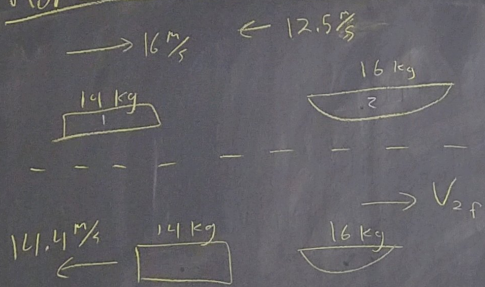


More Elastic Collisions



a) Find final velocity of canoe

$$p_o = p_f \quad m_1 v_{1o} + m_2 v_{2o} = m_1 v_{1f} + m_2 v_{2f}$$
$$(14 \text{ kg})(16 \text{ m/s}) + (16 \text{ kg})(-12.5 \text{ m/s}) = (14 \text{ kg})(-14.4 \text{ m/s}) + (16 \text{ kg})v_{2f}$$
$$224 \text{ kg m/s} + (-200 \text{ kg m/s}) = -201.6 \text{ kg m/s} + (16 \text{ kg})v_{2f}$$
$$225.6 \text{ kg m/s} = (16 \text{ kg})v_{2f}$$

$$v_{2f} = \frac{225.6 \text{ kg m/s}}{16 \text{ kg}}$$

$$v_{2f} = 14.1 \text{ m/s to the right}$$

b) compare KE_o & KE_f

$$KE_o = \frac{1}{2} m_1 v_{1o}^2 + \frac{1}{2} m_2 v_{2o}^2$$

$$KE_o = \frac{1}{2} (14 \text{ kg}) (16 \text{ m/s})^2 + \frac{1}{2} (16 \text{ kg}) (-2.5 \text{ m/s})^2$$

$$KE_o = 3,040 \text{ J}$$

$$KE_f = \frac{1}{2} m_1 v_{1f}^2 + \frac{1}{2} m_2 v_{2f}^2$$

$$KE_f = \frac{1}{2} (14 \text{ kg}) (14.4 \text{ m/s})^2 + \frac{1}{2} (16 \text{ kg}) (14.1 \text{ m/s})^2$$

$$KE_f = 3,040 \text{ J}$$

$$KE_o = KE_f$$

Elastic collision

Classwork

1. A 4.0 kg bowling ball sliding 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 2nd ball after the collision.

b) Verify answer by comparing KE_o & KE_f

2. A 25.0 kg bumper car moving to the right at 5.00 m/s collides elastically with a 35.0 kg bumper car moving to the right. After the collision, the 25.0 kg bumper car slows to 1.50 m/s to the right, & the 35.0 kg car moves at 4.50 m/s to the right.

a) Find the initial velocity of the 35.0 kg bumper car.

b) Verify answer by comparing KE_o & KE_f