58.) *use cons. of energy first to find speed @ bottom of swing before picking up Jane

$mgh = \frac{1}{2}mv_F^2$

$v_F = \sqrt{2 \cdot g \cdot h} = \sqrt{2 \cdot 10 m/s^2 \cdot 3.0 m}$

$v_F = 7.7 m/s$

- next use cons. of momentum to solve for speed following collision with Jane

$m_1 v_i = (m_1 + m_2) v_F$

$\frac{m_1 v_i}{(m_1 + m_2)} = v_F = \frac{(80.0 kg)\ 7.7 m/s}{(80.0 kg + 60.0 kg)} =$

$v_F = 4.4 m/s$

- next use cons. of energy to solve for final height

$\frac{1}{2}mv_i^2 = mgh$

$\frac{\frac{1}{2}v_i^2}{g} = h = \frac{\frac{1}{2}(4.4 m/s)^2}{10 m/s}$

$h = .968 m$

59.) a.) Cons. of momentum to start

$\vec{P_i} = \vec{P_f}$ * is a separation collision

$\vec{P_i} = 0 \frac{kg}{m/s}$

$P_f = 0 \frac{kg}{m/s}$

$0\ kg \cdot m/s = (.500kg \cdot +4.0 m/s) + (3.00kg \cdot \vec{V_F})$

$\vec{V}_{F\ wedge} = -0.667 m/s$

b.) Cons. of energy gives us height of wedge

$mgh_{block} = \frac{1}{2} m\vec{v}^2_{F\ block} + \frac{1}{2} m\vec{v}^2_{F\ wedge}$

$h = \frac{\frac{1}{2} m\vec{v}^2_{F\ block} + \frac{1}{2} mv^2_{F\ wedge}}{m_{blk} \cdot g}$

$h = \frac{\frac{1}{2}(.500kg)(+4.0 m/s)^2 + \frac{1}{2}(3.00kg)(-.667 m/s)^2}{(.500kg \cdot 10 m/s^2)}$

$h = .93m$