**

Name three major landforms around the world. Hypothesize what erosional forces helped shape them. Use sketches to help you think about the processes.
Erosional Forces
Section 1 Erosion by Gravity

**Predict** what you will learn about erosion after looking at each illustration in Section 1 of your book.

**Review Vocabulary**
Write a sentence using the word *sediment* to show its scientific meaning.

*sediment*

**New Vocabulary**
Define the following key terms by using your book or a dictionary.

*erosion*

*deposition*

*mass movement*

*slump*

*creep*

**Academic Vocabulary**
Use a dictionary to define the word *structure*.

*structure*
Section 1 Erosion by Gravity (continued)

Main Idea

Erosion and Deposition

I found this information on page ________.

Details

Identify four major agents of erosion.

1. _______________________

2. _______________________

3. _______________________

4. _______________________

Summarize how energy affects the ability of agents of erosion to carry and drop sediment. Then describe how this occurs with water.

Water: _______________________

___________________________

___________________________

Compare and contrast characteristics of mass movements by completing the following chart.

<table>
<thead>
<tr>
<th>Mass Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
</tr>
<tr>
<td>Slump</td>
</tr>
<tr>
<td>Rock slide</td>
</tr>
<tr>
<td>Creep</td>
</tr>
</tbody>
</table>

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Main Idea

Model what a slope would look like before and after a mudflow.

Before | After

Consequences of Erosion

Analyze ways to reduce erosion on steep slopes. Complete the graphic organizer below.

Ways to reduce erosion on steep slopes

COMPARE IT

Model a way to build a house on a hillside. Draw the house and show methods to protect the house from erosion caused by gravity.
Scan the illustration headings in Section 2. Write three true statements about glaciers on the lines below.

Define plasticlike using your book.

Define accumulate by using a dictionary.
Main Idea

How Glaciers Form and Move
I found this information on page __________.

Ice Eroding Rock
I found this information on page __________.

Ice Depositing Sediment
I found this information on page __________.

Details

Sequence the steps of glacier formation and movement. The first step has been completed for you.
1. When snow doesn’t melt, it piles up.
2. ____________________________
3. ____________________________
4. ____________________________

Contrast two ways that glaciers erode rock.

<table>
<thead>
<tr>
<th>Plucking</th>
<th>Scouring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize the types of glacier deposits in the chart below.

<table>
<thead>
<tr>
<th>Mass Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Till</td>
</tr>
<tr>
<td>Outwash</td>
</tr>
</tbody>
</table>
Outside of a town in the Midwest is a long, winding ridge made of sand and gravel. Hypothesize how this landform may have formed.

<table>
<thead>
<tr>
<th>Synthesize It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside of a town in the Midwest is a long, winding ridge made of sand and gravel. Hypothesize how this landform may have formed.</td>
</tr>
</tbody>
</table>
Erosional Forces
Section 3 Wind

Skim the headings in Section 3. Write three questions that occur to you.

1. __________________________________________
2. __________________________________________
3. __________________________________________

Define friction using your book or a dictionary.

friction

when windblown sediment strikes rock, the surface of the rock gets scraped and worn away

wind-blown deposits of fine-grained sediments are called a mound of sand drifted by the wind.

wind removes small particles such as silt and sand and leaves behind heavier, coarser material.

Read each definition. Write the correct vocabulary word to match on the blank in the left column.

Write a sentence that shows the meaning of the word eventual.
Section 3 Wind (continued)

Main Idea

Wind Erosion

Contrast two ways wind differs from other agents of erosion.

1. 

2. 

Sequence deflation and abrasion in the flowchart. Make a sketch for the process that occurs in each box.

<table>
<thead>
<tr>
<th>Deflation Drawing</th>
<th>Abrasion Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description</td>
</tr>
</tbody>
</table>

Contrast sandstorms and dust storms in the chart.

<table>
<thead>
<tr>
<th></th>
<th>Sandstorms</th>
<th>Dust Storms</th>
</tr>
</thead>
<tbody>
<tr>
<td>What particles are carried by the storm?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What happens?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Reducing Wind Erosion

I found this information on page ___________.

Details

Summarize how plants help conserve soil. Make a sketch to show each effect in the boxes at right.

1. Windbreaks: _______________
   _______________
   _______________
   _______________

2. Roots: _______________
   _______________
   _______________
   _______________

Deposition by Wind

I found this information on page ___________.

Complete the statements about loess and sand dunes.

Loess forms when wind blows across _______________. When the sediment is dropped, it forms _______________ deposits. Loess deposits often become ___________ soils. Sand dunes often form in ___________. After the dunes form, they move in the direction that the _________ blows. Sand blows up the _________ side of the dune. It then falls down the _________ side of the dune. This process causes the _________ to move slowly across the desert.

SYNTHESIZE IT

During the 1930s, wind eroded soil from much of the south-central United States (the Dust Bowl). Infer what farming practices might have contributed to the Dust Bowl. Summarize how farmers could have protected their farms.

____________________________
____________________________
____________________________
____________________________
Imagine that you are a reporter for a newspaper. The town where you live is located near a moraine and along the shore of a large lake. Plan a series of two articles that will explain

i. how erosion and deposition shaped the town’s land

ii. what dangers the town may face from erosion in the future.

Article 1
Topic: Erosion and deposition and the town’s history

Headline: _____________________________________________

Key Points for Article:

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Article 2
Topic: Mass wasting

Headline: _____________________________________________

Key Points for Article:

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Erosional Forces</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Glaciers can erode rocks and soil.</td>
<td></td>
</tr>
<tr>
<td>• Human activity can increase erosion.</td>
<td></td>
</tr>
<tr>
<td>• Steep slopes can be unsafe for structures such as houses.</td>
<td></td>
</tr>
<tr>
<td>• Planting vegetation can increase erosion.</td>
<td></td>
</tr>
</tbody>
</table>

Review
Use this checklist to help you study.

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Summarize It
After reading this chapter, identify three things that you have learned about erosional forces.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

94 Erosional Forces
Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
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</tr>
<tr>
<td></td>
<td>• Beaches are always made of pieces of rock.</td>
</tr>
</tbody>
</table>

Hoodoos are narrow towers of rock. What processes might have formed hoodoos? What will happen if this process continues?
Skim Section 1 of your book and read the headings. Write three questions that come to mind. Try to answer your questions as you read.

1. ____________________________
2. ____________________________
3. ____________________________

Define erosion.

erosion

Write a paragraph that uses each vocabulary term in a way that shows its scientific meaning.

runoff

drainage basin

meander

Use your book or a dictionary to define likewise.

likewise
Distinguish four factors that determine how much runoff occurs after rain falls.

Factors Affecting Runoff

Water Erosion

Summarize the causes and effects of four types of surface water erosion in the chart below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Causes</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gully</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stream</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scan the map of drainage basins in the United States in your text. Identify three major drainage basins.

1. 
2. 
3. 
A broad, flat river flows slowly along its bed while a young, swift stream rushes past. Explain which one would probably deposit more sediment.
Scan the headings in Section 2. Then predict three topics that will be covered in this section.

1. 
2. 
3. 

Define pore.

Use your book or a dictionary to define the following terms.

permeable

aquifer

water table

geyser

Use your book or a dictionary to define underlie.
Main Idea

Groundwater Systems

I found this information on page ____________.

Water Table

I found this information on page ____________.

Details

Summarize how groundwater collects. Complete the graphic organizer.

Soil is made of fragments of rocks and minerals with spaces between them.

Create a drawing that shows how groundwater flows. Label the impermeable layer, permeable layer, water table, and zone of saturation. Use arrows to show how the groundwater flows.

Organize information about wells and springs. Complete the chart.

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Important Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular well</td>
<td></td>
</tr>
<tr>
<td>Artesian well</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Water Table
I found this information on page __________.

The Work of Groundwater
I found this information on page __________.

Details

Sequence the events that cause a geyser to erupt. Complete the flow chart.

1. __________
2. __________
3. __________
4. __________

Complete the concept map to identify ways that groundwater shapes land.

Caves
Stalactites
Groundwater shapes land
Stalagmites
Sinkholes

CONNECT IT
Aquifers are important natural resources. Due to human activity, the levels of some aquifers have dropped over time. What problems can this cause for humans?

[Blank lines for student response]
Scan Section 3 of your text using the checklist below.
- Read all section titles.
- Read all bold words.
- Look at all pictures and labels.
- Think about what you already know about waves and shorelines.

Write three facts you discovered about ocean shorelines as you scanned the section.

1. _________________________________
2. _________________________________
3. _________________________________

Define spring tide.

spring tide

Use your book to define the following terms.

longshore current

Use your book or a dictionary to find the meaning of transport as a verb. Then write a sentence using the term.

transport
Complete the graphic organizer below to identify how shoreline erosion occurs.

**Main Idea**

**The Shore**

I found this information on page __________.

**Rocky Shorelines**

I found this information on page __________.

**Details**

**Causes of Shoreline Erosion**

- Waves
- Longshore Currents
- Tides

**Sequence** three steps in the erosion process of a rocky shoreline. Create a sketch to help you remember each step.

1. 

2. 

3.
Main Idea

Sandy Beaches
I found this information on page __________.

Sand Erosion and Deposition
I found this information on page __________.

Details

Summarize how beach sand forms.

Analyze ways that beaches can change.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analyze how barrier islands form and change. Complete the outline.

I. How barrier islands form
   A. ___________________________
   B. ___________________________

II. How barrier islands change
   A. ___________________________
   B. ___________________________

SYNTHESIZE IT

Which shoreline feature would you expect to last longest: a rocky shoreline, a sandy beach, or a barrier island? Which would you expect to last the shortest time? Explain your response.
Tie It Together

Test Soil Permeability

In a small group, collect several different types of soil or rock, such as gravel, sand, and clay. Test the permeability of each sample by following the process below.

1. Cut the top from a plastic 2-liter bottle. Be sure to follow safety procedures when cutting.
2. Place about 10 cm of the material to be tested in the bottom part of the bottle.
3. Pour 100 ml of water into the bottle. Use a stopwatch to determine how long it takes the water to soak into the material. Observe the substance carefully until there is no water collected on the surface of the soil or gravel.
4. Record your results in the table below.
5. Remove the material from the bottle, and rinse and dry the bottle thoroughly. Then repeat steps 1–4 with the other materials you chose.

<table>
<thead>
<tr>
<th>Material</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Given your results, which material would you use in the yard of a house built on a low area? Explain your response.
Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

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Summarize It
After reading this chapter, identify three things that you have learned about erosion and deposition by water.
Plate Tectonics

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.

2. Write a D if you disagree with the statement.

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<thead>
<tr>
<th>Before You Read</th>
<th>Plate Tectonics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Fossil evidence provides support for the idea that continents have moved over time.</td>
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<td></td>
<td>• New seafloor is continuously forming while old seafloor is being destroyed.</td>
</tr>
<tr>
<td></td>
<td>• Earth’s crust is broken into sections called plates.</td>
</tr>
<tr>
<td></td>
<td>• Rock flows deep inside Earth.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Pretend you’re a journalist with an audience that assumes the continents have never moved. Write about the kinds of evidence you’ll need to convince people otherwise.

__

__

__

__

__

__

__

__

__

__

__

__

__

__
Skim through Section 1 of your book. Write three questions that come to mind from reading the headings and examining the illustrations.

1. 
   
2. 
   
3. 

Define continent to show its scientific meaning.

continent

Use your book to define the following terms. Then write an original sentence using each term.

continental drift

Pangaea

Use a dictionary to define controversy.

controversy
Summarize Alfred Wegener’s hypothesis about Earth’s continents.

Create a graphic organizer to identify the three types of clues that are evidence for continental drift.

Analyze the clue in the left column below. Then describe how Alfred Wegener would have explained it in the right column.

<table>
<thead>
<tr>
<th>Clue</th>
<th>Wegener’s Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossils of Mesosaurus found in South America and Africa</td>
<td></td>
</tr>
<tr>
<td>Fossil plant found in five continents, including Antarctica</td>
<td></td>
</tr>
<tr>
<td>Fossils of warm weather plants found on Arctic island</td>
<td></td>
</tr>
<tr>
<td>Glacial deposits found in Africa, India, and Australia</td>
<td></td>
</tr>
</tbody>
</table>
Section 1 Continental Drift (continued)

Main Idea

I found this information on page ___________.

Details

Model what the continents may have looked like 250 million years ago.

Summarize Wegener’s explanations of how and why continental drift occurs.

How: Wegener’s explanation for continental drift

Why: Wegener’s explanation for continental drift

How could continents drift?

I found this information on page ___________.

EVALUATE IT

Do you think it was reasonable for scientists initially to reject the hypothesis of continental drift? Explain your response.
Plate Tectonics
Section 2  Seafloor Spreading

**Predict** three things that might be discussed in Section 2 after reading its headings.

1. __________________________________________

2. __________________________________________

3. __________________________________________

**Review Vocabulary**

**Define** seafloor. *Then use the word in a sentence.*

seafloor

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

**New Vocabulary**

*Use your book to define seafloor spreading. Then use the term in a sentence.*

seafloor spreading

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

**Academic Vocabulary**

*Use a dictionary to define interval. Then use the word in a sentence about magnetic clues to seafloor spreading.*

interval

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________
**Main Idea**

**Mapping the Ocean Floor**

I found this information on page __________.

**Details**

**Summarize** how sound waves are used to map the seafloor.

---

**Model** the process of seafloor spreading by drawing a cross section of a mid-ocean ridge and the magma below it. Use arrows to indicate the directions of motion.

---

**Sequence** steps describing seafloor spreading.

Hot, less dense material below Earth’s crust rises toward the surface at a mid-ocean ridge.

The less dense material flows _____________________________.

As the seafloor spreads apart, magma is _________________.

---

112 Plate Tectonics
Section 2 Seafloor Spreading (continued)

Main Idea

Evidence for Spreading
I found this information on page _________.

Details

Label the diagram below to identify evidence for seafloor spreading. Add arrows to show the direction of spreading, and indicate where older rock and newer rock occur.

Model the polarity of Earth’s magnetic field today.

- Draw a sphere to represent Earth.
- Label the north pole and south pole.
- Draw arrows indicating the direction in which magnetic lines of force enter and leave Earth.

Summarize how reversals in the direction of Earth’s magnetic field have provided evidence of seafloor spreading.

At times, the ____________________________ that pass through Earth have ____________________________ of Earth’s magnetic field are recorded in ___________ that forms along _____________________________. Scientists can detect ____________________________ that are ____________________________ to mid-ocean ridges. This occurs on _____________________________.

Plate Tectonics 113
Plate Tectonics
Section 3 Theory of Plate Tectonics

Scan the headings and illustrations in Section 3. List four features caused by plate tectonics.
1. __________________ 3. __________________
2. __________________ 4. __________________

Define the review terms to show their scientific meanings.
converge
__________________
diverge
__________________
transform
__________________

Use your book to define the following terms.
plate
__________________
plate tectonics
__________________
lithosphere
__________________
asthenosphere
__________________
convection current
__________________

Use a dictionary to define rigid.
rigid
__________________
Main Idea

Plate Tectonics

I found this information on page 115.

Details

Complete the following outline on the theory of plate tectonics.

I. A new theory
   A. In the 1960s, a new theory called ____________ was developed.
   B. Earth’s ____________ and part of the ____________ are broken into sections called ____________, that move slowly.

II. Details about the theory
   A. The layer of Earth that is broken into sections is called the ____________.
   B. The ____________ is the plasticlike layer below the ____________.
   C. The rigid plates move over the ____________.

Compare and contrast the different plate boundaries by defining them side by side. Draw the plates of the world. Identify plate motion by using arrows.

<table>
<thead>
<tr>
<th>Divergent</th>
<th>Convergent</th>
<th>Transform</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Plate Boundaries

I found this information on page 115.
Main Idea

Causes of Plate Tectonics
I found this information on page ____________.

Features Caused by Plate Tectonics
I found this information on page ____________.

Details

Label the convection currents depicted below with heating, rising, cooling, and sinking.

[Diagram of convection currents]

Organize information to describe features caused by plate tectonics. Fill in the chart below.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rift valley</td>
<td></td>
</tr>
<tr>
<td>Folded and faulted mountains</td>
<td></td>
</tr>
<tr>
<td>Strike-slip faults</td>
<td></td>
</tr>
</tbody>
</table>

Summarize how the Satellite Laser Ranging System measures plate movement.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Your book has a picture showing how continents may have drifted. It shows their positions 250 million years ago, 125 million years ago, and at the present. Work with a partner to trace the paths that the continents have taken. Then extend their paths forward in time to project where they may be 125 million years from now. Draw a map in the space below, showing your prediction.
Plate Tectonics Chapter Wrap-Up

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SUMMARIZE IT

After reading this chapter, identify three things that you have learned about plate tectonics.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
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Before you read the chapter, respond to these statements.

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</tr>
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<td></td>
<td>• The interior of Earth has several layers.</td>
</tr>
<tr>
<td></td>
<td>• Earthquake waves travel through all parts of Earth at the same speed.</td>
</tr>
<tr>
<td></td>
<td>• Thousands of earthquakes occur on Earth every day.</td>
</tr>
</tbody>
</table>

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Science Journal

Write three things that you would ask a scientist studying earthquakes.
Earthquakes
Section 1 Forces Inside Earth

Preview the headings in Section 1. Write three topics that you predict will be covered in this section.

1. ____________________________
2. ____________________________
3. ____________________________

Define plate to show its scientific meaning.

plate

______________________________
______________________________
______________________________

Write the correct vocabulary term next to each definition.

______________________________
surface along which rocks move when they break

______________________________
vibrations caused by the breaking of rock

______________________________
fault in which rock above the fault surface moves downward in relation to rock below the fault surface

______________________________
fault in which rock above the fault surface is forced up and over the rock below the fault surface

______________________________
fault in which rocks on either side of the fault are moving past each other without much upward or downward motion

Write an original sentence that uses the term stress and shows its scientific meaning.

______________________________
Section 1 Forces Inside Earth (continued)

Main Idea

Earthquake Causes
I found this information on page ____________.

I found this information on page ____________.

Types of Faults
I found this information on page ____________.

Details

Define the elastic limit of an object.

Summarize how motion along faults causes earthquakes.

Distinguish the three types of forces that act on rocks. Complete the graphic organizer.

- Force
  - Tension
  - Shear

  squeezes rocks together.
Main Idea

I found this information on page __________.

Details

Model each type of fault.

- Draw each type of fault.
- Include labeled arrows to show direction of motion.
- Draw and label another set of arrows to identify the type of force involved.
- Beneath each drawing, write a description of the fault.

Normal Fault


Reverse Fault


Strike-Slip Fault


122 Earthquakes
Earthquakes
Section 2 Features of Earthquakes

Read the What You’ll Learn statements. Rewrite each as a question. Then look for the answers as you read.

1. __________________________________________
2. __________________________________________
3. __________________________________________

Define wave to show its scientific meaning.

wave ________________________________________

Write a paragraph about earthquakes, using the new vocabulary terms. Underline each vocabulary term as you use it.

seismic wave ______________________________________

focus ________________________________________

primary wave ______________________________________

secondary wave ______________________________________

surface wave ______________________________________

epicenter ________________________________________

seismograph ______________________________________

Use a dictionary to define exceed to show its scientific meaning.

exceed ________________________________________
Main Idea

Seismic Waves

Sequence the process through which seismic waves form.

1. Moving rocks get caught on each other at faults.
2. 
3. 
4. 

Organize information about the three types of seismic waves. Identify and explain how each wave moves.

Seismic waves

- 
- 
- 

Summarize which type of wave causes the most earthquake damage, and explain why.

Most earthquake damage is caused by _______________ because


Locating an Epicenter

Analyze the three types of seismic waves. Fill in the missing words.

______________ are the fastest seismic waves, followed by ________________, which travel about ___________ as fast.

______________ are the slowest seismic waves. If the epicenter of an earthquake is far away, ________________ arrive first.
A scientist finds that primary waves from an earthquake arrived at a seismograph, but secondary waves did not. What can the scientist conclude about the path the waves took?
Earthquakes
Section 3 People and Earthquakes

**Skim** Section 3 of your book. Write down three questions that come to mind from reading the headings and examining the pictures and illustrations.

1. 

2. 

3. 

**Review Vocabulary**

**Define** crest to show its scientific meaning in relation to waves.

crest

**New Vocabulary**

Use your book to define each vocabulary term.

magnitude

liquefaction

tsunami

**Academic Vocabulary**

Use a dictionary to define detect to show its scientific meaning.

detect
Section 3  People and Earthquakes (continued)

Main Idea

Earthquake Activity
I found this information on page ____________.

Details

Summarize information about how earthquakes affect humans by listing one positive and one negative effect.

Positive:  

Negative:  

Distinguish how the Richter scale represents the energy released by an earthquake and the height of the lines on a seismogram.

For every increase of 1.0 on the Richter scale

- the height of a line on a seismogram is ________

32 times greater

Evaluate how different magnitude earthquakes affect humans and cause damage.

<table>
<thead>
<tr>
<th>Richter scale magnitude</th>
<th>1.5</th>
<th>4.0</th>
<th>8.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felt by humans?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causes damage?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distinguish the four factors that can affect how much damage an earthquake causes.

1. ___________________________
2. ___________________________
3. ___________________________
4. ___________________________
Section 3 People and Earthquakes (continued)

Main Idea

I found this information on page __________.

Define the Mercalli scale by identifying what it describes.
The Mercalli scale describes ________________________________

Analyze how liquefaction occurs and how it damages buildings.

Sequence the events that result in a tsunami.

Earthquake Safety

I found this information on page __________.

Analyze earthquake safety. List three ways to make a home more earthquake-safe.

1. ________________________________
2. ________________________________
3. ________________________________

CONNECT IT

Look at the map in your book showing the risk of damaging earthquakes. What is the risk in your area? Draw a conclusion about the places where the risk is highest.

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Tie It Together

Modeling

Construct a model of a building that is designed to resist earthquake damage. Present your model to the class, and explain how it protects against earthquake damage. Plan your model in the space below.
### Earthquakes Chapter Wrap-Up

**Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.**

1. Write an A if you agree with the statement.
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### Summarize It

After reading this chapter, identify three things that you have learned about earthquakes.

---

130  *Earthquakes*
Volcanoes

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
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<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Volcanoes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One volcano in Hawaii has been erupting for hundreds of years.</td>
<td></td>
</tr>
<tr>
<td>• Lava is called magma when it reaches Earth’s surface.</td>
<td></td>
</tr>
<tr>
<td>• All volcanoes have the same type of eruptions.</td>
<td></td>
</tr>
<tr>
<td>• Volcanic activity can form underground rock features.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Do all volcanoes begin with violent, explosive eruptions? Write about your current beliefs, then do some research and write about your discoveries.
Volcanoes
Section 1 Volcanoes and Earth’s Moving Plates

Predict three topics that might be discussed in Section 1 as you scan the headings and look at the pictures.

1. 
2. 
3. 

Review Vocabulary Define lava.

lava

New Vocabulary Use your book to define each vocabulary term.

volcano

vent

crater

hot spot

Academic Vocabulary Use a dictionary to define area as it is used in geography.

area
Section 1 Volcanoes and Earth’s Moving Plates (continued)

Main Idea

What are volcanoes?
I found this information on page __________.

Effects of Eruptions
I found this information on page __________.

How do volcanoes form?
I found this information on page __________.

Details

Identify two places on Earth that have active volcanoes.
1. ________________
2. ________________

Summarize the effects of volcanic eruptions on people.

<table>
<thead>
<tr>
<th>Product of Eruption</th>
<th>Effect on People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lava</td>
<td></td>
</tr>
<tr>
<td>Ash</td>
<td></td>
</tr>
<tr>
<td>Pyroclastic flow</td>
<td></td>
</tr>
<tr>
<td>Sulfurous gas</td>
<td></td>
</tr>
</tbody>
</table>

Sequence the events that occur as a volcano forms.

1. ________________
2. ________________
3. ________________
4. ________________
5. ________________

Volcanoes 133
Section 1 Volcanoes and Earth’s Moving Plates (continued)

Main Idea

Where do volcanoes occur?
I found this information on page _________.

Details

Identify the three places at which volcanoes often form.
1. ____________________________
2. ____________________________
3. ____________________________

Compare and contrast how volcanoes form at divergent and convergent plate boundaries.

<table>
<thead>
<tr>
<th>At Divergent Boundary</th>
<th>At Convergent Boundary</th>
</tr>
</thead>
</table>

Sequence the events that caused the Hawaiian Islands to form.

- An area between Earth’s core and mantle was unusually hot.

CONNECT IT

Look at the map of volcanoes and plate boundaries in your book. Describe where most volcanoes occur.

____________________

____________________

____________________
Volcanoes

Section 2 Types of Volcanoes

**Skim** Section 2 of your book. Write three questions that come to mind as you read the headings and examine the illustrations. Look for the answers as you read.

1. 
2. 
3. 

**Review Vocabulary**

**Define** magma.

magma

**New Vocabulary**

*Use your book to define each vocabulary term.*

shield volcano

tephrā

cinder cone volcano

**Academic Vocabulary**

*Use a dictionary to define release as a verb.*

release

**Name** ___________________________ **Date** ___________________________
What controls eruptions?

Identify the effects of trapped gases on volcanic eruptions.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Effect on Eruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gases escape easily from magma.</td>
<td></td>
</tr>
<tr>
<td>Gases build up to high pressures in magma.</td>
<td></td>
</tr>
</tbody>
</table>

Contrast pahoehoe lava and aa lava.

Pahoehoe lava

Aa lava

Compare and contrast the three major types of magma. Identify the characteristics of each type and the type of volcanic eruption to which each leads.

<table>
<thead>
<tr>
<th></th>
<th>Basaltic</th>
<th>Granitic</th>
<th>Andesitic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where it is found</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of eruption</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 2 Types of Volcanoes (continued)

**Main Idea**

**Forms of Volcanoes**

I found this information on page __________.

**Details**

Organize information about the three types of volcanoes. Complete the graphic organizer.

**Volcano Types**

- Formation
- Appearance
- Example

Describe two factors that control whether an eruption will be quiet or explosive.

---

**Summarize It**

Describe two factors that control whether an eruption will be quiet or explosive.

[Blank spaces for student responses]
Scan the section headings, boldfaced words, and illustrations. Write three facts that you discovered about rock features.

1. 
2. 
3. 

Define intrude and extrude.

intrude 

extrude 

Write the vocabulary term that matches each definition.

one of the largest intrusive igneous rock bodies 
magma that is forced into a crack that cuts across rock layers and hardens 
igneous rock feature formed when magma is squeezed into a horizontal crack between layers of rock and then hardens underground 
solid igneous core left behind when a volcano erodes 
depression left when the top of a volcano collapses 

Use a dictionary to define collapse.
Define intrusive rock features. Then identify the four most common types of intrusive features.

Intrusive rock features are ________________________________  

______________________________  

______________________________  

Compare and contrast batholiths, dikes, and sills by completing the chart below.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Origin, Size, and Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batholths</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Dikes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Sills</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Other Features
I found this information on page __________.

Details

Sequence events to explain how a volcanic neck forms.
1. __________________________
2. __________________________
3. __________________________
4. __________________________

Model the stages of caldera formation by drawing three pictures.

Stage 1

Stage 2

Stage 3

Summarize It

Explain how intrusive rock features become visible above ground.
Tie It Together

Recently hired by the United States Geological Survey, you notice signs of activity coming from a large composite volcano and predict an eruption within the next few days. The volcano is near several small towns, and the people in these towns must be warned of the danger. On the lines below, prepare a broadcast to warn the townspeople of the eruption. Present your broadcast warning to the class. Include the following topics in your warning:

- Information about composite volcanoes
- The types of hazards that might occur
- What people should do to stay safe
Volcanoes  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
   2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Volcanoes</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One volcano in Hawaii has been erupting for hundreds of years.</td>
<td></td>
</tr>
<tr>
<td>• Lava is called magma when it reaches Earth’s surface.</td>
<td></td>
</tr>
<tr>
<td>• All volcanoes have the same type of eruptions.</td>
<td></td>
</tr>
<tr>
<td>• Volcanic activity can form underground rock features.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about volcanoes.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

142  Volcanoes
Clues to Earth’s Past

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Clues to Earth’s Past</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The footprint of a dinosaur is considered a fossil.</td>
<td></td>
</tr>
<tr>
<td>• Scientists use fossils to learn what an environment was like long ago.</td>
<td></td>
</tr>
<tr>
<td>• The oldest rock layer is always the one found on top.</td>
<td></td>
</tr>
<tr>
<td>• Scientists can determine the age of some rocks.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

List three fossils that you would expect to find a million years from now in the place you live today.
**Clues to Earth’s Past**

**Section 1 Fossils**

**Skim** Section 1 of your book. Read the headings and examine the illustrations. Write three questions that come to mind.

1. 
2. 
3. 

**Define** paleontologist to show its scientific meaning.

**Review Vocabulary**

**paleontologist**

**New Vocabulary**

**Define the following terms to show their scientific meaning.**

**permineralized remains**

**carbon film**

**cast**

**index fossils**

**Define** emerge to show its scientific meaning.

**Academic Vocabulary**

**emerge**
Complete the table to describe the two conditions that improve the chances of fossil formation. Give an example of each.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Create a concept web to summarize the types of preservation.

Sequence the steps involved in the making of the cast of a shell.

Sediment buries shell. → Mold results. → Cast results.
**Main Idea**

**Index Fossils**

I found this information on page _______.

Summarize the three characteristics of index fossils.
1. __________________________________________
2. __________________________________________
3. __________________________________________

Analyze why index fossils are more useful to paleontologists than many other fossils.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

**Fossils and Ancient Environments**

I found this information on page _______.

Organize the kinds of information about ancient environments that scientists can learn from fossils. Complete the graphic organizer.

Information about environment revealed by fossils

CONNECT IT

You find a fossil shell in a layer of rock. It appears to be a clam.

What type of rock must the rock layer be? What type of environment would the animal have lived in?

________________________________________________________________________
________________________________________________________________________
Clues to Earth’s Past
Section 2 Relative Ages of Rocks

Scan the list below to preview Section 2 of your book.
• Read all section headings.
• Read all bold words.
• Look at all of the pictures.
• Think about what you already know about rock.

Write three facts you discovered about the relative ages of rocks as you scanned the section.
1. 
2. 
3. 

Define sedimentary rock to show its scientific meaning.

Read each definition below. Write the correct vocabulary term in the blank to the left.

states that in undisturbed rock layers, the oldest rocks are on the bottom and the rocks are progressively younger toward the top age of something compared with the ages of other things gap in a sequence of rock layers that is due to erosion or periods without any deposition

Define sequence to show its scientific meaning.

Name ___________________________ Date ________________

Clues to Earth’s Past 147

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Main Idea

Superposition
I found this information on page ___________.

Relative Ages
I found this information on page ___________.

Details

**Model** the principle of superposition by sketching a cross-section of layers of undisturbed sedimentary rock. Number the layers, starting with 1 for the oldest layer.

---

**Describe** how the relative age of a rock layer is different from the actual age of the rock layer.

---

**Model** how a folded rock formation containing limestone, coal, and sandstone would form. Draw and label the layers as they would form originally. Then draw what they would look like after being folded.

---
As you pass through a highway cut, you notice distinct layers of rock. Can you be sure that the top layer is the youngest one? Explain.

**Main Idea**

**Unconformities**

I found this information on page __________.

**Details**

**Compare and contrast** angular unconformity, disconformity, and nonconformity in rocks by sequencing the steps in their formation.

<table>
<thead>
<tr>
<th>Unconformities</th>
<th>Type</th>
<th>How It Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angular unconformity</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>Disconformity</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>Nonconformity</td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

**Matching Up Rock Layers**

I found this information on page __________.

**Identify** the two ways to match up, or correlate, exposed rock layers from two different places. Complete the graphic organizer.

**SYNTHESIZE IT**

As you pass through a highway cut, you notice distinct layers of rock. Can you be sure that the top layer is the youngest one? Explain.


Clues to Earth’s Past
Section 3 Absolute Ages of Rocks

Predict three things that might be discussed in Section 3 as you read the headings.

1. 

2. 

3. 

Define isotopes to show its scientific meaning.

Define these key terms to show their scientific meaning.

radioactive decay

radiometric dating

uniformitarianism

Define ratio to show its scientific meaning.
Main Idea

Absolute Ages and Radioactive Decay

I found this information on page _________.

Details

Organize information about radioactive decay as a tool to find a rock’s absolute age. Complete the Venn diagram below with at least six points of information.

Radioactive Decay

- Alpha decay
- Both
- Beta decay

Create a bar chart to show four half-lives. Then draw a curve connecting the tops of the bars. Label each axis.

Half-lives
Analyze carbon-14 dating by completing the statements.

The half-life of carbon-14 is ________________________.

When carbon-14 decays, it becomes ________________________.

Carbon-14 radiometric dating is used for ________________________, ________________________, and ________________________ samples up to ________________________ old. Scientists compare amounts of carbon-14 in the ________________________ to the amount in a fossil of an organism that lived long ago. While the organism was alive, it took in and processed carbon-14 and ________________________.

The ________________________ of carbon-14 to carbon-12 tells the approximate ________________________ of the fossil.

Summarize Hutton’s view of uniformitarianism and the modern view of changes that affect Earth.

Hutton’s view: __________________________________________
________________________________________________________________________
________________________________________________________________________

Modern view: __________________________________________
________________________________________________________________________
________________________________________________________________________

SYNTHESIZE IT

Explain why the principle of uniformitarianism is critical to what you have learned about determining the absolute age of rocks.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Tie It Together

A paleontologist found the following composition of rock layers at a site. The paleontologist concludes that no folding or other disruption has happened to the layers. What can you conclude about the area’s history? Write a summary of your conclusions.

Top layer: coal layer made up of altered plant material

Middle layer: mix of sandstone and shale, with some tracks made by dinosaurs

Bottom layer: limestone with fossils of clams, snails, and sea lilies

Name __________________________ Date __________________________
Clues to Earth’s Past Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Clues to Earth’s Past</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The footprint of a dinosaur is considered a fossil.</td>
<td></td>
</tr>
<tr>
<td>• Scientists use fossils to learn what an environment was like long ago.</td>
<td></td>
</tr>
<tr>
<td>• The oldest rock layer is always the one found on top.</td>
<td></td>
</tr>
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<td>• Scientists can determine the age of some rocks.</td>
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</tr>
</tbody>
</table>

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- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

Identify three facts about fossils and rock layers that you found interesting.
Geologic Time

Before You Read

Preview the chapter title, section titles, and section headings. Complete the first two columns of the table by listing at least two ideas for each section in each column.

<table>
<thead>
<tr>
<th>K What I know</th>
<th>W What I want to find out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe how an animal or a plant might change if Earth becomes hotter in the next million years.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Geologic Time
Section 1 Life and Geologic Time

**Skim** the headings in Section 1. Predict two topics that will be covered in this section.
1. 
2. 

**Define** fossils to show its scientific meaning.

**New Vocabulary**

Write the correct vocabulary term next to each definition.

representation of Earth’s history that shows the time units used to divide it

longest subdivision of geologic time

second-longest subdivision of geologic time

subdivision of an era

subdivision of a period

change of species through time

group of organisms that normally reproduce only with other members of their group

process by which organisms that have characteristics that are better suited to an environment have a better chance of surviving and reproducing than those that do not

organism with a three-lobed exoskeleton that was abundant in Paleozoic oceans

large ancient landmass composed of all the continents joined together

**Academic Vocabulary**

Use a dictionary to define survive.
Main Idea

Geologic Time

I found this information on page _______.

Details

Distinguish *the* units of geologic time. Give examples of each.

Largest subdivision: ________________________________

   Examples: ________________________________

Second-largest subdivision: ________________________________

   Examples: ________________________________

Third-largest subdivision: ________________________________

   Examples: ________________________________

Fourth-largest subdivision: ________________________________

   Examples: ________________________________

Complete the table to identify when each of the following key developments in the history of Earth occurred.

<table>
<thead>
<tr>
<th>Event</th>
<th>Eon</th>
<th>Era (if identified)</th>
<th>Period (if identified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First trilobites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First flowering plants</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Organic Evolution

I found this information on page _______.

Sequence *the steps of* natural selection as described by Darwin.

1. __________________________________________

2. __________________________________________

3. __________________________________________
**Main Idea**

Identify two factors that are necessary for natural selection to occur within a species.

1. 

2. 

**Details**

Organize information about how trilobites evolved over time. Complete the flow charts.

Contrast two theories explaining the extinction of trilobites at the end of the Paleozoic era. Fill in the missing words.

Some scientists believe that the formation of ______________
caused __________________________________________.
Trilobites could not _________________________________.
Other scientists suggest that __________________________
_________________________ caused the extinction.

**Trilobites**

I found this information on page ____________.

**Plate Tectonics and Earth History**

I found this information on page ____________.

**CONNECT IT**

Compare and contrast natural selection and artificial selection.
## Geologic Time

### Section 2 Early Earth History

**Skim** Section 2. Write three questions that come to mind from looking at the headings and illustrations.

1. 
2. 
3. 

**Review Vocabulary**

**Define** life to show its scientific meaning.

**life**

**New Vocabulary**

Use your book to define each vocabulary term.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precambrian time</td>
<td></td>
</tr>
<tr>
<td>cyanobacteria</td>
<td></td>
</tr>
<tr>
<td>Paleozoic Era</td>
<td></td>
</tr>
</tbody>
</table>

**Academic Vocabulary**

Use a dictionary to define hypothesis. Use hypothesis in a sentence to show its scientific meaning.

**hypothesis**

---

---
Summarize two reasons why little is known about the organisms that lived during Precambrian time.

1. _______________________________________________________________________

2. _______________________________________________________________________

Sequence important events in the evolution of life during Precambrian time. Complete the flowchart.

The first ________________ appeared on Earth. They used ________________ and produced ________________.

Organize information about life during the Paleozoic Era. Complete the concept web with examples of life that appeared during the Paleozoic Era.
Analyze how the characteristics of amphibians and reptiles allowed them to live on land.

<table>
<thead>
<tr>
<th>Amphibians</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Effect</td>
</tr>
<tr>
<td>Lungs</td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reptiles</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Effect</td>
</tr>
<tr>
<td>Protective coating on eggs</td>
<td></td>
</tr>
<tr>
<td>Skin covered with hard scales</td>
<td></td>
</tr>
</tbody>
</table>

Organize information about three possible explanations of the extinctions that took place at the end of the Paleozoic Era.

Possible Explanations

SYNTHESIZE IT

Analyze why rock formations that show the soft parts of Paleozoic organisms are important.
Geologic Time
Section 3 Middle and Recent Earth History

 Preview the What You’ll Learn statements for Section 3. Rewrite each statement as a question. Look for the answers as you read.
1. ________________________________________________________________
2. ________________________________________________________________
3. ________________________________________________________________

 Define dinosaur to show its scientific meaning.

dinosaur

 Use your book to define each vocabulary term.

Mesozoic Era

Cenozoic Era

 Use a dictionary to define diverse. Then use the term in an original scientific sentence.

diverse
Section 3 Middle and Recent Earth History (continued)

**Main Idea**

The Mesozoic Era

I found this information on page __________.

**Details**

Organize *key information about* dinosaurs.

<table>
<thead>
<tr>
<th>Size</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dinosaurs

Caring for Young

Complete *the chart to identify key characteristics of other important organisms from the Mesozoic Era.*

<table>
<thead>
<tr>
<th>Description</th>
<th>When They Appeared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds</td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
</tr>
<tr>
<td>Gymnosperms</td>
<td></td>
</tr>
<tr>
<td>Angiosperms</td>
<td></td>
</tr>
</tbody>
</table>

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**Main Idea**

**The Mesozoic Era**

I found this information on page __________.

**Details**

Summarize *what happened at the end of the Mesozoic Era to the environment and many species.*

Distinguish *the two periods that make up the Cenozoic Era*

1. ____________, began about _______ million years ago
2. ____________, began about _______ million years ago

Analyze *the effects of changes that occurred during the Cenozoic Era. Complete the diagrams.*

- Grasslands expanded.
- Continents moved apart.
- *Homo sapiens* appeared.

**SYNTHESIZE IT**

Infer how paleontologists study the behaviors of extinct animals, such as taking care of young.
Tie It Together

You are directing a new movie about prehistoric times. The script you get shows humans interacting with dinosaurs. Write a memo to the scriptwriter explaining why this would not be scientifically accurate. Suggest two other possible settings, one that includes dinosaurs and one that includes humans.

Memo:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Geologic Time  Chapter Wrap-Up

After You Read

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I know</th>
<th>W</th>
<th>What I want to find out</th>
<th>L</th>
<th>What I learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

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☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about geologic time.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Atmosphere

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Earth’s early atmosphere was produced by erupting volcanoes.</td>
</tr>
<tr>
<td></td>
<td>• Nitrogen makes up most of Earth’s atmosphere.</td>
</tr>
<tr>
<td></td>
<td>• Energy from the Moon causes winds and ocean currents.</td>
</tr>
<tr>
<td></td>
<td>• Wind is the movement of air from an area of higher pressure to an area of lower pressure.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write an article describing how you might prepare to climb Mt. Everest.

[Blank lines for writing]
Atmosphere

Section 1 Earth’s Atmosphere

Skim the headings in Section 1. Then make three predictions about what you will learn.

1. 

2. 

3. 

Define pressure in a sentence that shows its scientific meaning.

pressure

Use your book or a dictionary to define the following key terms.

atmosphere

ionosphere

ultraviolet radiation

chlorofluorocarbon

Use a dictionary to define trace in terms of a scientific amount.

trace
Section 1 Earth’s Atmosphere (continued)

**Main Idea**

**Importance of the Atmosphere**

I found this information on page _______.

**Makeup of the Atmosphere**

I found this information on page _______.

**Layers of the Atmosphere**

I found this information on page _______.

**Details**

**Summarize** why Earth’s atmosphere is important to life on Earth.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

**Compare** the amount of gases in the atmosphere by rereading the section and analyzing the circle graph in your book. Then complete the following paragraph.

The gas that makes up most of the atmosphere is ___________.

__________ makes up 21 percent of the atmosphere. Oxygen gas is important because ________________________________

______________________________ Although carbon dioxide makes up only 0.03% of the atmosphere it is a concern because

________________________________________________________________________

________________________________________________________________________

**Model** the layers of the atmosphere by drawing them. Label and describe the characteristics of each layer.
Model how air pressure changes as you go higher in the atmosphere by creating a drawing in which dots represent air molecules. To the right, describe the cause of air pressure.

Air Molecules

Compare the temperature changes that occur as you go higher in the troposphere, stratosphere, mesosphere, and thermosphere. Use the figure in your book to help you.

Why did many governments around the world agree to ban the production and use of CFCs in the mid-1990s?
Atmosphere

Section 2 Energy Transfer in the Atmosphere

**Skim** through Section 2 of your book. Write three questions that come to mind from reading the headings and examining the illustrations.

1. __________________________
2. __________________________
3. __________________________

**Review Vocabulary**

*evaporation*

Use your book to define the term evaporation.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

**New Vocabulary**

Write the correct key term next to each definition.

__________________________ energy that is transferred in the form of rays or waves
__________________________ transfer of energy that occurs when molecules bump into one another
__________________________ transfer of heat by the flow of material
__________________________ term that describes all of the water on Earth’s surface
__________________________ process of water vapor changing to a liquid

**Academic Vocabulary**

*transfer*

Use a dictionary to define transfer.

____________________________________________________________________
____________________________________________________________________

*Atmosphere* 171
Analyze the figure in your book that shows what percent of the Sun’s energy is absorbed and reflected by Earth. Then, label the circle graph to represent the data.

Compare and contrast the three forms of energy transfer in the chart.

<table>
<thead>
<tr>
<th>Process</th>
<th>How Energy Is Transferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation</td>
<td></td>
</tr>
<tr>
<td>Conduction</td>
<td></td>
</tr>
<tr>
<td>Convection</td>
<td></td>
</tr>
</tbody>
</table>

Describe the types of energy transfer that occur when you burn your bare feet when walking on hot sand.
Section 2 Energy Transfer in the Atmosphere (continued)

Main Idea

**The Water Cycle**

I found this information on page __________.

**Earth’s Atmosphere is Unique**

I found this information on page __________.

Details

**Create** a flow chart to describe the water cycle.

**Compare** Earth’s atmosphere to the atmospheres of Venus and Mars.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Description of Atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venus</td>
<td></td>
</tr>
<tr>
<td>Mars</td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARIZE IT**

Infer from your reading three ways in which the atmosphere allows for life on Earth.

______________________________

______________________________

______________________________

______________________________

______________________________
Scan Section 3 in your book. Then write three ways that moving air affects people.

1. 
2. 
3. 

**Review Vocabulary**

*Use density in a sentence that shows its scientific meaning.*

<table>
<thead>
<tr>
<th>density</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**New Vocabulary**

*Use the following key terms in a sentence that reflects its scientific meaning.*

<table>
<thead>
<tr>
<th>Coriolis effect</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>jet stream</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sea breeze</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>land breeze</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Academic Vocabulary**

*Use a dictionary to define create.*

<table>
<thead>
<tr>
<th>create</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Atmosphere**

Section 3 Air Movement

Name ____________________  Date ____________________

174  Atmosphere
### Main Idea

**Forming Wind**

I found this information on page __________.

### Sequence

*how heated air and the Coriolis effect form wind.*

1. The equator receives ____________________________
   ____________________________

2. As a result, air near the equator is ____________________________
   ____________________________

3. Dense air moves from ____________________________
   ____________________________

4. The rotation of Earth causes ____________________________
   ____________________________

5. Thus, the Coriolis effect causes ____________________________
   ____________________________

### Global Winds

I found this information on page __________.

### Analyze

*the models of the surface winds and winds of the upper troposphere in your book. Then complete the following statements.*

1. The equatorial doldrums are located at ______________ latitude.

2. ______________ blow from the east in areas north and south of the equator.

3. ______________ move weather systems across most of North America.

4. Most surface wind systems are named ______________
   ____________________________.

5. The jet stream in the United States travels from ______________
   ____________________________.

6. The jet stream travels at the border between ______________
   ____________________________.
Model how air flows where the land meets the sea during the day and at night. Draw the two conditions below using arrows to indicate the direction of air flow.

Day

Night

I found this information on page _________.

Sequence three steps that occurred in each of your drawings above.

Day:
1.
2.
3.

Night:
1.
2.
3.

I found this information on page _________.

Describe the role that the Sun’s energy has in creating wind.
Tie It Together

Model

Design a way to model how the curved surface of Earth affects how much direct sunlight the equator receives compared to the north pole. Discuss how you could test your model, and describe what you would hope to observe.

Materials might include: flashlight or lamp, a round object like a basketball, darkened room

1. 

2. 

Results: 

---------------------------
Atmosphere Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Atmosphere</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
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☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about Earth’s atmosphere.
Weather

Before You Read

Before you read the chapter, look at the headings throughout the chapter and complete the chart below.

<table>
<thead>
<tr>
<th>What I know</th>
<th>What I want to find out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Foldables Study Organizer**

Construct the Foldable as directed at the beginning of this chapter.

**Science Journal**

Write three questions you would ask a meteorologist about weather.

- What is the typical weather in your area?
- Why do some days have storms while others are sunny?
- How are weather patterns predicted?
Weather
Section 1 What is weather?

Scan the headings of the paragraphs throughout Section 1. Write a sentence about a topic that interests you.

Define each vocabulary word below.

factor

weather

humidity

relative humidity

dew point

fog

precipitation

Use a dictionary to write a definition of role.
Section 1 What is weather? (continued)

Main Idea

Weather Factors
I found this information on page __________.

I found this information on page __________.

Dew Point
I found this information on page __________.

Details

Organize information about factors that determine the weather by completing the concept map.

Contrast the characteristics of low and high air pressure.

<table>
<thead>
<tr>
<th>Air Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
</tbody>
</table>

Summarize the relationship between the dew point and the amount of water vapor in the air.
Sequence the steps in cloud formation. The first step is filled in for you.

<table>
<thead>
<tr>
<th>Cloud Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Warm air is forced upward.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
</tbody>
</table>

Classifying Clouds

Types of Clouds

- **stratus clouds**
  - appear as
  - appear as puffy, often with flat bases
  - appear at low to high altitudes

- **cirrus clouds**
  - appear at dark

**CONNECT IT**

A bottle of water sitting on a picnic table has droplets of water covering it. Analyze what this tells you about the temperatures of the water bottle and the air around it.

<p>| | | | |</p>
<table>
<thead>
<tr>
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</tbody>
</table>

Weather

Section 2 Weather Patterns

Scan the headings throughout Section 2. Write three questions about the topics covered in the section.

1. 
2. 
3. 

Define barometer using your book or a dictionary.

barometer 

Use your book or a dictionary to define each key term.

air mass 

front 

tornado 

hurricane 

blizzard 

Use a dictionary to define the term accompany.

accompany 

Name ___________________________ Date ____________
Main Idea

Weather Changes

I found this information on page ____________.

Details

Classify the characteristics of air masses according to where they develop by completing the table below.

<table>
<thead>
<tr>
<th></th>
<th>Tropics</th>
<th>Polar regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>warm, dry</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model the directions in which winds blow in high- and low-pressure systems of the northern hemisphere. Use arrows to draw the direction the winds move. Then describe the weather associated with each.

<table>
<thead>
<tr>
<th>Low-pressure Winds</th>
<th>High-pressure Winds</th>
</tr>
</thead>
</table>

Compare and describe the four types of fronts.

<table>
<thead>
<tr>
<th>Fronts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Description</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Organize the information on severe weather by completing the Venn diagram using the list of items below.

- may be accompanied by damaging hail
- pose danger to people, structures, and animals
- measured by the Fujita scale
- the most powerful type of storm
- occurs in warm, moist air masses along fronts
- violently rotating column of air in contact with ground
- heavy rains can cause flooding
- turns heat from ocean into wind

Severe Weather

I found this information on page ________.

Connect It

Summarize what actions to take during severe weather.

________________________________________

________________________________________

________________________________________
Weather
Section 3 Weather Forecasts

Scan the headings and look at the illustrations throughout Section 3. List four things you would like to learn about.

1. 
2. 
3. 
4. 

Write the correct vocabulary word next to each definition.

to predict a condition or event on the basis of observations

a scientist who studies weather and weather patterns in an effort to predict changing weather conditions

combination of symbols that meteorologists record on a map showing weather conditions at one specific location

line on a weather map drawn to connect locations of equal temperature

line on a weather map drawn to connect points of equal atmospheric pressure

Define predict using a dictionary.

predict

predict
Organize information about a meteorologist’s work. List five measurements that a meteorologist takes and four instruments that improve a meteorologist’s ability to predict weather.

**Measurements**
1.  
2.  
3.  
4.  
5.  

**Instruments**
1.  
2.  
3.  
4.  

Compare and contrast isobars and isotherms by completing the Venn diagram. List at least one descriptor in each part of the diagram.

Isobars

Isotherms

Both
Section 3  Weather Forecasts (continued)

Main Idea

Forecasting Weather

I found this information on page ___________.

Details

Summarize information provided by the spacing of isobars on a weather map by completing the chart.

<table>
<thead>
<tr>
<th>Spacing of Isobars</th>
<th>What spacing indicates about atmospheric pressure</th>
<th>What spacing indicates about wind conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobars close together</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isobars far apart</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I found this information on page ___________.

Analyze the information provided by the weather map in your book. Choose a city, and describe the weather it is experiencing.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

CONNECT IT

Evaluate the information you have learned in this chapter to predict whether forecasting the weather will become more accurate or less accurate in the coming years. Support your position with facts.

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
You live in a region that sometimes is struck by hurricanes. Describe the plans that you would make to prepare for and respond to a hurricane.

Long-term planning for hurricane

When a hurricane has been predicted

Following a hurricane
Weather Chapter Wrap-Up

Review the chart that you completed before you read the chapter. Then complete the chart below.

<table>
<thead>
<tr>
<th>What I learned</th>
<th>What I still want to find out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

- Review the information you included in your Foldable.
- Study your Science Notebook on this chapter.
- Study the definitions of vocabulary words.
- Review daily homework assignments.
- Re-read the chapter and review the charts, graphs, and illustrations.
- Review the Self Check at the end of each section.
- Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about weather.

______________________________
______________________________
______________________________
______________________________
Climate

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Climate is the state of the atmosphere at a specific time and place.</td>
</tr>
<tr>
<td></td>
<td>• The polar zones generally have cooler temperatures because solar radiation hits these zones at a more direct angle.</td>
</tr>
<tr>
<td></td>
<td>• The climate of an area can be affected by a large lake.</td>
</tr>
<tr>
<td></td>
<td>• El Niño and La Niña are climatic events that can disrupt normal temperature and precipitation patterns around the world.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write a paragraph explaining what you already know about the causes of seasons.
Climate
Section 1  What is climate?

Scan the Section 1 headings and illustrations. Formulate two questions about this section that come to mind.

1. 

2. 

Define the following key terms to show their scientific meanings.

latitude

climate

tropics

polar zone

temperate zone

affect
Section 1 What is climate? (continued)

**Main Idea**

**Latitude and Climate**

*I found this information on page _________.

**Details**

**Identify** and label the climate zones on the globe below. Also include:

- the equator
- Tropic of Cancer
- Tropic of Capricorn

**Other Factors**

*I found this information on page _________.

**Organize** factors that affect climate on the concept map below.

- latitude
- Factors that affect climate
- [Blank]
- [Blank]
- [Blank]

**COMPARE IT**

Contrast the climate of Buffalo, New York and Yuma, Arizona. Discuss the geographical features that affect the two climates.
Climate
Section 2 Climate Types

<table>
<thead>
<tr>
<th>Predict</th>
<th>Read the title and the headings of Section 2. List three things that might be discussed in this section.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Define</th>
<th>the following key terms. Use your book or a dictionary to help you.</th>
</tr>
</thead>
<tbody>
<tr>
<td>regions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>adaptation</td>
</tr>
<tr>
<td>hibernation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>vary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classifying Climates</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found this information on page __________.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complete</th>
<th>the following paragraph about climates.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wladimir Köppen developed a __________________________. He noticed that different types of __________________________. He was able to relate __________________________.</td>
<td></td>
</tr>
</tbody>
</table>
Main Idea

Classifying Climates

I found this information on page _________.

Details

**Summarize** the six major climate zones shown in your book. Describe the important characteristics of each.

<table>
<thead>
<tr>
<th>World Climates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Zone</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
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<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

SYNTHESIZE IT

Analyze the two types of adaptations organisms have to climate. Discuss structural and behavioral adaptations, give an example of each, and then tell how both are similar.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Climate
Section 3  Climate Changes

Scan  Use the checklist below to preview Section 3 of your book.

☐ Read all section titles.
☐ Read all bold words.
☐ Look at all pictures, charts, and graphs.
☐ Think about what you already know about climates.

Write three facts you discovered about climatic changes as you scanned the section.

1. ____________________________
2. ____________________________
3. ____________________________

Define solar radiation using a dictionary.

solar radiation

增加平均全球温度

自然通过某些大气中的气体吸收热量

当信风减弱或逆流时，可能发生的气候事件，可能破坏正常温度和降水模式

森林的破坏可能导致大气中的二氧化碳含量增加

地球轴线倾斜导致的短期气候变化，地球围绕太阳旋转

Use a dictionary to find the scientific definition of reverse.

reverse

科学定义
Section 3 Climate Changes (continued)

Main Idea

**Earth’s Seasons**
I found this information on page __________.

**El Niño and La Niña**
I found this information on page __________.

Details

**Synthesize** information from your book to explain why the northern hemisphere has winter at the time when Earth is closest to the Sun.

Contrast conditions that occur during El Niño years with those that occur during La Niña years in the chart below.

<table>
<thead>
<tr>
<th>El Niño and La Niña</th>
<th>El Niño Year</th>
<th>La Niña Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength of trade winds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water temperature along west coast of South America</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical climate effects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Complete the paragraph below about climate change.

In the past, Earth’s overall climate has been ____________ and ____________. During the last two million years, Earth’s climate has cycled between ____________ when glaciers advanced and ____________ when climate was similar to today’s climate.

Sequence events to explain how an erupting volcano can cause short-term climate change.

A volcano erupts adding small particles called aerosols to atmosphere.

The particles block some sunlight from reaching Earth.

Complete the following chart about sunspots.

<table>
<thead>
<tr>
<th>Sunspots</th>
<th>Definition of sunspots</th>
<th>How sunspots affect climate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Period between 1645 and 1715</td>
<td>Safety warning</td>
</tr>
</tbody>
</table>
Climatic Changes Today

I found this information on page ________.

Global Warming and Human Activities and The Carbon Cycle

I found this information on page ________.

Sequence steps explaining the greenhouse effect. The first one has been done for you.

<table>
<thead>
<tr>
<th>The Greenhouse Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Radiation from the Sun strikes Earth’s surface.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
</tr>
</tbody>
</table>

Analyze global warming by completing the concept map below.

Global Warming

- Related Human Activities
- Effect on carbon cycle

SYNTHESIZE IT

Analyze how humans impact Earth’s atmosphere and how it may have long term effects on global climates.
Climate Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Climate</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Climate is the state of the atmosphere at a specific time and place.</td>
<td></td>
</tr>
<tr>
<td>• The polar zones generally have cooler temperatures because solar radiation hits these zones at a more direct angle.</td>
<td></td>
</tr>
<tr>
<td>• The climate of an area can be affected by a large lake.</td>
<td></td>
</tr>
<tr>
<td>• El Niño and La Niña are climatic events that can disrupt normal temperature and precipitation patterns around the world.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about climate.
Ocean Motion

Before You Read

Preview the chapter title, the section titles, and the section headings. List at least one idea for each section in each column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I know</td>
<td>What I want to find out</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Record some facts you know about ocean currents, waves, or tides. Include some pictures to show your ideas.

Name ______________________ Date ______________________

Copyright © Glencoe/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.
Scan the headings in Section 1 of your book. Predict three topics that will be discussed.

1. 
2. 
3. 

Define resource using your book or a dictionary.

resource

Use your book or a dictionary to define the vocabulary terms. Then use each term in a sentence that shows its scientific meaning.

basin

salinity

Use a dictionary to define constant to show its scientific meaning.

constant
Main Idea

Importance of Oceans and Origin of Oceans
I found this information on page _________.

Details

Organize information about the importance of oceans by completing the chart below.

<table>
<thead>
<tr>
<th>Importance of Oceans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Use</td>
</tr>
<tr>
<td>Food</td>
</tr>
<tr>
<td>Energy</td>
</tr>
<tr>
<td>Minerals</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
</tbody>
</table>

Model the part of Earth that is covered by oceans by shading in the correct percentage in the blocks below. Each block is equal to ten percent.

Summarize the composition of ocean water by completing the graphic organizer.

Ocean Water contains

dissolved ___________

Examples: ___________, nitrogen, and ___________

Sources: the ___________, respiration, and ___________

dissolved salts

Examples: ___________, sulfate, ___________, potassium, and ___________

Sources: ___________ from dissolved ___________ carried by rivers and erupting
How does a solar desalination plant make use of natural processes of the water cycle and gravity to remove salts and produce freshwater?
Review Vocabulary

Define circulation using your book or a dictionary.

Skim Section 2 of your book. Write three questions that come to mind. Look for answers to your questions as you read the section.

1. 

2. 

3. 

New Vocabulary

Read the definitions below. Write the correct vocabulary term on the blank to the left of each definition.

forms when a mass of more dense seawater sinks beneath less dense seawater

causes moving air and water to turn left in the southern hemisphere and turn right in the northern hemisphere due to Earth’s rotation

wind-powered ocean current that moves the upper few hundred meters of seawater horizontally, parallel to Earth’s surface

vertical circulation in the ocean that brings deep, cold water to the ocean surface

Academic Vocabulary

Use a dictionary to define layer. Then use the term in a sentence to show its scientific meaning.

layer
Describe the characteristics of surface currents by completing the graphic organizer below.

**Surface Currents**

1. Surface __________ cause water to __________ in the ocean.
2. __________ pulls water off the pile.
3. The Coriolis effect __________ the water.
4. The surface water __________ around the piles of water.

Move in huge, __________ patterns
Move only the upper __________ meters of seawater

Model the direction that surface currents circulate for the areas of Earth listed in the chart by drawing arrows showing the direction of the currents.

<table>
<thead>
<tr>
<th>Place on Earth</th>
<th>Direction of Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>North of the equator</td>
<td></td>
</tr>
<tr>
<td>South of the equator</td>
<td></td>
</tr>
</tbody>
</table>
Analyze how surface currents affect climate by completing the flow chart below.

- Surface currents flow from the equator.
- ____________ is released.
- The ____________ is warmed.

Summarize an effect of upwelling.

Density Currents

Compare information about density currents as they form in the Antarctic and the North Atlantic oceans.

<table>
<thead>
<tr>
<th>Density Currents</th>
<th>Antarctic</th>
<th>North Atlantic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where does it form?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How does it form?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where does it move?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize It

Compare the characteristics of surface currents with those of density currents.
Scan the What You’ll Learn statements for Section 3 of your book. Identify three topics that will be discussed.

1. 
2. 
3. 

Define energy using your book or a dictionary.

Write a paragraph using the three vocabulary terms.

Read the definitions below. Write the correct vocabulary term on the blank to the left of each definition.

collapsing ocean wave that forms in shallow water and breaks onto the shore

difference between the level of the ocean at high tide and the level at low tide

daily rise and fall of sea level caused by the gravitational pull of the Sun and the Moon on Earth

Use a dictionary to define range to show its meaning in science and math.
Main Idea

Waves

I found this information on page __________.

Model a wave below by drawing it and labeling the following parts: crest, trough, wavelength, and wave height.

Summarize information in your book to complete the chart about waves.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do waves form?</td>
<td></td>
</tr>
<tr>
<td>How does water move in waves?</td>
<td></td>
</tr>
<tr>
<td>What do waves carry?</td>
<td></td>
</tr>
<tr>
<td>When do waves stop forming?</td>
<td></td>
</tr>
<tr>
<td>What affects the height of waves?</td>
<td></td>
</tr>
</tbody>
</table>

Sequence the formation of a breaker onto shore.

1. ____________ slows water at the bottom of a wave near shore.
2. The ____________ of the wave keeps ____________.
3. The top of the wave outruns the bottom and ____________, or ____________, onto the shore.
4. ____________ pulls the water back to sea.
Tides

I found this information on page __________.

Complete the graphic organizer about tides.

Tides

Are ____________ produced by the _____________.

Each giant wave is usually 1 to 2 _______ high. Its ____________ is thousands of kilometers long.

High Tide
As the crest nears shore, the sea seems to _____________.

Low Tide
As the trough nears shore, the sea seems to _____________.

The ____________ between the level of the ocean at high tide and the level at low tide is _____________.

CONNECT IT

Draw two pictures, one that shows waves forming in wind that is blowing at 5 kilometers per hour and one that shows waves forming in wind that is blowing at 20 kilometers per hour. Describe how the waves in each picture are different.
Tie It Together

Tracking Currents

Goods lost from wrecked ships have been used to track ocean currents. Read about tracking ocean currents in your book. Then, using the map of surface currents in your book, predict where 80,000 pairs of shoes lost overboard by a freighter in the northern Pacific would wash ashore. Explain your prediction, and draw a picture showing the paths the shoes might travel.

Prediction: ______________________________

______________________________

______________________________

______________________________

______________________________
Ocean Motion  Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I know</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>What I want to find out</td>
</tr>
<tr>
<td>L</td>
<td>What I learned</td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

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☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three main ideas from the chapter.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Oceanography

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Oceanography</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Sediment that originates on land rarely settles as far as the deep ocean floor.</td>
</tr>
<tr>
<td></td>
<td>• Hot water streams out into surrounding seawater through holes and cracks along mid-ocean ridges.</td>
</tr>
<tr>
<td></td>
<td>• The Sun is the source of nearly all of the energy used by organisms in the ocean.</td>
</tr>
<tr>
<td></td>
<td>• Factories sometimes release chemicals into streams that eventually empty into the ocean.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Describe characteristics of three marine organisms you are familiar with.
Predict three things that might be discussed as you scan the headings and illustrations of Section 1.
1. 
2. 
3. 

Define magma using its scientific meaning.
magma

Use your book to define the following terms.
abyssal plain
mid-ocean ridge
trench

Use a dictionary to find the scientific definition of locate.
locate
Main Idea

The Ocean Basins
I found this information on page __________.

Model the ocean basin. Label each of the following features in your drawing.

- abyssal plain
- continental shelf
- continental slope
- where new ocean crust forms
- where ocean crust is destroyed
- oceanic trench
- seamount
- volcanic island
- mid-ocean ridge

Distinguish between the continental shelf and the continental slope by inserting one fact into each section of the Venn diagram.

- Continental Shelf
- Both
- Continental Slope

Oceanography 215
Main Idea

**Ridges and Trenches**

I found this information on page _________.

**Details**

**Sequence** *how seafloor is constantly forming and being destroyed.*

At Mid-Ocean Ridges

1. [Blank]
2. [Blank]
3. new ocean floor forms

At Subduction Zones

1. [Blank]
2. [Blank]
3. seafloor is destroyed

**Mineral Resources from the Seafloor**

I found this information on page _________.

**Organize** *resources that exist on the continental shelf and in the deep ocean by listing them below.*

<table>
<thead>
<tr>
<th>Continental Shelf Deposits</th>
<th>Deep Ocean Water Deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONNECT IT**

Infer why retrieving resources from deep water is such a challenge.

1. __________
2. __________
3. __________
4. __________
Oceanography
Section 2 Life in the Ocean

Skim through Section 2 of your book. Read the headings and examine the illustrations. Write three questions that come to mind.

1. ____________________________________________________________
2. ____________________________________________________________
3. ____________________________________________________________

Define nutrient using its scientific meaning.

nutrient ______________________________________________________

Use your book to define each of the following terms. Then write a sentence to show its scientific meaning.

estuary ______________________________________________________

reef _________________________________________________________

Use a dictionary to define undergo. Then write a sentence to show its scientific meaning.

undergo ____________________________________________________
**Main Idea**

**Life Processes**

*I found this information on page ___________.

---

**Details**

**Summarize** the ways that marine organisms obtain energy by completing the chart below.

<table>
<thead>
<tr>
<th>Name of process used to make food</th>
<th>How food is made</th>
<th>Example of producers</th>
<th>Example of consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photosynthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemosynthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Ocean Life**

*I found this information on page ___________.

---

**Classify** the organisms that live in the ocean. Complete the graphic organizer below to organize the types. Include descriptions and examples of each type.

- **Ocean Life**
- **nekton**
- **organisms that live on ocean floor**;
Section 2 Life in the Ocean (continued)

**Main Idea**

Ocean Margin Habitats

I found this information on page [ ].

**Details**

Compare and contrast ocean margin habitats. Identify four margin habitats and at least four examples of organisms that live in each one. Make a sketch of each habitat to help you remember.

1.  
2.  
3.  
4.  

Ocean Margin Habitats

**SYNTHESIZE IT**

Compare and contrast food webs that rely on chemosynthesis with food webs that depend on photosynthesis.
Scan  Use the checklist below to preview Section 3 of your book.

☐ Read all section titles.
☐ Read all bold words.
☐ Read all charts and graphs.
☐ Look at all of the pictures.
☐ Think about what you already know about ocean pollution.

Write three facts you discovered about ocean pollution.
1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

Define runoff  using its scientific meaning.

runoff

_____________________________________________________
_____________________________________________________
_____________________________________________________

New Vocabulary

Use your book to define pollution. Then identify three types of pollution with which you are already familiar.
pollution

_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________
_____________________________________________________

Academic Vocabulary

Use a dictionary to define phenomenon using its scientific meaning.

phenomenon

_____________________________________________________
_____________________________________________________

220  Oceanography
Complete the graphic organizer to identify five types of ocean pollution and their causes or sources.

<table>
<thead>
<tr>
<th>Types of Ocean Pollution</th>
<th>Causes of Ocean Pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Effects of Pollution
I found this information on page ____________.

Controlling Pollution
I found this information on page ____________.

Main Idea

Summarize the effects of pollution by completing the outline below.

Effects of Pollution

I. Delaware to North Carolina rivers and estuaries
   A. Type of pollution—______________________________
   B. Effects
      1. have killed billions of fish
      2. ________________________________

B. Florida
   A. Type of pollution—______________________________
   B. Effects
      1. ________________________________
      2. ________________________________

List five things you can do to reduce ocean pollution. Highlight the way you think would make the most impact.

1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________

CONNECT IT
Design a flow chart to show how pollution travels from your location to the ocean.
Make a diagram of an ocean basin. Include

• the major features of the basin;
• the locations of continental shelf and deep-water resources;
• an example of a food chain;
• two examples of ocean pollution.
Oceanography Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Oceanography</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sediment that originates on land rarely settles as far as the deep ocean floor.</td>
<td></td>
</tr>
<tr>
<td>• Hot water streams out into surrounding seawater through holes and cracks along mid-ocean ridges.</td>
<td></td>
</tr>
<tr>
<td>• The Sun is the source of nearly all of the energy used by organisms in the ocean.</td>
<td></td>
</tr>
<tr>
<td>• Factories sometimes release chemicals into streams that eventually empty into the ocean.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

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☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

Summarize It

After reading this chapter, identify three things that you have learned about oceanography.
Our Impact on Land

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
   2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Our Impact on Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population explosion is a term that describes how the world population has grown rapidly in recent history.</td>
<td></td>
</tr>
<tr>
<td>By the time you are 75 years old, you will have produced enough garbage to equal the mass of 11 African elephants.</td>
<td></td>
</tr>
<tr>
<td>To feed the growing population, farmers are using higher yielding seeds.</td>
<td></td>
</tr>
<tr>
<td>Most deforestation occurs in developed countries.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Write three ways that you can reduce the amount of trash you throw in the garbage.

_______

_______

_______

_______

_______

_______

_______
Our Impact on Land
Section 1 Population Impact on the Environment

Scan Section 1 of your book. Write three facts that you discovered about world population as you scanned the section.

1. ________________________________
2. ________________________________
3. ________________________________

Define natural resource using your book or a dictionary.

natural resource

Use your book or a dictionary to define each key term. Then use each in a scientific sentence.

population

____________________________________
____________________________________
____________________________________

carrying capacity

____________________________________
____________________________________
____________________________________

pollutant

____________________________________
____________________________________
____________________________________

Use a dictionary to define environment.

environment

____________________________________
____________________________________
Main Idea

Population and Carrying Capacity

I found this information on page __________.

Details

Model population growth of modern humans on the grid below. Use the facts given in the five sentences.

1. Human population was ______________ in 1700 A.D.
2. Human population first reached 1 billion in ______________
3. In 1960 A.D., human population was ______________
4. Human population reached 6.1 billion in ______________
5. The population is expected to reach ______________
   by 2050 A.D.

Population Growth of Modern Humans

Define carrying capacity. Hypothesize about some factors that limit the carrying capacity and things humans could do to increase Earth’s carrying capacity.

<table>
<thead>
<tr>
<th>Carrying Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limits</td>
</tr>
<tr>
<td>--------</td>
</tr>
</tbody>
</table>
Main Idea

Create a concept map to summarize reasons why there is such concern about the growing population.

People and the Environment

Complete the chart to show how some of your daily activities consume resources and affect the environment.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Effect on Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONNECT IT

Describe how you might be affected at school if suddenly there were twice as many students.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Our Impact on Land
Name ___________________________ Date __________________

Our Impact on Land
Section 2 Using Land

Skim Section 2 of your book. Read the headings and look at the pictures. Write three questions that come to mind.

1. ____________________________
2. ____________________________
3. ____________________________

Review Vocabulary

Define erosion using your book or a dictionary.

erosion

New Vocabulary

Skim through the section to find each term, and then give a definition for each from your text.

stream discharge

sanitary landfill

hazardous waste

enzyme

Academic Vocabulary

Use a dictionary to define impact.

impact
Organize information about land usage in the outline.

Land uses and their environmental problems

A. Agriculture
   1. 
   2. Increases soil erosion.

B. Forest Resource Use
   1. 
   2. 

C. Development
   1. Paving stops water from soaking into soil and causes flooding.
   2. 

D. Landfills
   1. 
   2. 

Create a diagram of a sanitary landfill. Be sure to label each element in your plan.

Describe how your landfill will keep pollution from entering the environment.
Section 2 Using Land (continued)

Main Idea

Hazardous Wastes

I found this information on page ________

Details

Summarize characteristics and effects of hazardous waste.

Characteristics: ____________________________

Effects: ____________________________

I found this information on page ________.

Identify four actions by the government and citizens since 1980 that relate to hazardous wastes.

1. ____________________________

2. ____________________________

3. ____________________________

4. ____________________________

I found this information on page ________.

Natural Preserves

Classify the three types of national preserves.

1. ____________________________

2. ____________________________

3. ____________________________

I found this information on page ________.

Connect It

List three kinds of hazardous wastes found in many homes. Identify the characteristic that makes each hazardous.

__________________________

__________________________

__________________________

Our Impact on Land 231
### Our Impact on Land

#### Section 3  Conserving Resources

**Skim** the headings and boldfaced terms in Section 3. Then make three predictions about what you will learn.

1. 
2. 
3. 

**Define** consumption. Then use it in a sentence to show its scientific meaning.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>consumption</td>
<td></td>
</tr>
<tr>
<td>conservation</td>
<td></td>
</tr>
<tr>
<td>composting</td>
<td></td>
</tr>
<tr>
<td>recycling</td>
<td></td>
</tr>
</tbody>
</table>

**Define** the following terms. Then use each in a scientific sentence.

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>recover</td>
<td></td>
</tr>
</tbody>
</table>

Use a dictionary to define recover.
Complete the graphic organizer below to show the benefits of conserving resources.

Classify various conservation activities by providing an example of each under the correct heading.

<table>
<thead>
<tr>
<th>Reduce</th>
<th>Reuse</th>
<th>Recycle</th>
</tr>
</thead>
</table>

Complete the statements with the correct percent from the bank.  

20%  40%  58%  74%

Paper makes up ________ of the mass of trash. Recycling this paper would use ________ less water and make ________ less pollution than making new paper.

If everyone in the United States composted, it would reduce the trash in landfills by ________.
Section 3  Conerving Resources (continued)

**Main Idea**

I found this information on page ___________.

**Details**

**Compare** the use of resources by the average person in the United States with the resources used by the average person elsewhere in the world. Use the figure in your book to help you.

<table>
<thead>
<tr>
<th>Resource Use</th>
<th>United States</th>
<th>Rest of world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil (liters)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel (kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals (kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper (kg)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Identify** four recyclable materials.

1. ____________________  2. ____________________
2. ____________________  4. ____________________

**Summarize** challenges to developing good recycling programs.

1. ____________________
2. ____________________
3. ____________________

**CONNECT IT**

Think about the resources listed in the chart above. Describe a strategy for reducing the amount of oil, steel, metals, or paper that you use.

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________
Create an ad campaign that promotes the conservation of resources. Your campaign may be

- a video,
- a pamphlet,
- posters, or
- flyers.

Choose an audience for your campaign: young children, senior citizens, your peers, your school, or your community.

Then create an informative and inspiring message. Write your message below.
Our Impact on Land  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Our Impact on Land</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population explosion is a term that describes how the world population has grown rapidly in recent history.</td>
<td></td>
</tr>
<tr>
<td>By the time you are 75 years old, you will have produced enough garbage to equal the mass of 11 African elephants.</td>
<td></td>
</tr>
<tr>
<td>To feed the growing population, farmers are using higher yielding seeds.</td>
<td></td>
</tr>
<tr>
<td>Most deforestation occurs in developed countries.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about our impact on land.
Our Impact on Water and Air

Before You Read

Preview the chapter, including section titles and section headings. Complete the chart by listing at least one idea for each section in each column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I know</td>
<td>What I want to find out</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Hypothesize what happens to the water in your home after the water goes down the drain.
Objectives  
Review the objectives for Section 1. Write three questions that come to mind from reading these statements. Look for answers to these questions as you read the section.

1. __________________________________________
2. __________________________________________
3. __________________________________________

Define  pollution using your book or a dictionary.

pollution
__________________________________________
__________________________________________
__________________________________________

Read the definitions below. Write the correct key term on the blank in the left column.

a chemical that helps plants grow

a substance that destroys pests

pollution that enters a body of water from a large area, which might include lawns, construction sites, and roads

Use a dictionary to define chemical.

chemical
__________________________________________
__________________________________________
Complete the paragraph about clean water.

Clean water is important because all __________ need it to live. Plants need water to _______________. People must ____________ water every day. Many organisms, such as fish, ____________ in water. ________________ can damage organisms. Animals might die or be more likely to get a ________________.

Summarize the effects of each source of water pollution by completing the chart.

<table>
<thead>
<tr>
<th>Sources of Water Pollution and Their Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source</strong></td>
</tr>
<tr>
<td>Sediment</td>
</tr>
<tr>
<td>Pesticides</td>
</tr>
<tr>
<td>Fertilizers</td>
</tr>
<tr>
<td>Human waste/sewage</td>
</tr>
<tr>
<td>Metals</td>
</tr>
<tr>
<td>Oil and gasoline</td>
</tr>
<tr>
<td>Heat</td>
</tr>
</tbody>
</table>
Section 1 Water Pollution (continued)

**Main Idea**

**Reducing Water Pollution**

I found this information on page __________.

**Details**

**Compare and contrast** the Clean Water Act of 1987 and the Safe Drinking Water Act of 1996. Complete the Venn diagram with two facts about each act.

Create two original drawings that illustrate (1) how people can help to reduce water pollution and (2) how people can help to conserve water. Include captions for each drawing.

<table>
<thead>
<tr>
<th>Reduce Water Pollution</th>
<th>Conserve Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caption:</td>
<td>Caption:</td>
</tr>
</tbody>
</table>

**CONNECT IT**

Identify three ways you use water in your daily life that are not discussed in the book. Choose one of your suggestions, and explain how you can change the way you use water to help conserve this vital resource.
Our Impact on Water and Air

Section 2  Air Pollution

Scan  Use the checklist below to preview Section 2 of your book.

☐ Read all section headings.
☐ Read all bold words.
☐ Look at all of the pictures and read their labels.
☐ Think about what you already know about air pollution.

Write two facts that you discovered about air pollution.
1. ____________________________________________
2. ____________________________________________

Define  ozone layer using your book or a dictionary.

Write the correct key term on the blank in the left column.

_____________________________  acidic moisture that falls to Earth as rain or snow
_____________________________  colorless, odorless gas in car exhaust that contributes to
_____________________________  air pollution
_____________________________  substance with a pH higher than 7
_____________________________  device that removes sulfur dioxide from smoke produced by
_____________________________  a coal-burning power plant
_____________________________  substance with a pH below 7
_____________________________  used to describe how acidic or basic a substance is
_____________________________  fine particles such as dust, pollen, mold, ash, and soot that are
_____________________________  in the air
_____________________________  hazy, yellowish-brown smog that sometimes occurs over cities

Use a dictionary to define convert using its scientific meaning.

_____________________________
### Causes of Air Pollution

Classify the causes of air pollution discussed in the book as Natural or Produced by Humans. List each cause in the chart.

<table>
<thead>
<tr>
<th>Natural</th>
<th>Produced by Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### What is smog?

Sequence steps in the formation of smog.

1. 
2. 
3. 
4. 

### Acid Rain

Create an original drawing in the box to show how acid rain forms. Add labels to your drawing to identify what it shows.
**Main Idea**

**CFCs**

I found this information on page __________.

**Air Pollution and Your Health**

I found this information on page __________.

**Reducing Air Pollution**

I found this information on page __________.

**Details**

**Summarize why CFCs are harmful.**

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

**Summarize the health effects of air pollutants in the chart.**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Health Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td></td>
</tr>
<tr>
<td>Acid rain</td>
<td></td>
</tr>
<tr>
<td>Particulates</td>
<td></td>
</tr>
</tbody>
</table>

**Complete the graphic organizer about reducing air pollution.**

![Diagram of ways to reduce air pollution]

**SYNTHESIZE IT**

Why would setting the thermostat in your home at a lower temperature in winter and a higher temperature in summer help reduce air pollution?

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

Our Impact on Water and Air  243
Our Impact on Water and Air
Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column. How do your ideas now compare with those you wrote at the beginning of the chapter?

<table>
<thead>
<tr>
<th>K</th>
<th>What I know</th>
<th>W</th>
<th>What I want to find out</th>
<th>L</th>
<th>What I learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Review
Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT
Summarize three main points of the chapter.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Exploring Space

Before You Read

Preview the chapter, including section titles and the section headings. Complete the chart by listing at least one idea for each of the three sections in each column.

<table>
<thead>
<tr>
<th>K</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I know</td>
<td>What I want to find out</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Do you think space exploration is worth the risk and expense? Explain why.
Exploring Space
Section 1 Radiation from Space

Evaluate the objectives found in What You’ll Learn for Section 1. Write three questions that come to mind from reading these statements.

1. 
2. 
3. 

Define telescope using your book or a dictionary.

telescope

Use your book or a dictionary to define the vocabulary terms.

electromagnetic spectrum

refracting telescope

reflecting telescope

observatory

radio telescope

Use a dictionary to define visible.
Main Idea

Electromagnetic Waves

List seven forms of electromagnetic radiation.
1. ______________________   5. ______________________
2. ______________________   6. ______________________
3. ______________________   7. ______________________
4. ______________________

Compare and contrast short wavelength radiation with long wavelength radiation by completing the chart below.

<table>
<thead>
<tr>
<th>Short Wavelength</th>
<th>Long Wavelength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sketch of each wave</td>
<td></td>
</tr>
<tr>
<td>Description of frequency</td>
<td></td>
</tr>
</tbody>
</table>

Optical Telescopes

Compare a refracting telescope with a reflecting telescope.
- Use your book to help you draw cross-sections of each telescope.
- Use arrows to indicate the path taken by light in each type.
- Label the eyepiece lens, focal point, and any other mirrors or lenses.
- Model the shapes of a convex lens and a concave mirror.
Summarize information about the Hubble Space Telescope by completing the paragraph.

In __________, the __________________________ was launched. Scientists expected clear pictures from this __________________________ telescope because it was __________________________. However, a mistake was made when the telescope’s __________________________, so it did not make __________________________. Repair missions were made in (years) ______________, when small __________________________ were added to correct the images.

Organize information about radio telescopes in the chart below.

<table>
<thead>
<tr>
<th>Radio telescopes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose:</td>
</tr>
<tr>
<td>Design:</td>
</tr>
<tr>
<td>Collect information used to:</td>
</tr>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
</tbody>
</table>

CONNECT IT

Radio waves from space have been studied for decades, but scientists have yet to find signs of intelligent life. Suggest several explanations for this.
Exploring Space
Section 2 Early Space Missions

**Predict** three things that you think might be discussed in this section after reading its headings.

1. ____________________________________________________
   ____________________________________________________
2. ____________________________________________________
   ____________________________________________________
3. ____________________________________________________
   ____________________________________________________

**Write the correct vocabulary term next to each definition.**

- force that propels an aircraft or missile: __________

- curved path followed by a satellite as it revolves around an object: __________

- space mission with goal of landing a human on the Moon’s surface: __________

- special engine that can work in space and burns liquid or solid fuel: __________

- space mission with goals of connecting spacecraft in orbit and investigating the effects of space travel on the human body: __________

- any object that revolves around another object in space: __________

- space mission with goal of orbiting a piloted spacecraft around Earth and bringing it back safely: __________

- instrument that gathers information and sends it back to Earth: __________

**Define** the scientific meaning of **goal** using a dictionary.

- __________
**Main Idea**

**The First Missions into Space**

I found this information on page __________.

---

**Details**

**Compare and contrast the two types of rockets by completing the Venn diagram with the information below.**

- Solid-propellant rockets
  - can be shut down and restarted
  - do not require air for operation
  - liquid fuel and oxidizer stored in separate tanks
  - preferred for long-term space missions

- Liquid-propellant rockets
  - gases thrust it forward
  - rubberlike fuel contains oxidizer
  - generally simpler
  - cannot be shut down once ignited

**Both**

---

Model the path of a satellite. Draw a satellite in orbit around Earth. Show the complete path of the satellite and the path it would take if it were not affected by gravity.
Section 2 Early Space Missions (continued)

Main Idea

Space Probes
I found this information on page __________.

Moon Quest
I found this information on page __________.

Details

Compare the advantages and disadvantages of space probes with spacecraft piloted by humans.

<table>
<thead>
<tr>
<th>Comparison of Space Probes to Piloted Spacecraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantages</td>
</tr>
</tbody>
</table>

Create a time line of the United States’ quest to reach the Moon by identifying an event that corresponds to each date.

1. ___________ 3. ___________ 5. ___________

2. ___________ 4. ___________

CONNECT IT

Design a plan for a space mission to take humans to Mars. Analyze challenges the crew would have to face. Develop a simple program to help prepare the crew to face these challenges.
Exploring Space

Section 3 Current and Future Space Missions

**Skim** through Section 3 of your text. Read the headings and examine the illustrations. Write three questions that come to mind. Try to answer your questions as you read.

1. __________________________________________
   __________________________________________

2. __________________________________________
   __________________________________________

3. __________________________________________
   __________________________________________

**Review Vocabulary**

Use cosmonaut in a sentence that shows its scientific meaning.

- cosmonaut ________________________________________
  __________________________________________

**New Vocabulary**

Use the following key terms in original sentences to show their scientific meaning.

- space shuttle _____________________________________
  __________________________________________

- space station _____________________________________
  __________________________________________

**Academic Vocabulary**

Define the scientific meaning of technology using a dictionary.

- technology _______________________________________
  __________________________________________
### Main Idea

**The Space Shuttle**

I found this information on page __________.

**Exploring Mars**

I found this information on page __________.

### Details

**Summarize** characteristics of the space shuttle below.

<table>
<thead>
<tr>
<th>Engines:</th>
<th>Cargo bay:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landings:</th>
<th>Reusability:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Organize** information about missions to Mars by completing the diagram. Identify each probe by its name and mission.

- 1996
- 2002
- 2003
- 2008
Exploring the Moon and Cassini

I found this information on page _________.

Complete the chart with information about the Lunar Prospector and Cassini spacecraft.

<table>
<thead>
<tr>
<th>Spacecraft</th>
<th>Launch Date</th>
<th>Destination</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lunar Prospector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassini</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Organize information by identifying an example of technology developed for space programs that is useful in everyday life.

Everyday uses of space technology

- transportation and construction
- medicine
- law enforcement and safety

Research and construction of the earliest space stations was undertaken by nations working independently. Work on the International Space Station is being performed by many nations working together. Analyze some benefits to such international cooperation in scientific research.
Much of today’s planetary research is carried out using remote-controlled rovers that are monitored and maneuvered by scientists on Earth. Suppose that you could design a remote-controlled rover to conduct research on a planet or the Moon.

• Draw a sketch of your rover below.
• Identify features you would include on your rover.
• Explain why you would include each feature.
• Use what you have learned about space technologies in this section.
Exploring Space  Chapter Wrap-Up

Review the ideas you listed in the chart at the beginning of the chapter. Cross out any incorrect information in the first column. Then complete the chart by filling in the third column.

<table>
<thead>
<tr>
<th>K</th>
<th>What I know</th>
<th>W</th>
<th>What I want to find out</th>
<th>L</th>
<th>What I learned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.

☐ Study your *Science Notebook* on this chapter.

☐ Study the definitions of vocabulary words.

☐ Review daily homework assignments.

☐ Re-read the chapter and review the charts, graphs, and illustrations.

☐ Review the Self Check at the end of each section.

☐ Look over the Chapter Review at the end of the chapter.

**SUMMARIZE IT**

After reading this chapter, identify three things that you have learned about exploring space.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>The Sun-Earth-Moon System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The Sun appears to move across the sky each day.</td>
</tr>
<tr>
<td></td>
<td>• The spinning of Earth on its axis is rotation.</td>
</tr>
<tr>
<td></td>
<td>• The Moon’s rotation and revolution take the same amount of time, so the same side of the Moon always faces Earth.</td>
</tr>
<tr>
<td></td>
<td>• No evidence of water has been found on the Moon.</td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Rotation or revolution—which motion of Earth brings morning and which brings summer?

---

The Sun-Earth-Moon System

Before You Read
The Sun-Earth-Moon System

Section 1 Earth

Scan the tables and illustrations in Section 1, and write three questions you have about Earth.

1. __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. __________________________________________________________
   __________________________________________________________
   __________________________________________________________

3. __________________________________________________________
   __________________________________________________________
   __________________________________________________________

Review Vocabulary

Use orbit in a sentence that reflects its scientific meaning.

orbit

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

New Vocabulary

Write the correct vocabulary term on each blank.

spinning of Earth on its axis, which causes day and night to occur

Earth's yearly orbit around the Sun

imaginary line around which Earth spins

elongated, closed curve, such as Earth's orbit around the Sun

occurs when the Sun is directly above Earth's equator and the number of daylight and nighttime hours are nearly equal

day when the Sun reaches its greatest distance north or south of the equator

round, three-dimensional object

Academic Vocabulary

Define maintain using a dictionary.

maintain

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

258 The Sun-Earth-Moon System
Section 1 Earth (continued)

Main Idea

Properties of Earth

I found this information on page ___________.

Magnetic Field

I found this information on page ___________.

Details

Label the diagram of Earth.

Diameter (pole to pole):

Diameter (equator):

Period of rotation (1 day):

Period of revolution (1 year):

Compare Earth’s magnetic poles with its rotational poles by drawing them on the circle below. Label Earth’s:

- rotational axis
- rotational poles
- north magnetic pole
- south magnetic pole
- the difference in degrees between the magnetic and rotational poles

Summarize why Earth has a magnetic field.
Compare facts about summer and winter in the chart.

<table>
<thead>
<tr>
<th>Seasonal Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Summer</td>
</tr>
<tr>
<td>Winter</td>
</tr>
<tr>
<td>Hemisphere tilts</td>
</tr>
<tr>
<td>Hours of daylight</td>
</tr>
<tr>
<td>Solar radiation</td>
</tr>
<tr>
<td>Temperatures</td>
</tr>
</tbody>
</table>

Compare and contrast solstices and equinoxes by completing the Venn diagram using the phrases below.

- caused by tilt of Earth’s axis
- daylight hours and nighttime hours nearly equal
- longest or shortest period of daylight of the year
- occur twice yearly
- Sun at 90° angle to equator
- Sun reaches greatest distance from equator

It takes Earth one year to make a complete revolution around the Sun. Determine how much time passes between one spring equinox and the next. Explain your reasoning.
The Sun-Earth-Moon System
Section 2 The Moon—Earth’s Satellite

Predict three things that might be discussed in Section 2 based on its title and headings.

1. 
2. 
3. 

Define mantle to show its scientific meaning.

mantle

Write the correct vocabulary term next to each definition.

different ways the Moon appears from Earth

occurs when the lit side of the moon is not visible; the moon is between Earth and the Sun

describes the Moon when more of its lighted portion is visible each night

occurs when all of the Moon’s surface that faces Earth is lit

describes the Moon when less of its lighted portion is visible each night

occurs when the Moon moves between the Sun and Earth and casts a shadow over part of Earth

occurs when Earth moves between the Sun and the Moon and casts a shadow on the Moon

dark, flat regions on the Moon that formed as lava spread over the surface

Use the term cycle in a sentence that reflects its scientific meaning.

cycle
Describe why the face of the Moon that we see does not change.

Phases of the Moon

Analyze the diagram below. Imagine that you are standing on Earth and that the Sun's rays are coming from the direction shown. Draw a picture showing how the moon would look from Earth at each of the labeled positions. The first one has been done for you.
Section 2 The Moon—Earth’s Satellite (continued)

**Main Idea**

**Eclipses**

Compare the alignments that cause solar and lunar eclipses by drawing diagrams of the positions of the Sun, the Moon, and Earth relative to one another. Show how the shadow is cast in each case.

**Inside the Moon**

Summarize the Moon’s structure according to one model.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crust</td>
<td></td>
</tr>
<tr>
<td>Upper Mantle</td>
<td></td>
</tr>
<tr>
<td>Lower Mantle</td>
<td></td>
</tr>
<tr>
<td>Core</td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARIZE IT**

Summarize the impact theory of how the Moon formed.
The Sun-Earth-Moon System
Section 3 Exploring Earth’s Moon

Objectives  Review the objectives for Section 3. Write two questions that come to mind.

1. 
2. 

Define comet using your book or a dictionary. Then write a sentence or make a sketch to show its scientific meaning.

Define impact basin using your book or a dictionary. Then sketch how an impact basin forms.

Use a dictionary to define core as it relates to planets and moons. Then sketch the Moon, and show where you think its core is.
Distinguish between the following Moon missions by indicating when they took place and what they accomplished.

<table>
<thead>
<tr>
<th>Mission</th>
<th>Year</th>
<th>Accomplishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luna 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveyor 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunar Orbiters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apollo 8</td>
<td></td>
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<td>Apollo 11</td>
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<td>Apollo 15</td>
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<td>Apollo 17</td>
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</tr>
</tbody>
</table>

Organize information about Clementine’s mission by outlining it below.

Clementine’s mission

I. Objectives
   A. __________________________________________
   B. __________________________________________

II. Instruments
   A. __________________________________________
   B. __________________________________________

III. Discoveries
   A. __________________________________________
   B. __________________________________________
Main Idea

I found this information on page __________.

Details

Organize information about the Lunar Prospector by completing the diagram.

Lunar Prospector Mission

To map the Moon’s:  

Confirmed that the Moon has:

Analyze why the presence of water on the Moon would be a benefit to humans.

________________________________________

________________________________________

________________________________________

Synthesize It

Missions to the Moon have included some with astronauts and some without astronauts. Predict whether astronauts will be sent on Moon missions in the future. Support your position with three facts or examples.

________________________________________

________________________________________

________________________________________

________________________________________

________________________________________
Suppose that you are on a mission to explore the Moon. In the spaces provided, describe what you think you will observe from each location.

From the windows of your spacecraft orbiting the Moon

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

On the Moon’s surface near the Moon’s equator

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

On the surface near the Moon’s south pole

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________
The Earth-Moon-Sun System

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>The Sun-Earth-Moon System</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The Sun appears to move across the sky each day.</td>
<td></td>
</tr>
<tr>
<td>• The spinning of Earth on its axis is rotation.</td>
<td></td>
</tr>
<tr>
<td>• The Moon’s rotation and revolution take the same amount of time, so the same side of</td>
<td></td>
</tr>
<tr>
<td>the Moon always faces Earth.</td>
<td></td>
</tr>
<tr>
<td>• No evidence of water has been found on the Moon.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about the Sun-Earth-Moon system.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Before You Read

*Before you read the chapter, respond to these statements.*

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>The Solar System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The planets revolve around Earth.</td>
</tr>
<tr>
<td></td>
<td>• The solar system is more than 4.6 billion years old.</td>
</tr>
<tr>
<td></td>
<td>• Mercury has an atmosphere similar to Earth’s.</td>
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<tr>
<td></td>
<td>• Uranus has craters and deep valleys.</td>
</tr>
<tr>
<td></td>
<td>• Earth is the only planet known to be able to support life.</td>
</tr>
</tbody>
</table>

**Construct the Foldable as directed at the beginning of this chapter.**

**Science Journal**

*If you could command the Keck telescope, what would you view? Describe what you would see.*

<p>| |</p>
<table>
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</table>
The Solar System

Section 1 The Solar System

**Skim** the headings in Section 1. Write three things you expect to learn in Section 1.

1. __________________________________________

2. __________________________________________

3. __________________________________________

**Define** system using your book or a dictionary. Give an example of a system.

system

____________________________________________

____________________________________________

____________________________________________

**Write a scientific sentence describing the solar system.**

solar system

____________________________________________

____________________________________________

____________________________________________

**Define** contract as a verb, using a dictionary. Then rewrite the following sentence, using the word contracted.

Over time, the cloud of gas and dust became smaller, forming a large, tightly packed, spinning disk.

contract

____________________________________________

____________________________________________

____________________________________________

____________________________________________
Contrast the Earth-centered model of the solar system and the Sun-centered model of the solar system in the chart below.

<table>
<thead>
<tr>
<th></th>
<th>Earth-centered</th>
<th>Sun-centered</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many planets are in the system?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe motions in the system.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluate how Galileo’s discoveries provided evidence for the Sun-centered model of the solar system. Complete the statements.

Galileo discovered that the planet ____________ went through ____________ like our ____________. These changes could occur only _________________.

Create a drawing of the solar system.
- Draw and label the Sun and the planets in the correct order.
- Identify which planets were included in the Earth-centered model of the solar system by putting a check mark beside those.
Sequence the steps in the formation of the solar system.

1. 

2. 

3. 

4. 

Classify the eight planets as inner or outer planets, using the chart below. Identify a characteristic of each group of planets.

<table>
<thead>
<tr>
<th>The Eight Planets</th>
<th>Inner</th>
<th>Outer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Names of Planets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Summarize how ideas about the structure and motions of the solar system changed over time.
The Solar System

Section 2 The Inner Planets

Scan the headings of Section 2. Write a question for each heading.

Mercury: ________________________________

Venus: _________________________________

Earth: ________________________________

Mars: ________________________________

Define space probe using your book or a dictionary.

space probe

____________________________

____________________________

____________________________

____________________________

Write a scientific sentence using each vocabulary term.

Mercury

____________________________

____________________________

____________________________

____________________________

Venus

____________________________

____________________________

____________________________

____________________________

Earth

____________________________

____________________________

____________________________

____________________________

Mars

____________________________

____________________________

____________________________

____________________________

Use a dictionary to define reveal.

reveal

____________________________

____________________________

____________________________

____________________________
Section 2 The Inner Planets (continued)

Main Idea

**Mercury**
I found this information on page ________.

**Venus**
I found this information on page ________.

**Earth**
I found this information on page ________.

Details

Organize key facts about Mercury. Complete the chart.

<table>
<thead>
<tr>
<th>Mercury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Surface</td>
</tr>
<tr>
<td>Core</td>
</tr>
<tr>
<td>Atmosphere</td>
</tr>
<tr>
<td>Temperature</td>
</tr>
<tr>
<td>Explored By</td>
</tr>
</tbody>
</table>

Complete the graphic organizer to identify key features of Venus.

![Graphic Organizer for Venus]

Summarize unique features of Earth that allow it to support life.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Main Idea

Mars

I found this information on page _______.

Details

Summarize important information about Mars.

- Surface Features
- Space Probes
- Atmosphere
- Seasons
- Moons

Synthesize It

Compare and contrast the inner planets. Choose one feature, such as temperature, size, or atmosphere, and write a paragraph comparing and contrasting this feature for the four inner planets.

__________________________________________________________________________

__________________________________________________________________________

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__________________________________________________________________________
The Solar System
Section 3 The Outer Planets

**Skim** Section 3. Predict two ways in which the outer planets differ from the inner planets.

1. 

2. 

**Define** the word moon using a dictionary or your book.

**New Vocabulary**

- Label each definition with the correct vocabulary term.
  - the seventh planet from the Sun; large and gaseous, with a distinct bluish-green color
  - largest planet and fifth from the Sun; contains more mass than all of the other planets combined
  - considered to be a dwarf planet; has a solid icy-rock surface
  - giant, high-pressure storm in Jupiter’s atmosphere
  - the eighth planet from the Sun; large and gaseous, with rings that vary in thickness
  - second-largest planet and sixth from the Sun; has a complex ring system and at least 31 moons

**Academic Vocabulary**

Define survey as a verb, using a dictionary. Then use this term in a sentence related to the topic of Section 3.
### Main Idea

**Jupiter**

I found this information on page ___________.

**Saturn**

I found this information on page ___________.

### Details

**Identify** the space probes that have explored Jupiter.

<table>
<thead>
<tr>
<th>Space Probes</th>
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<tbody>
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</table>

**Complete** the chart to identify key facts about Jupiter.

<table>
<thead>
<tr>
<th>Jupiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmosphere</td>
</tr>
<tr>
<td>Moons</td>
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</tbody>
</table>

**Organize** key facts about Saturn.

<table>
<thead>
<tr>
<th>Saturn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Probes</td>
</tr>
<tr>
<td>Atmosphere</td>
</tr>
<tr>
<td>Rings</td>
</tr>
<tr>
<td>Moons</td>
</tr>
</tbody>
</table>
Section 3 The Outer Planets (continued)

Main Idea

Uranus
I found this information on page ____________.

Neptune
I found this information on page ____________.

Dwarf Planets
I found this information on page ____________.

Details

Summarize details about Uranus in the graphic organizer.

<table>
<thead>
<tr>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

Uranus

<table>
<thead>
<tr>
<th>Moons</th>
<th>Rotation</th>
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</thead>
<tbody>
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<td></td>
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</tbody>
</table>

Complete the chart of key facts about Neptune.

<table>
<thead>
<tr>
<th>Neptune</th>
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<tbody>
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<td></td>
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</table>

Atmosphere

Moons

Summarize the features of the dwarf planets.

CONNECT IT

Summarize the major features that distinguish the outer planets from the inner planets.

Name ___________________________ Date ___________________________
The Solar System
Section 4 Other Objects in the Solar System

Scan the title and headings in Section 4. Write a sentence that describes what you think will be covered in the section.

Review Vocabulary Write a scientific sentence using the term crater.

crater

New Vocabulary Define each term using your book or a dictionary.

comet

meteor

meteorite

asteroid

Define approach, using a dictionary. Then locate a sentence in Section 4 that uses the word or a form of the word.

approach
Summarize two facts about the Oort Cloud.
1. 
2. 

Model a comet. Label its nucleus, coma, and tail. Show the solar wind coming from the Sun and where the Sun is in relation to the comet’s tail.

Distinguish between meteoroids, meteors, and meteorites. Identify key features of meteoroids, and then contrast meteors and meteorites.

Meteoroids are 

Do they burn up in the atmosphere? 

Yes 

They are called .

Another term for these is .

No 

They are called . They come from 
1. 
2. 
3. 
4. 
Main Idea

Asteroids

I found this information on page ________.

Details

Organize information about asteroids. Complete the outline.

Asteroids are ____________________________________________

A. Location

1. ____________________________________________

2. ____________________________________________

B. What scientists learn from asteroids

1. ____________________________________________

2. ____________________________________________

Model the appearance of the asteroid belt in the solar system.
Identify the two planets between which it lies.

Model__________________________________________________

SYNTHESIZE IT

Compare and contrast comets, meteoroids, and asteroids in a paragraph or a chart.

______________________________
The Solar System Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>The Solar System</th>
<th>After You Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The planets revolve around Earth.</td>
<td></td>
</tr>
<tr>
<td>• The solar system is more than 4.6 billion years old.</td>
<td></td>
</tr>
<tr>
<td>• Mercury has an atmosphere similar to Earth’s.</td>
<td></td>
</tr>
<tr>
<td>• Uranus has craters and deep valleys.</td>
<td></td>
</tr>
<tr>
<td>• Earth is the only planet known to be able to support life.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

You are planning a new space probe mission to the solar system. Decide on one or more planets, moons, comets, or asteroids that you would like to study. Explain what you expect to see and learn about each object.
Stars and Galaxies

Before You Read

Before you read the chapter, respond to these statements.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Before You Read</th>
<th>Stars and Galaxies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern astronomy divides the sky into 88 constellations.</td>
<td></td>
</tr>
<tr>
<td>The Sun is an ordinary star and is the center of our solar system.</td>
<td></td>
</tr>
<tr>
<td>All stars have the same brightness.</td>
<td></td>
</tr>
<tr>
<td>The Milky Way is a part of a cluster called the Local Group, made up of about 45 galaxies.</td>
<td></td>
</tr>
</tbody>
</table>

Construct the Foldable as directed at the beginning of this chapter.

Science Journal

Write a description in your Science Journal of a galaxy.
Predict three topics that will be discussed in Section 1 as you scan the headings and illustrations.

1. 
2. 
3. 

Define star to show its scientific meaning.

Define the following terms to show their scientific meanings.

constellation

absolute magnitude

apparent magnitude

light-year

Use a dictionary to define component as a noun. Then explain what the statement “breaking it down into its component parts” might mean.

component
Main Idea

**Constellations**
*I found this information on page ___________.*

Organize facts about constellations into an outline. Use the structure provided below as a guide.

I. Constellations
   A. __________________________________________
   B. __________________________________________
   C. __________________________________________

II. Movement of constellations
   A. Circumpolar constellations
      1. _______________________________________
      2. _______________________________________
   B. Other constellations
      1. _______________________________________
      2. _______________________________________

Complete the diagram to show how each type of magnitude is related to a star’s distance.

**Effect of Distance on Magnitude**

- Absolute magnitude ____________
- Apparent magnitude ____________
Analyze the diagram below that shows how parallax occurs as Earth moves in its orbit.

Summarize how astronomers use parallax.

Sequence the colors of stars by temperature. Complete the diagram by writing the correct color in each box.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cooler</th>
<th>Medium</th>
<th>Hotter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Star Color</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A hot, blue-white star has brighter absolute magnitude than a cooler, red star. The red star appears brighter from Earth. What can you conclude about the two stars?
Skim through Section 2 of your book. Write three questions that come to mind from reading the headings and examining the illustrations.

1. ________________________________
2. ________________________________
3. ________________________________

Define cycle to show its scientific meaning.

Write a sentence from your book in which each term appears.

photosphere

chromosphere

corona

Use a dictionary to define nuclear to show its scientific meaning. Use nuclear in an original sentence.

nuclear
Summarize basic information about the Sun. Complete the graphic organizer.

The Sun’s Layers
I found this information on page __________.

Model the Sun, including the following features. Include captions summarizing each feature.
• chromosphere
• convection zone
• core
• corona
• photosphere
• radiation zone

The Sun’s Atmosphere
I found this information on page __________.
### Section 2 The Sun (continued)

#### Main Idea

**Surface Features**
*I found this information on page _________.*

**Details**

Organize *information about the Sun’s surface features.*

- **Sunspots:**
  - __________________________
  - __________________________
  - __________________________

- **Prominences:**
  - __________________________
  - __________________________
  - __________________________

- **Flares:**
  - __________________________
  - __________________________
  - __________________________

- **Coronal mass ejection (CME):**
  - __________________________
  - __________________________

Compare and contrast *the Sun with other stars.* Complete the paragraph below.

Compared with other stars, the Sun’s __________, __________, __________, and __________ are about average. In contrast with other stars, the Sun __________ and __________.

---

#### The Sun—An Average Star

*I found this information on page _________.*

---

**CONNECT IT**

Choose one characteristic you have learned about the Sun, such as its size, structure, or distance from Earth. Suppose that the characteristic was different. Predict how this would affect life on Earth.

---
Scan the headings of Section 3 to find three stages of the evolution of stars.

1. ____________ 2. ____________ 3. ____________

Define gravity. Use the term in a sentence to show its scientific meaning.

gravity

Define the following terms. Write a sentence to show each term’s scientific meaning.

nebula

white dwarf

neutron star

Define enormous using a dictionary.

enormous
Classify stars using the H-R diagram. Label the diagram below to show where you would expect to find white dwarfs, the main sequence, supergiants, giants, and the Sun.

Increasing brightness

Temperature (K)

Spectra Class

O  B  A  F  G  K  M

Summarize how stars generate energy.

I found this information on page ____________.
**Main Idea**

**Evolution of Stars**

*I found this information on page __________.*

**Details**

**Sequence** the evolution of stars. Complete the flow chart.

**Stars with mass 8 times the Sun’s mass or less**

- contracts and fusion begins
- hydrogen fuel runs out
- outer layers escape, leaving core

**Stars with mass more than 8 times the Sun’s mass**

- contracts and fusion begins
- hydrogen fuel runs out; heavy elements form
- iron forms in core; core collapses violently

- core mass between 1.4 and 3 times the mass of the Sun
- core mass more than 3 times the mass of the Sun

**CONNECT IT**

Evaluate why supernovas are important to the existence of life on Earth.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

292  *Stars and Galaxies*
Stars and Galaxies
Section 4 Galaxies and the Universe

Preview Section 4 of your book using the list below.

☐ Read all section headings.
☐ Read all bold words.
☐ Look at all of the pictures.
☐ Think about what you already know about galaxies and the universe.

Write two facts that you discovered during your preview.
1. ____________________________________________________________
2. ____________________________________________________________

Define universe to reflect its scientific meaning.

universe

Define the following key terms. Then write sentences to show the scientific meaning of each term.

galaxy

big bang theory

Define normal. Write a sentence to show its scientific meaning.

normal
Classify the three major types of galaxies. Complete the chart.

<table>
<thead>
<tr>
<th>Galaxy Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiral arms that wind outward from the center</td>
<td></td>
</tr>
<tr>
<td>Does not look like the other two types of galaxies; many possible shapes</td>
<td></td>
</tr>
</tbody>
</table>

Model the Milky Way galaxy.
- Draw a side view and overhead view of the Milky Way.
- Mark the Sun's position on both views.
- Label the size of the Milky Way and the distance from the center to the Sun's position on the overhead view.

Identify three other facts about the Milky Way.

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
Section 4 Galaxies and the Universe (continued)

Main Idea

Origin of the Universe
I found this information on page ____________.

Details

Contrast two models of the origin of the universe: the steady state theory and the oscillating model.

Steady state theory:

Oscillating model:

Expansion of the Universe
I found this information on page ____________.

Analyse how scientists used the Doppler shift to reach a conclusion about whether the universe is expanding or contracting.

Observation

Conclusion

The Big Bang Theory
I found this information on page ____________.

Summarise the big bang theory of the origin of the universe.

---

Summarize It

Describe your location in the universe as completely as you can.

---
Stars and Galaxies  Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned and complete the table below. Compare your previous answers with these.

1. Write an A if you agree with the statement.
2. Write a D if you disagree with the statement.

<table>
<thead>
<tr>
<th>Stars and Galaxies</th>
<th>After You Read</th>
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<td>• The Milky Way is a part of a cluster called the Local Group, made up of about 45 galaxies.</td>
<td></td>
</tr>
</tbody>
</table>

Review

Use this checklist to help you study.

☐ Review the information you included in your Foldable.
☐ Study your Science Notebook on this chapter.
☐ Study the definitions of vocabulary words.
☐ Review daily homework assignments.
☐ Re-read the chapter and review the charts, graphs, and illustrations.
☐ Review the Self Check at the end of each section.
☐ Look over the Chapter Review at the end of the chapter.

SUMMARIZE IT

After reading this chapter, identify three things that you have learned about stars and galaxies.

__________________________________________

__________________________________________

__________________________________________
<table>
<thead>
<tr>
<th><strong>Academic Vocabulary</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>accompany</strong>: to go together with; to happen at the same time as</td>
</tr>
<tr>
<td><strong>accumulate</strong>: to gather, pile up, or collect</td>
</tr>
<tr>
<td><strong>accurate</strong>: careful and exact; without mistakes or errors</td>
</tr>
<tr>
<td><strong>affect</strong>: to influence</td>
</tr>
<tr>
<td><strong>approach</strong>: to come near</td>
</tr>
<tr>
<td><strong>area</strong>: particular space, region, or section</td>
</tr>
<tr>
<td><strong>chemical</strong>: any substance used in or obtained by a chemical process</td>
</tr>
<tr>
<td><strong>collapse</strong>: to fall or shrink together abruptly and completely</td>
</tr>
<tr>
<td><strong>compensate</strong>: to make up for</td>
</tr>
<tr>
<td><strong>component</strong>: part of a machine or system</td>
</tr>
<tr>
<td><strong>consist</strong>: to be made up of; to contain</td>
</tr>
<tr>
<td><strong>constant</strong>: not changing; remaining the same; remaining free of variation; regular; stable</td>
</tr>
<tr>
<td><strong>contract</strong>: to make or become shorter or smaller</td>
</tr>
<tr>
<td><strong>controversy</strong>: argument or debate</td>
</tr>
<tr>
<td><strong>convert</strong>: to change from one form to another form</td>
</tr>
<tr>
<td><strong>core</strong>: center; a central part of something</td>
</tr>
<tr>
<td><strong>create</strong>: to bring about</td>
</tr>
<tr>
<td><strong>cycle</strong>: series of actions that repeat</td>
</tr>
<tr>
<td><strong>derive</strong>: to get or receive from a source</td>
</tr>
<tr>
<td><strong>detect</strong>: to discover something hidden or not easily noticed</td>
</tr>
<tr>
<td><strong>diverse</strong>: not all the same, varied</td>
</tr>
<tr>
<td><strong>emerge</strong>: to come out; to appear</td>
</tr>
<tr>
<td><strong>enormous</strong>: having great size</td>
</tr>
<tr>
<td><strong>environment</strong>: the physical, chemical, and biotic factors that surround living things</td>
</tr>
<tr>
<td><strong>erode</strong>: to wear away</td>
</tr>
<tr>
<td><strong>eventual</strong>: ultimately resulting</td>
</tr>
<tr>
<td><strong>exceed</strong>: to go beyond or be greater than</td>
</tr>
<tr>
<td><strong>expose</strong>: to leave open or without protection; to reveal</td>
</tr>
<tr>
<td><strong>extract</strong>: to take, get, or pull out</td>
</tr>
<tr>
<td><strong>formula</strong>: a group of symbols and figures showing the elements in a chemical compound</td>
</tr>
<tr>
<td><strong>goal</strong>: objective or end that one strives to achieve</td>
</tr>
<tr>
<td><strong>hypothesis</strong>: a reasonable guess that can be tested and is based on what is known and what is observed</td>
</tr>
<tr>
<td><strong>impact</strong>: a strong effect</td>
</tr>
<tr>
<td><strong>indicate</strong>: to be or give a sign of</td>
</tr>
<tr>
<td><strong>infer</strong>: to arrive at a conclusion or an opinion by reasoning</td>
</tr>
<tr>
<td><strong>interval</strong>: space or time between events</td>
</tr>
<tr>
<td><strong>layer</strong>: one thickness over another</td>
</tr>
<tr>
<td><strong>likewise</strong>: in the same way</td>
</tr>
<tr>
<td><strong>locate</strong>: to find the position or site of</td>
</tr>
<tr>
<td><strong>maintain</strong>: to continue; to support</td>
</tr>
<tr>
<td><strong>normal</strong>: conforming to a type; standard or regular pattern</td>
</tr>
<tr>
<td><strong>nuclear</strong>: of or relating to the atomic nucleus</td>
</tr>
</tbody>
</table>
objective: open and fair; without bias
obtain: to get through effort; gain
obvious: easy to see or understand; clear
occur: to happen or take place
outcome: end result of a particular situation or experiment
parallel: being the same distance apart at all points
phenomenon: any fact, condition, or happening that can be observed and described in a scientific way
physical: having to do with things we experience through our senses
predict: to tell what one thinks will happen in the future
process: series of changes by which something develops
range: the difference between the highest and lowest values
ratio: relation of one thing to another in size or amount
recover: to get back something that has been lost
release: to set free or let go
reveal: to make known; to show or display
reverse: to go in the opposite direction
rigid: not bending or moving; stiff and hard
role: part played by a person or thing
sequence: one thing following another in a fixed order
stress: a force exerted when one body presses on, pulls on, pushes against, or tends to compress or twist another body
structure: anything that is built; a home or other building or a molecule’s structure
sum: the number that results when two or more numbers are added
survey: to look at or study in detail
survive: to continue to exist; to live through
technology: use of science for practical purposes, especially in engineering and industry
trace: a very small amount
transfer: to move, carry, send, or change from one person or place to another
transform: to change the nature or condition of something
transport: to carry from one place to another
undergo: to go through; to endure
underlie: to lie beneath
vary: to change; to make different
visible: able to be seen; perceptible with the eye
volume: the amount of space taken up by an object or substance