CHAPTER 7 Highlights

KEY TERMS

centripetal acceleration (p. 235)

gravitational force (p. 240)

torque (p. 255)

lever arm (p. 255)

KEY IDEAS

Section 1 Circular Motion

- An object that revolves about a single axis undergoes circular motion.
- An object in circular motion has a centripetal acceleration and a centripetal force, which are both directed toward the center of the circular path.

Section 2 Newton's Law of Universal Gravitation

- Every particle in the universe is attracted to every other particle by a force that is directly proportional to the product of the particles' masses and inversely proportional to the square of the distance between the particles.
- Gravitational field strength is the gravitational force that would be exerted on a unit mass at any given point in space and is equal to free-fall acceleration.

Section 3 Motion in Space

- Kepler developed three laws of planetary motion.
- Both the period and speed of an object that is in a circular orbit around another object depend on two quantities: the mass of the central object and the distance between the centers of the objects.

Section 4 Torque and Simple Machines

- Torque is a measure of a force's ability to rotate an object.
- The torque on an object depends on the magnitude of the applied force and on the lever arm.
- Simple machines provide a mechanical advantage.

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.**

Variable Symbols

Quantities		Units	
v_t	tangential speed	m/s	meters/second
a_c	centripetal acceleration	m/s^2	meters/second^2
F_c	centripetal force	N	newtons
F_g	gravitational force	N	newtons
g	gravitational field strength	N/kg	newtons/kilogram
T	orbital period	s	seconds
τ	torque	N•m	newton meter