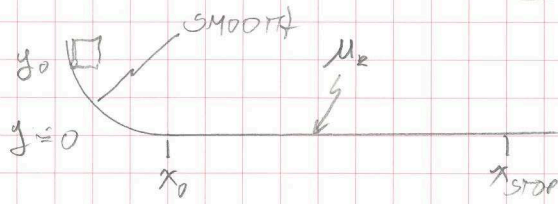


- 5) A 2.0 kg BLOCK SLIDES DOWN A RAMP & ALONG SURFACE TO STOP  
 a) FIND EXPRESSIONS FOR SPEED AT BOTTOM & FRICTION.  
 b) FIND  $x_{STOP}$  FOR  $m = 2 \text{ kg}$ ,  $y_0 = 2 \text{ m}$  AND  $\mu_k = 0.25$ .



a) CONSERVE ENERGY

$$U_{TOP} = T_{BOT}$$

$$mgy_0 = \frac{1}{2}mv_{BOTTOM}^2$$

$$\Rightarrow v_{BOTTOM} = \sqrt{2gy_0}$$

APPLY WORK-ENERGY

$$T_{BOT} = \int X_{SLIDE}$$

$$\frac{1}{2}mv_{BOT}^2 = (\mu_k N) X_{SLIDE}$$

$$\frac{1}{2}mv_{BOT}^2 = \mu_k mg X_{SLIDE}$$

$$\Rightarrow X_{SLIDE} = \frac{v_{BOT}^2}{2\mu_k g} = \frac{2gy_0}{2\mu_k g} = \boxed{\frac{y_0}{\mu_k} = X_{SLIDE}}$$

Wow! SIMPLE!

b) For  $y_0 = 2 \text{ m}$  AND  $\mu_k = 0.25$

$$\boxed{X_{SLIDE} = \frac{2}{0.25} = 8 \text{ m}}$$

That worked out nicely!