## DRILL

## **CHAPTER 7 PRACTICE QUESTIONS**

**Directions:** Complete the following problems as specified by each question, and then check your work using the solutions that follow. For extended, step-by-step solutions, access your Student Tools online.

- How much time is required for a 10 g ball to bounce off the floor if it hits it at 8 m/s and bounces elastically, assuming the normal force on the ball during the bounce is about 100 N?
- A mass m<sub>1</sub> collides with a second mass m<sub>2</sub>. During the collision, the acceleration on the first mass is a<sub>1</sub>. What is the acceleration of the second mass during the collision, a<sub>2</sub>?
- A spring with a force constant of 10 kN/m begins at rest at its natural length with a 1 kg mass attached to it. If an impulse of 50 N·s is imparted on the mass, what will the amplitude of the resulting motion be?
- 4. Wind blowing in a sail allows a sailboat to move through the water. If the wind had died, could you construct a giant fan on the deck of your boat to blow air into the sail and move the boat through the water?
- 5. A 500 kg cannon aimed horizontally fires a 1 kg cannonball at a speed of 250 m/s. If the cannon was initially at rest, what would its recoil speed be after the cannonball was fired?

- 6. If the cannon in the previous question was not on wheels, but on wooden blocks that had a coefficient of kinetic friction of 0.65 with the ground, how far would the cannon slide before it stopped?
- 7. A way to measure the exit speed of bullets from gun barrels is to fire the bullet into a wooden block hanging from a string. If a 15 g bullet exits a barrel at 260 m/s and enters a 1 kg wooden block, to what height will the block rise as it swings backward?
- 8. Two 1 kg masses are attached at either end of a thin 1 m rod of mass 5 kg. A constant torque of 15 N-m is applied about an axis through the center of the rod. What is the angular acceleration of the system? What is the gain in angular momentum of the system after 1 s?
- **9.** A rocket engine burns fuel at a rate of 15 L/s, and the gases exit the rocket engine at 3,000 m/s. What is the thrust of the rocket engine if the fuel has a mass of 1.2 kg/L?