

$$1) \vec{J} = m \Delta \vec{v}$$

$$K_i + U_{gi} = K_f + U_{gf}$$

$$m = 0.15 \text{ kg} \quad 2mgh = \frac{1}{2} m v_f^2$$

$$h_1 = 1.25 \text{ m}$$

$$h_2 = 0.96 \text{ m}$$

$$v_{f1} = \sqrt{2gh}$$

$$\vec{J} = \frac{mgh}{g} = \frac{mgh}{g} = \sqrt{2(9.8 \frac{m}{s^2})(1.25 \text{ m})}$$

$$\vec{v}_{f1} = -4.95 \frac{m}{s}$$

signs could be reversed

$$2) \vec{v}_i = 50 \frac{m}{s}$$

$$\vec{v}_f = -40 \frac{m}{s}$$

$$m = 0.06 \text{ kg}$$

$$\vec{J} = \text{---} \frac{kg \cdot m}{s}$$

$$W = \text{---} J$$

$$\vec{J} = m(\vec{v}_f - \vec{v}_i)$$

$$= 0.06 \text{ kg}(-40 \frac{m}{s} - 50 \frac{m}{s})$$

$$a) \vec{J} = -5.4 \frac{kg \cdot m}{s} \text{ or } +$$

$$5) m_B = 0.145 \text{ kg}$$

$$m_L = 0.003 \text{ kg}$$

$$v_L = 1500 \frac{m}{s}$$

$$v_B = \text{---} \frac{m}{s}$$

$$K_B = \text{---} J$$

$$K_L = \text{---} J$$

$$\vec{P}_B = \vec{P}_L$$

$$m_B v_B = m_L v_L$$

$$v_B = \frac{m_L v_L}{m_B}$$

$$= \frac{0.003 \text{ kg}(1500 \frac{m}{s})}{0.145 \text{ kg}}$$

$$a) v_B = 31.0 \frac{m}{s}$$

less  
greater  
K  
than  
ball

$$10) m_B = 0.5 \text{ kg}$$

$$v_B = 15 \frac{m}{s}$$

$$t = 0.02 \text{ s}$$

$$v_{Bf} = 0 \frac{m}{s}$$

$$J = \text{---} \frac{kg \cdot m}{s}$$

$$F = \text{---} N$$

$$\vec{J} = m(\vec{v}_f - \vec{v}_i)$$

$$= 0.5 \text{ kg}(0 \frac{m}{s} - 15 \frac{m}{s})$$

$$a) \vec{J} = -7.5 \frac{kg \cdot m}{s} \text{ west}$$

$$F \Delta t = J$$

$$F = \frac{J}{\Delta t} = \frac{-7.5 \text{ kg} \cdot \text{m/s}}{0.02 \text{ s}}$$

$$b) F = 375 N$$

$$11) m = 1.5 \text{ kg}$$

$$J = \text{---} N \cdot s$$

$$v_f = \text{---} \frac{m}{s} \text{ if } v_i = 0 \frac{m}{s}$$

$$v_f = \text{---} \frac{m}{s} \text{ if } v_i = -2 \frac{m}{s}$$

Area under curve is  $6 N \cdot s + 2 N \cdot s$

$$a) J = 8 N \cdot s$$

$$J = m(v_f - v_i)$$

$$J = m v_f - m v_i$$

$$v_f = \frac{J + m v_i}{m}$$

$$v_f = \frac{8 N \cdot s + 1.5 \text{ kg}(0 \frac{m}{s})}{1.5 \text{ kg}}$$

$$b) v_{fi} = 5.33 \frac{m}{s}$$

$$v_f = \frac{8 N \cdot s + 1.5 \text{ kg}(-2 \frac{m}{s})}{1.5 \text{ kg}}$$

$$c) v_f = 3.33 \frac{m}{s}$$

$$K_i + U_{gi} = K_f + U_{gf}$$

$$\frac{1}{2} m v_2^2 = 2mgh$$

$$v_2 = \sqrt{2(9.8 \frac{m}{s^2})(0.96 \text{ m})}$$

$$\vec{v}_2 = 4.34 \frac{m}{s}$$

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

$$= 0.15 \text{ kg}(4.34 \frac{m}{s} - (-4.95 \frac{m}{s}))$$

$$\vec{J} = +1.39 \frac{kg \cdot m}{s} \text{ up}$$

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1, 2, 5, 10, 11

use  $t = 0.002 \text{ s}$

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

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

$$= \frac{5.4 \frac{kg \cdot m}{s}}{0.002 \text{ s}}$$

$$b) F = 2700 N$$

$$K_B = \frac{1}{2} m v^2$$

$$= \frac{1}{2} (0.145 \text{ kg})(31 \frac{m}{s})^2$$

$$K_B = 69.7 J$$

$$K_L = \frac{1}{2} (0.003 \text{ kg})(1500 \frac{m}{s})^2$$

$$K_L = 3375 J$$