

PROB. 14-32

FIND ENERGY LOST DURING COLLISIONS IN PROB. 14-7

a) A AND C HIT B AT SAME TIME

$$v_{A,0} = 2 \frac{\text{m}}{\text{s}}, \quad v_{B,0} = 0, \quad v_{C,0} = 1.5 \frac{\text{m}}{\text{s}}$$

$$m_A = 240 \text{ kg}, \quad m_B = 260 \text{ kg}, \quad m_C = 235 \text{ kg}$$

FROM PROB. 14-7,

$$v_{A,F} = 1.288 \frac{\text{m}}{\text{s}}, \quad v_{B,F} = 0.3122 \frac{\text{m}}{\text{s}}, \quad v_{C,F} = 1.512 \frac{\text{m}}{\text{s}}$$

INITIAL KINETIC ENERGY:

$$T_1 = \frac{1}{2} m_A v_{A,0}^2 + \frac{1}{2} m_C v_{C,0}^2 = 744.3 \text{ J}$$

FINAL KINETIC ENERGY:

$$T_2 = \frac{1}{2} m_A v_{A,F}^2 + \frac{1}{2} m_B v_{B,F}^2 + \frac{1}{2} m_C v_{C,F}^2$$

$$T_2 = \frac{1}{2} (240) (1.288)^2 + \frac{1}{2} (260) (0.3122)^2 + \frac{1}{2} (235) (1.512)^2$$

$$T_2 = 480.4 \text{ J}$$

$$T_1 - T_2 = 744.3 - 480.4 = 263.9 \text{ J}$$

b) A HITS B, C HITS B, A HITS B AGAIN

INITIAL KINETIC ENERGY:  $T_1 = 744.3 \text{ J}$

AFTER ALL COLLISIONS,

$$T_2 = \frac{1}{2} m_A v_{A,F}^2 + \frac{1}{2} m_B v_{B,F}^2 + \frac{1}{2} m_C v_{C,F}^2$$

PROB. 14-32 CONT.

$$T_2 = \frac{1}{2}(240)(0.9559)^2 + \frac{1}{2}(260)(0.02953)^2 + \frac{1}{2}(235)(1.552)^2$$

$$T_2 = 392.8 \text{ J}$$

$$T_1 - T_2 = 351.5 \text{ J}$$