

Q #21, p# 21, 25

"D"

Q #21

$$\vec{P}_i = \vec{P}_f$$

$$(m_1 v_{1i}) + (m_2 v_{2i}) = (m_1 + m_2)(v_x)_f$$

$$(m_1)(2v_{2i}) + (3m)(v_{2i}) = (m + 3m)(v_x)_f$$

$$(v_x)_f = \frac{(m)(2(v_x)_i) + (3m)(v_x)_i}{m + 3m}$$

$$\frac{5m(v_x)_i}{4m}$$

$$\frac{5(v_x)_i}{4}$$

P # 21

$$m_1 - \cancel{300}g$$

$$v_1 - 6.0 \text{ m/s}$$

$$m_2 - \cancel{10}g$$

$$v_2 - -30 \text{ m/s}$$

$$m_1 -$$

$$v_x$$

$$m_2 -$$

$$p_{f_x} = p_{i_x}$$

$$(m_1 + m_2)(v_x)_f = (m_1 v_1)_i + (m_2 v_2)_f$$

$$(300g + 10g)(v_x)_f = (300g)(6.0 \text{ m/s}) + (10g)(-30 \text{ m/s})$$

$$310g (v_x)_f = 1800 + (-300)$$

$$\frac{310g (v_x)_f}{310} = \frac{1500}{310}$$

$$(v_x)_f = 4.8 \text{ m/s}$$

$$2 \text{kg} \left(1 \frac{\text{m}}{\text{s}}\right) + 4 \frac{\text{m}}{\text{s}} x = (2+x) \left(2 \frac{\text{m}}{\text{s}}\right)$$

$$2 \frac{\text{kg} \cdot \text{m}}{\text{s}} + 4 \frac{\text{m}}{\text{s}} x = 4 \frac{\text{kg} \cdot \text{m}}{\text{s}} + 2x \frac{\text{m}}{\text{s}} - 2x \frac{\text{m}}{\text{s}}$$

$$2 \frac{\text{kg} \cdot \text{m}}{\text{s}} + 2x \frac{\text{m}}{\text{s}} = 4 \frac{\text{kg} \cdot \text{m}}{\text{s}} - 2 \frac{\text{kg} \cdot \text{m}}{\text{s}}$$

$$\frac{2x \frac{\text{m}}{\text{s}}}{2 \frac{\text{m}}{\text{s}}} = \frac{2 \text{kg} \frac{\text{m}}{\text{s}}}{2 \frac{\text{m}}{\text{s}}}$$

$$x = 1 \text{kg}$$

P #25

$$\begin{array}{l|l} m_1 - 2.0 \text{ kg} & m_1 - 2.0 \text{ kg} \\ v_1 - 1.0 \text{ m/s} & v_x - 2.0 \text{ m/s} \\ m_2 - ? & m_2 - \\ v_2 - 4.0 \text{ m/s} & \end{array}$$

$$P_i = P_f$$

$$(m_1 v_1)_i + (m_2 v_2)_i = (m_1 + m_2) (v_x)_f$$

$$(2.0 \text{ kg})(1.0 \text{ m/s})_i + (m_2)(4.0 \text{ m/s}) = (2.0 \text{ kg} + m_2)(2.0 \text{ m/s})$$

$$2 \text{ kg} \cdot \text{m/s} + (m_2) \left(\frac{4.0 \text{ m/s}}{2.0} \right) = (2.0 \text{ kg} + m_2) \left(\frac{2.0 \text{ m/s}}{2.0} \right)$$

$$2 \text{ kg} \cdot \text{m/s} + (m_2) 2 \text{ m/s} = 2.0 \text{ kg} + m_2$$