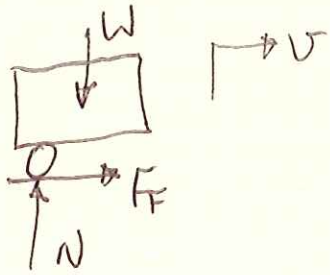
PROB. 13.6

a) $\mu_K = 0.6$, $v_1 = 0$, FIND v_2 IF $\Delta x_1 = 60$ ft



$T_1 + {}_1U_2 = T_2$

SINCE $v_1 = 0$, $T_1 = 0$

${}_1U_2 = F\cos\alpha \cdot \Delta x = F_F \cdot \Delta x$

$F_F = \mu_K N = \mu_K W$

${}_1U_2 = \mu_K W \cdot \Delta x_1$

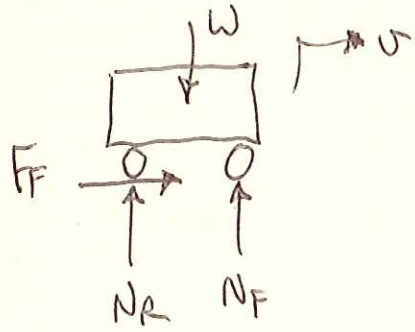
$T_2 = \frac{1}{2} m v_2^2 = \frac{1}{2}\left(\frac{W}{g}\right) v_2^2$

$\mu_K W \cdot \Delta x_1 = \frac{1}{2}\left(\frac{W}{g}\right) v_2^2$

$v_2 = \sqrt{2g\mu_K \Delta x_1} = \sqrt{2\left(32.2 \frac{ft}{s^2}\right)(0.6)(60\ ft)}$

$v_2 = \left(48.15 \frac{ft}{s}\right)\left(\frac{3600\ s}{HR}\right)\left(\frac{mi}{5280\ ft}\right) = 32.83 \frac{mi}{HR}$

b) $v_2 = 48.15 \frac{ft}{s}$, $\mu_s = 0.85$, $N_R = 0.6W$, FIND v_3



$F_F = \mu_s N_R = 0.6\mu_s W$

$T_2 + {}_2U_3 = T_3$

$\frac{1}{2} m v_2^2 + F_F \cdot \Delta x_2 = \frac{1}{2} m v_3^2$

$\frac{1}{2}\left(\frac{W}{g}\right) v_3^2 = \frac{1}{2}\left(\frac{W}{g}\right) v_2^2 + 0.6\mu_s W \cdot \Delta x_2$

$v_3^2 = v_2^2 + 1.2g\mu_s \cdot \Delta x_2$

PROB. 13.6 CONT.

$$V_3 = \sqrt{V_2^2 + 1.29 M_s \cdot \Delta X_2}$$

$$= \sqrt{\left(48.15 \frac{ft}{s}\right)^2 + 1.2\left(32.2 \frac{ft}{s^2}\right)(0.85)(1320 - 60\ ft)}$$

$$V_3 = \left(209.0 \frac{ft}{s}\right)\left(\frac{3600\ s}{HR}\right)\left(\frac{MI}{5280\ ft}\right) = \boxed{142.5 \frac{MI}{HR}}$$