PROB. 13-134

$W = 4^{LB}$, $v_1 = 0$

a) FIND v_2 @ $t = 2^s$

BLOCK BEGINS TO MOVE WHEN $P = 4^{LB}$

$P = at$, $a = \frac{P}{t} = \frac{(10^{LB})}{(2^s)} = 5\ \frac{LB}{s}$

$P = 5t$, $t = \frac{(4^{LB})}{(5\ \frac{LB}{s})} = 0.8^s$

$m\vec{v}_1 + \Sigma \vec{IMP}_{1-2} = m\vec{v}_2 = \frac{W}{g}\vec{v}_2$

$\Sigma IMP_{1-2} = \int F\,dt = \int_{t_1}^{t_2} (P - W)\,dt = \int_{t_1}^{t_2} (5t - W)\,dt$

$= \left[5\frac{t^2}{2} - Wt\right]_{t_1}^{t_2} = \frac{5}{2}(t_2^2 - t_1^2) - W(t_2 - t_1)$

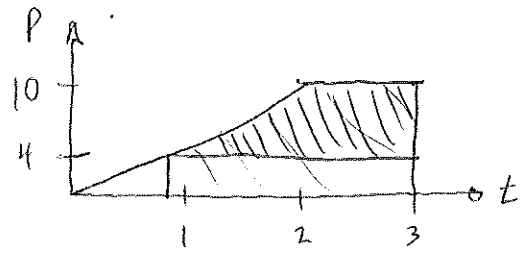
$\frac{5}{2}(t_2^2 - t_1^2) - W(t_2 - t_1) = \frac{W}{g} v_2$

$v_2 = \frac{g}{W}\left[\frac{5}{2}(t_2^2 - t_1^2) - W(t_2 - t_1)\right]$

$v_2 = \frac{(32.2\ \frac{ft}{s^2})}{(4^{LB})} \cdot \left\{\frac{5}{2}\left[(2^s)^2 - (0.8^s)^2\right] - (4^{LB})(2 - 0.8^s)\right\}$

$v_2 = 28.98\ \frac{ft}{s}$

b) FIND v_2 @ $t = 3^s$



BLOCK BEGINS TO MOVE AT $t_1 = 0.8^s$

IMPULSE IS SHADED AREA

PROB. 13-134 CONT.

$$mv_1 + \sum \int P_{1-2} = mv_2 = \frac{W}{g} v_2$$

$$\sum \int P_{1-2} = \int F\,dt = \int_{t_1}^{t_2} (P - W)\,dt + \int_{t_2}^{t_3} (P - W)\,dt$$

$$\int_{t_2}^{t_3} (P - W)\,dt = (P - W)(t_3 - t_2)$$

$$v_2 = \frac{g}{W} \cdot \left[\frac{5}{2}\left(t_2^2 - t_1^2\right) - W(t_2 - t_1) + (P - W)(t_3 - t_2) \right]$$

$$v_2 = \frac{\left(32.2 \frac{ft}{s^2}\right)}{(4^{LB})} \cdot \left\{ \frac{5}{2}\left[(2^s)^2 - (0.8^s)^2 \right] - (4^{LB})(2 - 0.8^s) + 6(1^s) \right\}$$

$$\boxed{v_2 = 77.28 \frac{ft}{s}}$$