

# Chapter 17 – Introduction to Electricity

## Directed Reading A

### Section: Electric Charge and Static Electricity

#### ELECTRIC CHARGE

\_\_\_\_\_ 1. What do you call the tiny particles that make up matter?  
a. electricity  
b. atoms  
c. electrons  
d. charges

\_\_\_\_\_ 2. Atoms are made up of protons, neutrons, and what third particle?  
a. charges  
b. electricity  
c. electrons  
d. forces

3. What three types of charge can an object have?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. What does the law of electric charges state?  
\_\_\_\_\_  
\_\_\_\_\_

5. Protons are \_\_\_\_\_ charged.

6. Electrons are \_\_\_\_\_ charged.

7. The force between charged objects is a(n) \_\_\_\_\_.

8. What two things affect the size of the electric force?  
\_\_\_\_\_  
\_\_\_\_\_

9. The region around a charged object where an electric force is exerted on another charged object is the \_\_\_\_\_.

10. How do charged objects within an electric field interact?  
\_\_\_\_\_





**Directed Reading A *continued***

\_\_\_\_\_ **21.** Which of the following is a material in which charges CANNOT move easily?  
a. electrical conductor  
b. electrical insulator  
c. electrical jumper  
d. electrical stopper

\_\_\_\_\_ **22.** Which of the following is a good conductor?  
a. wood  
b. air  
c. copper  
d. glass

\_\_\_\_\_ **23.** Which of the following is a good insulator?  
a. aluminum  
b. glass  
c. mercury  
d. copper

**24.** Why are most metals good conductors?  
\_\_\_\_\_  
\_\_\_\_\_

**25.** What factors make a material a good insulator?  
\_\_\_\_\_  
\_\_\_\_\_

**STATIC ELECTRICITY**

**26.** What is static electricity?  
\_\_\_\_\_  
\_\_\_\_\_

**27.** The loss of static electricity as charges move off an object is called \_\_\_\_\_.

**28.** What three things might you notice after an electric discharge?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Directed Reading A** *continued*

**29.** How does lightning occur within a cloud?

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**30.** Why is it unsafe to be at the beach during a lightning storm?

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**31.** How do lightning rods protect buildings from lightning?

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# Directed Reading A

## Section: Electric Current and Electrical Energy

1. The energy of electric charges is called \_\_\_\_\_.

### ELECTRIC CURRENT

\_\_\_\_\_ 2. What is the rate at which charges pass a given point?

- a. electrical energy
- b. amps
- c. electric current
- d. voltage

\_\_\_\_\_ 3. Which of the following is the unit for electric current?

- a. amperes, or amps
- b. ohms
- c. volts
- d. charges

\_\_\_\_\_ 4. Which of these letters is used to represent current in equations?

- a. *C*
- b. *I*
- c. *R*
- d. *T*

\_\_\_\_\_ 5. What are the two types of electric current?

- a. electrons and neutrons
- b. alternating and direct
- c. current and electric
- d. charge and negative

6. When you flip the switch on a flashlight, a(n) \_\_\_\_\_ is set up in the wire.

7. When charges continually shift from flowing in one direction to flowing in the reverse direction, there is a(n) \_\_\_\_\_ current.

8. When charges always flow in the same direction, there is a(n) \_\_\_\_\_ current.

**Directed Reading A *continued***

9. Which type of current is used in batteries and which is used in household outlets?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**VOLTAGE**

\_\_\_\_\_ 10. What is the potential difference between two points in a circuit called?

- a. resistance
- b. current
- c. voltage
- d. charge

\_\_\_\_\_ 11. Which letter is used to represent voltage in equations?

- a. *G*
- b. *C*
- c. *V*
- d. *I*

\_\_\_\_\_ 12. What happens to electric current if voltage becomes larger?

- a. The current decreases.
- b. The current increases.
- c. The current stays the same.
- d. No current will flow.

**RESISTANCE**

\_\_\_\_\_ 13. What is the opposition to the flow of electric charge called?

- a. resistance
- b. current
- c. voltage
- d. charge

\_\_\_\_\_ 14. Which letter is used to represent resistance in equations?

- a. *E*
- b. *C*
- c. *V*
- d. *R*

15. Resistance is expressed in \_\_\_\_\_.

**Directed Reading A *continued***

16. The higher the resistance of a material is, the lower the \_\_\_\_\_.

17. What four things determine an object's resistance?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

18. Good conductors have a(n) \_\_\_\_\_ resistance.

19. Why are high resistance materials useful in light bulbs?

\_\_\_\_\_

\_\_\_\_\_

20. What is a superconductor?

\_\_\_\_\_

\_\_\_\_\_

**GENERATING ELECTRICAL ENERGY**

**Match the correct definition with the correct term. Write the letter in the space provided.**

- |   |                 |
|---|-----------------|
| _____ 21. This changes chemical or radiant energy into electrical energy.                 | a. cell         |
| _____ 22. This is a mixture of chemicals in a cell.                                       | b. electrode    |
| _____ 23. This converts light energy into electrical energy.                              | c. thermocouple |
| _____ 24. This conducts thermal energy into electrical energy.                            | d. electrolyte  |
| _____ 25. This is the part of the cell through which charges enter and exit.              | e. photocell    |
| 26. Chemical changes between the electrolyte and the electrodes convert _____ into _____. |                 |



**Directed Reading A *continued***

**27.** Compare electrolytes found in a wet cell with those found in a dry cell.

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**28.** Thermocouples are useful for monitoring the temperatures of what three things?

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**29.** How do photocells convert light energy into electrical energy?

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## Skills Worksheet

**Directed Reading A****Section: Electrical Calculations****CONNECTING CURRENT, VOLTAGE, AND RESISTANCE**

- \_\_\_\_\_ 1. What is the ratio of voltage to current?
- electrical power
  - electrical energy
  - resistance
  - current
- \_\_\_\_\_ 2. Which of the following equations is Ohm's law?
- $V = I \times R$
  - $I = V \times R$
  - $R = I \times V$
  - $R = V \times I$
3. How did Georg Ohm study the resistances of different materials?

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**ELECTRIC POWER**

- \_\_\_\_\_ 4. Which of the following is the rate at which electrical energy is changed into other forms of energy?
- electric current
  - electric power
  - voltage
  - kilowatt
- \_\_\_\_\_ 5. In the formula  $P = V \times I$ , what does the  $P$  stand for?
- performance
  - power
  - price
  - penny
6. Name two common units of power.

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**Directed Reading A *continued***

7. What happens to a light bulb as power increases?

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8. One kilowatt is equal to \_\_\_\_\_ W.

**MEASURING ELECTRICAL ENERGY**

9. What two factors does the electric company use to determine how much a business will pay for electrical energy?

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10. What is the formula for finding electrical energy?

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11. What unit is usually used to express electrical energy?

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12. Electric companies use a(n) \_\_\_\_\_ to determine how many kilowatt-hours of energy are used by a household.

13. Name two ways you can help to save energy.

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# Directed Reading A

## Section: Electric Circuits

1. A closed pathway where the start and end points are the same is called

a(n) \_\_\_\_\_.

### PARTS OF AN ELECTRIC CIRCUIT

\_\_\_\_\_ 2. Which of the following is a complete, closed path through which electric charges flow?

- a. electric current
- b. electric circuit
- c. energy source
- d. load

\_\_\_\_\_ 3. Which of the following is NOT a basic part of a circuit?

- a. wires
- b. force
- c. energy source
- d. load

\_\_\_\_\_ 4. Which of the following is connected to the energy source by wires and changes electrical energy into other forms of energy?

- a. wires
- b. force
- c. energy source
- d. load

5. Name four possible energy sources for a circuit.

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6. A circuit is opened and closed using a(n) \_\_\_\_\_.

7. What will happen to the charges in a circuit when a switch is closed?

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**Directed Reading A *continued***

8. What will happen to the charges in a circuit when a switch is open?

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**TYPES OF CIRCUITS**

9. All of the electrical devices in your home are \_\_\_\_\_ in a large circuit.

10. A circuit in which all parts are connected in a single loop is called

a(n) \_\_\_\_\_.

11. What happens to a series circuit if you add more loads?

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12. In a series circuit, what happens if there is a break in the circuit?

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13. Why aren't series circuits a convenient way to wire a home?

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14. A circuit in which loads are connected side by side is called a(n)

\_\_\_\_\_.

15. Each load in a parallel circuit uses the same \_\_\_\_\_.

16. What happens in a parallel circuit if one load is broken or missing?

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**Directed Reading A *continued***

**17.** Why can you use one light or appliance at a time in a parallel circuit even if a load fails?

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**HOUSEHOLD CIRCUIT SAFETY**

**18.** What is the standard voltage per branch in a home in the United States?

- a. 100 V
- b. 110 V
- c. 120 V
- d. 130 V

**19.** Name two things that can cause a short circuit in your home.

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**20.** What happens to a fuse to stop the flow of charges through it?

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**21.** A switch that automatically opens if the current is too high is

a(n) \_\_\_\_\_.

**22.** How does a ground fault circuit interrupter act like a small circuit breaker?

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**23.** Name two safety measures to follow when using electrical energy.

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