

## CONSERVATION OF MOMENTUM

1. A bowling ball of mass 8.0 kg is traveling at 10 m/s when it strikes a 1.5-kg bowling pin. After being hit by the ball, the pin flies backward (in the direction that the ball was traveling) at 20 m/s while the ball continues in the same direction. What is the velocity of the ball after impact?

$$v_1' = \underline{\hspace{2cm}}$$

2. A less-than-intelligent inventor designs a lightweight gun that shoots heavy bullets. In fact, the 50.0-N bullets leave the 40.0-N gun with a velocity of 200 m/s. What is the recoil velocity of the gun?

$$v_2' = \underline{\hspace{2cm}}$$

3. A large cannon of mass 400 kg can fire a 10.0-kg cannonball at a velocity of 50.0 m/s. If the cannon is put on a hard, level surface with negligible friction and then fired at a 45° angle, what would be the recoil velocity of the cannon?

$$v_{1x}' = \underline{\hspace{2cm}}$$

4. A loaded freight car of mass 5,000 kg breaks away and moves down the track with a speed of 4.0 m/s. It finally collides with two stationary freight cars of mass 1,500 kg each. If they all couple together, at what rate do they move down the track?

$$v' = \underline{\hspace{2cm}}$$

5. An ice-hockey player weighing 900 N is skating with a velocity of 8.0 m/s when he slams into a member of the opposing team who is standing still. They become tangled together and move down the ice with a velocity of 5.0 m/s. What is the weight of the other player?

$$F_{w2} = \underline{\hspace{2cm}}$$