CHAPTER 19 Highlights

KEY TERMS

magnetic domain (p. 679)

magnetic field (p. 680)

solenoid (p. 685)

KEY IDEAS

Section 1 Magnets and Magnetic Fields

- Like magnetic poles repel, and unlike poles attract.
- A magnetic domain is a group of atoms whose magnetic fields are aligned.
- The direction of any magnetic field is defined as the direction the north pole of a magnet would point if placed in the field. The magnetic field of a magnet points from the north pole of the magnet to the south pole.
- The magnetic north pole of Earth corresponds to the geographic South Pole, and the magnetic south pole corresponds to the geographic North Pole.

Section 2 Magnetism from Electricity

- A magnetic field exists around any current-carrying wire; the direction of the magnetic field follows a circular path around the wire.
- The magnetic field created by a solenoid or coil is similar to the magnetic field of a permanent magnet.

Section 3 Magnetic Force

- The direction of the force on a positive charge moving through a magnetic field can be found by using the alternate right-hand rule.
- A current-carrying wire in an external magnetic field undergoes a magnetic force. The direction of the magnetic force on the wire can be found by using the alternate right-hand rule.
- Two parallel current-carrying wires exert on one another forces that are equal in magnitude and opposite in direction. If the currents are in the same direction, the two wires attract one another. If the currents are in opposite directions, the wires repel one another.

PROBLEM SOLVING

See **Appendix D: Equations** for a summary of the equations introduced in this chapter. If you need more problem-solving practice, see **Appendix I: Additional Problems.**

Diagram Symbols

Magnetic field vector	
Magnetic field pointing into the page	
Magnetic field pointing out of the page	

Variable Symbols

Quantities		Units		Conversions
B	magnetic field	T	tesla	$= \frac{N}{C \cdot m/s} = \frac{N}{A \cdot m}$
$F_{magnetic}$	magnetic force	N	newtons	$= \frac{kg \cdot m}{s^2}$
ℓ	length of conductor in field	m	meters	