


PHYS
WS-2



$$m_1 = 6000 \text{ kg} \quad m_2 = 3000 \text{ kg} = m \quad m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$$

$$v = 2.0 \text{ m/s} \quad -3 \text{ m/s} = v \quad v' = \frac{m_1 v_1 + m_2 v_2}{(m_1 + m_2)}$$

$$v' = \frac{(6000 \text{ kg})(2.0 \text{ m/s}) + (3000 \text{ kg})(-3 \text{ m/s})}{9000 \text{ kg}} = 0.333 \text{ m/s}$$

2)  $P_i = P_f \quad m_1 v_1 + m_2 v_2 = 0 \quad v_1' = -\frac{m_2 v_2'}{m_1}$

$$v_1' = \frac{(0.0500 \text{ kg})(300 \text{ m/s})}{5.00 \text{ kg}} = -3.00 \text{ m/s}$$



$$m_1 = 5000 \text{ kg} \quad m_2 = 8000 \text{ kg} \quad m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$$

$$v_1 = 5.20 \text{ m/s} \quad v_2 = ? \quad v' = \frac{m_1 v_1}{m_1 + m_2} =$$

$$v' = \frac{(5000 \text{ kg})(5.2 \text{ m/s})}{13000 \text{ kg}} = 2.00 \text{ m/s}$$

4.)  $m_1 = 10 \text{ kg} \quad v_1 = 2 \text{ m/s} \quad m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$

$$m_2 = 75 \text{ kg} \quad v_2 = 3 \text{ m/s} \quad v' = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$$

$$v' = \frac{(10 \text{ kg})(2 \text{ m/s}) + (75 \text{ kg})(3 \text{ m/s})}{85 \text{ kg}} = 2.88 \text{ m/s}$$

5) \rightarrow 0

$$m_1 = .1 \text{ kg}$$

$$m_2 = .4 \text{ kg}$$

$$v_1 = 2.0 \text{ m/s}$$

$$v_2 = 0 \text{ m/s}$$

$$v_1' = 1.2 \text{ m/s}$$

$$v_2' = ?$$

$$m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$$

$$v_2' = \frac{m_1 v_1 + m_2 v_2 - m_1 v_1'}{m_2}$$

$$v_2' = \frac{(.1 \text{ kg})(2.0 \text{ m/s}) + 0 - (.10 \text{ kg})(1.2 \text{ m/s})}{.4 \text{ kg}}$$

$$v_2' = .800 \text{ m/s}$$

6.) \rightarrow 0

$$m_1 = 25 \text{ kg}$$

\leftarrow 0

$$m = 15 \text{ kg}$$

$$v_1 = 3.0 \text{ m/s}$$

$$v_1' = -6 \text{ m/s}$$

$$a) m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$$

$$\frac{m_1 v_1 + m_2 v_2 - m_2 v_2'}{m_1} = v_1'$$

$$v_1' = \frac{(25 \text{ kg})(3.0 \text{ m/s}) + (15 \text{ kg})(-6 \text{ m/s}) - (15 \text{ kg})(-3.0 \text{ m/s})}{25 \text{ kg}}$$

$$b) -.870 \text{ m/s}$$

$$v_1' = -.420 \text{ m/s}$$

$$c) m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$$

$$v' = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2} = \frac{(25 \text{ kg})(3.0 \text{ m/s}) + (15 \text{ kg})(-6 \text{ m/s})}{40 \text{ kg}} = -.375 \text{ m/s}$$

7) $\square \rightarrow \square$

$$m_{Bu} = .002 \text{ kg}$$

$$m_{BL} = 1.5 \text{ kg}$$

$$v_{Bu} = 300 \text{ m/s}$$

$$v_{BL} = 0 \text{ m/s}$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v'$$

$$\frac{m_1 v_1}{m_1 + m_2} = v' = \frac{(.002 \text{ kg})(300 \text{ m/s})}{1.502 \text{ kg}} = .399 \text{ m/s}$$