

Solutions

Each answer shows the steps, then the **result**.

2.1

- $p = mv$

$$p = (0.40 \text{ kg})(5.0 \text{ m/s}) = \mathbf{2.0 \text{ kg m/s}}$$

2.2

- when no external force acts, the total momentum before a collision equals the total momentum after

3.1 B

- momentum = mass $\times$ velocity

3.2

(a) total momentum before

$$p = (3.0 \text{ kg})(4.0 \text{ m/s}) + (1.0 \text{ kg})(0) = \mathbf{12 \text{ kg m/s}}$$

(b) conservation of momentum: $12 \text{ kg m/s} = (3.0 \text{ kg} + 1.0 \text{ kg})v$

$$v = \frac{12 \text{ kg m/s}}{4.0 \text{ kg}} = \mathbf{3.0 \text{ m/s}}$$

3.3

- $F = \Delta p / \Delta t$

$$\Delta p = (2.0 \text{ kg})(6.0 \text{ m/s}) = 12 \text{ kg m/s}$$

$$F = \frac{12 \text{ kg m/s}}{0.10 \text{ s}} = \mathbf{120 \text{ N}}$$