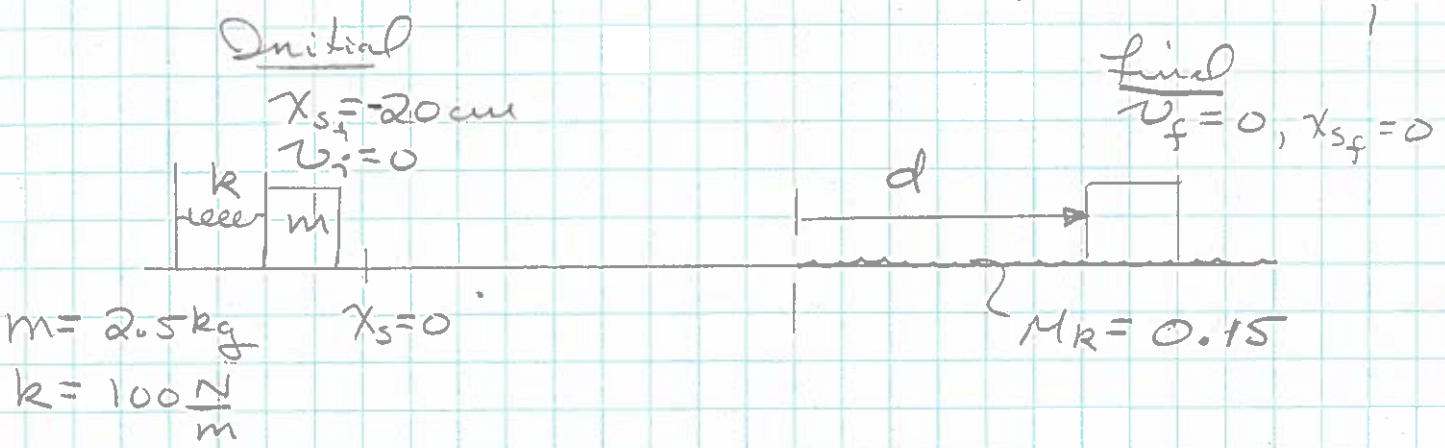


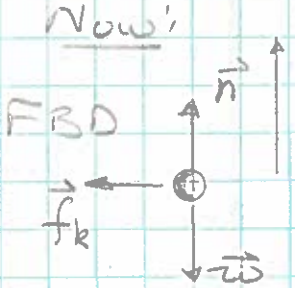
Conserve Energy $i \to f$:

$$\Delta E_{mech} = \Delta K + \Delta U_s = W_{nc}$$

$$\tfrac{1}{2} m (v_f^2 - v_i^2) + \tfrac{1}{2} k (x_{s_f}^2 - x_{s_i}^2) = W_f$$

$$-\tfrac{1}{2} k x_{s_i}^2 = W_f$$

Now:



$$\Sigma F_y = n - w = ma_y = 0$$

$$n = w = mg$$

and

$$f_k = \mu_k n = \mu_k mg$$

Now:

$$W_f = \vec{f} \cdot \Delta \vec{r} = -fd = -\mu_k mgd$$

So:

$$-\tfrac{1}{2} k x_{s_i}^2 = -\mu_k mgd$$

$$\therefore \quad d = \frac{k x_{s_i}^2}{2 \mu_k mg} = \underline{0.5442\ m}$$