

**6.3 NEWTON'S SECOND LAW OF MOTION**

- Two horizontal forces, 225 N and 165 N, are exerted on a canoe. **(a)** If these forces are applied in the same direction, find the net horizontal force on the canoe. **(b)** If the same two forces are exerted on the canoe in opposite directions, what is the net horizontal force on the canoe? Be sure to indicate the magnitude and direction of the net force.
- You are pulling your little sister on her sled across an icy surface. When you exert a constant horizontal force of 110 N, the sled has an acceleration of  $2.5 \text{ m/s}^2$ . If the sled has a mass of 7.0 kg, what is the mass of your little sister?
- Driving home from school one day, you spot a ball rolling out in the street. You brake for 1.20 s, slowing your 950-kg car from 16.0 m/s to 9.50 m/s. **(a)** What was the average force exerted on your car during braking? **(b)** How far did you travel while braking?
- On Earth, a scale shows that you weigh 585 N. **(a)** What is your mass? **(b)** What would the scale read on the Moon ( $g = 1.60 \text{ m/s}^2$ )?
- You pull upward on a stuffed suitcase with a force of 115 N, and it accelerates upward at  $0.725 \text{ m/s}^2$ . What is **(a)** the mass and **(b)** the weight of the suitcase?
- Your mass is 75.0 kg, and you are standing on a bathroom scale in an elevator. What would the scale read in the following situations:
  - The elevator is stationary.
  - The elevator moves upward at a constant speed.
  - The elevator moves downward at a constant speed.
  - The elevator slows at  $2.00 \text{ m/s}^2$  while moving upward.
  - The elevator slows at  $2.00 \text{ m/s}^2$  while moving downward.
  - The elevator speeds up at  $2.00 \text{ m/s}^2$  while moving upward.
  - The elevator speeds up at  $2.00 \text{ m/s}^2$  while moving downward.
- When you lift a bowling ball with a force of 82 N, the ball accelerates upward with an acceleration  $a$ . If you lift with a force of 92 N, the ball's acceleration is  $2a$ . Find **(a)** the weight of the bowling ball, and **(b)** the acceleration  $a$ .

**6.4 NEWTON'S THIRD LAW OF MOTION**

- You hold a brick at rest in your hand. **(a)** How many forces act on the brick? **(b)** Identify these forces. **(c)** Are these forces equal in magnitude and opposite in direction? **(d)** Are these forces an action-reaction pair? Explain.
- A 71-kg parent and a 19-kg child meet at the center of an ice rink. They place their hands together and push. **(a)** Is the force experienced by the child more than, less than, or the same as the force experienced by the parent? Explain. **(b)** Is the acceleration of the child more than, less than, or the same as the acceleration of the parent? Explain. **(c)** If the acceleration of the child is  $2.6 \text{ m/s}^2$  in magnitude, what is the magnitude of the parent's acceleration?

NAME \_\_\_\_\_

PERIOD \_\_\_\_\_

**UNIT 6 PRACTICE PROBLEMS**

**AP PHYSICS**

10. On vacation, your 1300-kg car pulls a 540-kg trailer away from a stoplight with an acceleration of  $1.90 \text{ m/s}^2$ . **(a)** what is the net force exerted by the car on the trailer? **(b)** What force does the trailer exert on the car? **(c)** What is the net force acting on the car?
11. A force of magnitude  $7.50 \text{ N}$  pushes three boxes with masses  $m_1 = 1.30 \text{ kg}$ ,  $m_2 = 3.20 \text{ kg}$ , and  $m_3 = 4.90 \text{ kg}$  as shown in the figure. Find the magnitude of the contact force **(a)** between boxes 1 and 2, and **(b)** between boxes 2 and 3.

