

p. 227 # 2, 6, 7, 8, 11, 12

2. In your own words

6. Increased time results in increased impulse. This means the same force, applied over greater time, has greater impulse which is greater increase in speed/velocity.

7. If the balls have the same mass and fall at the same rate, the impulse should be equal. If the basketball falls slightly slower, due to air resistance, then it will have a slightly lower momentum.

8. $v_1 = 0 \text{ m/s}$

$F = 1100.0 \text{ N [F]}$

$\Delta t = 5.0 \text{ ms}$

$= 5.0 \times 10^{-3} \text{ s}$

a) $\vec{J} = ?$

$\vec{J} = \vec{F} \Delta t$

$= (1100.0 \text{ N [F]}) (5.0 \times 10^{-3} \text{ s})$

$= 5.5 \times 10^3 \text{ N}\cdot\text{s [F]}$

b) $m = 0.12 \text{ kg}$

$v_2 = ?$

$\vec{J} = \vec{p}_2 - \vec{p}_1 \Rightarrow \vec{p}_2 = \frac{\vec{J}}{m} + \vec{p}_1$

$v_2 = \frac{5.5 \times 10^3 \text{ N}\cdot\text{s [F]}}{0.12 \text{ kg}} + 0 \text{ m/s}$

$= 4.6 \times 10^4 \text{ m/s [F]}$

P. 227 # 2, 6-8, 11, 12

$$11 \quad m = 0.030 \text{ kg}$$

$$v_2 = 88 \text{ m/s [E]}$$

$$\vec{v}_1 = 0 \text{ m/s}$$

$$a) \quad \vec{J} = ?$$

$$\vec{J} = m \Delta v$$

$$= (0.030 \text{ kg})(88 \text{ m/s [E]})$$

$$= 2.64 \text{ N}\cdot\text{s [E]} = 2.6 \text{ N}\cdot\text{s [E]}$$

$$b) \quad \Delta t = 0.015 \text{ s}$$

$$F = ?$$

$$\vec{F} \Delta t = \vec{J}$$

$$\vec{F} = \frac{\vec{J}}{\Delta t}$$

$$= \frac{2.64 \text{ N}\cdot\text{s [E]}}{0.015 \text{ s}}$$

$$= 176 \text{ N [E]}$$

$$= 180 \text{ N [E]}$$

$$12 \quad \vec{v}_1 = 63 \text{ m/s [W]}$$

$$= -63 \text{ m/s [E]}$$

$$\vec{v}_2 = 41 \text{ m/s [E]}$$

$$m = 0.057 \text{ kg}$$

$$a) \quad \vec{J} = ?$$

$$\vec{J} = m (\vec{v}_2 - \vec{v}_1)$$

$$= (0.057 \text{ kg})(41 \text{ m/s} - (-63 \text{ m/s}))$$

$$= 5.928$$

$$= 5.9 \text{ N}\cdot\text{s [E]}$$

$$b) \quad F = ?$$

$$\Delta t = 0.023 \text{ s}$$

$$\vec{F} = \frac{\vec{J}}{\Delta t}$$

$$= \frac{5.928 \text{ N}\cdot\text{s [E]}}{0.023 \text{ s}}$$

$$= 257.7 \text{ N [E]}$$

$$= 260 \text{ N [E]}$$