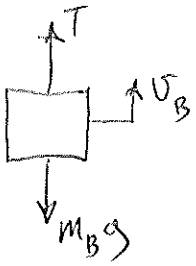
PROB. 13-132

$m_A = 4\ kg$, $m_B = 4\ kg$, $m_C = 8\ kg$, $v_{A,1} = v_{B,1} = v_{C,1} = 0$

a) FIND $v_{B,2}$ AFTER $t = 0.8\ s$

BLOCK B: $m_B \cancel{v_{B,1}}^{\,0} + \sum \int \vec{F}\,dt = m_B v_{B,2}$



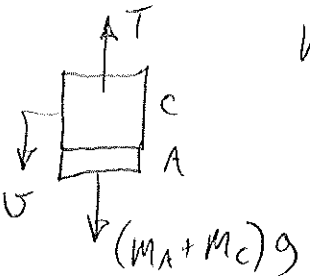
$\int F\,dt = F \cdot \Delta t = (T - m_B g)\Delta t$

$(T - m_B g)\Delta t = m_B v_{B,2}$

$T = m_B g + m_B\left(\frac{v_{B,2}}{\Delta t}\right) = m_B\left(g + \frac{v_{B,2}}{\Delta t}\right)$

BLOCK A AND C: $m\vec{v}_1^{\,0} + \sum \int \vec{F}\,dt = m\vec{v}_2$

$v_1 = 0$, $\sum \int \vec{F}\,dt = [(m_A + m_C)g - T]\Delta t$



$m v_2 = (m_A + m_C) v_2$

$0 + [(m_A + m_C)g - T]\Delta t = (m_A + m_C) v_2$

KINETICS: $v_{B,2} = v_{A,2} = v_{C,2} = v_2$

$[(m_A + m_C)g - m_B\left(g + \frac{v_2}{\Delta t}\right)]\Delta t = (m_A + m_C) v_2$

$m_A g \Delta t + m_C g \Delta t - m_B g \Delta t - m_B v_2 = m_A v_2 + m_C v_2$

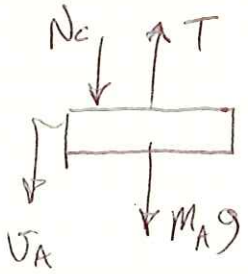
$$v_2 = \frac{(m_A + m_C - m_B)g\Delta t}{(m_A + m_C + m_B)} = \frac{(4 + 8 - 4\ kg)\left(9.81\ \frac{m}{s^2}\right)(0.8\ s)}{(4 + 8 + 4\ kg)}$$

$$v_2 = 3.924\ \frac{m}{s}$$

PROB. 13-132 CONT.

b) FIND FORCE ON PLATFORM

FBD PLATFORM:



$$m_A \cancel{v_{A,1}}^{\,0} + \sum \int_{1-2} \vec{P} = m_A v_{A,2} = m_A v_2$$

$$\sum \int_{1-2} \vec{P} = F \cdot \Delta t = (m_A g + N_C - T)\Delta t$$

$$(m_A g + N_C - T)\Delta t = m_A v_2$$

$$N_C = T - m_A g + \frac{m_A v_2}{\Delta t}$$

$$N_C = m_B\left(g + \frac{v_2}{\Delta t}\right) - m_A g + \frac{m_A v_2}{\Delta t}$$

$$N_C = (m_B - m_A)g + (m_B + m_A)\frac{v_2}{\Delta t}$$

$$N_C = (4-4\,kg)\left(9.81\,\tfrac{m}{s^2}\right) + (4+4\,kg)\frac{\left(3.924\,\tfrac{m}{s}\right)}{(0.8\,s)} = 39.24\,N$$