

Chapter 21 Magnetism

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 | |
| Direction of magnetic fields | |
| Direction of electric currents | |
| Solenoids and electromagnets | |
| Electromagnetic devices | |

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

Electricity and Magnetism (pages 635–636)

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

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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. _____
8. A coil of current-carrying wire that produces a magnetic field is called a(n) _____.
9. What is an electromagnet? _____

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

13. What types of solenoid cores make stronger electromagnets? _____

Electromagnetic Devices (pages 638–639)

14. Electromagnetic devices change _____ energy into _____ energy.
15. Complete the following table about electromagnetic devices.

| Description | Device |
|--|----------------|
| Uses electromagnets to convert electrical signals into sound waves | |
| | Electric motor |
| Uses an electromagnet to measure small amounts of current | |