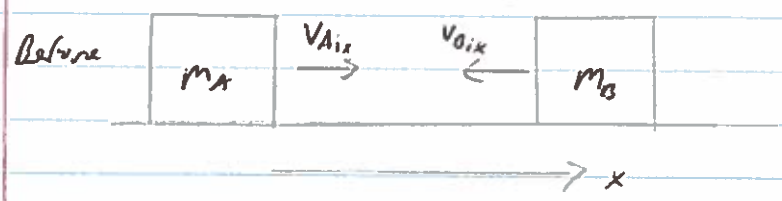
Ex 8-7
p 252



$m_A = 0.50\,kg$
$m_B = 0.30\,kg$
$v_{Ai_x} = 2.0\,ms^{-1}$
$v_{Bi_x} = -2.0\,ms$

$v_{f_x} = v_{Af_x} = v_{Bf_x}$
- ~~momentum~~
- for totally inelastic

Conserve momentum: $\Delta \vec{p}_{tot} = 0$

or $\Delta p_{tot_x} = 0$ as we work in 1-D.

$$\Delta p_{A_x} + \Delta p_{B_x} = 0$$

$\Delta p = p_f - p_i$

$$p_{Af_x} - p_{Ai_x} + p_{Bf_x} - p_{Bi_x} = 0$$

$p = mv$

$$m_A v_{Af_x} - m_A v_{Ai_x} + m_B v_{Bf_x} - m_B v_{Bi_x} = 0$$

$v_{Af_x} = v_{Bf_x} = v_{f_x}$

$$v_{f_x}(m_A + m_B) = + m_A v_{Ai_x} + m_B v_{Bi_x}$$

$$v_{f_x} = \frac{m_A v_{Ai_x} + m_B v_{Bi_x}}{m_A + m_B}$$

$$v_{f_x} = \frac{(0.50\,kg)(2.0\,ms^{-1}) + (0.30\,kg)(-2.0\,ms^{-1})}{(0.50\,kg + 0.30\,kg)}$$

$$\underline{v_{f_x} = 0.50\,ms^{-1}}$$

fore: $K_i = K_{A_i} + K_{B_i} = \frac{1}{2} m_A v_{A_i}^2 + \frac{1}{2} m_B v_{B_i}^2$

$= \frac{1}{2}\left((0.50\,kg)(2.0\,ms^{-1})^2 + (0.30\,kg)(-2.0\,ms^{-1})^2\right)$

$\underline{K_i = 1.6\,J}$

er: $K_f = \frac{1}{2} m_{tot} v_{f_c}^2$

$= \frac{1}{2}(m_A + m_B) v_{f_c}^2$

$= \frac{1}{2}\left((0.50\,kg) + (0.30\,kg)\right)(0.50\,ms^{-1})^2$

$\underline{K_f = 0.10\,J}$

System has lost 1.5 J during collision.