

# Study Guide and Reinforcement

## Student Edition

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**SECTION**  
**1**

**Study Guide**

**What is science?**

**Chapter**

**1**

**Directions:** *Tell three interesting points about scientific journals and magazines.*

1. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Directions:** *List twelve things that should be included in a science experiment journal.*

2. \_\_\_\_\_ 8. \_\_\_\_\_  
 3. \_\_\_\_\_ 9. \_\_\_\_\_  
 4. \_\_\_\_\_ 10. \_\_\_\_\_  
 5. \_\_\_\_\_ 11. \_\_\_\_\_  
 6. \_\_\_\_\_ 12. \_\_\_\_\_  
 7. \_\_\_\_\_

**Directions:** *Explain how early scientists made scientific observations. Use your own experience to explain the problem with that method of observing.*

14. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Directions:** *Match the terms below with their definitions.*

**scientific law**

**technology**

**theory**

- \_\_\_\_\_ 15. a rule that describes a pattern in nature  
 \_\_\_\_\_ 16. an explanation that is supported by facts  
 \_\_\_\_\_ 17. the application of science for everyday use

**Directions:** *Number the following events in the order they happen. The first step in the sequence has been numbered for you.*

18. \_\_\_\_\_ using scientific methods the scientist tests the prediction  
 \_\_\_\_\_ using previous experience and knowledge, the scientist makes a prediction  
1 a scientist has a problem to solve  
 \_\_\_\_\_ the scientist reports on the results  
 \_\_\_\_\_ other scientists may read about the results and get ideas for their own research

**SECTION**  
**2**

**Study Guide**

**Doing Science**

**Chapter**

**1**

**Directions:** Complete the following sentences using the words below. Some of the words might not be used.

**variable**

**models**

**trials**

**experiment**

**control**

**metric**

**bias**

**hypothesis**

**experimental research design**

**English**

**descriptive research**

1. A method of solving scientific problems based mostly on observations is \_\_\_\_\_.
2. A(n) \_\_\_\_\_ is a method of answering scientific questions by testing a hypothesis through the use of a series of carefully controlled steps.
3. Prior knowledge, new information, and previous observations are used to form a(n) \_\_\_\_\_.
4. A(n) \_\_\_\_\_ is a sample treated like other experimental groups except that the variable is not applied.
5. Computer \_\_\_\_\_ help modern scientists do their work.
6. After a hypothesis is developed, a(n) \_\_\_\_\_ is often designed to test the hypothesis.
7. Multiple \_\_\_\_\_ of an experiment ensure valid results.
8. Experiments are reliable only if one \_\_\_\_\_ at a time is tested.
9. The International System of Units is based on the \_\_\_\_\_ system.
10. A random sample is one way to reduce \_\_\_\_\_ when choosing people for an experiment.

**Directions:** Match the SI unit with what it measures by writing the correct letter in the space provided.

- |                        |           |
|------------------------|-----------|
| _____ 11. meter        | a. mass   |
| _____ 12. kilogram     | b. volume |
| _____ 13. square meter | c. length |
| _____ 14. cubic meter  | d. area   |

**SECTION**  
**3**

**Study Guide**

**Science and Technology**

**Chapter**

**1**

**Directions:** Use the words to complete the sentences below. Some of the words may not be used.

**hobby**  
**information**  
**science**

**knowledge**  
**modernization**  
**worldwide**

**lifestyle**  
**discoveries**  
**globalization**

1. Scientific \_\_\_\_\_ often challenges old ways of thinking or doing things.
2. People of all races, ages, sexes, cultures, and professions practice \_\_\_\_\_.
3. Some scientific discoveries have been made by people pursuing a(n) \_\_\_\_\_.
4. Scientific \_\_\_\_\_ are constantly incorporated into products that influence our style of living.
5. Thanks to modern information technology, information about new scientific discoveries is available \_\_\_\_\_.
6. Modern technology has led to the \_\_\_\_\_ of new information.

**Directions:** Answers the following questions on the lines provided.

7. What is meant by the statement “Science can provide information that people use to make decisions”?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. Name three aspects of everyday life that have been greatly changed by new technologies.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





**SECTION**  
**1**

**Study Guide**

**Traits and the Environment**

**Chapter**

**2**

**Directions:** Use the terms from the word bank to fill in the blanks in the summary statements.

**DNA**  
**environment**  
**genes**

**gender**  
**hormones**  
**selecting**

**sunlight**  
**temperature**  
**traits**

Eye, hair, and skin color you inherit from your parents are called inherited (1) \_\_\_\_\_.

Traits result from coded information found in (2) \_\_\_\_\_.

Native Americans developed maize by carefully (3) \_\_\_\_\_ and breeding wild corn.

Humans have tens of thousands of (4) \_\_\_\_\_ in their DNA.

A phenotype is a combination of genetic makeup and the effects of the (5) \_\_\_\_\_.

External influences of environment on phenotype can include amounts of (6) \_\_\_\_\_

and (7) \_\_\_\_\_. Internal influences include (8) \_\_\_\_\_.

Some species maintain a desired male-female ratio by having individuals that change

(9) \_\_\_\_\_.

**Directions:** Give six examples of phenotypes that may be expressed in different ways, according to the environment. Explain the environmental factor and how it makes the phenotype change.

10. \_\_\_\_\_

\_\_\_\_\_

11. \_\_\_\_\_

\_\_\_\_\_

12. \_\_\_\_\_

\_\_\_\_\_

13. \_\_\_\_\_

\_\_\_\_\_

14. \_\_\_\_\_

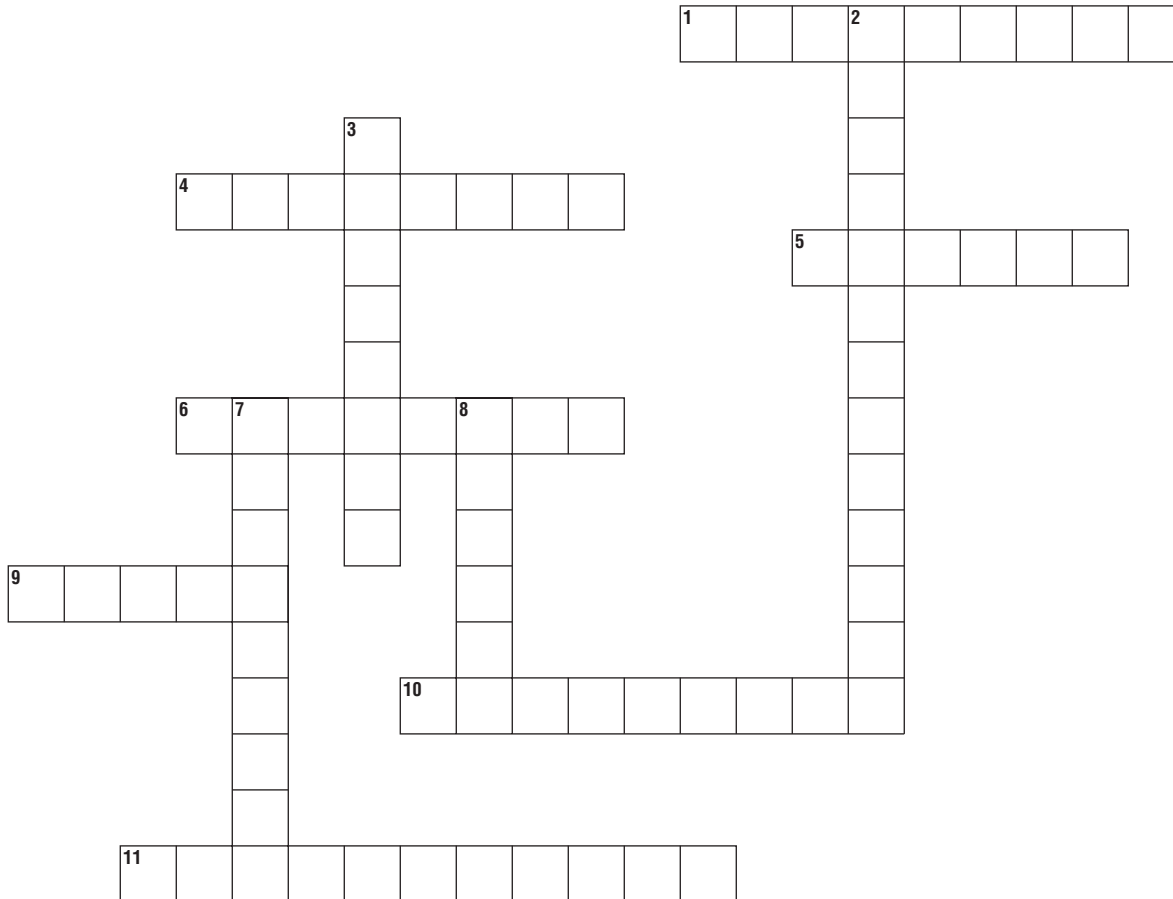
\_\_\_\_\_

15. \_\_\_\_\_

\_\_\_\_\_

**SECTION**  
**2**
**Study Guide**
**Genetics**
**Chapter**
**2**

**Directions:** Use the clues below to complete the crossword puzzle.


**Across**

1. Mendel's plants
4. Passing of traits from parent to offspring
5. Famous heredity scientist
6. Alleles that will show their effect on the phenotype when present in the genotype
9. Parts of the DNA code on chromosomes
10. Two of the same alleles of this type are needed to produce a trait
11. Principle that each parent passes only one allele for a trait to its offspring

**Down**

2. Chart to help predict genetic crosses
3. Science of heredity
7. Parents produce \_\_\_\_\_.
8. Different form of a gene

**SECTION**  
**3****Study Guide****Environmental Impact  
over Time****Chapter****2**

**Directions:** Find the mistakes in the statements below. Rewrite each statement correctly on the lines provided.

1. Pollution is a living environmental factor that can limit whether a species survives in a habitat.

---

---

2. Predators never limit the number of animals found in an environment.

---

---

3. In Darwin's theory, the theory of evolution by independent assortment, several factors act together over time to make new species.

---

---

4. Over generations, groups in an environment adapt to predators by evolving ways to be detected.

---

---

5. Darwin and Mendel were working separately to determine theories of evolution.

---

---

6. Mapping is the process that changes DNA to form new alleles.

---

---

7. Selective breeding is used in nature to provide change over time.

---

---

8. The production of several species from many ancestral species is called adaptive radiation.

---

---

9. Evidence of selective breeding is found in fossil records.

---

---

10. New species can occur when natural selection favors a useless variation.

---

---



## SECTION

## 1

## Study Guide

## The Human Organism

## Chapter

## 3

**Directions:** Use Table 1 to help you complete the table with seven minerals that can be found in leafy green vegetables.

	Mineral	Body Parts/Systems/Functions That Need It
1.		
2.		
3.		
4.		
5.		
6.		
7.		

**Directions:** List four processes in your body that need water.

8. \_\_\_\_\_ 9. \_\_\_\_\_

10. \_\_\_\_\_ 11. \_\_\_\_\_

**Directions:** List three problems that may arise if you do not get enough water daily.

12. \_\_\_\_\_ 13. \_\_\_\_\_ 14. \_\_\_\_\_

**Directions:** List three body functions that will be affected if you do not get enough water over long periods of time.

15. \_\_\_\_\_ 16. \_\_\_\_\_ 17. \_\_\_\_\_

**Directions:** Name four types of cells and give the function of each using one or two words.

18. \_\_\_\_\_ 19. \_\_\_\_\_

20. \_\_\_\_\_ 21. \_\_\_\_\_

**Directions:** Arrange 6 levels of body organization in order from smallest to largest.

Smallest

Largest

22.	23.	24.	25.	26.	27.
-----	-----	-----	-----	-----	-----

**SECTION**  
**2** Study Guide

# How Your Body Works

**Chapter**  
**3**

**Directions:** Use the words in the list to fill in the blanks.

- |                             |                       |                          |                 |
|-----------------------------|-----------------------|--------------------------|-----------------|
| <b>alveoli</b>              | <b>enzymes</b>        | <b>villi</b>             | <b>absorbed</b> |
| <b>cellular respiration</b> | <b>carbon dioxide</b> | <b>negative feedback</b> |                 |

- In the process of \_\_\_\_\_, oxygen combines with food molecules and energy is released.
- \_\_\_\_\_ are proteins that help break down the chemicals in food.
- Nutrients are carried through the bloodstream after they are \_\_\_\_\_ in the small intestine.
- In the small intestine, nutrients pass through small, fingerlike projections, called \_\_\_\_\_.
- Thin-walled sacs in the lungs are called \_\_\_\_\_.
- Oxygen and \_\_\_\_\_ are exchanged in the lungs.
- The mechanism of \_\_\_\_\_ helps the body maintain homeostasis.

**Directions:** Answer the following questions on the lines provided.

- Why is excretion an important life process?

---



---

- What are nephrons? What job do kidneys perform?

---



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- How do rapid breathing, flushing, and sweating help maintain homeostasis?

---



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**SECTION**  
**1**

**Study Guide**

**Living Earth**

**Chapter**

**4**

**Directions:** Use the information from your textbook to complete the summary chart below.

	Vocabulary	Definition	Two Real-World Examples
1.	biosphere		a. b.
2.	community		a. b.
3.	ecology		a. b.
4.	ecosystem		a. b.
5.	habitat		a. b.
6.	organism		a. b.
7.	population		a. b.
8.	species		a. b.

**Directions:** Describe a part of the biosphere and a particular community, population, and habitat in that ecosystem.

9. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SECTION**  
**2****Study Guide****Populations****Chapter****4**

**Directions:** Answer the following questions on the lines provided.

1. How can competition limit a population's growth?

---

---

2. How can a limiting factor affect a population's growth?

---

---

3. Which has a higher biotic potential, a pumpkin or a peach?

---

4. If two squirrels live in one square m of a 50 square m park, what is the park's estimated squirrel population?

---

5. What are some factors that might stop a population's exponential growth?

---

---

6. What is carrying capacity?

---

7. Give an example of how migration affects population size.

---

---

8. Is it possible for a population with a high birth rate to decrease in size? Explain.

---

---

9. Describe how scientists measure wildlife populations such as rabbits.

---

---

---

---

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**SECTION**  
**3**

**Study Guide**

**Interactions Within  
Communities**

**Chapter**

**4**

**Directions:** Match the terms in Column II with the definitions in Column I. Write the letter of the correct term in the blank at the left.

**Column I**

- \_\_\_\_\_ 1. plant eaters
- \_\_\_\_\_ 2. consume wastes and dead organisms
- \_\_\_\_\_ 3. a consumer captured and eaten by another consumer
- \_\_\_\_\_ 4. use the Sun to make energy-rich molecules
- \_\_\_\_\_ 5. animals that eat other animals
- \_\_\_\_\_ 6. eat plants and other animals
- \_\_\_\_\_ 7. consumers that capture and eat other consumers
- \_\_\_\_\_ 8. cannot make their own energy-rich molecules

**Column II**

- a. carnivores
- b. consumers
- c. omnivores
- d. herbivores
- e. predators
- f. producers
- g. decomposers
- h. prey

**Directions:** Select the term from the following list that matches each example.

**commensalism**

**mutualism**

**parasitism**

- \_\_\_\_\_ 9. A clown fish is protected by an anemone's tentacles.
- \_\_\_\_\_ 10. cyanobacteria, or alga, living in the tissues of a fungus
- \_\_\_\_\_ 11. a roundworm that lives in a puppy

**Directions:** Label the examples below either **habitat** or **niche**.

- \_\_\_\_\_ 12. A chameleon changes its colors to blend in with its surroundings.
- \_\_\_\_\_ 13. Ducks and amphibians live in or near a pond.
- \_\_\_\_\_ 14. Birds nest in trees.
- \_\_\_\_\_ 15. A male lion's mane attracts a mate.
- \_\_\_\_\_ 16. Your cat's sense of smell helps it find its way home.
- \_\_\_\_\_ 17. Monarch butterflies eat milkweed, making them poisonous to other species.
- \_\_\_\_\_ 18. Woodpeckers use their beaks to pry insects from trees.



**SECTION**  
**1**

**Study Guide**

**Abiotic Factors**

**Chapter**

**5**

**Directions:** Write the correct term on the line in front of its definition.

**abiotic**  
**elevation**  
**temperature**

**atmosphere**  
**humus**  
**timberline**

**biotic**  
**soil**  
**water**

**climate**  
**sunlight**  
**wind**

- \_\_\_\_\_ 1. decaying matter found in soil
- \_\_\_\_\_ 2. layer of air that surrounds Earth
- \_\_\_\_\_ 3. the elevation above which trees cannot grow
- \_\_\_\_\_ 4. degree of hotness or coldness measured on a scale
- \_\_\_\_\_ 5. features of environment that are alive or were once alive
- \_\_\_\_\_ 6. inorganic compound needed for life processes
- \_\_\_\_\_ 7. nonliving, physical features of an environment
- \_\_\_\_\_ 8. air currents caused by heat from the Sun that warms the air
- \_\_\_\_\_ 9. distance above sea level
- \_\_\_\_\_ 10. energy source for almost all life on Earth
- \_\_\_\_\_ 11. average weather conditions in an area over time
- \_\_\_\_\_ 12. mixture of mineral and rock particles, remains of dead organisms, water, air, bacteria, fungi, insects, and worms

**Directions:** List the six abiotic factors and how each affects the organisms that live in the environment.

	<b>Abiotic Factor</b>	<b>Effect on Organisms in the Environment</b>
<b>13.</b>		
<b>14.</b>		
<b>15.</b>		
<b>16.</b>		
<b>17.</b>		
<b>18.</b>		

**SECTION**  
**2**

**Study Guide**

**Cycles in Nature**

**Chapter**

**5**

**Directions:** Match the term in Column II with the description in Column I. Write the letter of the correct term in the blank at the left. All terms may not be used.

**Column I**

- \_\_\_\_\_ 1. photosynthesis is part of this continuous movement
- \_\_\_\_\_ 2. gas removed from the air during photosynthesis
- \_\_\_\_\_ 3. element that helps plants grow
- \_\_\_\_\_ 4. process that changes nitrogen gas into compound plants can use
- \_\_\_\_\_ 5. process of water changing from a gas to a liquid
- \_\_\_\_\_ 6. transfer of nitrogen from air to soil to organism, and back to air or soil
- \_\_\_\_\_ 7. process of water changing from a liquid to a gas
- \_\_\_\_\_ 8. continuous movement of water from Earth's surface to the air, and back to Earth's surface

**Column II**

- a. nitrogen cycle
- b. evaporation
- c. carbon dioxide
- d. water cycle
- e. respiration
- f. nitrogen
- g. condensation
- h. carbon cycle
- i. transpiration
- j. nitrogen fixation

**Directions:** Match the cause in the first column with the effect in the second column. Write the letter of the correct effect in the blank at the left. An effect may have more than one cause.

- |  |  |
|--|--|
| _____ 9. water vapor condenses                   | a. soil infertility                      |
| _____ 10. fossil fuels burn                      | b. precipitation                         |
| _____ 11. forests are cut down                   | c. increase of carbon dioxide in the air |
| _____ 12. clouds become large and heavy          |  |
| _____ 13. nitrogen removed when harvesting crops |  |

**Directions:** Answer the following questions on the lines provided.

14. What are the three primary steps of the water cycle?

\_\_\_\_\_

\_\_\_\_\_

15. Explain the importance of nitrogen to living things.

\_\_\_\_\_

\_\_\_\_\_

**SECTION**  
**3**

**Study Guide**

**Energy Flow**

**Chapter**

**5**

**Directions:** Complete the following sentences using the terms listed below.

**chemosynthesis**

**producers**

**energy pyramid**

**consumers**

**photosynthesis**

**food web**

- The production of energy-rich food molecules from chemicals is called \_\_\_\_\_.
- A diagram that shows all the possible feeding, or energy transfer, relationships in a community is called a(n) \_\_\_\_\_.
- A food chain begins with \_\_\_\_\_.
- \_\_\_\_\_ make up the second and higher steps in a food chain.
- A diagram that shows the comparative amount of energy at each feeding level is called a(n) \_\_\_\_\_.
- The production of energy-rich sugar molecules using light energy is called \_\_\_\_\_.

**Directions:** The steps in the following food chains are out of order. Put them in the correct order by numbering them using **1** as the producer level. Place the number of the step in the blank at the left.

- |          |          |          |          |          |            |           |           |
|----------|----------|----------|----------|----------|------------|-----------|-----------|
| 7. _____ | a. hawk  | 8. _____ | a. tiger | 9. _____ | a. grasses | 10. _____ | a. marmot |
| _____    | b. grain | _____    | b. grass | _____    | b. hawk    | _____     | b. grass  |
| _____    | c. mouse | _____    | c. deer  | _____    | c. grouse  | _____     | c. bear   |
| _____    | d. snake |          |          | _____    | d. insects |           |           |

**Directions:** Answer the following questions on the lines provided.

11. In the above food chains, what do all the first-step organisms have in common?

\_\_\_\_\_

Second-step organisms?

12. Explain why an energy pyramid is in the shape of a pyramid.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**SECTION**  
**1**
**Study Guide**
**How Ecosystems Change**
**Chapter**
**6**

**Directions:** Use the terms provided to complete the following summary.

<b>birds</b>	<b>climax community</b>	<b>drought</b>	<b>fire</b>
<b>grasses</b>	<b>human</b>	<b>insects</b>	<b>lichens</b>
<b>mammals</b>	<b>mosses</b>	<b>organic matter</b>	<b>pioneer species</b>
<b>plants</b>	<b>primary succession</b>	<b>secondary succession</b>	<b>seeds</b>
<b>succession</b>	<b>trees</b>		

Gradual change in the types of species that live in an area is called (1)\_\_\_\_\_.

The first species to inhabit an area, the (2)\_\_\_\_\_, must be able to survive (3)\_\_\_\_\_, extreme heat and cold, and other harsh conditions. These are usually (4)\_\_\_\_\_. The succession that begins in a place previously without plants is referred to as (5)\_\_\_\_\_. As the first species of (6)\_\_\_\_\_ arrive, and erosion takes place, the rock begins to break down into smaller pieces. As these organisms die, they add (7)\_\_\_\_\_ to the rock. Plants, such as (8)\_\_\_\_\_ and ferns grow in the new soil. The soil layer thickens, and (9)\_\_\_\_\_, wildflowers, and other plants take over. Eventually, the organic buildup is enough to support shrubs and (10)\_\_\_\_\_. At the same time, small birds, (11)\_\_\_\_\_, and (12)\_\_\_\_\_ have begun to move in.

Occasionally, natural or (13)\_\_\_\_\_ activity causes a change in the environment. These might include (14)\_\_\_\_\_, avalanche, lumbering, or construction. Succession that begins in a place that already has soil and was once the home of living organisms is called (15)\_\_\_\_\_. After a fire, the bare soil is exposed, but it already contains the (16)\_\_\_\_\_ of weeds, grasses, and trees. Wind and (17)\_\_\_\_\_ deposit more seeds and growth begins very quickly. It may take hundreds or thousands of years for the community to become relatively stable and to develop into a (18)\_\_\_\_\_.

**SECTION**  
**2**

**Study Guide**

**Biomes**

**Chapter**

**6**

**Directions:** Complete the table below using information in your textbook.

Biome	Climate	Dominant plants	Characteristic animals
1. Tundra			
2. Taiga			
3. Temperate deciduous forest			
4. Temperate rain forest			
5. Tropical rain forest			
6. Desert			
7. Grassland			



**SECTION**  
**3**

**Study Guide**

**Aquatic Ecosystems**

**Chapter**

**6**

**Directions:** Describe two life zones in the ocean and how organisms are affected by the conditions in each zone.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_



**Directions:** Answer the following questions on the lines provided.

3. The illustrations above show two types of freshwater ecosystems. Which supports more species and why?

\_\_\_\_\_  
\_\_\_\_\_

4. What is an estuary and why is it important to marine organisms?

\_\_\_\_\_  
\_\_\_\_\_

5. Why are wetlands protected in most areas?

\_\_\_\_\_  
\_\_\_\_\_

6. How do coral reefs form? What makes them vulnerable to environmental stress?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**SECTION**  
**1****Study Guide****Continental Drift****Chapter****7**

**Directions:** *In the space provided, briefly discuss Pangaea and continental drift and the scientific clues that support Alfred Wegener's theory.*

1. Pangaea: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Continental drift: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Puzzle-like fit clues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Fossil clues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Plant clues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Climate clues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Rock clues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. New ideas about continental drift developed through advanced technology. One new explanation for how the continents could drift is \_\_\_\_\_.

**SECTION**  
**2****Study Guide****Seafloor Spreading****Chapter****7**

**Directions:** Find the mistakes in the statements below. Rewrite each statement correctly on the lines provided.

1. During the 1940s and 1950s, scientists began using radar on moving ships to map large areas of the ocean floor in detail.

---

---

2. The youngest rocks are found far from the mid-ocean ridges.

---

---

3. The scientist Henry Hess invented echo-sounding devices for mapping the ocean floor.

---

---

4. As the seafloor spreads apart, hot saltwater moves upward and flows from the cracks.

---

---

5. As the new seafloor moves away from the ridge and becomes hotter, it moves upward and forms still higher ridges.

---

---

6. The research ship *Glomar Challenger* was equipped with a drilling rig that records magnetic data.

---

---

7. Rocks on the seafloor are much older than many continental rocks.

---

---

8. When plates collide, the denser plate will ride over the less-dense plate.

---

---

9. Earth's magnetic field has always run from the north pole to the south pole.

---

---

10. The magnetic alignment in rocks on the ocean floor always runs from the north pole to the south pole.

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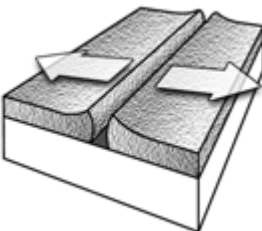
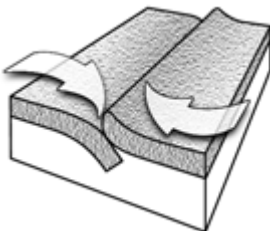
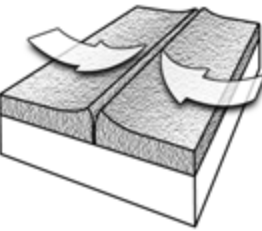
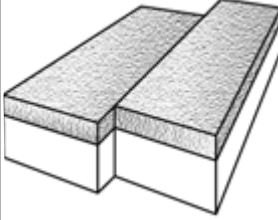
**SECTION**  
**3**
**Study Guide**
**Theory of Plate Tectonics**
**Chapter**
**7**

**Directions:** Use the following words to fill in the blanks below.

**asthenosphere**
**lithosphere**
**plate tectonics**
**convection**
**plates**

- The theory of \_\_\_\_\_ states that Earth's crust and upper mantle are broken into sections.
- These sections, called \_\_\_\_\_, are composed of the crust and a part of the upper mantle.
- The crust and upper mantle together are called the \_\_\_\_\_.
- Beneath this layer is the plasticlike \_\_\_\_\_.
- Scientists suggest that differences in density cause hot, plasticlike rock to be forced upward toward the surface, cool, and sink. This cycle is called a \_\_\_\_\_ current.

**Directions:** Four diagrams are shown in the table below. Label and describe each diagram in the space provided in order to complete the table.

Diagram	Type of boundary and motion at boundary	Diagram	Type of boundary and motion at boundary
6. 		8. 	
7. 		9. 	



**SECTION**  
**1**

**Study Guide**

**Earthquakes**

**Chapter**

**8**

**Directions:** Match the terms from the word bank with the phrases below.

**elastic rebound**  
**epicenter**  
**fault**  
**focus**

**magnitude**  
**Mercalli**  
**P-wave**  
**Richter**

**seismic safe**  
**seismic wave**  
**strain**

**surface wave**  
**S-wave**  
**tsunami**

- \_\_\_\_\_ 1. the point where the movement occurs that causes the wave energy to start
- \_\_\_\_\_ 2. the type of earthquake wave that does damage to roads and buildings
- \_\_\_\_\_ 3. a type of seismic wave that causes particles to vibrate perpendicular to the direction of the wave
- \_\_\_\_\_ 4. surface of a break along which rocks move
- \_\_\_\_\_ 5. the snapping back of rock when it breaks apart
- \_\_\_\_\_ 6. a consequence of earthquakes that occur on the ocean floor
- \_\_\_\_\_ 7. point on Earth's surface above an earthquake's focus
- \_\_\_\_\_ 8. the fastest type of seismic wave, which causes rock to vibrate in the same direction the wave is moving
- \_\_\_\_\_ 9. a scale of magnitude that tells how much energy an earthquake releases
- \_\_\_\_\_ 10. waves that travel through Earth
- \_\_\_\_\_ 11. a scale that describes the intensity of an earthquake by the amount of geologic and structural damage it causes
- \_\_\_\_\_ 12. something measured by the height of lines traced on a seismograph by the energy of an earthquake
- \_\_\_\_\_ 13. the kind of energy that builds up as rock bends and is released when rock breaks
- \_\_\_\_\_ 14. a description for buildings that can stand up to the vibrations of an earthquake

**Directions:** List three types of faults and how they form.

15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_

**SECTION**  
**2**

**Study Guide**

**Volcanoes**

**Chapter**

**8**

**Directions:** *Indicate whether each statement refers to a shield volcano (sh), a cinder cone volcano (cc), or a composite volcano (cv).*

- \_\_\_\_\_ 1. moderate to violent eruptions throwing volcanic ash, cinders, and lava high into the air
- \_\_\_\_\_ 2. largest type of volcano
- \_\_\_\_\_ 3. a relatively small cone of volcanic material formed from tephra
- \_\_\_\_\_ 4. sometimes erupts violently, forming a layer of tephra; sometimes a quieter eruption forming a lava layer
- \_\_\_\_\_ 5. forms along subduction zones
- \_\_\_\_\_ 6. buildup of basaltic layers, forming a broad volcano with gently sloping sides
- \_\_\_\_\_ 7. forms where magma is being forced up from the extreme depths within Earth, or in areas where Earth's plates are moving apart
- \_\_\_\_\_ 8. Sunset Crater, near Flagstaff, Arizona
- \_\_\_\_\_ 9. Mount St. Helens, in Washington
- \_\_\_\_\_ 10. a steep-sided mountain composed of alternating layers of lava and tephra

**Directions:** *Match the descriptions in Column II with the items in Column I. Write the letter of the correct description in the blank at the left.*

**Column I**

- \_\_\_\_\_ 11. pyroclastic flow
- \_\_\_\_\_ 12. mudflows
- \_\_\_\_\_ 13. lava
- \_\_\_\_\_ 14. lava rich in silica
- \_\_\_\_\_ 15. lava rich in iron and magnesium
- \_\_\_\_\_ 16. tephra

**Column II**

- a. magma when it reaches Earth's surface
- b. ash, cinders, solidified lava
- c. tends to flow easily
- d. tends to be thicker and is more resistant to flow
- e. hot, glowing rock flows on cushion of hot gases
- f. often accompany eruptions, and can be brought on by heavy rain



**SECTION**  
**3**

**Study Guide**

**Earthquakes, Volcanoes, and  
Plate Tectonics**

**Chapter**

**8**

**Directions:** Answer the following questions on the lines provided.

1. Describe the lithosphere.

---



---

2. What are rifts? What kinds of eruptions would you expect there?

---



---

3. What happens at a convergent plate boundary? How does this set up conditions that form volcanoes?

---



---



---

4. Where do most volcanoes form? How did the Hawaiian Islands form?

---



---

5. Where and how do earthquakes form?

---



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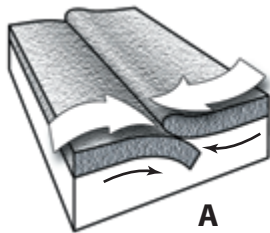
6. Describe the convection theory of tectonic plate movement.

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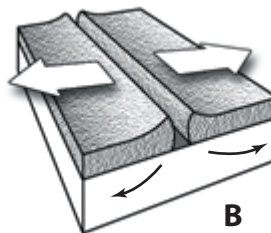


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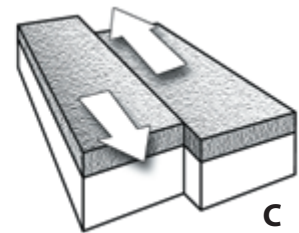
**Directions:** Use the drawings to identify the types of plate boundaries.



**A**



**B**



**C**

7. transform boundary \_\_\_\_\_

8. convergent boundary \_\_\_\_\_

9. divergent boundary \_\_\_\_\_



**SECTION**  
**1**

**Study Guide**

**Fossils**

**Chapter**

**9**

**Directions:** Write the correct Earth science term from the word bank on the line next to its definition.

**carbon films**

**cast**

**coal**

**fossils**

**index fossils**

**mineral replacement**

**mold**

**original remains**

**permineralized remains**

**trace fossils**

- \_\_\_\_\_ 1. thin film of carbon residue forming a silhouette of the original organism
- \_\_\_\_\_ 2. soft spaces inside an organism are filled with minerals from groundwater
- \_\_\_\_\_ 3. hard, outer cavity in the rock where fossil has been dissolved
- \_\_\_\_\_ 4. fossilized tracks and evidence of activity of organisms
- \_\_\_\_\_ 5. traces of species that existed on Earth, used to judge climate, environment, and geologic time
- \_\_\_\_\_ 6. minerals or sediments fill a fossil mold
- \_\_\_\_\_ 7. totally carbonized remains, now used as fuel source
- \_\_\_\_\_ 8. the replacement of hard and soft parts of an organism
- \_\_\_\_\_ 9. remains, imprints, or traces of prehistoric organisms
- \_\_\_\_\_ 10. entire, complete organism found in amber, ice, or natural tar pit

**Directions:** List three requirements for a fossil to be considered an index fossil.

11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_

**Directions:** Discuss three things scientists studying fossils might learn about the environment.

14. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

# SECTION 2

## Study Guide

# Relative Ages of Rocks

## Chapter

# 9

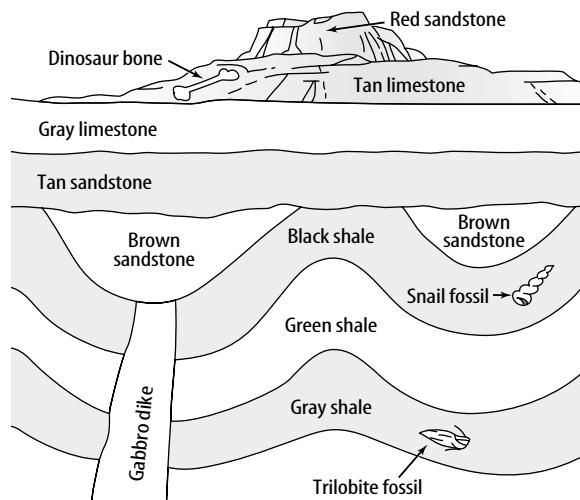
**Directions:** In the blank at the left, write the term that completes each statement.

- \_\_\_\_\_ 1. Natural laws govern the way geologists determine the age of rock deposits. This technique is called \_\_\_\_\_.
- \_\_\_\_\_ 2. The principle of \_\_\_\_\_ states that an older rock layer and things buried in it occur beneath younger layers unless the layers have been disturbed.
- \_\_\_\_\_ 3. Some rock layers are incomplete. The gaps are called \_\_\_\_\_.
- \_\_\_\_\_ 4. A common cause of gaps in rock layers is \_\_\_\_\_.

**Directions:** Look at the cross-sectional view of the rock layers shown in Figure 1. For each question, decide which of the two named materials is older. Assume the layers have not been overturned. Write the name of the older material on the line provided.

- \_\_\_\_\_ 5. tan sandstone and brown sandstone
- \_\_\_\_\_ 6. brown sandstone and gray limestone
- \_\_\_\_\_ 7. gabbro dike and brown sandstone
- \_\_\_\_\_ 8. gabbro dike and gray shale
- \_\_\_\_\_ 9. snail fossil and trilobite fossil
- \_\_\_\_\_ 10. snail fossil and dinosaur bone
- \_\_\_\_\_ 11. snail fossil and green shale
- \_\_\_\_\_ 12. dinosaur bone and red sandstone
- \_\_\_\_\_ 13. red sandstone and gray limestone
- \_\_\_\_\_ 14. tan limestone and tan sandstone
- \_\_\_\_\_ 15. tan limestone and gray limestone
- \_\_\_\_\_ 16. The type of unconformity shown in Figure 1 is a(n) \_\_\_\_\_.

**Figure 1**



**SECTION**  
**3**

**Study Guide**

**Absolute Ages of Rocks**

**Chapter**

**9**

**Directions:** Match the terms in Column I with their definitions in Column II. Write the letter of the correct phrase in the blank at the left.

**Column I**

- \_\_\_\_\_ 1. absolute dating  
 \_\_\_\_\_ 2. half-life  
 \_\_\_\_\_ 3. radioactive decay  
 \_\_\_\_\_ 4. radiometric dating  
 \_\_\_\_\_ 5. uniformitarianism

**Column II**

- a. time it takes for half of the atoms in an isotope to decay  
 b. breaking down of a neutron into a proton and an electron  
 c. principle that Earth processes occurring today are similar to those that occurred in the past  
 d. process that uses the properties of atoms in rocks and other objects to determine their ages  
 e. calculating the absolute age of a rock by measuring the amounts of parent and daughter materials in a rock and by knowing the half-life of the parent material

**Directions:** Follow the steps below to demonstrate the radioactive decay of carbon-14. Then answer the questions.

1. Cut a strip of paper 8 cm long. Think of the paper as all of the carbon-14 in an animal when it died.
2. The idea is to show how you find the age of a rock that contains an animal fossil by using the half-lives of isotopes. Cut the strip of paper in half.
3. Discard one half of the paper. This represents the decayed material. Record the cut in Item 6 below with an X.
4. Continue by cutting the second half of the paper in half. Record the cut below with an X.
5. Continue Steps 3 and 4 until the paper is so small you cannot make another cut. Record each cut you make with an X.

6. Number of cuts: \_\_\_\_\_

7. What is the total number of times you were able (practically) to cut the sample in half?

\_\_\_\_\_

8. Each cut represents the half-life of carbon-14. What is the total amount of time represented by each cut?

\_\_\_\_\_

9. Multiply the number of cuts by the half-life of carbon-14. What is the total amount of time represented by the cuts?

\_\_\_\_\_

10. Could using the half-life of carbon-14 determine when dinosaurs died? Explain.

\_\_\_\_\_



**SECTION**  
**1**

**Study Guide**

**Life and Geologic Time**

**Chapter**

**10**

**Directions:** Use the following word bank to complete the summary statements below.

**artificial selection**

**era**

**natural selection**

**eon**

**evolution**

**period**

**epoch**

**geologic time scale**

**species**

**trilobites**

**Definition**

- \_\_\_\_\_ 1. theory that species have changed over time
- \_\_\_\_\_ 2. longest geologic time unit; based on abundance of fossils
- \_\_\_\_\_ 3. shortest geologic time unit; based on difference in life forms that vary regionally, such as from continent to continent
- \_\_\_\_\_ 4. time unit based on major, striking, and world-wide changes in types of fossils present
- \_\_\_\_\_ 5. division of Earth's history into time units based on the lifeforms that lived only during certain periods; consists of periods, epochs, eras, and eons
- \_\_\_\_\_ 6. theory proposed by Charles Darwin to explain how species change over time
- \_\_\_\_\_ 7. breeding of certain species by humans for desired traits
- \_\_\_\_\_ 8. time unit characterized by types of life existing world-wide at the time
- \_\_\_\_\_ 9. group of organisms that normally reproduces only with other members of their group
- \_\_\_\_\_ 10. three-segment-bodied organisms used as index fossils

**Directions:** Define natural selection and then give a real-world example of an organism that is well adapted to its environment and has a good chance of survival.

11. Natural selection: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Example: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**SECTION**  
**2**

**Study Guide**

**Early Earth History**

**Chapter**

**10**

**Directions:** List the events and types of organisms below in the order in which they happened or appeared on Earth. The oldest one is Number 1.

- amphibians      complex organisms      cyanobacteria      fish      invertebrates
- organisms with hard parts      shielding of Earth from ultraviolet rays
- Pangaea      reptiles      oxygen is major atmospheric gas

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

**Directions:** Answer the following questions on the lines provided.

11. Which of the events in your list above occurred in the Precambrian time? Which occurred in the Paleozoic Era? \_\_\_\_\_  
\_\_\_\_\_
12. Why is so little known about the Precambrian time? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
13. Where did most life-forms of the Paleozoic Era live? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
14. What might have caused the mass extinctions at the end of the Paleozoic Era?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**SECTION**  
**3**

**Study Guide**

**Middle and Recent  
Earth History**

**Chapter**

**10**

**Directions:** Match the descriptions in Column I with the terms in Column II. Write the letter of the correct term in the space provided in the left-hand column.

**Column I**

- \_\_\_\_\_ 1. seed plants which first appeared in the Paleozoic Era
- \_\_\_\_\_ 2. era of “middle life”
- \_\_\_\_\_ 3. most recent period in the Mesozoic Era
- \_\_\_\_\_ 4. oldest period in the Mesozoic Era
- \_\_\_\_\_ 5. northern part of Pangaea
- \_\_\_\_\_ 6. southern part of Pangaea
- \_\_\_\_\_ 7. fast-moving dinosaur
- \_\_\_\_\_ 8. dinosaur thought to nurture hatchlings
- \_\_\_\_\_ 9. winged animal resembling both dinosaurs and birds
- \_\_\_\_\_ 10. milk-producing animals; first appeared in the Triassic Period
- \_\_\_\_\_ 11. flowering plants
- \_\_\_\_\_ 12. most recent era
- \_\_\_\_\_ 13. most recent period in the Cenozoic Era
- \_\_\_\_\_ 14. climate change that allowed flowering plants to increase
- \_\_\_\_\_ 15. where most marsupials live
- \_\_\_\_\_ 16. animals with pouches

**Column II**

- a. Gondwanaland
- b. mammals
- c. Australia
- d. Laurasia
- e. Cretaceous
- f. gymnosperms
- g. angiosperms
- h. Mesozoic
- i. Quaternary
- j. *Maiasaura*
- k. Triassic
- l. Cenozoic
- m. marsupials
- n. tyrannosaurs
- o. cooling
- p. *Archaeopteryx*
- q. *Gallimimus*

**Directions:** Complete the following statements.

- 17. The bones of cold-blooded animals have \_\_\_\_\_.
- 18. The bones of dinosaurs resemble those of \_\_\_\_\_-blooded animals.
- 19. Some dinosaurs may have \_\_\_\_\_ their young.



**SECTION**  
**1**

**Study Guide**

**Earth**

**Chapter**

**11**

**Directions:** Complete the following statements. Write the correct word on the blank provided.

<b>axis</b>	<b>rotates</b>	<b>elliptical</b>
<b>seasons</b>	<b>equinox</b>	<b>spherical</b>
<b>revolves</b>	<b>solstice</b>	<b>magnetic field</b>

1. Earth is \_\_\_\_\_ in shape, with a slight bulge at the equator.
2. The day when the Sun reaches the greatest distance north or south of the equator is the \_\_\_\_\_.
3. Earth turns on its \_\_\_\_\_ once every 24 h.
4. Earth \_\_\_\_\_ around the Sun in a(n) \_\_\_\_\_ orbit.
5. When the Sun is directly above Earth's equator, we refer to it as the \_\_\_\_\_.
6. Earth is tilted on its axis at a 23.5-degree angle creating a short period of climate change commonly called \_\_\_\_\_.
7. Scientists hypothesize that the movement of material inside Earth's core and Earth's rotation generate a(n) \_\_\_\_\_.
8. Earth \_\_\_\_\_, creating day and night.

**Directions:** Define the terms revolve and rotate in your own words and give an example of each.

9. Revolve: \_\_\_\_\_

Example: \_\_\_\_\_

10. Rotate: \_\_\_\_\_

Example: \_\_\_\_\_

**Directions:** Explain how the tilt of Earth's axis causes seasons. (Hint: Refer to **Figure 3** and your text to discuss the hours of sunlight and angle of direct rays at different times of the year.)

11. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

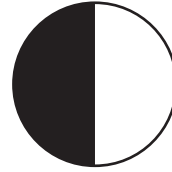
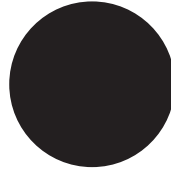
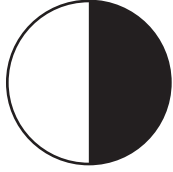
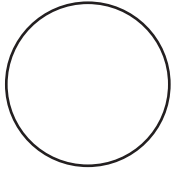
**SECTION**  
**2** Study Guide

**The Moon—Earth's Satellite**

**Chapter**  
**11**

**Directions:** Identify each phase of the Moon in Figure 1 by writing its name on the line beneath the phase shown. Then answer the following questions on the lines provided.

**Figure 1**

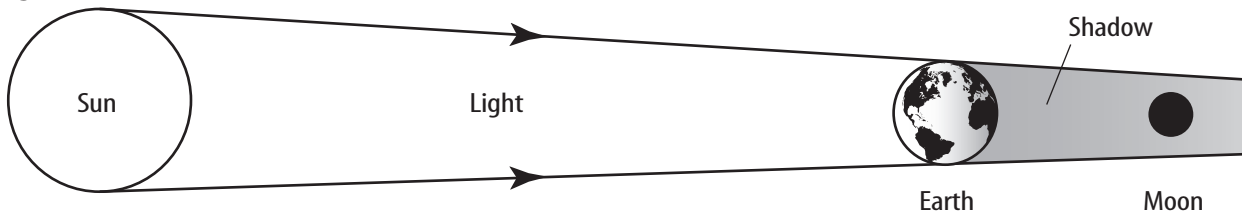


1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_

- \_\_\_\_\_ 5. What phase occurs between the full moon and the third quarter?  
 \_\_\_\_\_ 6. What phase occurs between the third quarter and the new moon?  
 \_\_\_\_\_ 7. What phase occurs between the new moon and the first quarter?  
 \_\_\_\_\_ 8. What phase occurs between the first quarter and the full moon?

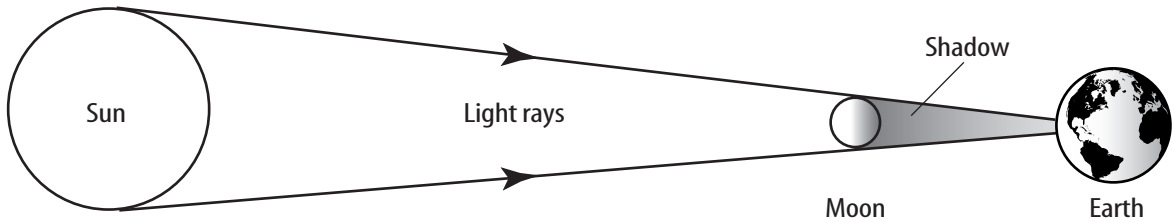
**Directions:** Identify Figures 2 and 3 as either a **total lunar eclipse** or **total solar eclipse**. Then on the lines below, explain why each type of eclipse happens and who would be able to see the eclipse.

**Figure 2**



9. \_\_\_\_\_

**Figure 3**



10. \_\_\_\_\_

11. Figure 2: \_\_\_\_\_  
 \_\_\_\_\_

12. Figure 3: \_\_\_\_\_  
 \_\_\_\_\_

**SECTION**  
**3**

**Study Guide**

**Exploring Earth's Moon**

**Chapter**

**11**

**Directions:** Complete the following sentences using the terms listed below.

**crust**

**lunar**

**shadow**

**thinner**

**basin**

**minerals**

**water**

**surface**

**ice**

**core**

- Information from *Clementine* helped scientists measure the thickness of the Moon's \_\_\_\_\_.
- Lunar Prospector* enabled scientists to confirm that the moon has an iron-rich \_\_\_\_\_.
- Hydrogen is one of the elements that make up \_\_\_\_\_.
- The South Pole-Aitken Basin is an impact crater, or impact \_\_\_\_\_, on the surface of the Moon.
- The *Clementine* spacecraft was placed in \_\_\_\_\_ orbit.
- Throughout the Moon's rotation, most of the South Pole-Aitken Basin stays in \_\_\_\_\_.
- Clementine* also took photographs for use in making a map of the Moon's \_\_\_\_\_.
- Some scientists theorize that \_\_\_\_\_ may exist in the floors of the craters at the Moon's poles.
- Data show that the Moon's crust is \_\_\_\_\_ on the side of the Moon facing Earth.
- Another kind of information collected by *Clementine* indicates what kinds of \_\_\_\_\_ make up Moon rocks.

**Directions:** Answer the following questions on the lines provided.

- Why might the South Pole-Aitken Basin be a good place for a solar-powered Moon colony?

\_\_\_\_\_

\_\_\_\_\_

- Where did the spacecraft *Clementine* get its name?

\_\_\_\_\_

\_\_\_\_\_



**SECTION**  
**1**

**Study Guide**

**The Solar System**

**Chapter**

**12**

**Directions:** List the historical models and astronomical ideas of the solar system by completing the study chart below.

	Model	Supporter of the Model	Key Ideas
1.	(also known as the geocentric model)	early Greek astronomers	
2a.			Moon revolved around Earth, all planets revolved around the Sun in circular orbits
2b.	(also known as the heliocentric model)	Johannes Kepler	
3.	Modern View of Solar System	current understanding	

**Directions:** List the planets of our solar system in order. (Hint: refer to *Figure 1* in the text for additional help.)

Sun	4.	5.	6.	7.	8.	9.	10.	11.	12.
-----	----	----	----	----	----	----	-----	-----	-----

**Directions:** Describe the four steps that help explain how the solar system may have formed. (Hint: refer to *Figure 3* in the text for additional help.)

13. \_\_\_\_\_

14. \_\_\_\_\_

15. \_\_\_\_\_

16. \_\_\_\_\_

**SECTION**  
**2**

**Study Guide**

**The Inner Planets**

**Chapter**

**12**

**Directions:** Write the names of the inner planets as headings in the chart in the order of their position from the Sun. Then fill in the chart using information from your textbook.

	1.	2.	3.	4.
Size and composition	5.	6.	7.	8.
Atmosphere	9.	10.	11.	12.
Temperatures	13.	14.	15.	16.
Surface features	17.	18.	19.	20.
Moons (number/ names)			21.	22.
Space probes	23.	24.		25.



**SECTION**  
**3**

**Study Guide**

**The Outer Planets**

**Chapter**

**12**

**Directions:** List the outer planets across the top of the chart in the order of their usual position from the Sun. Then fill in the chart using information from your textbook.

	1. (Fifth from Sun)	2. (Sixth from Sun)	3. (Seventh from Sun)	4. (Eighth from Sun)	5. (Ninth from Sun)
<b>Size and Composition</b>	6.	7.	8.	9.	10.
<b>Atmosphere</b>	11.	12.	13.	14.	15.
<b>Below the Atmosphere</b>	16.	17.	18.	19.	20.
<b>Notable Features</b>	21.	22.	23.	24.	25.
<b>Moons (number/ names)</b>	26.	27.	28.	29.	30.
<b>Space Probes</b>	31.	32.	33.	34.	

**SECTION**  
**4**

**Study Guide**

**Other Objects in the Solar System**

**Chapter**  
**12**

**Directions:** Answer the following questions on the lines provided.

1. What is the Oort Cloud, and where is it located?

\_\_\_\_\_

2. What is an asteroid, and where are most asteroids located?

\_\_\_\_\_

**Directions:** Identify Figure 1 and its parts, then answer the question that follows.

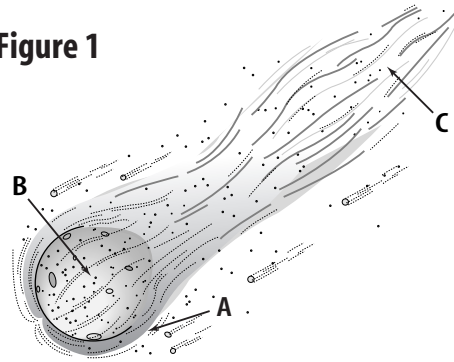
3. Figure 1: \_\_\_\_\_

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

**Figure 1**



4. How does a comet begin and end?

\_\_\_\_\_

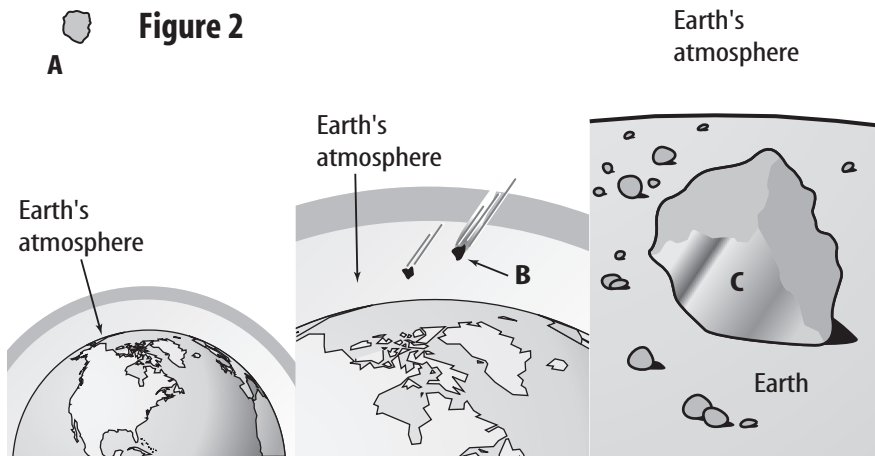
**Directions:** Identify the parts of Figure 2, then answer the question that follows.

5. A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

**Figure 2**



6. What two space objects produce meteorites?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**SECTION**  
**1**

**Study Guide**

**Stars**

**Chapter**

**13**

**Directions:** Use the vocabulary terms to complete the summary paragraph about stars.

<b>24 hours</b>	<b>chemical elements</b>	<b>Polaris</b>
<b>88 constellations</b>	<b>circumpolar constellations</b>	<b>Proxima Centauri</b>
<b>absolute magnitude</b>	<b>constellation</b>	<b>spectroscope</b>
<b>apparent magnitude</b>	<b>light-year</b>	<b>stars</b>
<b>atmosphere</b>	<b>parallax</b>	<b>temperature</b>

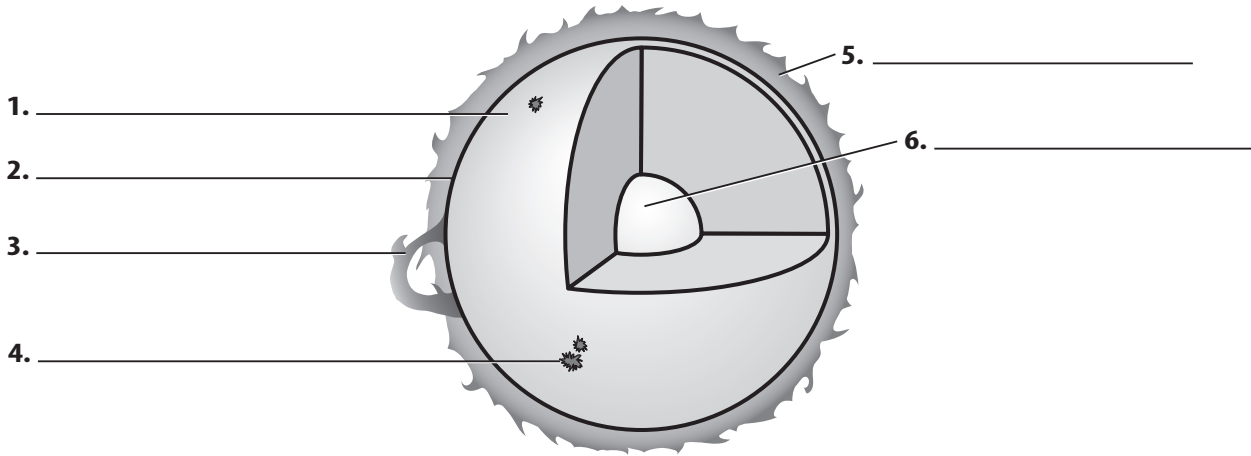
Modern astronomy has divided the sky into (1)\_\_\_\_\_. A (2)\_\_\_\_\_ is defined as a pattern of stars in the sky that looks like a familiar object. However, the (3)\_\_\_\_\_ in the constellation have no relationship to each other in space—some may be close, and some light-years away. The North Star, also called (4)\_\_\_\_\_, is positioned almost directly over Earth’s north pole. Some constellations can be viewed all year round near Earth’s poles. (5)\_\_\_\_\_ appear to rotate above the pole one full circle in the sky every (6)\_\_\_\_\_ as Earth rotates on its axis. Scientists measure the brightness of stars to determine a star’s age and chemical makeup. They are able to measure the actual amount of light the star gives off, called (7)\_\_\_\_\_, as well as the amount of light received on Earth, called (8)\_\_\_\_\_. The distance a star is from Earth can be measured by studying the apparent shift in position of the star when viewed from two different positions—referred to as (9)\_\_\_\_\_. The nearer the object is to the observer, the greater the apparent shift in position. Scientists are able to measure the distances between Earth and stars such as (10)\_\_\_\_\_ which is 4.3 light-years away and is the closest star to Earth, excluding the Sun. A (11)\_\_\_\_\_ is the distance light travels in one year. Astronomers are also interested in the color of a star, as it indicates the (12)\_\_\_\_\_ and age of a star. When attached to a telescope, a (13)\_\_\_\_\_ acts like a prism and spreads light out into a band of colors called a spectrum. As light from the star passes out of the star’s atmosphere, (14)\_\_\_\_\_ in the star’s atmosphere absorb specific wavelengths of light, producing a unique pattern of dark lines. These patterns of lines can be used to identify which chemical elements are in the star’s (15)\_\_\_\_\_.

**SECTION**  
**2** Study Guide

# The Sun

**Chapter**  
**13**

**Directions:** *The diagram shows interior and outer features of the Sun. Write the name of each feature on the lines provided in the diagram.*



**Directions:** *Answer the questions in complete sentences.*

7. How can the Sun be classified?

\_\_\_\_\_

\_\_\_\_\_

8. How is the energy of the Sun produced?

\_\_\_\_\_

\_\_\_\_\_

9. How does our Sun differ from most other main sequence stars?

\_\_\_\_\_

\_\_\_\_\_

10. How do CMEs (coronal mass ejections) affect Earth?

\_\_\_\_\_

\_\_\_\_\_

11. How are sunspots related to prominences and solar flares?

\_\_\_\_\_

\_\_\_\_\_

**SECTION**  
**3**

**Study Guide**

**Evolution of Stars**

**Chapter**

**13**

**Directions:** Circle the term in the puzzle that fits each clue. Then write the term on the line. In the puzzle, the terms read across or down.

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

1. A \_\_\_\_\_ is a large cloud of dust and gas that becomes a star.
2. A graph that shows the relationship between a star's absolute magnitude and temperature is an \_\_\_\_\_.
3. A star that is a \_\_\_\_\_ has exhausted its supply of hydrogen.
4. The \_\_\_\_\_ of atoms powers the Sun and other stars.
5. The temperature and brightness of stars are indicated by their \_\_\_\_\_.
6. About 90 percent of the stars, including our Sun, are \_\_\_\_\_ stars.
7. A \_\_\_\_\_ is produced when the outer core of a star explodes after the core collapses.
8. The hottest, brightest stars are \_\_\_\_\_ and white.
9. Medium hot and bright stars like our Sun are \_\_\_\_\_ in color.
10. When a star has no fuel left and its outer layers escape into space, it is a \_\_\_\_\_.
11. As heavier elements are formed by fusion, a massive star expands into a \_\_\_\_\_.
12. When a collapsed core becomes so dense only neutrons can exist there, a \_\_\_\_\_ is formed.
13. A \_\_\_\_\_ is so dense that nothing, including light, can escape its gravity field.
14. Write the remaining letters in the puzzle in the order in which they appear to reveal a famous scientist's theory. \_\_\_\_\_

**SECTION**  
**4**

**Study Guide**

**Galaxies and the Universe**

**Chapter**

**13**

**Directions:** Use the terms below to complete the following sentences.

<b>Milky Way</b>	<b>one trillion</b>	<b>Andromeda</b>
<b>Local Group</b>	<b>Steady state theory</b>	<b>galaxy</b>
<b>Doppler shift</b>	<b>Big Bang theory</b>	<b>irregular</b>
<b>elliptical</b>	<b>Clouds of Magellan</b>	<b>Oscillating model</b>
		<b>cluster</b>
		<b>spiral</b>

- The two types of \_\_\_\_\_ galaxies are barred and normal.
- A \_\_\_\_\_ is a group of galaxies.
- \_\_\_\_\_ galaxies have many different shapes and are usually smaller and less common than other types of galaxies.
- An elliptical galaxy about 2.9 million light-years away is in the constellation of \_\_\_\_\_.
- Galaxies shaped like footballs are \_\_\_\_\_ galaxies.
- Two irregular galaxies called the \_\_\_\_\_ orbit the Milky Way.
- A \_\_\_\_\_ is a large group of stars, gas, and dust held together by gravity.
- The \_\_\_\_\_ is an explanation for the formation of the universe.
- The solar system in which we live is in the \_\_\_\_\_ Galaxy.
- The Milky Way Galaxy may contain \_\_\_\_\_.
- The Andromeda Galaxy is a member of the \_\_\_\_\_.
- The \_\_\_\_\_ causes changes in the light coming from distant stars and galaxies.
- One model of the origin of the universe is the \_\_\_\_\_, which proposes that the universe was always as it is now.
- Another model of the origin of the universe is the \_\_\_\_\_, which believes that the universe expands and contracts in a regular pattern.

**SECTION**  
**1**

**Study Guide**

**Models of the Atom**

**Chapter**

**14**

**Directions:** Match the terms in the word bank with the descriptions below.

**alpha particle**

**electrode**

**matter**

**waves**

**anode**

**electron**

**element**

**neutron**

**cathode**

**electron cloud**

**gold foil experiment**

- \_\_\_\_\_ 1. led to the development of the idea of an atomic nucleus
- \_\_\_\_\_ 2. a particle that does not respond to magnets
- \_\_\_\_\_ 3. cathode ray
- \_\_\_\_\_ 4. a way to understand unpredictable electrons
- \_\_\_\_\_ 5. the kind of particle Rutherford used to shoot through gold foil
- \_\_\_\_\_ 6. matter made of atoms of only one kind
- \_\_\_\_\_ 7. where electrons travel
- \_\_\_\_\_ 8. a piece of metal that can conduct electricity
- \_\_\_\_\_ 9. an electrode with a positive charge
- \_\_\_\_\_ 10. an electrode with a negative charge
- \_\_\_\_\_ 11. what a chemist studies

**Directions:** Number the following events in the development of atomic theory in the order they happened. The first step in the sequence has been numbered for you.

12. \_\_\_\_\_ Veering alpha particles led Rutherford to think up the idea of a nucleus.
- \_\_\_\_\_ Bohr proved that electrons might be in energy levels.
- \_\_\_\_\_ 1 Early philosophers believed that there would be very small particles that could not be divided, and they named these particles atoms.
- \_\_\_\_\_ Neutrons were discovered.
- \_\_\_\_\_ Thomson proved that the rays in Crooke's tube were affected by a magnet.

**Directions:** List Dalton's four ideas about matter.

13. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**SECTION**  
**2****Study Guide****The Nucleus****Chapter****14**

**Directions:** Answer the following questions on the lines provided.

1. What does the atomic number of an element refer to?

\_\_\_\_\_

2. Define isotopes. \_\_\_\_\_

\_\_\_\_\_

3. What is the strong nuclear force? \_\_\_\_\_

4. Name two types of transmutations. \_\_\_\_\_

5. Explain what happens during transmutation. \_\_\_\_\_

\_\_\_\_\_

6. What is radioactive decay?

\_\_\_\_\_

7. Describe an alpha particle.

\_\_\_\_\_

8. Describe a beta particle.

\_\_\_\_\_

9. What is meant by the half-life of a radioactive isotope?

\_\_\_\_\_

10. Why are nuclear waste products a problem?

\_\_\_\_\_

11. Why are tracer elements important?

\_\_\_\_\_

**Directions:** Identify each statement as **true** or **false**. Rewrite the false statements to make them correct.

12. Radioactive isotopes used for medical purposes should have long half-lives.

\_\_\_\_\_

13. Scientists can use particle accelerators to create new elements.

\_\_\_\_\_

14. Archaeologists can estimate the age of any ancient artifact with carbon dating.

\_\_\_\_\_

15. The half-life of a radioactive isotope decreases as the isotope decays.

\_\_\_\_\_



**SECTION**  
**1**

**Study Guide**

**Introduction to the  
Periodic Table**

**Chapter  
15**

**Directions:** Match the terms from the word bank with the descriptions below.

7	atomic mass	Mendeleev	Mt
17	Au	mercury	nonmetals
18	copper, tin, and iron	boron	periodic
55	gold and silver group	metals Moseley	representative elements transition elements

- \_\_\_\_\_ 1. a man who accurately predicted the properties of gallium, scandium, and germanium
- \_\_\_\_\_ 2. the number of columns in the periodic table
- \_\_\_\_\_ 3. a man who arranged the elements according to their atomic number
- \_\_\_\_\_ 4. elements in groups 3-12
- \_\_\_\_\_ 5. the number of elements named by 1830
- \_\_\_\_\_ 6. a brittle element that conducts electricity
- \_\_\_\_\_ 7. metals for weapons
- \_\_\_\_\_ 8. a metal named for the shining dawn
- \_\_\_\_\_ 9. the number of nonmetals
- \_\_\_\_\_ 10. the group of elements that contains those that are most important for life
- \_\_\_\_\_ 11. a group that includes metals, metalloids, and nonmetals
- \_\_\_\_\_ 12. the property of atoms first used to arrange them into a periodic table
- \_\_\_\_\_ 13. a metal named for scientist Lise Meitner
- \_\_\_\_\_ 14. a metal that is not a solid
- \_\_\_\_\_ 15. a pattern that repeats over and over is this
- \_\_\_\_\_ 16. elements that are reflective, ductile, malleable, and conducts heat and electricity
- \_\_\_\_\_ 17. metals for jewelry
- \_\_\_\_\_ 18. the number of rows, or periods, in the modern periodic table
- \_\_\_\_\_ 19. elements that share this have similar chemical properties



**SECTION**  
**3**
**Study Guide**
**Transition Elements**
**Chapter**
**15**

**Directions:** Complete the following sentences using the correct terms.

- All transition elements are \_\_\_\_\_.
- The iron triad are elements that have \_\_\_\_\_ properties.
- Many of the heavy metals are \_\_\_\_\_ to living things.
- \_\_\_\_\_ has the highest melting point of any metal.
- \_\_\_\_\_ has the lowest melting point of any metal.
- The \_\_\_\_\_ group are often used for electrodes or catalysts because they do not combine easily with other elements.
- Another name for \_\_\_\_\_ is the rare earths.
- The \_\_\_\_\_ are soft metals that can be cut with a knife.
- All of the actinides are \_\_\_\_\_.
- All but three of the actinides are \_\_\_\_\_.

**Directions:** Match the use in the second column to the element in the first column. Write the correct letter in the space provided.

**Element**

- \_\_\_\_\_ 11. iron  
 \_\_\_\_\_ 12. silver  
 \_\_\_\_\_ 13. mercury  
 \_\_\_\_\_ 14. chromium  
 \_\_\_\_\_ 15. americium  
 \_\_\_\_\_ 16. tungsten  
 \_\_\_\_\_ 17. platinum  
 \_\_\_\_\_ 18. californium  
 \_\_\_\_\_ 19. plutonium  
 \_\_\_\_\_ 20. cerium

**Use**

- a. filament of lightbulbs  
 b. electrodes  
 c. used as a fuel in nuclear power plants  
 d. principal ingredient in misch metal  
 e. used to kill cancer cells  
 f. a necessary part of hemoglobin  
 g. thermometers  
 h. brightly colored paint  
 i. fill cavities  
 j. smoke detectors



**SECTION**  
**1**

**Study Guide**

**Why do atoms combine?**

**Chapter**

**16**

**Directions:** Match the term from the word bank with each phrase below.

alkali metals  
charged  
chemical bond  
down

electron cloud  
electron dot diagram  
empty space  
first

fourth  
halogens  
neutral  
noble gases

nucleus  
proton  
stable  
up

- \_\_\_\_\_ 1. the energy level that can hold only 2 electrons
- \_\_\_\_\_ 2. what an atom will be if it has a different number of protons and electrons
- \_\_\_\_\_ 3. the energy level that can hold 32 electrons
- \_\_\_\_\_ 4. what an atom may be if it has a different number of protons and electrons
- \_\_\_\_\_ 5. the group that needs one more electron to fill its outer energy level
- \_\_\_\_\_ 6. an area of space around the nucleus where electrons are likely to be
- \_\_\_\_\_ 7. the group that has one electron in its outer level
- \_\_\_\_\_ 8. the area where protons and neutrons can be found
- \_\_\_\_\_ 9. the force that holds atoms together
- \_\_\_\_\_ 10. the most stable group on the periodic table
- \_\_\_\_\_ 11. what makes up most of an atom
- \_\_\_\_\_ 12. the particle that must be present in the same number as electrons in a neutral atom
- \_\_\_\_\_ 13. the reactivities of alkali metals increase as you go this direction in the group
- \_\_\_\_\_ 14. the reactivities of noble gases increase as you go this direction in the group
- \_\_\_\_\_ 15. a handy way to represent the outer electrons of an atom
- \_\_\_\_\_ 16. atoms join with each other to become more like this

**Directions:** Explain why, even though electrons closer to the nucleus have a lower energy than electrons further away from the nucleus, it takes more energy to remove the electrons closer to the nucleus.

17. \_\_\_\_\_
- \_\_\_\_\_

**SECTION**  
**2**
**Study Guide**
**How Elements Bond**
**Chapter**
**16**

**Directions:** Correctly complete the following paragraphs using terms from the list below. Some terms may not be used, and some terms may be used more than once.

electrons	losing	positive	covalent
molecules	protons	gaining	negative
random	gains	regular	ionic
nonpolar	ions	polar	sharing
	neutral		
	loses		

Elements in Group 1 become more stable by 1. \_\_\_\_\_ an electron. These elements form 2. \_\_\_\_\_ ions because they have more 3. \_\_\_\_\_ than 4. \_\_\_\_\_. Chlorine readily 5. \_\_\_\_\_ an electron, forming a 6. \_\_\_\_\_ ion. The attraction between sodium ions and chlorine ions forms 7. \_\_\_\_\_ bonds. In sodium chloride, the ions are lined up in a 8. \_\_\_\_\_ pattern.

Unlike sodium and chlorine, some atoms become more stable by sharing 9. \_\_\_\_\_, forming 10. \_\_\_\_\_ rather than charged 11. \_\_\_\_\_. The bonds in a molecule of oxygen are 12. \_\_\_\_\_ 13. \_\_\_\_\_ bonds, while the bonds in a molecule of water are 14. \_\_\_\_\_ 15. \_\_\_\_\_ bonds.

**Directions:** Next to each formula, write the number of atoms of each element found in one unit of the compound.

16. potassium iodide, KI \_\_\_\_\_
17. sodium sulfide, Na<sub>2</sub>S \_\_\_\_\_
18. silicon dioxide, SiO<sub>2</sub> \_\_\_\_\_
19. carbonic acid, H<sub>2</sub>CO<sub>3</sub> \_\_\_\_\_

**Directions:** Complete the following activity.

20. Hydrogen combines with sulfur much like hydrogen combines with oxygen. Draw an electron dot diagram showing hydrogen combined with sulfur and write the chemical formula below.

**SECTION**  
**1****Study Guide****Chemical Formulas and Equations****Chapter****17**

**Directions:** Use the terms from the word bank to fill in the blanks in front of the correct phrases below.

<b>balanced</b>	<b>endothermic</b>	<b>products</b>
<b>bubbles</b>	<b>exothermic</b>	<b>reactants</b>
<b>chemical reaction</b>	<b>iron oxide</b>	<b>silver sulfide</b>
<b>conservation of mass</b>	<b>precipitate</b>	<b>subscripts</b>

- \_\_\_\_\_ 1. substances that are about to take part in a chemical reaction
- \_\_\_\_\_ 2. the numbers in a chemical formula that tell you the ratio of atoms in a compound
- \_\_\_\_\_ 3. the law Lavoisier devised, that says that matter is neither created nor destroyed during a reaction
- \_\_\_\_\_ 4. tarnish on silver
- \_\_\_\_\_ 5. what you call a chemical equation when it is written with the same number of each type of atom on both sides
- \_\_\_\_\_ 6. the process of changing some substances into other substances
- \_\_\_\_\_ 7. a reaction that releases heat to its surroundings. Energy appears on the products side of the equation.
- \_\_\_\_\_ 8. a sign that a gas has been produced
- \_\_\_\_\_ 9. rust
- \_\_\_\_\_ 10. the substances that are formed by a chemical reaction
- \_\_\_\_\_ 11. a reaction that absorbs heat. Energy appears on the left side of the equation.
- \_\_\_\_\_ 12. a solid formed in a reaction by mixing two solutions

**Directions:** List four ways you can detect a chemical reaction.

13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_

# SECTION 2

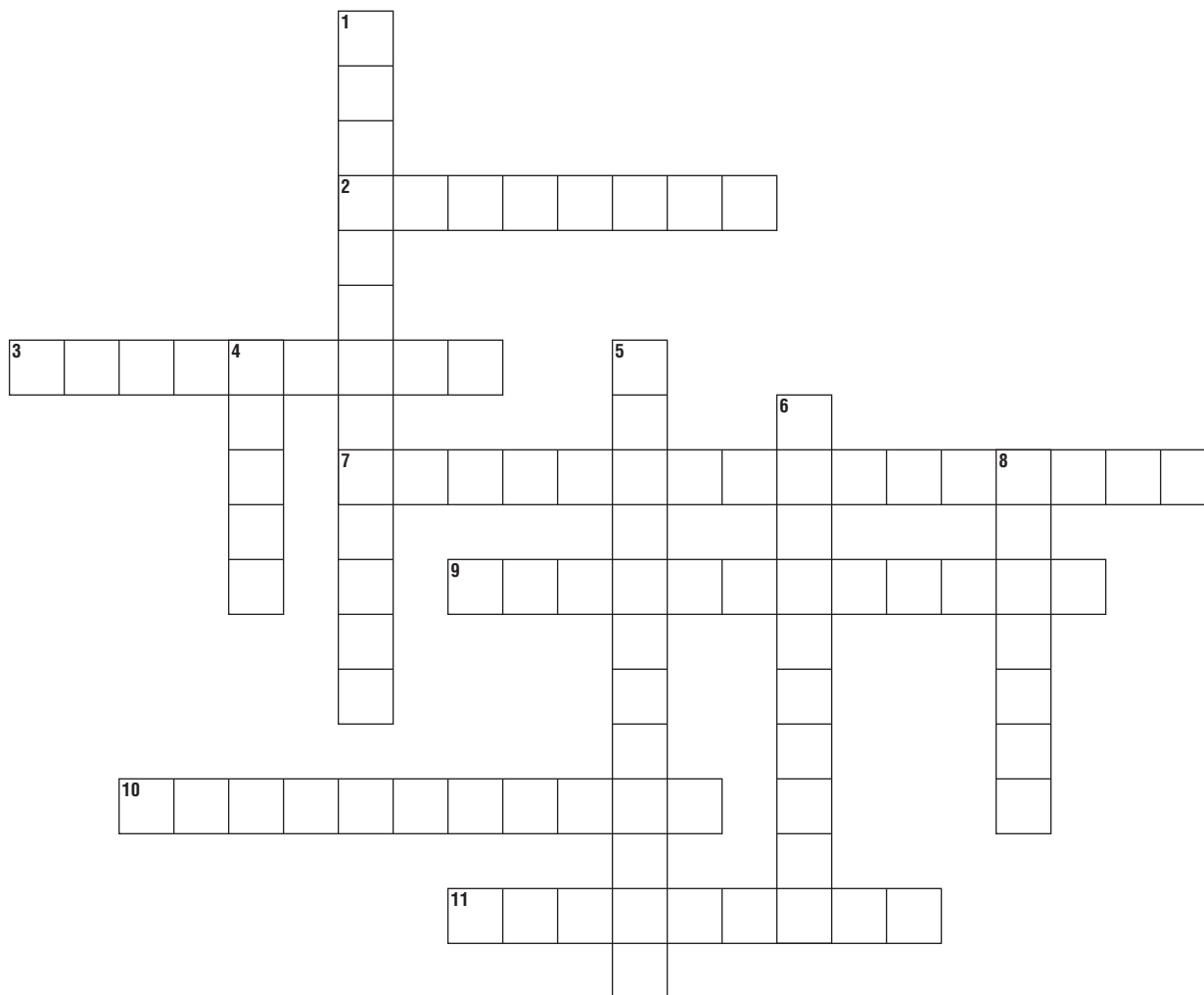
## Study Guide

# Rates of Chemical Reactions

## Chapter

# 17

**Directions:** Use the clues to complete the puzzle.



### Across

2. It speeds up a reaction but is not permanently changed
3. It slows down a chemical reaction
7. The minimum amount of energy needed to start any reaction (2 words)
9. By decreasing this, you can speed up a chemical reaction (2 words)
10. Increasing this speeds up most chemical reactions
11. Enzymes that break down proteins

### Down

1. Amount of substance present in a certain volume
4. They are broken before a chemical reaction takes place
5. Measure of how fast a reaction occurs (two words)
6. These must be strong in order to cause a chemical change to take place
8. Catalysts at work in the body



**SECTION**  
**1**

**Study Guide**

**What is motion?**

**Chapter**

**18**

**Directions:** *Fill in the chart using information from the chapter.*

	Term	Definition	Includes Direction?
1.	distance		
2.	displacement		
3.	average speed		
4.	instantaneous speed		
5.	velocity		

**Directions:** *List three ways the velocity of a car can change.*

6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

**Directions:** *Explain how the speed of an object is changing if the line representing the object's motion on a distance-time graph becomes steeper.*

9. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

**Directions:** *Explain how the displacement of an object could be zero while the distance the object travels is 150 m.*

10. \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

# SECTION 2

## Study Guide

# Acceleration

## Chapter

# 18

**Directions:** In the space provided, substitute a word for the word in *italics* to make the statement correct.

- \_\_\_\_\_ 1. *Velocity* is a change in an object's motion.
- \_\_\_\_\_ 2. Acceleration is the rate of change of velocity with *distance*.
- \_\_\_\_\_ 3. When an object slows down, it has *no* acceleration.

**Directions:** Answer the following questions on the lines provided.

4. A merry-go-round horse travels at a constant speed. Is it accelerating? Explain.

\_\_\_\_\_

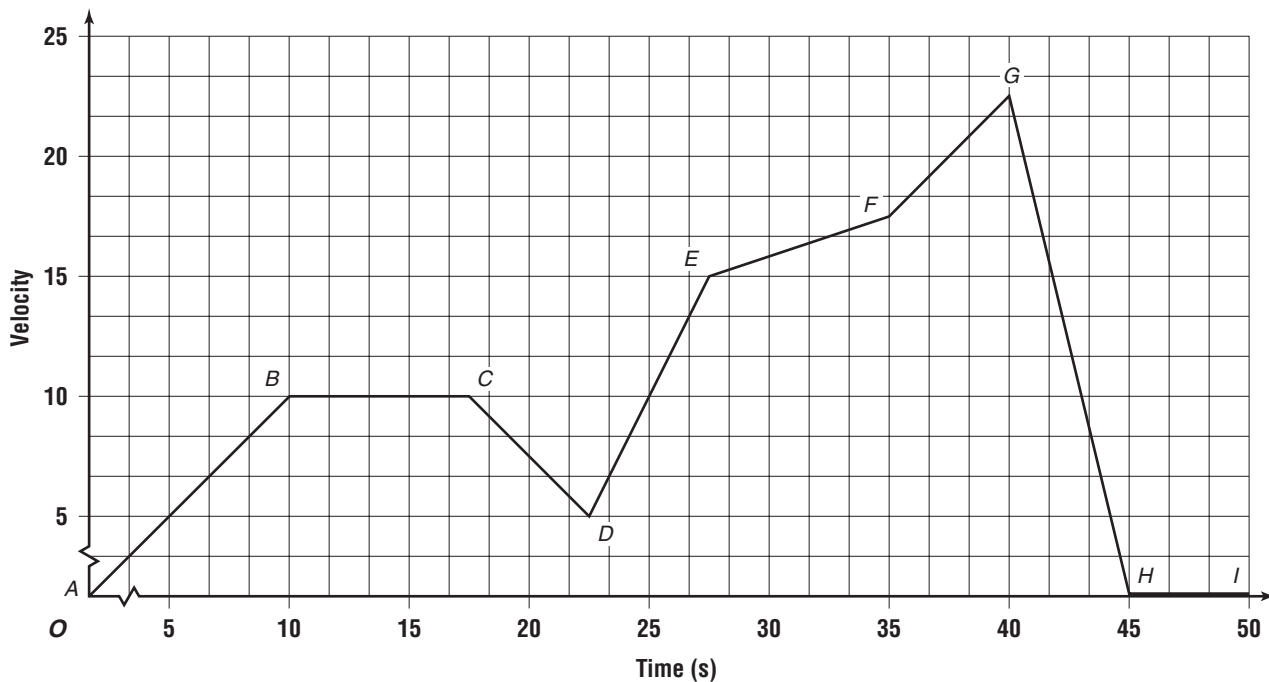
5. What is the unit for speed? For acceleration?

\_\_\_\_\_

6. If an object has an acceleration of  $-3 \text{ m/s}^2$ , describe its motion.

\_\_\_\_\_

**Directions:** Study the velocity-time graph for an object in motion. Then answer the following questions.



7. In what interval does the object have the fastest acceleration?

\_\_\_\_\_

8. Over what interval(s) does the object have a negative acceleration?

\_\_\_\_\_

9. Over what interval is the object stopped?

\_\_\_\_\_

**SECTION**  
**3**

**Study Guide**

**Momentum**

**Chapter**

**18**

**Directions:** In question 1, below, a code letter has been substituted for every letter of the alphabet. To find out what the sentence says, use the following key to decode it. In the key, the code letters are shown directly below the letters they stand for. Write the correct letter above each code letter, then read the sentence.

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

1.                                            
H O G    H D H L S    R D R G J H X R    D Z    D V P G Y H I    H O L H
- Y D S S B Q G    K B H O    G L Y O    D H O G N    Q D G I    J D H    Y O L J M G

2. What is the law that is stated above?
- \_\_\_\_\_

**Directions:** Correctly complete each sentence by underlining the best of the three choices in parentheses.

3. A feather floating in the air has (more, less, the same) momentum as a bowling ball on a shelf.
4. The momentum of an object depends on its mass and (velocity, acceleration, inertia).
5. The tendency for an object to resist change in its motion, is its (momentum, inertia, weight).
6. We say that momentum is conserved, yet objects slow down after collisions. This is because of (inertia, friction, mass).

**Directions:** Answer the following questions on the lines provided.

7. A 500 g model train car traveling at 0.8 m/s collides with a 300 g stationary car. The cars hook up and move off down the track together. How fast are they going?
- \_\_\_\_\_
- \_\_\_\_\_

8. Which has a greater momentum, a car or a bike moving at the same speed?
- \_\_\_\_\_

9. What happens when two objects with the same mass collide?
- \_\_\_\_\_
- \_\_\_\_\_



**SECTION**  
**1**

**Study Guide**

**Newton's First Law**

**Chapter**

**19**

**Directions:** Use the terms from the word bank to fill in the blanks in front of the correct phrases below.

**balanced  
force  
friction**

**net force  
Newton's first  
rolling**

**static  
sliding  
unbalanced**

- \_\_\_\_\_ 1. the force that brings nearly everything to a stop, also useful for mountain climbers and baseball players
- \_\_\_\_\_ 2. the type of friction that acts on a rolling wheel, easier to overcome than static friction
- \_\_\_\_\_ 3. the combination of all forces acting on an object
- \_\_\_\_\_ 4. the law that describes the motion of objects that experience balanced forces
- \_\_\_\_\_ 5. the forces acting on an object whose motion is not
- \_\_\_\_\_ 6. the type of friction that you have to overcome to push a stationary object
- \_\_\_\_\_ 7. the type of friction acting on surfaces sliding on each other
- \_\_\_\_\_ 8. a push or pull
- \_\_\_\_\_ 9. the forces that cause the motion of an object to change

**Directions:** Unscramble the words to fill in the blanks in this paragraph that explains how Galileo Galilei's ideas helped Isaac Newton to understand the nature of motion.

Galileo realized that an object could be in motion even if the (10) \_\_\_\_\_ (ecsfro) acting on it were (11) \_\_\_\_\_ (aebcdln). In real life, (12) \_\_\_\_\_ (cinotfri) is the force that (13) \_\_\_\_\_ (lswso) objects down and causes them to (14) \_\_\_\_\_ (sptso). Newton's (15) \_\_\_\_\_ (srift) law of motion described how forces cause the motion of objects to (16) \_\_\_\_\_ (aehncg): An object at rest remains at rest and an object in motion continues to move in a (17) \_\_\_\_\_ (gsahitr) line with constant (18) \_\_\_\_\_ (pedes) if the net force acting on it is (19) \_\_\_\_\_ (ozer).

# SECTION 2

## Study Guide

# Newton's Second Law

## Chapter

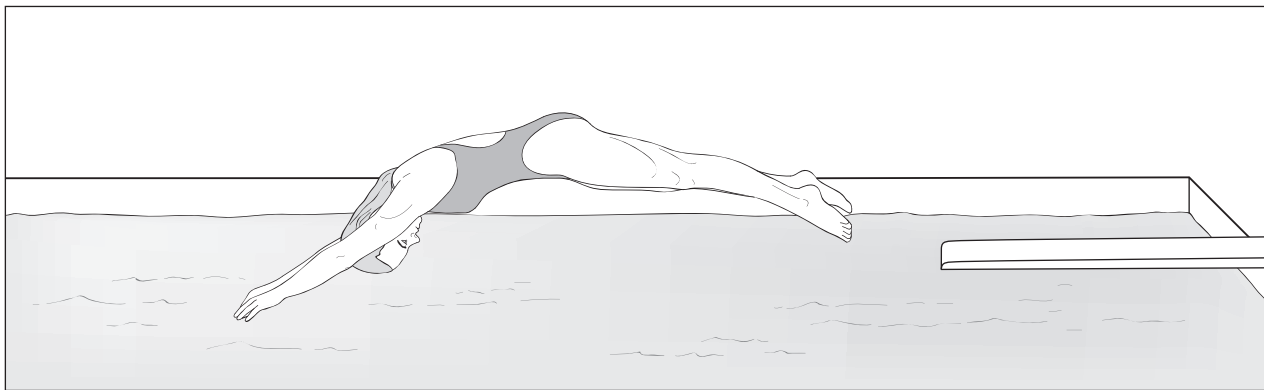
# 19

**Directions:** Select the term from the following list that matches each description. Some terms will not be used.

- |             |   |                                  |
|-------------|---|----------------------------------|
| a. 16 N     | e. $a = \frac{F}{m}$                                    | i. 600 N                         |
| b. -16 N    | f. normal forces  | j. Newton's second law of motion |
| c. gravity  | g. air resistance                                       | k. terminal velocity             |
| d. $F = ma$ | h. $F = m\left(\frac{9.8 \text{ m}}{\text{s}^2}\right)$ | l. Newton's first law of motion  |

- \_\_\_\_\_ 1. acts against the direction of motion and gets larger as an object moves faster
- \_\_\_\_\_ 2. Force is equal to mass times acceleration.
- \_\_\_\_\_ 3. An object acted upon by a net force will accelerate in the direction of that force.
- \_\_\_\_\_ 4. the gravitational force on any object near Earth's surface
- \_\_\_\_\_ 5. the outward forces exerted by a surface
- \_\_\_\_\_ 6. the speed an object reaches when the force of gravity is balanced by the force of air resistance
- \_\_\_\_\_ 7. What force must be applied to a 60-kg object to make it accelerate at 10 m/s<sup>2</sup>?

**Directions:** Study the illustration of the diver. Then identify each statement as **true** or **false**. If the statement is false, change the word(s) in *italics* to make it true.



- \_\_\_\_\_ 8. After the diver jumps forward from the diving board, the force of gravity will accelerate the diver *parallel* to the direction of motion.
- \_\_\_\_\_ 9. When the diver hits the water, the force of the water against her body can stop it about *five times faster* than the pull of gravity that accelerated it.
- \_\_\_\_\_ 10. If the diver doesn't have the correct form when she enters the water, the force of the water can *accelerate* her speed.
- \_\_\_\_\_ 11. *Air resistance* prevents the diver from moving in a straight line once she jumps from the platform.

**SECTION**  
**3**

**Study Guide**

**Newton's Third Law**

**Chapter**

**19**

**Directions:** Complete the table by naming the action and reaction forces in the following examples.

Example	Action force	Reaction force
1. A flying bird		
2. Two bumper cars collide		
3. Holding your hand out the window of a moving car		
4. Walking		
5. Touching your finger to your nose		

**Directions:** Complete the following sentences using the correct terms or phrases.

- Newton's third law states, "For every action, there is an equal but \_\_\_\_\_."
- There is no \_\_\_\_\_ in time between the action and the reaction.
- One reason it's often easy to miss an action-reaction pair is because of the \_\_\_\_\_ of one of the objects.
- Action-reaction forces are always the same \_\_\_\_\_ but are in opposite \_\_\_\_\_.
- When you swim in water, your arms push the water \_\_\_\_\_. The water reacts by pushing \_\_\_\_\_ on your arms, causing your body to accelerate \_\_\_\_\_.

**Directions:** Answer the following question using complete sentences.

- How could the action force of a canoe moving through water be increased?

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**SECTION**  
**1**

**Study Guide**

**Work and Power**

**Chapter**

**20**

**Directions:** Give an example of how you could apply a force to do work. Describe the necessary condition for the force to do work.

1. \_\_\_\_\_  
\_\_\_\_\_

**Directions:** Give an example of how you could apply a force and not do work. Explain why the applied force is not doing work.

2. \_\_\_\_\_  
\_\_\_\_\_

**Directions:** Write formulas to fill in the following chart.

	Write a Formula to Calculate	Data That Is Needed	Formula
3.	Work		
4.	Power		

**Directions:** Decide what each situation describes and write the term in the blank. You may use terms from the bank more than once or not at all.

**distance**  
**energy**

**force**  
**heat**

**kinetic energy**  
**potential energy**

**power**  
**work**

- \_\_\_\_\_ 5. what is done when a baseball is lifted 0.7 m
- \_\_\_\_\_ 6. the form of energy you give a chair by pushing it across the floor
- \_\_\_\_\_ 7. the form of energy a book has that decreases as it tumbles from a library shelf
- \_\_\_\_\_ 8. what a dog did as he pushed his food bowl across the room with his nose
- \_\_\_\_\_ 9. measured in newtons
- \_\_\_\_\_ 10. something that can not be created nor destroyed
- \_\_\_\_\_ 11. measured in watts
- \_\_\_\_\_ 12. the form of energy a baseball has that increases when it is lifted 0.7 m
- \_\_\_\_\_ 13. a baseball is carried 7 m
- \_\_\_\_\_ 14. the rate at which work is done

**SECTION**  
**2**

**Study Guide**

**Using Machines**

**Chapter**

**20**

**Directions:** Use the formula,  $\text{efficiency} = (W_{\text{out}}/W_{\text{in}}) \times 100\%$ , to calculate the efficiency of each of the following machines.

1. A 600-N box is pushed up a ramp that is 2 m high and 5 m long. The person pushing the box exerts a force of 300 N. What is the efficiency of the ramp?

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2. A person uses a fixed pulley to raise a 75-N object 40 m. The force exerted on the object is 120 N. What is the efficiency of the pulley?

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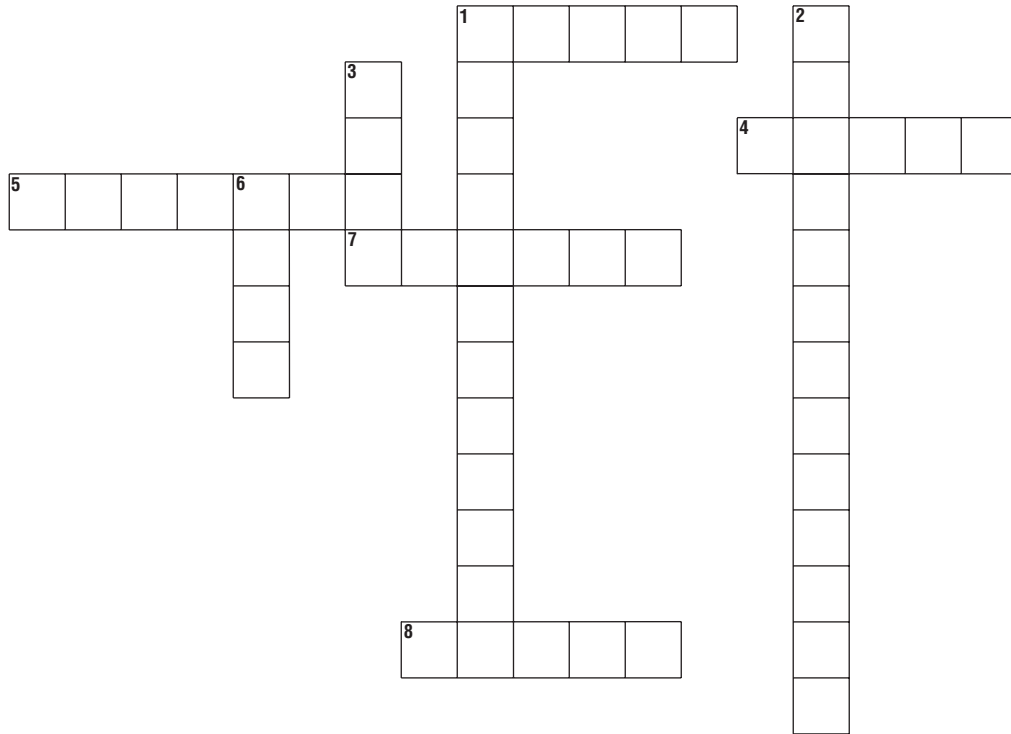
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**Directions:** Complete the following sentences using the correct terms.

3. The work input is equal to the work \_\_\_\_\_ in an ideal machine.
4. Machines are useful because they can change the \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_ of the force you need to exert.
5. The force you exert on an object is the effort, or \_\_\_\_\_ force.
6. The \_\_\_\_\_ of a machine compares the input force to the output force.
7. \_\_\_\_\_ can reduce a machine's efficiency.
8. The ability of a machine to convert input work to output work is called the machine's \_\_\_\_\_.

**SECTION**  
**3**
**Study Guide**
**Simple Machines**
**Chapter**
**20**

**Directions:** Use the clues to complete the puzzle.


**Across**

1. A moving inclined plane
4. An inclined plane wrapped around a post
5. The pivot point of a lever
7. A surface that re-directs force using a rope
8. A rod that pivots about a point

**Down**

1. Two rigidly attached wheels that rotate together
2. A sloped surface
3. An inclined plane
6. Used with a pulley to change the direction of a force




 SECTION  
1

## Study Guide

# Temperature and Thermal Energy

## Chapter

# 21

**Directions:** *Unscramble the words to fill in the blanks in the summary statements.*

(1) \_\_\_\_\_ (rateputerm) is a measure of the average kinetic energy of the  
 (2) \_\_\_\_\_ (oeeuscllm) in a substance. As the temperature increases, the mole-  
 cules have more (3) \_\_\_\_\_ (tiencikt greeny), and are moving  
 (4) \_\_\_\_\_ (reastf). For most materials, as the temperature increases, the mole-  
 cules in the material move (5) \_\_\_\_\_ (feathrr) apart, causing the material to  
 (6) \_\_\_\_\_ (pandex). When the material cools, its molecules move more  
 (7) \_\_\_\_\_ (yowlls) and the material (8) \_\_\_\_\_ (strancoct). For  
 the same temperature increase, (9) \_\_\_\_\_ (udsiqli) usually expand more than  
 (10) \_\_\_\_\_ (dlsois). On the (11) \_\_\_\_\_ (iueslcs) temperature  
 scale, the (12) \_\_\_\_\_ (bilingo) point of water is 100° C and the  
 (13) \_\_\_\_\_ (zengerif) point of water is 0° C. The (14) \_\_\_\_\_  
 (metlahr ygeren) of an object is the sum of the (15) \_\_\_\_\_ (nkctei) and  
 (16) \_\_\_\_\_ (lontpetia) energy of all the molecules in the object.

**Directions:** *Use the terms from the word bank to complete the section summary.*

**greater  
height**

**increases  
kelvin**

**more  
temperature**

**thermal energy**

A practical way to measure (17) \_\_\_\_\_ is to use a thermometer. One type of  
 thermometer contains a liquid that expands as its temperature (18) \_\_\_\_\_, so  
 that the (19) \_\_\_\_\_ of the liquid in the tube depends on the temperature. On  
 the (20) \_\_\_\_\_ temperature scale, the lowest possible temperature is 0 K. If two  
 glasses of water at the same temperature are poured into a container, the  
 (21) \_\_\_\_\_ of the water in the container is (22) \_\_\_\_\_ than  
 the thermal energy of the water in either glass, because there are (23) \_\_\_\_\_  
 molecules of water in the container.

**SECTION**  
**2****Study Guide****Heat****Chapter****21**

**Directions:** Answer the following questions on the lines provided.

1. How is heat related to thermal energy? Can an object contain heat?

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2. Explain how convection could be used to heat a room with a hot radiator on one side of the room.

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**Directions:** Fill in the blanks with the terms that best complete the statements.

3. Heat always moves from a(n) \_\_\_\_\_ object to a(n) \_\_\_\_\_ object.
4. When two objects are in contact, heat is best transferred by \_\_\_\_\_.
5. Heat is transferred by conduction when \_\_\_\_\_ moving molecules bump into \_\_\_\_\_ moving molecules and transfer \_\_\_\_\_ energy.
6. The heat from an electric space heater is transferred to you by \_\_\_\_\_.
7. Radiation transfers thermal energy by \_\_\_\_\_.
8. Heat is transferred in gases or liquids primarily by \_\_\_\_\_.

**Directions:** Correctly complete each sentence by underlining the best of the three choices in parentheses.

9. A small pan of water at 50°C is brought into contact with a larger pan of water at 50°C. Heat is transferred (from the large pan to the small pan, from the small pan to the large pan, not at all).
10. Convection involves (molecules moving, molecules colliding, electromagnetic waves).
11. Metals are good (reservoirs, insulators, conductors) because they transfer heat easily.
12. Cooking tools often have plastic handles because plastic is a good (conductor, insulator, reservoir) of heat.
13. A measure of how well a substance absorbs heat is its (equivalent heat, calorie content, specific heat).
14. Heat transfer by (convection, radiation, conduction) occurs when energy is transferred by electromagnetic waves.

**SECTION**  
**3****Study Guide****Engines and Refrigerators****Chapter****21**

**Directions:** Answer the following questions on the lines provided.

1. What is a heat engine?

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2. In a car with a four-cycle engine, why is it an advantage to have at least four cylinders?

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3. In nature heat only moves from a hotter object to a cooler object. How is it possible for a heat pump to remove heat from a cold object and add it to a hotter object?

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**Directions:** Identify each statement as **true** or **false**. If it is false, change the italicized term to make the statement true.

- \_\_\_\_\_ 4. In an air conditioner heat from inside the house is *absorbed* by coolant within pipes.

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- \_\_\_\_\_ 5. If you let the air out of a bicycle tire, the valve becomes cold. This is because when a gas under pressure expands, it *releases energy* to the environment.

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- \_\_\_\_\_ 6. When a heat pump is used for heating, it *removes* heat from the cold air outside and *adds* heat to the warm air inside.

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- \_\_\_\_\_ 7. A diesel engine *does not* use spark plugs.

---

- \_\_\_\_\_ 8. An engine that uses the process of burning fuel within the engine is called a(n) *internal combustion engine*.

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- \_\_\_\_\_ 9. A heat engine is any device that converts thermal energy into *kinetic energy*.

---

- \_\_\_\_\_ 10. In internal combustion engines, fuel burns in a *combustion chamber* inside the engine.

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# SECTION 1

## Study Guide

# Electric Charge

## Chapter

# 22

**Directions:** *Unscramble the terms to fill in the blanks in the summary paragraphs.*

When an atom gains electrons, it gains a (1)\_\_\_\_\_ (venagtie) charge. When an atom loses electrons, it becomes (2)\_\_\_\_\_ (soipviet). When many electrons move from one solid object to another, the charge created is called (3)\_\_\_\_\_ (actsti). Unlike electrons, (4)\_\_\_\_\_ (roptnos) usually do not move from one object to another. However, in (5)\_\_\_\_\_ (loustinos) both are positive and negative. (6)\_\_\_\_\_ (snio), such as sodium and (7)\_\_\_\_\_ (drochlie), can move. This enables (8)\_\_\_\_\_ (never) impulses to be transmitted.

**Directions:** *List the four steps that use ions to transmit nerve impulses.*

9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_

**Directions:** *Match the terms from the word bank with the correct phrases below.*

conductor	electric field	electric force	insulator
_____	_____	_____	_____
<b>electric discharge</b>	<b>electric field lines</b>	<b>induced charge</b>	
_____	13. something charged objects exert on each other, that depends on the amount of charge on each object and the distance between them		
_____	14. something that causes two charged balloons to repel each other without touching		
_____	15. lines that are drawn away from a positive charge and toward a negative charge		
_____	16. a material in which electrons can not move easily, such as glass and plastic		
_____	17. a material in which electrons can move easily, such as gold and copper		
_____	18. electric charge moves quickly from one location to another, as in a lightning strike		
_____	19. using Earth as a conductor to avoid lightning damage		
_____	20. separation of positive and negative charges due to an electric field		

**SECTION**  
**2**
**Study Guide**
**Electric Current**
**Chapter**
**22**

**Directions:** Complete the paragraphs using the terms listed below.

<b>chemical reactions</b>	<b>ohms</b>	<b>electric potential energy</b>
<b>resistance</b>	<b>volts</b>	<b>electric current</b>
<b>negative</b>	<b>positive</b>	<b>V</b>
		<b>circuit</b>

Life as we know it would be impossible without electricity. Think of the number of electrical devices we rely on every day: lights, refrigerators, computers, televisions, flashlights, car headlights, watches—the list is endless. All of these devices, and countless others, need a constant, steady source of electrical energy. This steady source of electrical energy comes from a(n)

1. \_\_\_\_\_, which is the steady flow of electrons through a conductor.

This steady flow of electricity requires a closed path, or 2. \_\_\_\_\_, through which to flow. Its basic elements are a conductor, such as wire, through which electrons flow and a source of electrons, such as a battery.

An electric current carries energy that comes from separating positive and negative charges. Negatively charged electrons “seek out” positively charged electrons to recombine. This can only happen if they travel through the circuit. In a circuit, the electrons flow from the

3. \_\_\_\_\_ end to the 4. \_\_\_\_\_ end.

A familiar source of electrons in electric circuits is a battery. The total stored electrical energy in a battery—the energy available to do work—is called 5. \_\_\_\_\_.

This energy is measured in units called 6. \_\_\_\_\_, which is abbreviated

7. \_\_\_\_\_. Batteries rely on 8. \_\_\_\_\_ to separate positive and negative electrical charges. When the negative and positive ends of the charges are connected by a conductor, a circuit forms and the electrical energy is available to do work.

However, the electrons don’t flow completely freely through the circuit. Depending on the material used for the conductor, the electrons have more or less difficulty flowing. The measure of how difficult it is for electrons to flow through a circuit is called 9. \_\_\_\_\_.

This is measured in units called 10. \_\_\_\_\_.

**SECTION**  
**3**

**Study Guide**

**Electric Circuits**

**Chapter**

**22**

**Directions:** Use the terms and statements from the list below to complete the table.

**kilowatt**                      **amount of electric energy used by a device**  
**series: a circuit that has only one path for the electric current to follow**  
**Ohm's law**                      **power = current  $\times$  voltage**                      **series circuit**  
**parallel: a circuit that has more than one path for the electric current to follow**  
**watt**                      **voltage = current  $\times$  resistance**                      **kW**  
 **$P = I \times V$**                       **parallel circuit**                       **$V = I \times R$**                       **W**

**Important Facts About Electric Circuits**

**1. There is a relationship among voltage, current, and resistance in an electric circuit.**

**a.** Name of law:

**b.** Expression of law:

**c.** Equation:

**2. There are two types of electric circuits.**

**a.** Two types of circuits:

(1)

(2)

**b.** Definitions of these circuits:

(1)

(2)

**3. The electrical power of a circuit can be measured.**

**a.** Definition of electrical power:

**b.** Unit of electrical power:

(1) Name:

(2) Abbreviation:

(3) Term for 1000 units:

(4) Abbreviation for 1000 units:

**c.** Determining the electrical power of a circuit:

(1) Expression:

(2) Formula:



## SECTION

## 1

## Study Guide

## What is magnetism?

## Chapter

## 23

**Directions:** You have two bar magnets. Describe or draw different arrangements of the two magnets to make the magnets behave as described.

	What the magnets will do	Diagram or Description	
1.	repel, end on	1.	2.
2.	attract, end on	3.	4.
3.	attract, side by side	5.	
4.	repel, side by side	6.	

**Directions:** Use the words from the word bank to fill in the blanks in the summary paragraph below.

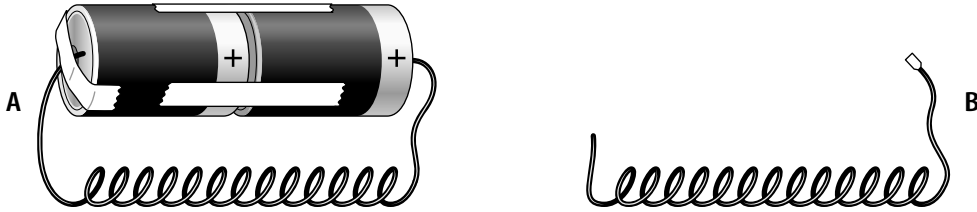
away                      magnets                      rocks                      toward  
 charged                      iron                      north                      south  
 domains                      magnetosphere                      outer                      stronger

Magnetic field lines begin at a magnet's (7) \_\_\_\_\_ pole and end at the (8) \_\_\_\_\_ pole. Field lines that curve (9) \_\_\_\_\_ each other show attraction. Field lines that curve (10) \_\_\_\_\_ from each other show repulsion. When the field is (11) \_\_\_\_\_, the lines will be closer together.

The atoms of magnetic materials behave like tiny (12) \_\_\_\_\_. Magnetic materials such as (13) \_\_\_\_\_ contain groups of atoms called magnetic (14) \_\_\_\_\_ in which the magnetic fields of the atoms in the group point in the same direction. Earth is surrounded by a magnetic field that is thought to be produced by the movement of molten iron in Earth's (15) \_\_\_\_\_ core. Earth's magnetic field affects a region of space called the (16) \_\_\_\_\_ that deflects most of the (17) \_\_\_\_\_ particles that come from the Sun. The magnetism of some ancient (18) \_\_\_\_\_ contains a record of the direction of Earth's magnetic field and how it has changed over time.

**SECTION**  
**2**
**Study Guide**
**Electricity and Magnetism**
**Chapter**
**23**

**Directions:** Use the figures below to answer questions 1 through 5.



- In figure A, when electrons move in the coiled wire what is produced?  
\_\_\_\_\_
- In figure A, if you changed the direction of electron flow by switching the connections to the battery, what would happen?  
\_\_\_\_\_
- In figure A, if an iron bar were inserted into the wire coil, what would happen to the iron bar?  
\_\_\_\_\_
- Suppose you wrapped an iron bar with wire and connected the ends of the wire to a battery. What is this device called? What would happen to this device if you disconnected the battery?  
\_\_\_\_\_
- In figure B, if you repeatedly moved a bar magnet in and out of the wire coil, what would be produced? What is this process called?  
\_\_\_\_\_  
\_\_\_\_\_

**Directions:** Answer the following questions on the lines provided.

- What is the function of an electric motor in terms of electric power and motion?  
\_\_\_\_\_
- Briefly explain how an electric motor works.  
\_\_\_\_\_  
\_\_\_\_\_
- What is the function of an electric generator in terms of electric power and motion?  
\_\_\_\_\_
- Briefly explain how an electric generator works.  
\_\_\_\_\_  
\_\_\_\_\_

**SECTION**  
**1**

**Study Guide**

**Waves**

**Chapter**

**24**

**Directions:** Match the words from the list with the descriptions below.

<b>amplitude</b>	<b>electromagnetic wave</b>	<b>refraction</b>
<b>compression</b>	<b>frequency</b>	<b>trough</b>
<b>crest</b>	<b>mechanical wave</b>	<b>wave</b>
<b>diffraction</b>	<b>rarefaction</b>	<b>wave speed</b>

- \_\_\_\_\_ 1. a disturbance that moves through matter or space
- \_\_\_\_\_ 2. low point in a transverse wave
- \_\_\_\_\_ 3. region where coils are farthest apart for a compressional wave on a spring coil
- \_\_\_\_\_ 4. type of wave that can travel through matter and empty space
- \_\_\_\_\_ 5. depends on the energy carried by a wave
- \_\_\_\_\_ 6. equals the wavelength times the frequency
- \_\_\_\_\_ 7. region where coils are closest together for a compressional wave on a spring coil
- \_\_\_\_\_ 8. a change in wave direction that occurs when a wave passes from one material to another and changes speed
- \_\_\_\_\_ 9. the bending of waves around an object
- \_\_\_\_\_ 10. a high point in a transverse wave
- \_\_\_\_\_ 11. the number of wavelengths that pass a point in a given time interval, measured in units of Hertz, which is the same as 1/s
- \_\_\_\_\_ 12. type of wave that can travel only through matter, including seismic waves

**Directions:** Fill in the blanks by unscrambling the words.

In water waves, energy is transferred by collisions between water (13) \_\_\_\_\_ (sloceemul). The (14) \_\_\_\_\_ (nactolsio) of the particles hardly (15) \_\_\_\_\_ (hcnesga) at all.

Waves are usually produced by something (16) \_\_\_\_\_ (gomvin) back and forth or (17) \_\_\_\_\_, (tgivibnra).

The (18) \_\_\_\_\_ (siopterper) of waves depend on the (19) \_\_\_\_\_ (tonsbrivia) that produce them.

**SECTION**  
**2****Study Guide****Sound Waves****Chapter****24**

**Directions:** Answer the questions on the lines provided.

1. How does a vibrating drum produce a sound wave?

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2. Does sound travel outside Earth's atmosphere in space? Explain.

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3. Explain how intensity, sound, and energy are related.

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4. What are the three main parts of the human ear and what is the function of each?

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5. Explain why sound travels faster through iron than through air.

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**SECTION**  
**3****Study Guide****Light****Chapter****24**

**Directions:** Answer the questions on the lines provided.

1. Compare and contrast light waves and sound waves.

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2. Describe the electromagnetic spectrum.

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3. What are ultraviolet waves, X-rays, and gamma rays used for?

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4. How do the cornea, lens, and retina aid in the vision process?

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5. What are rod and cone cells?

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