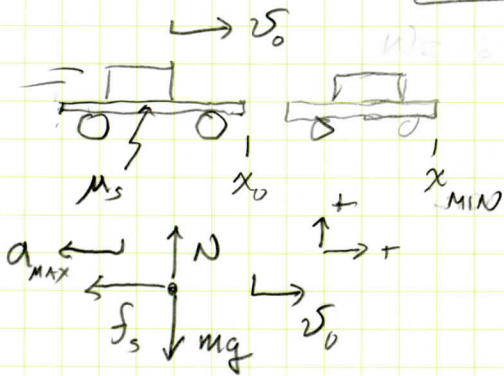


HR 2 5-18

A FLATCAR IS LOADED WITH CRATES HAVING  $\mu_s = 0.25$  WITH THE FLOOR. IF  $v_0 = 48 \text{ km/h}$ , FIND  $x_{\text{MIN}}$ .



WRITE  $x_{\text{STOP}}$  IN TERMS OF  $a_{\text{MAX}}$

$$v^2 = v_0^2 - 2a_{\text{MAX}}(x_{\text{MIN}} - x_0)$$

$$a_{\text{MAX}} = \frac{v_0^2}{2x_{\text{MIN}}}$$

APPLY NSL

$$\sum F_{\text{VERT}} = ma_{\text{VERT}}$$

$$N - mg = 0 \Rightarrow N = mg$$

$$\sum F_H = ma_{\text{MAX}}$$

$$-f_s = -ma_{\text{MAX}}$$

FROM KINEMATICS AND  $\sum F_{\text{VERT}}$

$$\mu_s mg = m \left( \frac{v_0^2}{2x_{\text{MIN}}} \right)$$

$$x_{\text{MIN}} = \frac{v_0^2}{2\mu_s g}$$

$$\text{FOR } v_0 = 48 \frac{\text{km}}{\text{h}} \left( \frac{1000 \text{ m}}{\text{km}} \right) \left( \frac{1 \text{ h}}{3600 \text{ s}} \right) = 13.3 \frac{\text{m}}{\text{s}}$$

$$x_{\text{MIN}} = \frac{(13.3)^2}{2(0.25)(9.8)} = 36.3 \text{ m} = x_{\text{MIN}}$$