PROB. 13.147

$m_m = 55\ kg$, $m_B = 20\ kg$, $v_{m,1} = v_{B,1} = 7.2\ \frac{km}{HR}$

$\Delta t = 3^s$, $v_{B,2} = 3.6\ \frac{km}{HR}$

a) FIND $v_{m,2}$

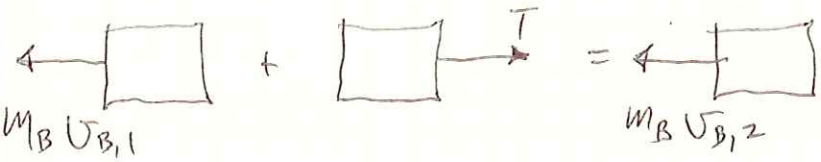
$$\Sigma m\vec{v}_1 = \Sigma m\vec{v}_2$$

$$m_B v_{B,1} + m_m v_{m,1} = m_B v_{B,2} + m_m v_{m,2}$$

$$v_{m,2} = \left(\frac{m_B}{m_m}\right)(v_{B,1} - v_{B,2}) + v_{m,1}$$

$$v_{m,2} = \left(\frac{20}{55}\right)(7.2 - 3.6) + (7.2) = 8.509\ \frac{km}{HR}$$

b) FIND TENSION IN ROPE



$$m_B v_{B,1} + \Sigma \int P_{1-2} = m_B v_{B,2}$$

$$m_B v_{B,1} - T \cdot \Delta t = m_B v_{B,2}$$

$$T = \frac{m_B}{\Delta t}(v_{B,1} - v_{B,2}) = \frac{(20\ kg)}{(3^s)} \cdot \left(7.2 - 3.6\ \frac{km}{HR}\right)\left(\frac{1000\ m}{km}\right)\left(\frac{HR}{3600^s}\right)$$

$$T = 6.667^N$$