

Name _____

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Guided Reading Chapter 9: Electric Charges and Current

Section 9-1: Electric Charge and Static Electricity

1. Why do protons repel protons but attract electrons?
2. The charge on a proton is called _____.
3. The charge on an electron is called _____.
4. Circle the letter of each statement that is true about interactions between charges.
 - a. Charges that are the same repel each other.
 - b. Charged objects never attract each other.
 - c. Charges that are different attract each other.
 - d. Charged objects always repel each other.
5. The field around electrically charged particles that exerts a force on other charged particles is called a(n) _____.
6. What happens when a charged particle is placed in the electric field of another particle with the same charge?
7. Electric field lines are drawn with arrows to show the direction of the force on a(n) _____.
8. Is the following sentence true or false? When two charged particles come near each other, the electric field of only one of the particles is altered.
9. Circle the letter of the sentence that explains why there is no overall electrical force in a neutral object.
 - a. In the object's atoms, each positive charge is balanced by a negative charge.
 - b. The object's atoms contain no charged particles.
 - c. The positive charges are attracted to other positive charges.
 - d. In the object's atoms, negative charges outnumber positive charges.
10. How can neutral object become charged?

11. If an object gains electrons, what will be its overall charge?

12. The buildup of charges on an object is called _____.

13. Complete the table about methods of transferring charge.

| Transferring Charges | |
|-----------------------------|--|
| Method | Definition |
| | The transfer of electrons from one object to another by rubbing |
| | The movement of electrons to one part of an object by the electric field of another object |
| | The transfer of electrons from a charged object to another object by direct contact |

14. What law states that charges are not created or destroyed?

15. Suppose you dry your clothes in a dryer, and when you take them out they cling to one another. Why do they stick together?

16. What happens when a negatively charged object and a positively charged object are brought together?

17. The loss of static electricity as electric charges move off an object is called _____.

18. On a humid day, what molecules might carry off extra electrons and prevent the buildup of charges on objects?

19. Is the following sentence true or false? Lightning is an example of static discharge.

20. An electric charge can be detected by an instrument called a(n) _____.

21. Why do the leaves of an electroscope spread apart when a charged object touches the metal knob?

Section 9-2: Circuit Measurements

1. The type of energy that depends on position is called _____.

2. The potential energy in an electric circuit is related to the force exerted by _____.
3. What is electrical potential?
4. The difference in electrical potential between two places is called the _____.
5. What is another name for potential difference?
6. What causes current to flow through an electric circuit?
7. What does a voltage source do in an electric circuit?
8. Circle the letter of each example of a voltage source.
 - a. light bulb
 - b. generator
 - c. computer
 - d. battery
9. What does an increase in voltage cause in an electric circuit?
10. Charges move around an electric circuit as the result of the potential difference between a voltage source's two _____.
11. Circle the letter of the two factors that affect the amount of current that flows through a circuit.
 - a. voltage
 - b. resistance
 - c. switch
 - d. current
12. Is the following sentence true or false? The greater the resistance, the less current there is for a given voltage.
13. If an electric current can travel through two paths, which will it travel through?
14. A device that measures potential difference, or voltage, is called a(n) _____.

15. What does an ammeter measure?
16. Is the following sentence true or false? The resistance of most conductors does not vary with the amount of voltage across them.
17. What is the formula for Ohm's law?
18. If you know the current and the resistance in a circuit, what formula would you use to find the voltage?
19. Write the **unit of measure and its abbreviation** for each value.
- a. resistance:
 - b. voltage:
 - c. current:
20. Circle the letter of each sentence that is true if the resistance of a conductor remains constant.
- a. The greater the voltage, the greater the current.
 - b. The greater the current, the greater the voltage.
 - c. The greater the voltage, the less the current.
 - d. The greater the current, the less the voltage.
21. If you double the resistance of a conductor, what happens to the current?
22. Why are resistors sometimes added to circuits?

Section 9-3: Series and Parallel Circuits

1. If all the parts of an electric circuit are connected one after another, the circuit is called a(n) _____.
2. In a series circuit, how many paths are there for a current to take?
3. Suppose you have a number of light bulbs connected together in a series circuit. What happens if one of the bulbs burns out?
4. As more light bulbs are added to a series circuit, the bulbs become dimmer. Why?

5. If you wanted to measure the current through some device in a circuit, how would you connect an ammeter?
6. If different parts of a circuit are on separate branches, the circuit is called a(n) _____.
7. Suppose you have a number of light bulbs connected on a circuit, with each bulb on a separate branch. What happens if one of the bulbs burns out?
8. Circle the letter of each sentence that is true about what happens when more branches are added to a parallel circuit.
 - a. Resistance increases.
 - b. The current has more paths to follow.
 - c. Resistance decreases.
 - d. The current has fewer paths to follow.
9. Is the following sentence true or false? Adding more paths to a parallel circuit will increase the current.
10. Why wouldn't you want the circuits in your home to be series circuits?
11. What kind of circuit carries current to wall sockets and appliances in a home?
12. The voltage in household circuits is _____.

Section 9-4: Electrical Safety

1. What is a short circuit?
2. If you touch your hand to a 120-volt circuit, a potential difference is created between your hand and _____.
3. Why is it dangerous when the insulation wears off of a wire?
4. The round prong of a plug that connects the metal shell of an appliance to the ground wire of a building is called the _____.

5. Circle the letter of the sentence that explains what it means when a circuit is electrically grounded.
 - a. Charges always flow from the intended path to the unintended path.
 - b. Short circuits move through the ground instead of through water.
 - c. Resistance increases throughout a parallel circuit in the event of a short circuit.
 - d. Charges are able to flow directly from the circuit into the ground connection in the event of a short circuit.

6. What is a lightning rod?

7. When lightning hits a lightning rod, what is the path of the current that results?

8. If you are outside during a thunderstorm, would it be safe to hold an umbrella with a pointed rod through the top? Explain.

9. Electric current can become too high if a circuit is overloaded. What might happen if a circuit is overloaded?

10. In order to prevent circuits from overheating, what are added to circuits?

11. Complete the table about fuses and circuit breakers.

| Fuses and Circuit Breakers | | |
|-----------------------------------|-------------------------------------|--|
| Device | What Happens When Overloaded | To Restore Electricity to Circuit |
| | Metal strip melts. | |
| | Electromagnet shuts off circuit. | |

12. Why might an electric shock affect your heart?

13. Circle the letter of each of the following that you should never do.
 - a. Use a wire with good insulation.
 - b. Turn on a radio when you're standing in water.
 - c. Try to repair a toaster while it's still plugged in.
 - d. Handle a plug with a third prong on it.