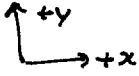


Problem 8-38

(a) Linear momentum is conserved. 

$$\therefore m v_{1y} = m v_1' \sin 28.0^\circ - m v_2' \sin 40.0^\circ$$

$$\therefore v_2' = \frac{\sin 28.0^\circ}{\sin 40.0^\circ} v_1' = 0.7304 v_1' \quad [1]$$

In x-direction:  $m v_{1x} = m v_1' \cos 28.0^\circ + m v_2' \cos 40.0^\circ$

$$\text{Subst. from [1]} \rightarrow v_{1x} = v_1' \cos 28.0^\circ + (0.7304 v_1') \cos 40.0^\circ$$

$$v_{1x} = 25.0 \text{ m/s}$$

$$\Rightarrow v_1' = 17.3 \text{ m/s} \quad (17.3_3 \text{ m/s})$$

$$[1] \Rightarrow v_2' = 0.7304 (17.3_3 \text{ m/s}) = 12.7 \text{ m/s} \quad (12.6_6 \text{ m/s})$$

(b) fraction of KE lost

$$= \frac{\frac{1}{2} m v_1^2 - \left( \frac{1}{2} m v_1'^2 + \frac{1}{2} m v_2'^2 \right)}{\frac{1}{2} m v_1^2}$$

$$= \frac{v_1^2 - (v_1'^2 + v_2'^2)}{v_1^2}$$

$$= \frac{(25.0)^2 - [(17.3_3)^2 + (12.6_6)^2]}{(25.0)^2}$$

$$= 0.263$$