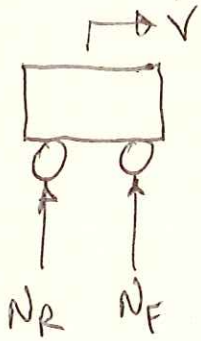
PROB. 13.5

$\Delta X = 360\ ft$, $v_1 = 0$, $\mu_R = 0.75$

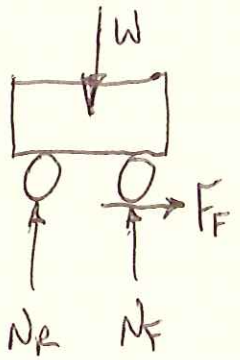


$W = N_R + N_F$

$N_R = 0.4W$, $N_F = 0.6W$

FIND v_{max} FOR F-W DRIVE, R-W DRIVE

a) FRONT WHEEL DRIVE



$T_1 + {}_1U_2 = T_2$

$T_1 = \frac{1}{2}mv_1^2 = 0$

$T_2 = \frac{1}{2}mv_2^2 = \frac{1}{2}\left(\frac{W}{g}\right)v_{max}^2$

${}_1U_2 = F\cos\alpha \cdot \Delta X$: $\alpha = 0 \Rightarrow {}_1U_2 = F_F \cdot \Delta X$

$F_F = \mu N_F = \mu(0.6W)$

$0.6\mu W \cdot \Delta X = \frac{1}{2}\left(\frac{W}{g}\right)v_{max}^2$

$v_{max} = \sqrt{2(0.6)\mu \cdot \Delta X \cdot g}$

$= \sqrt{2(0.6)(0.75)(360\ ft)\left(32.2\ \frac{ft}{s^2}\right)}$

$v_{max} = \left(102.1\ \frac{ft}{s}\right)\left(\frac{3600\ s}{HR}\right)\left(\frac{mi}{5280\ ft}\right) = \boxed{69.64\ \frac{mi}{HR}}$

PROB. 13.5 CONT.

b) REAR-WHEEL DRIVE

$$F_F = \mu N_R = \mu(0.4W)$$

$$v_{max} = \sqrt{2g(0.4)\mu \cdot \Delta x}$$

$$= \sqrt{2\left(32.2 \frac{ft}{s^2}\right)(0.4)(0.75)(360\,ft)}$$

$$v_{max} = \left(83.39 \frac{ft}{s}\right)\left(\frac{3600\,s}{HR}\right)\left(\frac{mi}{5280\,ft}\right) = 56.86 \frac{mi}{HR}$$