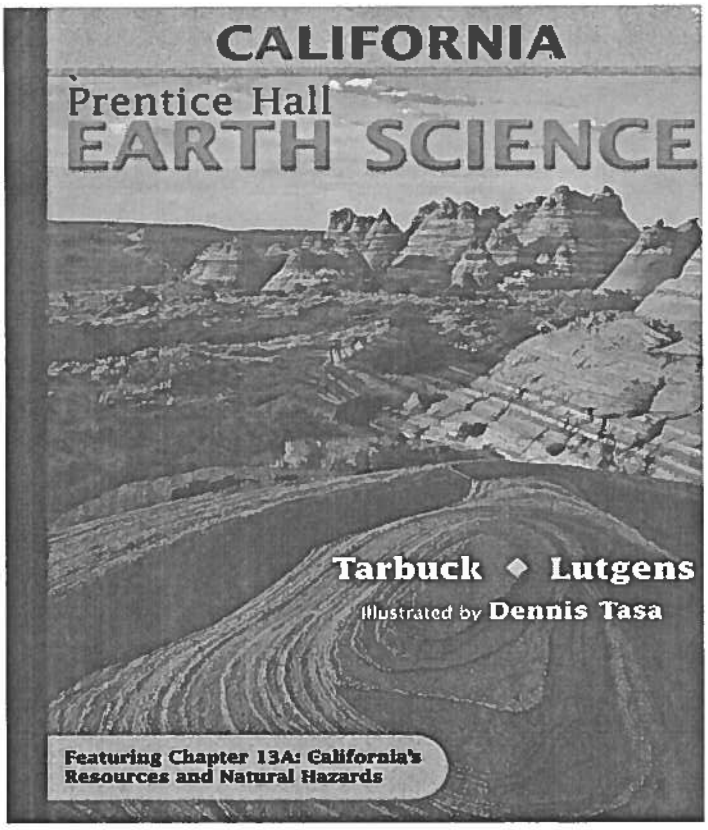
Chino Valley Alternative Education Center's

INDEPENDENT STUDY

Earth Science

SEMESTER 1 WORK BOOKLET 1



CHAPTERS 1-6

Name _____ Class _____ Date _____

Chapter 1 Introduction to Earth Science

Section 1.1 What Is Earth Science?

This section explains what Earth science is and what Earth scientists study.

Reading Strategy

Categorizing As you read about the different branches of Earth science, fill in the column with the name of each branch and list some of the things that are studied. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

geology	a.
b.	c.
d.	e.
f.	g.

Overview of Earth Science

1. Circle the letters of the topics studied in Earth science.
   a. Earth's atmosphere
   b. Earth's surface
   c. Earth's neighbors in space
   d. Earth's interior
2. What are some of the subdivisions of Earth science? _____
   _____
   _____
3. What does the word *geology* mean? _____
   _____
4. Is the following sentence true or false? Geology is divided into two broad areas—physical geology and historical geology. _____
5. What do physical geologists study? _____
   _____
   _____
6. Rocks and minerals form in response to Earth's _____ and _____ processes.

7. What do historical geologists study? _____

_____

_____

8. Circle the letter of each science that is integrated into oceanography.
   a. chemistry b. biology
   c. physics d. meteorology

9. What do oceanographers study? _____

_____

_____

10. The study of the atmosphere and the processes that produce weather and climate is _____.

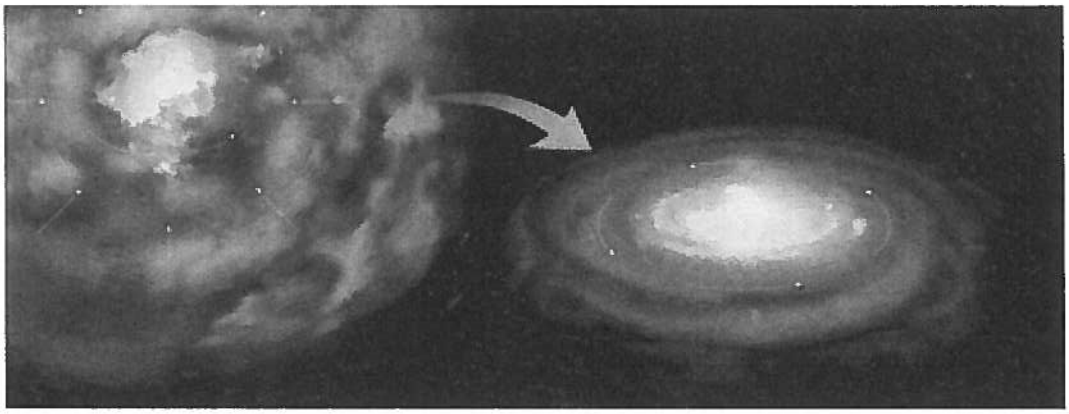
11. The science of _____ is the study of the universe.

Formation of Earth

12. The _____ hypothesis suggests that the bodies of our solar system evolved from an enormous rotating cloud called the solar nebula.

13. Is the following sentence true or false? The solar nebula is made up of mostly carbon and iron. _____

14. Look at the diagram. Describe what is occurring in the first two stages of the formation of the solar system according to the nebular hypothesis.



_____

_____

_____

_____

_____

_____

Name _____ Class _____ Date _____

Chapter 1 Introduction to Earth Science

Section 1.2 A View of Earth

This section explains the physical structure of Earth.

Reading Strategy

Predicting Before you read, predict the meaning of the vocabulary terms. After you read, revise your definition if your prediction was incorrect. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Vocabulary Term	Before You Read	After You Read
hydrosphere	a.	b.
atmosphere	c.	d.
geosphere	e.	f.
biosphere	g.	h.
core	i.	j.
mantle	k.	l.
crust	m.	n.

Earth's Major Spheres

1. Earth can be thought of as consisting of four major spheres: the _____, _____, _____, and _____.

Match each term to its description.

Term	Description
_____ 2. hydrosphere	a. all life-forms on Earth
_____ 3. atmosphere	b. composed of the core, mantle, and crust
_____ 4. geosphere	c. dense, heavy inner sphere of Earth
_____ 5. biosphere	d. thin outside layer of Earth's surface
_____ 6. core	e. the water portion of Earth
_____ 7. mantle	f. the gaseous envelope around Earth
_____ 8. crust	g. located between the crust and core of Earth

9. What does each letter in the diagram below represent?

A. _____
B. _____
C. _____
D. _____
E. _____
F. _____
G. _____
H. _____
I. _____
J. _____

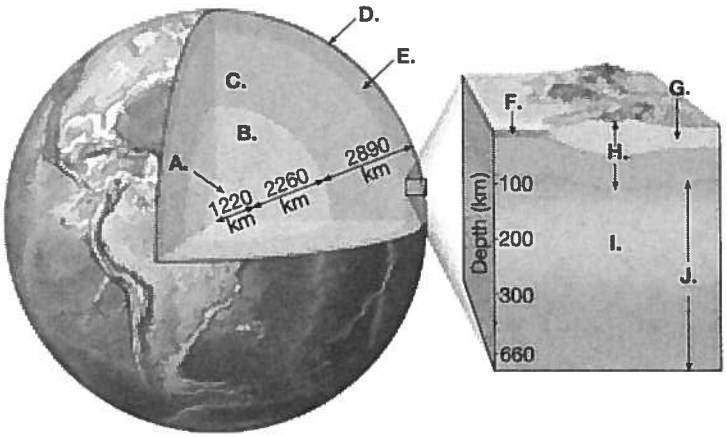


Plate Tectonics

10. Is the following sentence true or false? Forces such as weathering and erosion that work to wear away high points and flatten out Earth's surface are called constructive forces. _____

11. Circle the letter of each type of constructive force.
    a. gravity
    b. mountain building
    c. ocean currents
    d. volcanism

12. Is the following sentence true or false? Constructive forces depend on Earth's internal heat for their source of energy.
    _____

13. Circle the letter of the theory that provided geologists with a model to explain how earthquakes and volcanic eruptions occur and how continents move.
    a. continental drift
    b. evolution
    c. plate tectonics
    d. Pangaea

14. Explain the principles of the plate tectonics theory. _____

Name _____ Class _____ Date _____

Chapter 1 Introduction to Earth Science

Section 1.3 Representing Earth's Surface

This section explains various types of globes and maps used to represent Earth's surface.

Reading Strategy

Monitoring Your Understanding Preview the Key Concepts, topic headings, vocabulary, and figures in this section. List two things you expect to learn. After reading, state what you learned about each item you listed. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

What I Expect to Learn	What I Learned
a.	b.
c.	d.

Determining Location

Match each description to its term.

Description	Term
_____ 1. the distance north or south of the equator	a. longitude
_____ 2. the distance east or west of the prime meridian	b. globe
_____ 3. the line of latitude around the middle of the globe at 0 degrees	c. eastern, western
_____ 4. the line of longitude at 0 degrees	d. prime meridian
_____ 5. the two hemispheres formed by the equator	e. northern, southern
_____ 6. the two hemispheres formed by the prime meridian and the 180° meridian	f. latitude
_____ 7. a spherical model of Earth	g. equator

Name _____ Class _____ Date _____

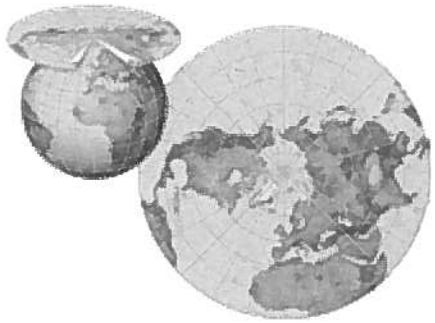
Maps and Mapping

8. A(n) _____ is a flat representation of Earth's surface.
9. Match the name of the map type with the correct example below.

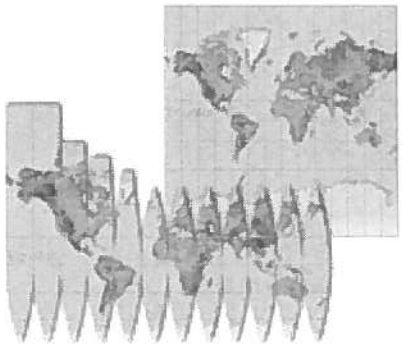
Robinson Projection Mercator Projection

Gnomonic Projection Conic Projection

A. _____ B. _____



C. _____ D. _____



Topographic Maps

10. Circle the information that topographical maps show.
    a. the round shape of Earth with no distortion
    b. the depth of Earth's layers
    c. separations between different climates
    d. the elevation of Earth's surface

Advanced Technology

11. Is the following sentence true or false? The process of collecting data about Earth from a distance (such as from orbiting satellites) is called remote sensing. _____
12. Circle the things scientists can study using satellite remote sensing.
    a. rivers and oceans b. fires
    c. pollution d. natural resources

Name _____ Class _____ Date _____

Chapter 1 Introduction to Earth Science

Section 1.4 Earth System Science

This section describes Earth as a system of interacting parts.

Reading Strategy

Outlining As you read, make an outline of the most important ideas in this section. Begin with the section title, then list the green headings as the next step of the outline. Outline further as needed. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

I. Earth System Science
  A. What Is a System?
    1. _____
    _____
    2. _____
    _____
  B. _____
    1. _____
    _____
    2. _____
    _____
    _____

1. Earth is a(n) _____ made up of numerous interacting parts, or subsystems.

What Is a System?

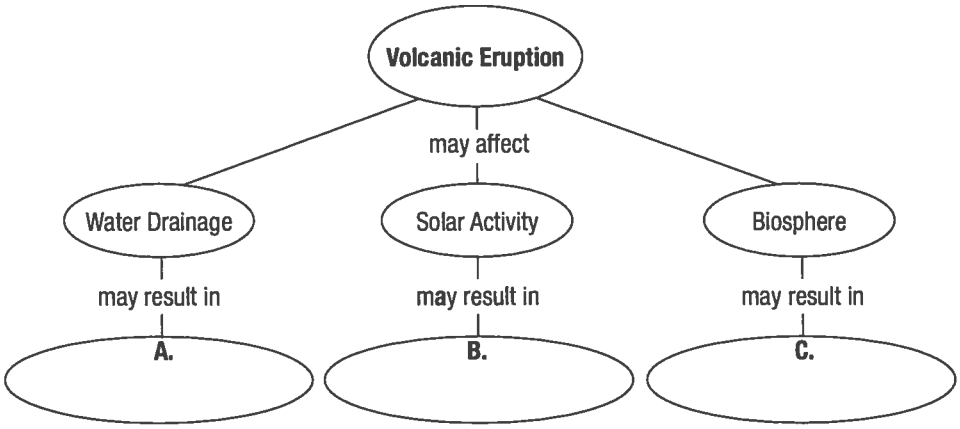
2. A system can be any size group of interacting parts that form a complex _____.
3. What is a closed system? _____
_____
_____
_____
4. What is an open system? _____
_____
_____

Earth as a System

5. Is the following sentence true or false? The Earth system is powered by energy from the sun and Earth's exterior.
_____

6. Is the following sentence true or false? The sun drives external processes that occur in the atmosphere, hydrosphere, and at Earth's surface. _____

7. Complete the concept map below.



People and the Environment

8. Circle the letter of each statement that is true about nonliving things that make up the environment.
   a. Water and air are nonliving things that make up the environment.
   b. Plants, animals, and microscopic organisms are nonliving things that make up the environment.
   c. Temperature, humidity, and sunlight are conditions that make up the environment.
   d. Soil and rock are nonliving things that make up the environment.

9. What are renewable resources? _____
_____
_____
_____
_____

10. Circle the letter of each item that is a nonrenewable resource.
   a. iron
   b. petroleum
   c. aluminum
   d. natural fibers

Environmental Problems

11. Significant threats to the environment include _____, _____, _____, and _____.

Name _____ Class _____ Date _____

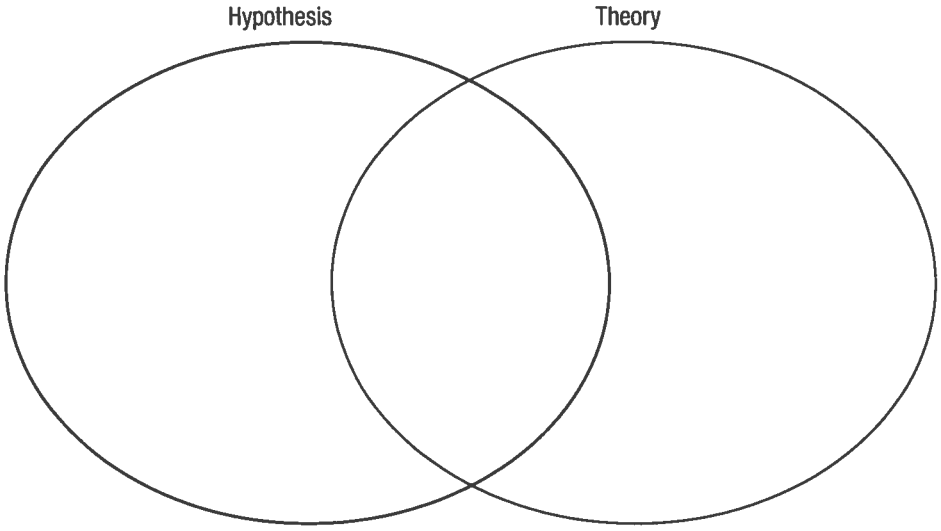
Chapter 1 Introduction to Earth Science

Section 1.5 What Is Scientific Inquiry?

This section describes methods used for scientific inquiry.

Reading Strategy

Comparing and Contrasting As you read, complete the Venn diagram by listing the ways that a hypothesis and a theory are alike and how they differ. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Hypothesis

1. What is a hypothesis? _____

_____

2. Is the following sentence true or false? Before a hypothesis can become an accepted part of scientific knowledge, it must be tested and analyzed. _____

3. Describe a well-known hypothesis that was discarded because it was found to be untrue. _____

_____

_____

4. Circle the letter of each sentence that is true about hypotheses.
   a. If a hypothesis can't be tested, it is not scientifically useful.
   b. Hypotheses that fail rigorous testing are discarded.
   c. A hypothesis is a well-tested and widely accepted principle.
   d. The concept of plate tectonics is a hypothesis.

5. Is the following sentence true or false? Sometimes more than one hypothesis is developed to explain the same set of observations.

_____

Name _____ Class _____ Date _____

Theory

6. A scientific _____ is well tested and widely accepted by the scientific community and best explains certain observable facts.
7. Describe a scientific theory that is currently accepted as true. _____

_____

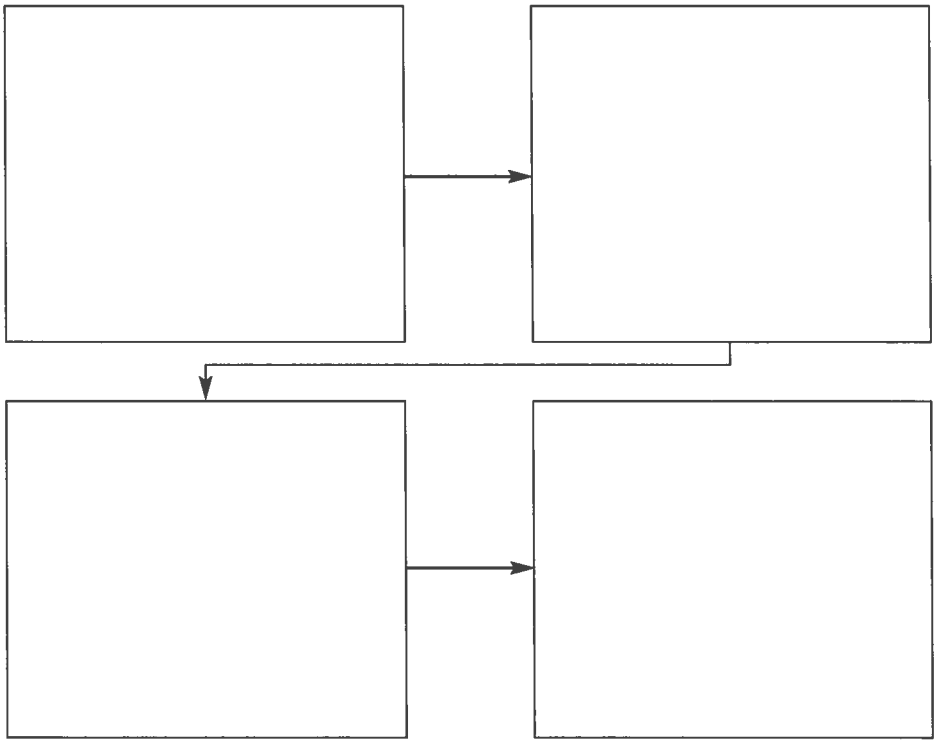
_____

_____

_____

Scientific Methods

8. Circle the letter that best answers the question. What is the process of gathering facts through observations and formulating scientific hypotheses and theories called?
   a. scientific hypothesis
   b. scientific theory
   c. scientific method
   d. scientific testing
9. Complete the flowchart showing the basic steps of the scientific method.



10. Is the following sentence true or false? All scientists follow the same steps outlined above when doing scientific research.

_____

Name _____ Class _____ Date _____

WordWise

Complete the sentences by using the scrambled vocabulary terms below.

troasnmyo	ymteeogorlo	tmsaohpeer
ttldeaiu	tidelngou	coountr lavterin
eoghpsree	ncoourt ilnes	essithopyh
yggeool	gocoaitprph pma	mstyes
oieepshbr	yhdroeeshrp	traeh ncsiece

The name of the group of sciences that deal with Earth and its neighbors in space is called _____.

All the water on Earth makes up the _____.

A word that means "study of Earth" is _____.

A distance measured in degrees north or south of the equator is called _____.

A distance measured in degrees east or west of the prime meridian is called _____.

The _____ tells you the difference in elevation between two adjacent lines on a topographic map.

Lying beneath both the atmosphere and the ocean is the _____.

A _____ can be any size group of interacting parts that form a complex whole.

An untested scientific explanation is called a _____.

The gaseous envelope surrounding Earth is called the _____.

A _____ represents Earth's three-dimensional surface in two dimensions.

The elevation on a topographic map is shown using _____.

The _____ includes all life on Earth.

The study of the atmosphere and the processes that produce weather and climate is _____.

The study of the universe is _____.

Name _____ Class _____ Date _____

Chapter 2 Minerals

Section 2.1 Matter

This section discusses the relationship between minerals and elements. It explains the parts of an atom and defines ions, isotopes, compounds, and chemical bonds.

Reading Strategy

Comparing and Contrasting As you read, complete the organizer to compare and contrast protons, neutrons, and electrons. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Protons	Electrons	Neutrons
	Differences	

Similarities

Elements and the Periodic Table

1. A substance that cannot be broken down into simpler substances by chemical or physical means is called a(n) _____.

2. The document in which elements are organized by their properties is known as the _____.

3. Circle the letter of the name for the columns within the periodic table.

   a. periods b. groups

   c. metals d. compounds

Atoms

4. What is an atom? _____

_____

5. The atomic number of boron is 5. What does this tell you about an atom of boron?

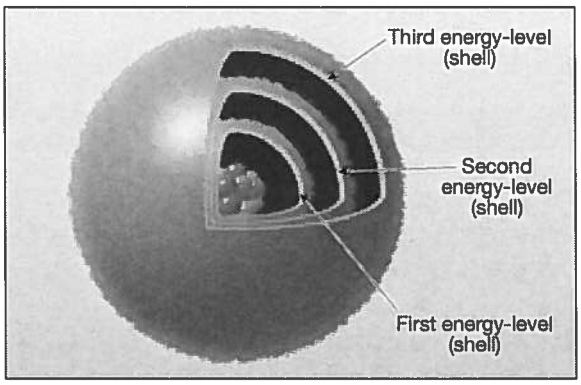
_____

_____

6. Name the three main types of particles in an atom.

_____

7. Indicate where each type of particle is located in an atom by placing the first letter of each name on the diagram.



8. From which energy level in the diagram would atomic particles be transferred to form a compound? _____

Isotopes

9. Is the following sentence true or false? Isotopes of carbon have the same number of neutrons and different numbers of protons.

_____

10. Is the following sentence true or false? The total mass of an atom of nitrogen is known as the atom's mass number. _____

Why Atoms Bond

11. What does a compound consist of? _____

_____

12. What is likely to happen to an atom of oxygen that does not contain the maximum number of electrons in its outermost energy level? _____

_____

Types of Chemical Bonds

Match each description with its type of chemical bond.

Description	Chemical Bond
_____ 13. when one metal ion shares electrons with another metal ion	a. covalent
_____ 14. when a positive ion is attracted to a negative ion	b. ionic
_____ 15. when one atom shares electrons with another atom	c. metallic

Name _____ Class _____ Date _____

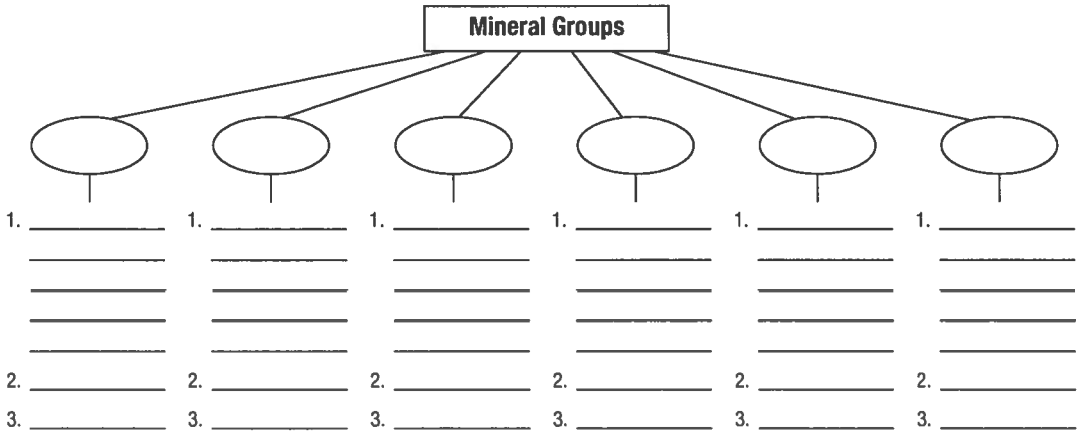
Chapter 2 Minerals

Section 2.2 Minerals

This section explains what minerals are and how they are formed, classified, and grouped.

Reading Strategy

Previewing Skim the material on mineral groups. Place each group name into one of the ovals in the organizer. As you read this section, complete the organizer with characteristics and examples of each major mineral group. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Describe the five characteristics an Earth material must have to be called a mineral.

1. _____

2. _____

3. _____

4. _____

5. _____

Name _____ Class _____ Date _____

Chapter 2 Minerals

How Minerals Form

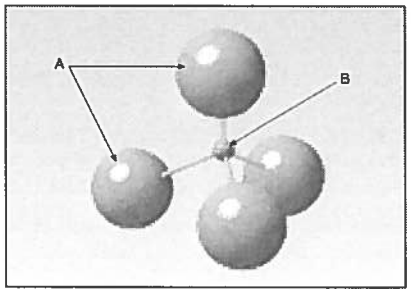
Match each description with its process of mineral formation.

Description	Process of Mineral Formation
_____ 6. As molten rock cools, elements combine to form minerals.	a. hydrothermal solution
_____ 7. Existing minerals recrystallize while still solid under pressure or form new minerals when temperature changes.	b. pressure and temperature changes
_____ 8 Hot mixtures of water and dissolved substances react with existing minerals to form new minerals.	c. precipitation
_____ 9. Substances dissolved in water react to form new minerals when the water evaporates.	d. crystallization from magma

Mineral Groups

10. What property is used to classify minerals into groups such as silicates? _____

11. What is the structure shown in the diagram? _____



12. In the diagram, letter A identifies _____ atoms.

13. In the diagram, letter B identifies a(n) _____ atom.

14. Circle the letter of something common to all halides.

a. an oxygen ion b. the element sulfur

c. a metallic element d. a halogen ion

15. Circle the letter of the mineral group that exists in a relatively pure form.

a. native elements b. sulfates

c. carbonates d. oxides

16. Is the following sentence true or false? Both carbonates and oxides are minerals that contain the element oxygen.

_____

Name _____ Class _____ Date _____

Chapter 2 Minerals

Section 2.3 Properties of Minerals

This section discusses the properties used to identify minerals, including color, luster, crystal form, streak, hardness, density, and some distinctive properties.

Reading Strategy

Outlining As you read, fill in the outline. Use the headings as the main topics and add supporting details. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

I. Properties of Minerals
  A. Color
    1. _____
    _____
    2. _____
    _____
  B. Luster
    1. _____
    _____
    2. _____
    _____

Color

1. Is the following sentence true or false? Because color is unique to all minerals, it is always useful in mineral identification.
_____

Streak

2. The color of a mineral in its _____ form is called streak.

Luster

3. What is a mineral's luster? _____
_____

4. Circle the letter of the type of luster some minerals have that makes them appear to be metals.
  a. earthy
  b. sub-metallic
  c. metallic
  d. glassy

Crystal Form

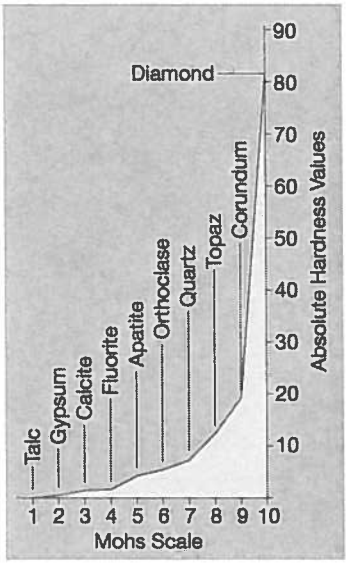
5. Is the following sentence true or false? The visible expression of a mineral's internal arrangement of atoms is its crystal form.
_____

Name _____ Class _____ Date _____

Chapter 2 Minerals

Hardness

6. Circle the letter of the hardest mineral shown on the graph.
   a. talc
   b. diamond
   c. topaz
   d. quartz
7. Circle the letter of the hardness number of corundum on the Mohs scale shown on the graph.
   a. 7
   b. 9
   c. 10
   d. 20
8. Circle the letter of the mineral that is harder than apatite shown on the graph.
   a. talc
   b. calcite
   c. fluorite
   d. orthoclase



Cleavage

9. What is a mineral's cleavage? _____
   _____
   _____

Fracture

10. Minerals are said to _____ if they do not show cleavage when broken.

Density

11. What equation could you use to express the density of an object such as a mineral sample? _____

Distinctive Properties of Minerals

12. Circle the letter of the distinctive property you could use to distinguish graphite from talc.
    a. color
    b. feel
    c. double refraction
    d. smell

Name _____ Class _____ Date _____

Chapter 2 Minerals

WordWise

Solve the clues to determine which vocabulary terms from Chapter 2 are hidden in the puzzle. Then find and circle the terms in the puzzle. The terms may occur vertically, horizontally, or diagonally.

V	E	M	A	S	S	N	U	M	B	E	R	U	N
C	D	Y	S	X	T	H	E	I	M	G	N	G	I
W	M	E	J	H	S	P	A	Q	X	Z	I	O	S
M	I	N	E	R	A	L	S	R	E	U	Y	J	O
S	C	E	H	V	T	H	Q	N	D	A	E	I	T
A	X	R	Y	P	O	B	D	T	C	N	S	L	O
L	I	G	R	A	M	C	U	G	P	L	E	S	P
B	A	Y	C	S	I	L	I	C	A	T	E	S	E
T	K	L	F	U	C	L	E	A	V	A	G	E	S
M	I	E	G	X	N	T	E	K	P	H	T	E	P
A	D	V	U	L	U	S	T	E	R	Z	P	J	B
C	H	E	L	E	M	E	N	T	D	S	S	T	X
E	X	L	M	N	B	A	U	S	S	V	H	A	L
Z	P	S	B	C	E	W	R	T	N	O	H	I	A
R	G	C	D	Q	R	J	H	S	M	F	L	K	P

Clues	Hidden Words
How light is reflected from the surface of a mineral	_____
Number of protons in an atom of an element	_____
Atoms of the same element having different numbers of neutrons	_____
Measure of how a mineral resists scratching	_____
Substance that cannot be broken down into simpler substances	_____
Examples include quartz, copper, fluorite, and talc	_____
Regions where electrons are located	_____
Most common groups of minerals on Earth	_____
Tendency of a mineral to break along flat, even surfaces	_____
Sum of protons and neutrons in the nucleus of an atom	_____

Name _____ Class _____ Date _____

Chapter 3 Rocks

Section 3.1 The Rock Cycle

This section explains the different types of rocks found on Earth and in the rock cycle.

Reading Strategy

Building Vocabulary As you read, write down the definition for each term. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Term	Definition
rock	a.
igneous rock	b.
sedimentary rock	c.
metamorphic rock	d.
rock cycle	e.
magma	f.
lava	g.
weathering	h.
sediments	i.

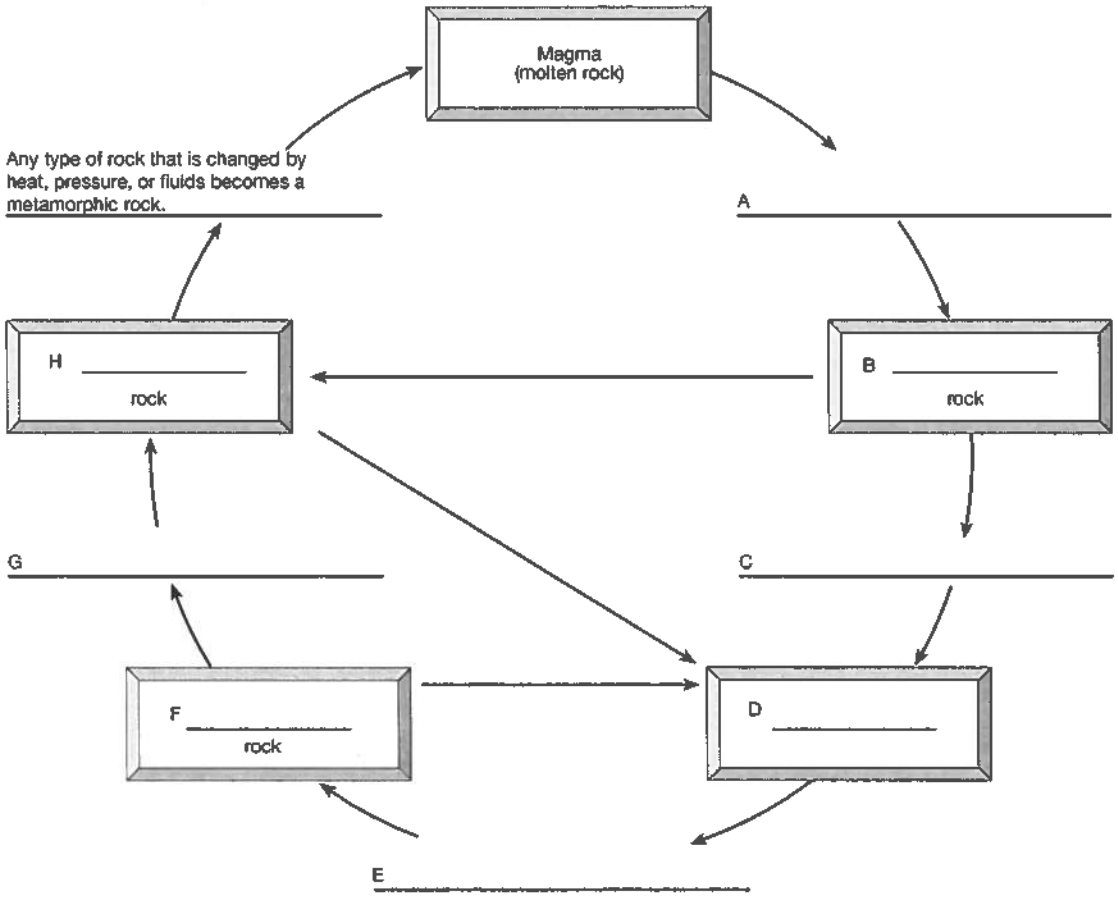
Rocks

1. A(n) _____ is any solid mass of mineral or mineral-like matter that occurs naturally as part of Earth.
2. Most rocks, such as granite, occur as a solid mixture of _____.
3. Is the following sentence true or false? A characteristic of rock is that each of the component minerals retains its properties in the mixture. _____
4. Describe a few rocks that are composed of nonmineral matter. _____

5. Circle the letters that identify a type of rock.
   a. igneous
   b. sedimentary
   c. metamorphic
   d. crystalline

The Rock Cycle

6. Fill in the blanks below in the illustration of the rock cycle.



Alternate Paths

7. Give an example of rocks that are not formed by the rock cycle.

Name _____ Class _____ Date _____

Chapter 3 Rocks

Section 3.2 Igneous Rocks

This section discusses the characteristics of igneous rocks.

Reading Strategy

Outlining Complete the outline as you read. Include points about how each of these rocks form, some of the characteristics of each rock type, and some examples of each. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

I. Igneous Rocks

A. Intrusive Rocks

1. _____

_____

2. _____

_____

B. Extrusive Rocks

1. _____

_____

2. _____

_____

Formation of Igneous Rocks

Match each description to its term.

Description	Term
_____ 1. the meaning of the Latin word *ignis*	a. magma
_____ 2. rocks that form when magma hardens beneath Earth's surface	b. granite
_____ 3. rocks that form when lava hardens	c. intrusive igneous
_____ 4. melted material beneath Earth's surface	d. lava
_____ 5. melted material at Earth's surface	e. rhyolite
_____ 6. an intrusive igneous rock that forms when magma cools slowly beneath Earth's surface	f. fire
_____ 7. an extrusive igneous rock that forms when lava cools quickly at Earth's surface	g. extrusive igneous

8. Complete the table below.

Compare and Contrast Igneous Rocks		
	Granite	**Rhyolite**
Compare		
Contrast		

Classification of Igneous Rocks

9. Two characteristics used to classify igneous rocks are _____ and _____.
10. Is the following sentence true or false? Igneous rocks that are composed primarily of quartz and feldspar have a granitic composition. _____
11. Rocks that contain dark silicate minerals and plagioclase feldspar have a(n) _____.
12. Circle the letters of the minerals that are found in andesitic rocks.
    a. amphibole b. pyroxene
    c. biotite d. plagioclase feldspar
13. Peridotite is composed almost entirely of dark silicate minerals. Its chemical composition is referred to as _____.
14. Is the following sentence true or false? Much of the upper mantle is thought to be made of granite. _____
15. Circle the statements that are true about the texture of igneous rocks.
    a. Slow cooling results in rocks with small, interconnected mineral grains.
    b. Rapid cooling of magma or lava results in rocks with small, interconnected mineral grains.
    c. A glassy texture is the result of lava that has cooled very slowly.
    d. An even rate of cooling results in rocks with very different-sized minerals.

Name _____ Class _____ Date _____

Chapter 3 Rocks

Section 3.3 Sedimentary Rocks

This section discusses the formation and classification of sedimentary rocks.

Reading Strategy

Outlining This outline is a continuation of the outline from Section 3.2. Complete this outline as you read. Include points about how each of these rocks forms, some of the characteristics of each rock type, and some examples of each. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

II. Sedimentary Rocks

A. Clastic Rocks

1. _____

_____

2. _____

_____

B. Chemical Rocks

1. _____

_____

2. _____

_____

Formation of Sedimentary Rocks

Match each description to its term.

	Description	Term
_____	1. a process that squeezes, or compacts, sediments	a. cementation
_____	2. involves weathering and the removal of rock	b. deposition
_____	3. takes place when dissolved minerals are deposited in the tiny spaces among the sediments	c. compaction
_____	4. when sediments are dropped by water, wind, ice, or gravity	d. erosion

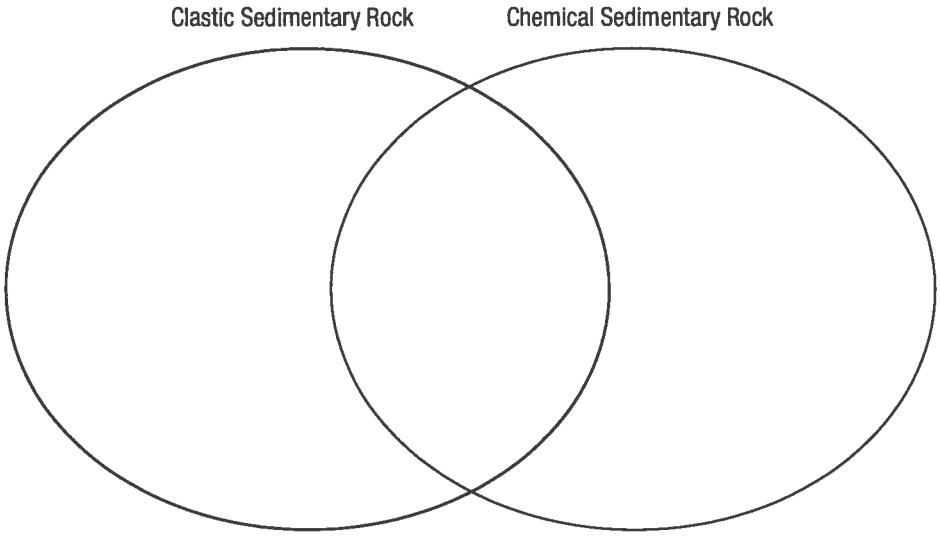
5. Is the following sentence true or false? Sedimentary rocks form when solids settle out of a fluid such as water or air.

_____

6. Circle the letters of the statements that are true of the formation of sedimentary rocks.
   a. Weathering is the first step in the formation of sedimentary rocks.
   b. Weathered sediments don't usually remain in place.
   c. Small sediments often are carried large distances before being deposited.
   d. Small sediments usually are deposited first.

Classification of Sedimentary Rocks

7. Complete the Venn diagram comparing the formation of the two main groups of sedimentary rocks.



8. Circle the letters of the names of the rock groups that are classified as clastic sedimentary rocks.
   a. conglomerate
   b. breccia
   c. coquina
   d. sandstone

Features of Some Sedimentary Rocks

9. Is the following sentence true or false? In undisturbed sedimentary rocks, the oldest layers are found on the bottom. _____

10. Ripple marks in a sedimentary rock may indicate that the rock formed along a(n) _____ or _____ bed.

11. What are the four major processes that form sedimentary rocks?

_____

_____

_____

Name _____ Class _____ Date _____

Chapter 3 Rocks

Section 3.4 Metamorphic Rocks

This section discusses the formation and classification of metamorphic rocks.

Reading Strategy

Outlining This outline is a continuation of the outline from Section 3.3. Complete it as you read. Include points about how each of these rocks forms, some of the characteristics of each rock type, and some examples of each. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

III. Metamorphic Rocks

A. Foliated Rocks

1. _____

_____

2. _____

_____

B. Nonfoliated Rocks

1. _____

_____

2. _____

_____

1. Is the following sentence true or false? Metamorphism means "a change in form." _____

Formation of Metamorphic Rocks

Match each description to its term. The terms will be used more than once.

	Description	Term
_____	2. takes place when magma intrudes rock	a. contact metamorphism b. regional metamorphism
_____	3. produces high-grade metamorphism	
_____	4. produces low-grade metamorphism	
_____	5. changes in rock are minor	
_____	6. results in large-scale deformation	
_____	7. forms marble	
_____	8. occurs during mountain building	

Name _____ Class _____ Date _____

Chapter 3 Rocks

Agents of Metamorphism

9. The agents of metamorphism are _____, _____, and _____ solutions.

10. Is the following sentence true or false? During metamorphism, rocks are usually subjected to one agent at a time.
_____

11. Complete the table below.

Agents of Metamorphism	
Cause	**Effect**
Heat	
Pressure	
Reactions in solution	

Classification of Metamorphic Rocks

12. Circle the letter of each sentence that is true about foliated metamorphic rocks.
    a. It is rock with a layered or banded appearance.
    b. Pressure can form it.
    c. Gneiss and marble are examples of it.
    d. Schist is an example of it.

13. Circle the letter of each sentence that is true about nonfoliated metamorphic rocks.
    a. It is a metamorphic rock that does not have a banded texture.
    b. Most of it contains several different types of minerals.
    c. Marble is an example of it.
    d. Quartzite and anthracite are examples of it.

Name _____ Class _____ Date _____

Chapter 4 Earth's Resources

Section 4.1 Energy and Mineral Resources

This section discusses different types of resources, including renewable, nonrenewable, energy, and mineral resources.

Reading Strategy

Monitoring Your Understanding List what you know about energy and mineral resources in the first column and what you'd like to know in the second column. After you read, list what you have learned in the last column. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Energy and Mineral Resources		
What I Know	**What I Would Like to Know**	**What I Learned**
a.	c.	e.
b.	d.	f.

Renewable and Nonrenewable Resources

1. Is the following sentence true or false? Renewable resources can be replenished over fairly short time spans. _____
2. A(n) _____ resource takes millions of years to form and accumulate.
3. Circle the letter of the nonrenewable resource.
   a. trees
   b. sunlight
   c. wind energy
   d. natural gas

Fossil Fuels

4. What are three examples of fossil fuels? _____
   _____
5. Circle the letter of the last stage of coal development.
   a. anthracite b. bituminous
   c. lignite d. peat
6. Is the following sentence true or false? Natural gas forms from the buried remains of animals and plants. _____

Name _____ Class _____ Date _____

Tar Sands and Oil Shale

Match each description with its fuel source.

Description	Fuel Source
_____ 7. World supplies are expected to dwindle in the future.	a. petroleum
_____ 8. mixture of bitumen, water, clay, and sand	b. oil shale
_____ 9. rock containing kerogen	c. tar sands

Formation of Mineral Deposits

10. Complete the table below.

Mineral Deposits		
Type	**How Forms**	**Mineral Examples**
Magma deposit		chromite, platinum
		gold, silver, mercury
	Eroded heavy minerals settle from moving water.	

Nonmetallic Mineral Resources

11. Circle the letter of the nonmetallic mineral resource.
    a. limestone
    b. gold
    c. chromite
    d. petroleum
12. Is the following sentence true or false? Nonmetallic mineral resources are used as a source of energy. _____

Name _____ Class _____ Date _____

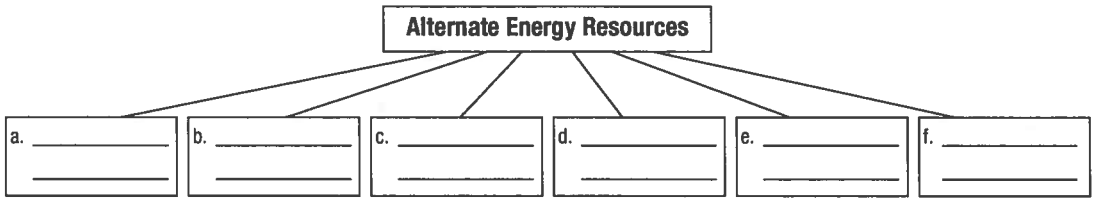
Chapter 4 Earth's Resources

Section 4.2 Alternate Energy Resources

This section discusses solar, nuclear, wind, hydroelectric, geothermal, and tidal energy.

Reading Strategy

Previewing Skim the section and complete the concept map for the various alternate energy resources. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Solar Energy

1. What is solar energy? _____

_____

_____

2. Complete the table below.

Solar Energy	
Advantages	**Disadvantages**
a.	a.
b.	b.

Name _____ Class _____ Date _____

Nuclear Energy

3. Is the following sentence true or false? Uranium nuclei split during nuclear fission. _____

4. At a nuclear power plant, a nuclear chain reaction releases heat, which drives steam turbines that turn _____.

Wind Energy

5. Is the following sentence true or false? Experts estimate that 15 to 25 percent of the United States' electricity demand can be met by wind power in the next 50 to 60 years. _____

6. What are three obstacles to the development of future use of wind power? _____

_____

_____

Hydroelectric Power

7. What is hydroelectric power? _____

_____

_____

8. At a hydroelectric power plant, water is held in a(n) _____ behind a dam.

9. Circle the letter of the limiting factor in the development of hydroelectric power plants.
   a. limited water supplies
   b. noise pollution
   c. increase in cloudy days
   d. availability of suitable sites

Geothermal Energy

10. Circle the letter of the geothermal energy source that is used for heating and for turning turbines.
    a. hot water b. sunlight
    c. wind d. moving water

11. Is the following sentence true or false? The fuel used in geothermal energy is found above Earth's surface. _____

Tidal Power

12. Tidal power is harnessed by constructing a(n) _____ across the mouth of an estuary or a bay.

13. What drives the turbines and electric generators at a tidal power plant? _____

_____

Name _____ Class _____ Date _____

Chapter 4 Earth's Resources

Section 4.3 Water, Air, and Land Resources

This section explains the importance of water, air, and land resources.

Reading Strategy

Building Vocabulary As you read, add definitions and examples to complete the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Definition	Example
point source pollution: pollution that can be traced to a location	factory pipes, sewer pipes
nonpoint source pollution: a.	b.
runoff: c.	d.
greenhouse gas: e.	f.

The Water Planet

1. List four ways people use fresh water. _____

_____

_____

Match each description with its term.

Description	Term
_____ 2. often carries nonpoint source pollution	a. runoff
_____ 3. chemicals from a factory pipe	b. point source pollution
_____ 4. pollution without a specific point of origin	c. nonpoint source pollution

Name _____ Class _____ Date _____

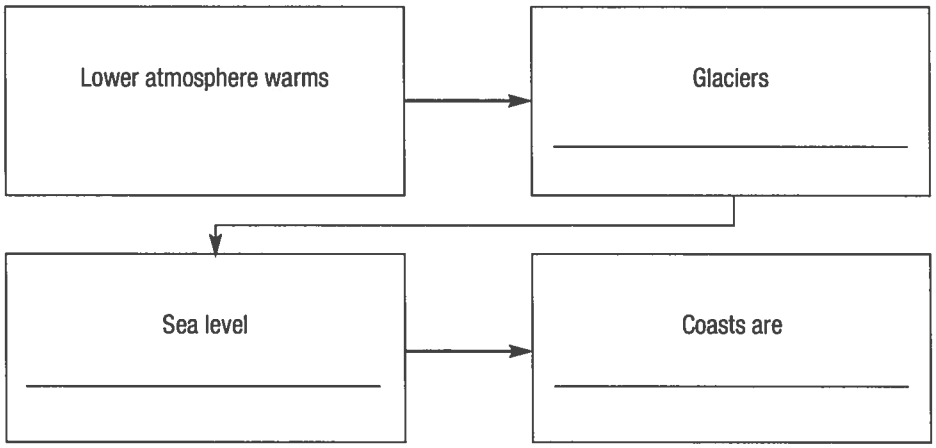
Earth's Blanket of Air

5. The _____ of Earth's atmosphere helps to maintain life on the planet.
6. Circle the letter of the gas in the atmosphere that people need to live.
   a. ozone b. oxygen
   c. water vapor d. nitrogen
7. What are gases such as carbon dioxide and methane called that help maintain the warm temperatures near the surface of Earth?

   _____

8. Fill in the blanks in the following flowchart.

Possible Effects of Global Warming



9. What is Earth's major source of air pollution?

   _____

Land Resources

10. List four resources that Earth's land provides.

    _____

    _____

    _____

11. Is the following sentence true or false? Agriculture has only a positive impact on the land. _____
12. Is the following sentence true or false? Mineral mining can destroy vegetation and cause soil erosion. _____
13. What negative impact can landfills have? _____

    _____

    _____

    _____

Name _____ Class _____ Date _____

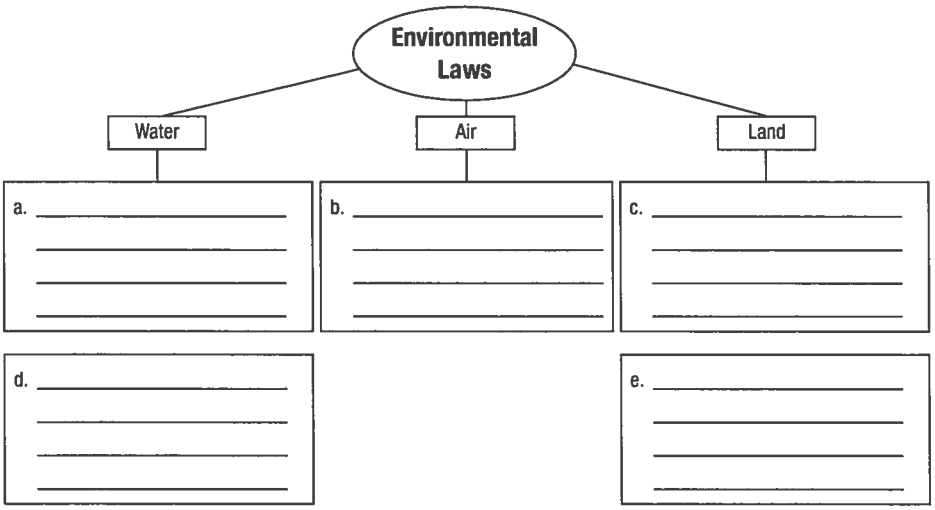
Chapter 4 Earth's Resources

Section 4.4 Protecting Resources

This section discusses laws passed to protect Earth's water, air, and land resources.

Reading Strategy

Summarizing After reading this section, complete the concept map to organize what you know about the major laws that help keep water, air, and land resources clean. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Keeping Water Clean and Safe

1. Circle the letter of the term defined as "careful use of resources."
   a. recycling b. pollution
   c. composting d. conservation

2. Circle the letter of the law that requires industries to reduce or stop point source pollution into surface waters.
   a. Clean Air Act
   b. Safe Drinking Water Act
   c. Clean Water Act
   d. Resource Conservation and Recovery Act

3. Circle the letter of the law that sets maximum contaminant levels for water pollutants that could harm people's health.
   a. Clean Air Act
   b. Safe Drinking Water Act
   c. Clean Water Act
   d. Resource Conservation and Recovery Act

Name _____ Class _____ Date _____

Protecting the Air

4. Is the following sentence true or false? The Clean Air Act is the United States' most important law for preventing air pollution.

_____

5. How could using less electricity help to reduce air pollution?

_____

_____

_____

_____

_____

_____

_____

Caring for Land Resources

6. What are two ways land resources can be protected?

_____

_____

_____

_____

_____

_____

Match each description with its term.

Description	Term
_____ 7. removing whole forest areas	a. recycling
_____ 8. plowing across the contour of hillsides	b. selective cutting
_____ 9. planting crops with different nutrient needs in adjacent rows	c. contour plowing
_____ 10. fertilizer made of partly decomposed organic material	d. strip cropping
_____ 11. Only some trees in a forest are cut.	e. compost
_____ 12. collecting and processing used items to make new products	f. clear-cutting

13. What law requires companies to store, transport, and dispose of their hazardous wastes according to guidelines?

_____

_____

_____

Name _____ Class _____ Date _____

Chapter 5 Weathering, Soil, and Mass Movements

Section 5.1 Weathering

This section describes different types of weathering in rocks.

Reading Strategy

Building Vocabulary As you read the section, define each vocabulary term. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Vocabulary Term	Definition
Mechanical weathering	a.
Frost wedging	b.
Talus	c.
Exfoliation	d.
Chemical weathering	e.

Mechanical Weathering

1. List and describe three types of mechanical weathering.

_____

_____

_____

_____

_____

2. Is the following sentence true or false? In nature, three physical processes are especially important causes of mechanical weathering: chemical reactions, spheroidal weathering, and the presence of water. _____

3. Circle the letter of each sentence that is true about mechanical weathering.
   a. Each piece of broken rock has the same characteristics as the original rock.
   b. In nature, three physical processes are especially important causes of mechanical weathering: frost wedging, unloading, and biological activity.
   c. When a rock is broken apart, less surface area is exposed to chemical weathering.
   d. Mechanical weathering is the transformation of rock into new compounds.

Name _____ Class _____ Date _____

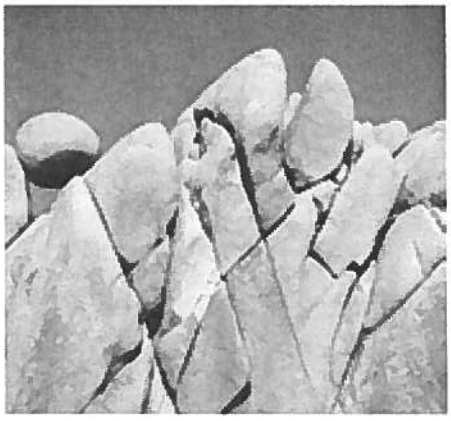
Chemical Weathering

4. Circle the letter of each sentence that is true about chemical weathering.
   a. Water is the most important agent in chemical weathering.
   b. Chemical weathering converts granite to clay minerals and quartz grains.
   c. Chemical weathering can change the shape of a rock and its chemical composition.
   d. Spheroidal weathering is a form of chemical weathering.
5. Describe the weathering process that the rocks in the photograph are undergoing.

_____

_____

6. The weathering process shown in the photograph is called _____.



Rate of Weathering

7. Is the following sentence true or false? Factors that affect rate of weathering are surface area, rock characteristics, and climate.

_____

8. Two characteristics that affect rate of weathering are _____ and _____.
9. What are three ways that the climatic factors of temperature and moisture affect rate of weathering?
   a. _____
   b. _____
   c. _____
10. What are two factors that cause differential weathering?

_____

_____

Name _____ Class _____ Date _____

Chapter 5 Weathering, Soil, and Mass Movements

Section 5.2 Soil

This section describes the characteristics of soil.

Reading Strategy

Comparing and Contrasting As you read this section, compare the three types of soils by completing the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Soil Type	Where It's Found
Pedalfer	a.
Pedocal	b.
Laterite	c.

Characteristics of Soil

Match each description to its term.

Description	Term
_____ 1. layer of rock and mineral fragments	a. soil
_____ 2. part of the regolith that supports growth of plants	b. humus
_____ 3. decayed remains of organisms	c. regolith

4. Is the following sentence true or false? Soil has four major components: mineral matter, humus, water, and air. _____

5. Humus is a source of _____, and it increases soil's ability to _____ .

6. Circle the letter of each sentence that is true about the functions that soil water serves in the soil.
   a. Soil water provides the moisture needed for chemical reactions that sustain life.
   b. Soil water is the source of carbon dioxide that plants use in photosynthesis.
   c. Soil water provides nutrients in a form that plants can use.
   d. All soils contain the same amount of soil water.

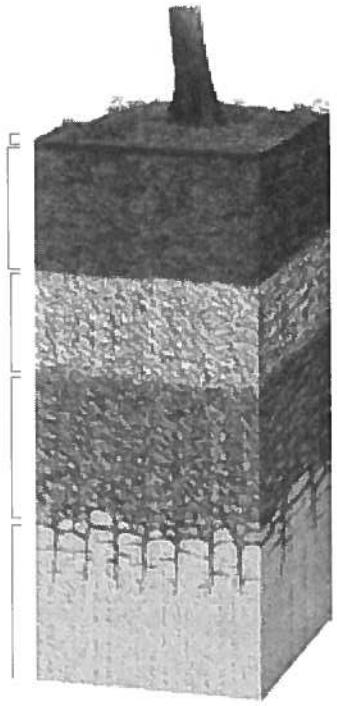
Soil Formation

7. The most important factors in soil formation are _____, _____, _____, _____, and _____ .

Name _____ Class _____ Date _____

The Soil Profile

8. Write a brief description of each soil horizon on the figure below and label each of the soil horizons with the appropriate identifying letter.



Soil Types

9. Write a brief description of each type of soil.

pedalfer _____

pedocal _____

laterite _____

10. Circle the letter of each sentence that is true about laterite.
    a. Laterite is not a useful material for making bricks.
    b. Laterite contains almost no organic matter.
    c. Laterite is one of the poorest soils for agriculture.
    d. In a newly cleared field, laterite can support agriculture for only a few years.

Soil Erosion

11. Is the following sentence true or false? Human activities, such as farming, logging, and construction, have slowed down the amount of erosion that occurs today. _____

12. Is the following sentence true or false? In many regions of the world, soil is eroding faster than it is being formed.

_____

Name _____ Class _____ Date _____

Chapter 5 Weathering, Soil, and Mass Movements

Section 5.3 Mass Movements

This section describes situations in which large amounts of soil are moved naturally.

Reading Strategy

Previewing As you read the section, rewrite the green topic headings as *what* questions. Then write an answer to each question. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Question	Answer
a.	b.
c.	d.

1. The transfer of rock and soil downslope due to _____ is called mass movement.

Triggers of Mass Movements

2. What are the factors that commonly trigger mass movements?

_____

_____

_____

3. Circle the letter of each sentence that is true about water triggering mass movements.
   a. Heavy rains and rapid melting of snow can trigger mass movements by saturating surface materials with water.
   b. When the pores in sediment become filled with water, the particles slide past one another more easily.
   c. If there is sufficient water, sand grains will ooze downhill.
   d. Saturation of the ground with water makes slopes more susceptible to the force of gravity.
4. Is the following sentence true or false? If the steepness of a slope exceeds the stable angle, mass movements become more likely.

_____

5. What are three possible causes of oversteepened slopes?

_____

_____

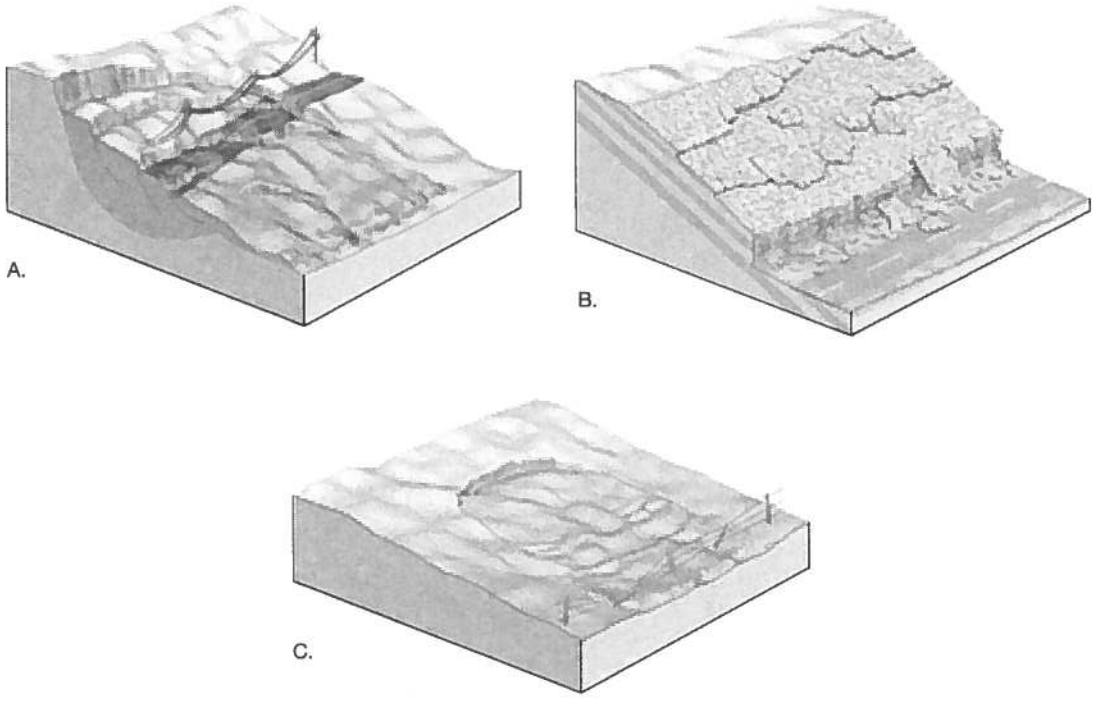
Name _____ Class _____ Date _____

Types of Mass Movements

Match each description with its term.

	Description	Term
_____	**6.** a flow that moves relatively slowly—from about a millimeter per day to several meters per day	a. rockfall
_____	**7.** the downward movement of a block of material along a curved surface	b. rockslide
_____	**8.** a quickly moving mass of material that contains large amounts of water	c. slump
_____	**9.** when rock or rock fragments fall freely through the air	d. mudflow
_____	**10.** slides that include bedrock that move suddenly along a flat, inclined surface	e. earthflow

11. Identify each of the forms of mass wasting illustrated in the figures below by writing the name of the process on the lines provided. Choose *earthflow, slump,* or *rockslide.*



A. _____

B. _____

C. _____

Name _____ Class _____ Date _____

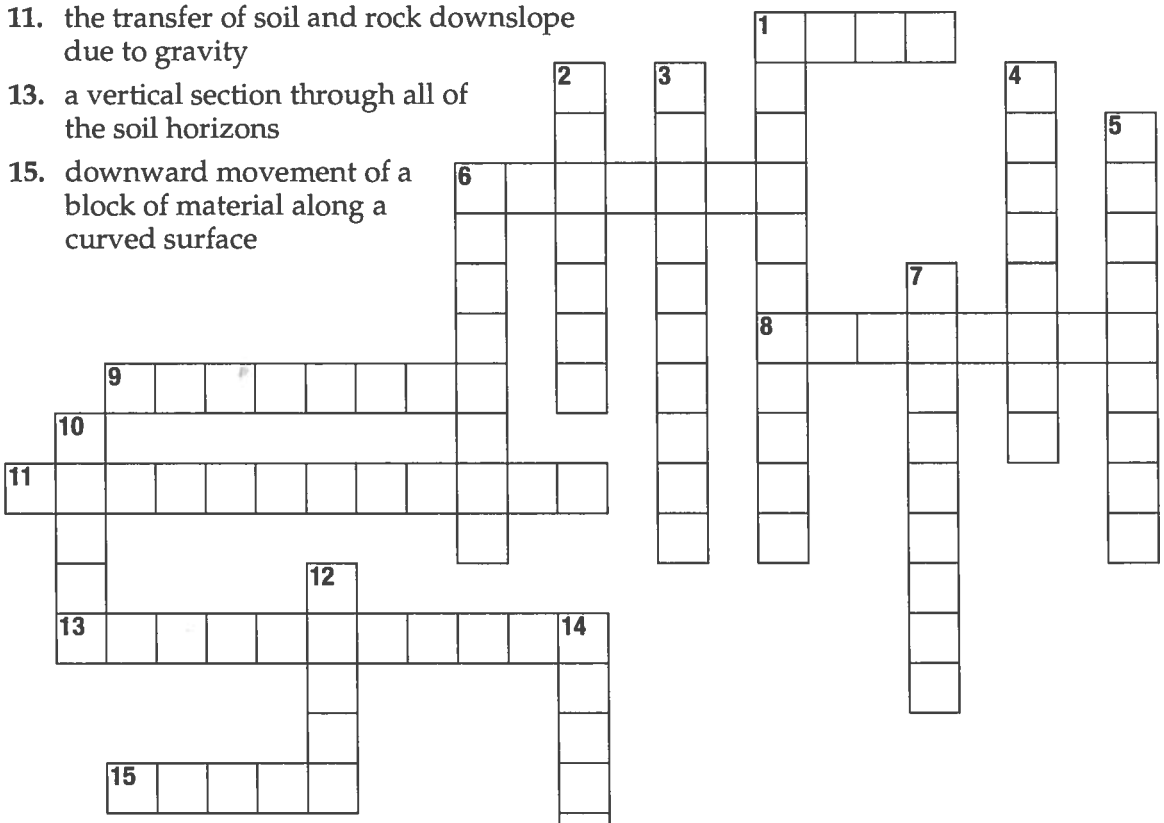
Chapter 5 Weathering, Soil, and Mass Movements

WordWise

Test your knowledge of vocabulary terms from Chapter 5 by completing this crossword puzzle.

Clues across:

1. the part of the regolith that supports the growth of plants
6. soil usually found in drier western United States in areas that have grasses and brush vegetation
8. a layer of rock and mineral fragments produced by weathering
9. occurs when rocks or rock fragments fall freely through the air
11. the transfer of soil and rock downslope due to gravity
13. a vertical section through all of the soil horizons
15. downward movement of a block of material along a curved surface



Clues down:

1. zones of soil that have similar composition, texture, structure, and color
2. flows that move quickly
3. a type of weathering in which physical forces break rock into smaller pieces without changing its composition
4. soil that forms in hot, wet tropical areas
5. flows that move relatively slowly
6. soil that usually forms in temperate areas
7. slides that include segments of bedrock
10. large piles of rock
12. the slowest type of mass movement
14. slabs of rock separating like layers of an onion

Name _____ Class _____ Date _____

Chapter 6 Running Water and Groundwater

Section 6.1 Running Water

This section discusses the water cycle and how water flows in streams.

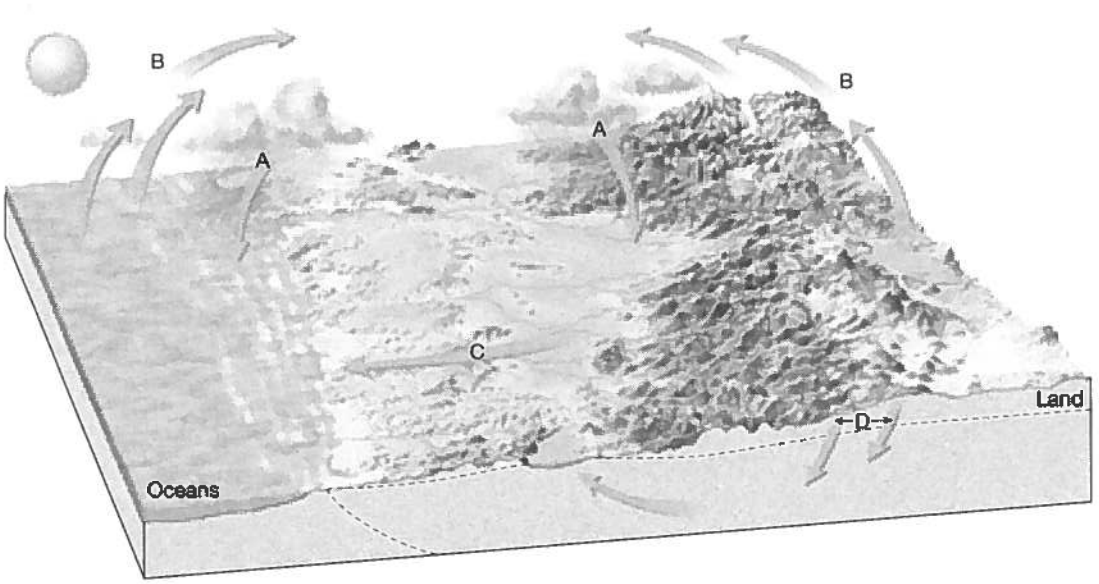
Reading Strategy

Building Vocabulary As you read this section, define in your own words each vocabulary term listed in the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Vocabulary Term	Definition
Water cycle	
Infiltration	
Transpiration	

The Water Cycle

1. Circle the letter of the term used to describe the unending circulation of Earth's water supply.
   a. water balance b. water cycle
   c. base level d. transpiration
2. Select the appropriate letter in the figure that represents each of the following processes in the water cycle.
   _____ runoff _____ evaporation
   _____ precipitation _____ infiltration



Name _____ Class _____ Date _____

Earth's Water Balance

5. Earth's water cycle is balanced in that each year the average amount of precipitation that occurs over Earth is equal to the amount of water that _____.

Streamflow

6. A stream's ability to pick up and move material depends largely on its _____.
7. What are five factors that determine the velocity of a stream?

_____

_____

_____

Match each definition with its term.

Definition	Term
_____ 8. course that water in a stream follows	a. gradient
_____ 9. volume of water flowing past a certain point in a given unit of time	b. discharge
_____ 10. steepness of a stream channel	c. velocity
_____ 11. distance that water travels in a period of time	d. stream channel

Changes from Upstream to Downstream

12. Is the following sentence true or false? A stream's discharge increases between the headwaters and mouth of the stream.

_____

13. Is the following sentence true or false? From its headwaters to its mouth, a stream's gradient increases. _____

Base Level

14. Circle the letter of the lowest point to which a stream can erode its channel.
    a. mouth
    b. headwaters
    c. valley
    d. base level
15. Circle the letter of what a bend in a stream is called.
    a. meander
    b. tributary
    c. mouth
    d. valley

Name _____ Class _____ Date _____

Chapter 6 Running Water and Groundwater

Section 6.2 The Work of Streams

This section discusses streams and explains how they help shape Earth's surface.

Reading Strategy

Comparing and Contrasting Preview the Key Concepts, topic headings, vocabulary, and figures in this section. List things you expect to learn about each. After reading, state what you learned about each item you listed. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

What I Expect to Learn	What I Learned

Erosion

1. How do streams erode their channels?

_____

_____

Sediment Transport

2. Circle the letter of the name for the material a stream carries in solution.

   a. bed load b. suspended load

   c. dissolved load d. mineral load

3. Circle the letter of what the large, solid material a stream carries along its bed is called.

   a. bed load b. suspended load

   c. dissolved load d. maximum load

4. Is the following sentence true or false? As a stream's velocity decreases, its competence increases. _____

5. A stream's _____ is the maximum load it can carry.

6. Is the following sentence true or false? Most streams carry the largest part of their load in suspension. _____

Deposition

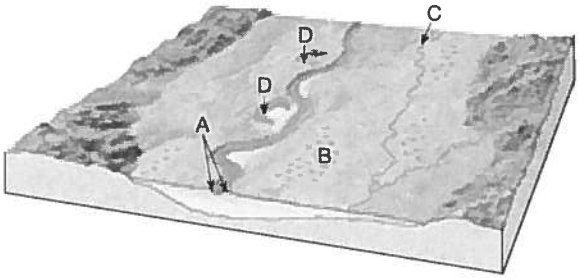
7. When stream flow decreases to below the critical settling velocity of a certain size particle, _____ occurs.

8. How does a delta form? _____

_____

9. Circle the letter that represents natural levees in the figure below.

a. A b. B c. C d. D



Stream Valleys

10. Circle the letter that represents an oxbow lake in the figure above.

a. A b. B c. C d. D

11. What shape will a stream valley have if its primary work has been downward erosion cutting toward base level?

_____

12. A stream's _____ is the flat valley floor onto which it overflows its banks during flooding.

Floods and Flood Control

Match each description with its term.

Description	Term
_____ 13. earthen mounds built on river banks	a. artificial levees
_____ 14. structures that store floodwater and let it out slowly	b. floods
_____ 15. mostly caused by rapid snowmelt and storms	c. flood-control dams

Drainage Basins

16. A(n) _____ is an imaginary line separating different drainage basins.

17. The land area that contributes water to a stream is know as a(n) _____.

Name _____ Class _____ Date _____

Chapter 6 Running Water and Groundwater

Section 6.3 Water Beneath the Surface

This section discusses groundwater, including the environmental threats posed to it and landforms associated with it.

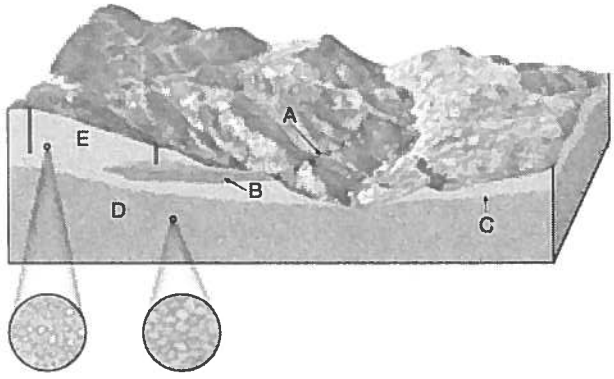
Reading Strategy

Comparing and Contrasting Before you read the section, rewrite the green topic headings as *how*, *why*, and *what* questions. As you read, write an answer to each question. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Question	Answer
How does water move underground?	

Distribution and Movement of Water Underground

1. Select the appropriate letter in the figure that identifies each of the following groundwater features.



_____ zone of saturation
_____ aquitard
_____ spring
_____ water table
_____ zone of aeration

2. Is the following sentence true or false? Groundwater moves faster through sediment with large pore spaces than through sediment with small pore spaces.

_____

Name _____ Class _____ Date _____

Springs

3. Circle the letter of the following that forms whenever the ground surface and water table intersect.

   a. aquifer b. spring

   c. well d. aquitard

4. A type of spring called a(n) _____ is a column of water that shoots up intermittently with great force.

Wells

5. Circle the letter of the location a well must be drilled to provide a continuous water supply.

   a. in the zone of aeration

   b. far below the water table

   c above the zone of saturation

   d. far above the water table

6. What two conditions must exist for an artesian well to form? _____

_____

_____

_____

Environmental Problems Associated with Groundwater

7. What are two things that threaten groundwater supplies?

_____

Caverns

Match each description with its groundwater feature .

Description	Groundwater Feature
_____ 8. dripstone feature that forms on a cavern ceiling	a. cavern
_____ 9. type of limestone deposited in caverns by dripping water	b. travertine
_____ 10. natural process that forms caverns	c. stalactite
_____ 11. naturally formed underground chamber	d. stalagmite
_____ 12. dripstone feature that forms on a cavern floor	e. erosion

Karst Topography

13. Typical of karst areas are depressions called _____.

14. Is the following sentence true or false? Areas with karst topography typically have irregular terrain. _____

Name _____ Class _____ Date _____

Chapter 6 Running Water and Groundwater

WordWise

Use the clues below to identify vocabulary terms from Chapter 6. Write the terms, putting one letter in each blank. Use the circled letters to find the hidden word.

Clues

1. how plants release water into the atmosphere
2. a stream's slope
3. the movement of surface water into rock or soil through cracks and pore spaces
4. a sediment's ability to release a fluid
5. a permeable rock layer that transmits groundwater freely
6. a triangular shaped sediment accumulation
7. the maximum load a stream can carry
8. the water within the zone of saturation
9. the percentage of a rock that is occupied by pore spaces

Vocabulary Terms

1. _ _ _ _ _ _ _ _ _ ○ _ _ _
2. _ ○ _ _ _ _ _ _
3. ○ _ _ _ _ _ _ _ _ _ _ _
4. _ _ _ _ _ _ ○ _ _ _ _ _
5. _ _ ○ _ _ _ _
6. _ _ _ ○ _
7. _ _ _ ○ _ _ _ _
8. _ ○ _ _ _ _ _ _ _ _ _
9. _ _ _ _ _ _ _ ○

Hidden Word: _ _ _ _ _ _ _ _ _

Definition: _____

_____