

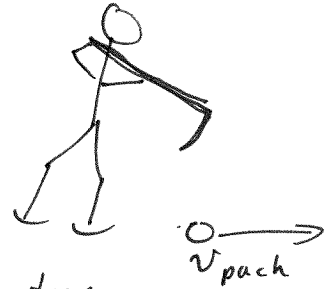
Chapter 9Problem 45

$$m = 0.150 \text{ kg}$$

$$v_{\text{puck}} = 45.0 \text{ m/s}$$

$$M = 90.0 \text{ kg}$$

Both are stationary before the puck is hit.



By conservation of momentum

$$p_0 = p_f$$

$$0 = p_{\text{player}} + p_{\text{puck}} = m_{\text{pl}} v_{\text{pl}} + m_{\text{pu}} v_{\text{pu}}$$

$$m_{\text{pl}} v_{\text{pl}} = -m_{\text{pu}} v_{\text{pu}}$$

$$v_{\text{pl}} = -\frac{m_{\text{pu}}}{m_{\text{pl}}} v_{\text{pu}} = -\frac{(0.150 \text{ kg})(45.0 \text{ m/s})}{(90.0 \text{ kg})}$$

$$\underline{\underline{v_{\text{pl}} = -0.075 \text{ m/s}}}$$

Distance to goal is $\Delta x = 15.0 \text{ m}$

Time for the puck to reach the goal is

$$x = v \cdot t \rightarrow t = \frac{x}{v} = \frac{15.0 \text{ m}}{45.0 \text{ m/s}} = \underline{\underline{0.33 \text{ s}}}$$

In that time the player recoils

$$\Delta x_{\text{pl}} = v_{\text{pl}} \cdot t = (-0.075 \text{ m/s})(0.33 \text{ s})$$

$$\Delta x_{\text{pl}} = -0.025 \text{ m}$$

or 2.5 cm about an inch