Name _____ Class _____ Date _____

Section 21.2 Electromagnetism

(pages 635–639)

This section describes how electricity and magnetism are related. Uses of solenoids and electromagnetic devices are discussed, and a description of how these devices work is presented.

Reading Strategy (page 635)

Identifying Main Ideas Copy the table on a separate sheet of paper. As you read, write the main idea of the text that follows each topic in the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Electromagnetism	
Topic	**Main Idea**
Electricity and magnetism	Electricity and magnetism are different aspects of a single force known as the electromagnetic force.
Direction of magnetic fields	Moving charges create a magnetic field.
Direction of electric currents	A charge moving in a magnetic field will be deflected in a direction perpendicular to both the magnetic field and the velocity of the charge.
Solenoids and electromagnets	Changing the current in an electromagnet controls the strength and direction of its magnetic field.
Electromagnetic devices	Electromagnetic devices such as galvanometers, electric motors, and speakers change electrical energy into mechanical energy.

1. In 1820 Hans Oersted discovered a connection between electricity and _____magnetism_____.

Electricity and Magnetism (pages 635–636)

2. Electricity and magnetism are different aspects of a single force known as the _____electromagnetic_____ force.
3. Both aspects of the electromagnetic force are caused by _____electric charges_____.
4. Is the following sentence true or false? Moving electric charges create a magnetic field. _____true_____
5. Is the following sentence true or false? The vibrating charges that produce an electromagnetic wave also create a magnetic field. _____true_____
6. A charge moving in a magnetic field will be deflected in a direction that is _____perpendicular_____ to both the magnetic field and to the velocity of the charge.

Solenoids and Electromagnets (pages 637–638)

7. Is the following sentence true or false? The strength of the magnetic field through the center of a coil of current-carrying wire is calculated by adding together the fields from each turn of the coil. true

8. A coil of current-carrying wire that produces a magnetic field is called a(n) solenoid.

9. What is an electromagnet? An electromagnet is a solenoid with a core made of ferromagnetic material.

10. Circle the letter of each sentence that is true about electromagnets.
    a. Placing an iron rod in a solenoid reduces the strength of its magnetic field.
    b. Devices that utilize electromagnets include doorbells and telephones.
    c. A magnetic field can be turned on and off with an electromagnet.
    d. An electromagnet can control the direction of a magnetic field.

11. List three factors that determine the strength of an electromagnet.
    a. Type of ferromagnetic core
    b. Number of turns in the solenoid coil
    c. Current in the solenoid

12. Is the following sentence true or false? Decreasing the current in the solenoid decreases the strength of an electromagnet. true

13. What types of solenoid cores make stronger electromagnets? Cores that are easily magnetized, such as "soft" iron, make stronger electromagnets.

Electromagnetic Devices (pages 638–639)

14. Electromagnetic devices change electrical energy into mechanical energy.

15. Complete the following table about electromagnetic devices.

Description	Device
Uses electromagnets to convert electrical signals into sound waves	Loudspeaker
Uses a rotating electromagnet to turn an axle	Electric motor
Uses an electromagnet to measure small amounts of current	Galvanometer