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Given:

$$m_c = 3.0 \times 10^5 \text{ kg}$$

$$m_D = 3.0 \times 10^5 \text{ kg}$$

$$v_{ci} = 2.2 \frac{\text{m}}{\text{s}}$$

$$v_{Di} = 0.0 \frac{\text{m}}{\text{s}}$$

\* stick together \*

$$v_{cf} = v_{Df} = v_f$$

Unknown:

$$v_f = \frac{\text{m}}{\text{s}}$$

Equation:

$$P_{ci} + P_{Di} = P_{cf} + P_{Df}$$

$$m_c v_{ci} + m_D v_{Di} = m_c v_{cf} + m_D v_{Df}$$

$$m_c v_{ci} + m_D v_{Di} = m_c v_f + m_D v_f$$

$$\frac{m_c v_{ci} + m_D v_{Di}}{(m_c + m_D)} = \frac{v_f (m_c + m_D)}{(m_c + m_D)}$$

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C ⇒ puck

D ⇒ goalie

Given:

$$m_c = 0.105 \text{ kg}$$

$$m_D = 75 \text{ kg}$$

$$v_{ci} = 24 \frac{\text{m}}{\text{s}}$$

$$v_{Di} = 0.0 \frac{\text{m}}{\text{s}}$$

\* puck caught by goalie  
stick together \*

$$v_{cf} = v_{Df} = v_f$$

Unknown:

$$v_f = \frac{\text{m}}{\text{s}}$$

Eyn:

$$P_{ci} + P_{Di} = P_{cf} + P_{Df}$$

$$m_c v_{ci} + m_D v_{Di} = m_c v_{cf} + m_D v_{Df}$$

$$\therefore v_f = \frac{m_c v_{ci} + m_D v_{Di}}{(m_c + m_D)}$$

(15) C  $\Rightarrow$  bullet  
D  $\Rightarrow$  Lumber

$$m_c = 35g \text{ * convert * } \frac{35g}{1000g} = 0.035 \text{ Kg}$$

$$m_D = 5.0 \text{ Kg}$$

$$V_{cf} = 8.6 \frac{m}{s}$$

$$V_{Df} = 8.6 \frac{m}{s}$$

$$V_{Di} = 0.0 \frac{m}{s}$$

Unknown:

$$V_{Ci} = \underline{\hspace{2cm}} \frac{m}{s}$$

Equation:

$$m_c V_{Ci} + m_D V_{Di} = m_c V_{cf} + m_D V_{Df}$$

$$\cancel{m_D V_{Di}} \quad - m_D V_{Di}$$

$$\frac{m_c V_{Ci}}{m_c} = \frac{m_c V_{cf} + m_D V_{Df} - m_D V_{Di}}{m_c}$$

(16)

C  $\Rightarrow$  bullet  
D  $\Rightarrow$  Flour

Given:

$$m_c = 0.035 \text{ Kg}$$

$$V_{Ci} = 475 \frac{m}{s}$$

$$m_D = 2.5 \text{ Kg}$$

$$V_{cf} = 275 \frac{m}{s}$$

$$V_{Di} = 0.0 \frac{m}{s}$$

Unknown:

$$V_{Df} = \underline{\hspace{2cm}} \frac{m}{s}$$

Equation:

$$P_{Ci} + P_{Di} = P_{Cf} + P_{Df}$$

$$m_c V_{Ci} + m_D V_{Di} = m_c V_{Cf} + m_D V_{Df}$$

$$\cancel{m_c V_{Cf}} \quad - m_c V_{Cf}$$

$$\frac{m_c V_{Ci} + m_D V_{Di} - m_c V_{Cf}}{m_D} = \frac{m_D V_{Df}}{m_D}$$