Elastic collisions

1. A 0.015 kg marble moving to the right at 22.5 cm/s makes an elastic head-on collision with a 0.015 kg marble moving to the left at 18.0 cm/s. After the collision, the first marble moves to the left at 18.0 cm/s.

a. Find the velocity of the second marble after the collision.

b. Verify your answer by calculating the total kinetic energy before and after the collision.

2. A 16.0 kg canoe moving to the left at 12 m/s makes an elastic head-on collision with a 4.0 kg raft moving to the right at 6.0 m/s. After the collision, the raft moves to the left at 22.7 m/s.

a. Find the velocity of the canoe after the collision.

b. Verify your answer by calculating the total kinetic energy before and after the collision.

3. A 4.0 kg bowling ball moving to the right at 8.0 m/s has an elastic head-on collision with another 4.0 kg bowling ball initially at rest. The first ball stops after the collision.

a. Find the velocity of the second ball after the collision.

b. Verify your answer by calculating the total kinetic energy before and after the collision.

4. A 25 kg bumper car moving to the right at 5.5 m/s overtakes and collides elastically with a 35 kg bumper car moving to the right at 2.0 m/s. After the collision, the 25 kg bumper car slows to 1.4 m/s to the right.

a. Find the velocity of the 35 kg bumper car after the collision.

b. Verify your answer by calculating the total kinetic energy before and after the collision.