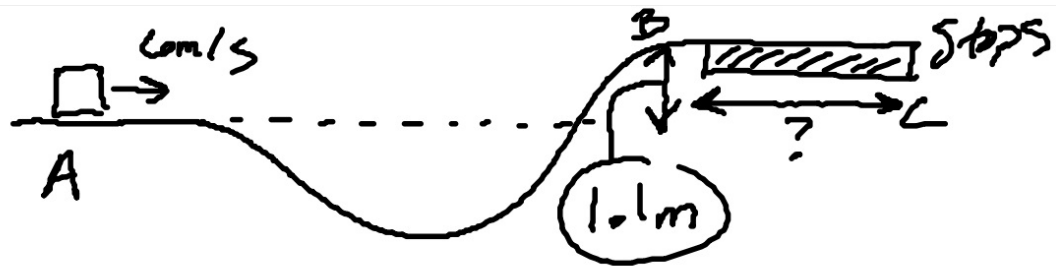


57.



A to B

$$U_A + K_A + W_{nc} = U_B + K_B$$

$$0 + K_A + 0 = U_B + K_B$$

B to C

$$U_B + K_B + W_{nc} = U_C + K_C$$

$$U_B + K_B + W_f = U_C + 0$$

$$K_A + W_f = U_C$$

$$f = \mu F_N \quad \left(\begin{array}{l} F_N = F_g \\ a_y = 0 \end{array} \right)$$

$$\frac{1}{2} m 6^2 + (\mu mg)(\Delta x) \cos 180^\circ$$

$$18 - 5.88(\Delta x) = 10.78 = mg(1.1)$$

$$(\Delta x = 1.23 \text{ m})$$

55. a) $W_s = ?$ $W_s = -\Delta U_s$

$$\Delta U_s = \frac{1}{2} k x_f^2 - \frac{1}{2} k x_o^2$$
$$= \frac{1}{2} (320) (0.075)^2 - 0$$

$$\Delta U_s = 0.9 \text{ J}$$

$$\underline{W_s = -0.9 \text{ J}}$$

$$f = \mu F_N \quad F_w = F_g \quad (a_y = 0)$$

b) $\Delta E_{th} = ?$ $\Delta E_{th} = (f_k) d = (0.25)(2.5)(9.8)(0.075)$

$$\underline{\Delta E_{th} = 0.459 \text{ J}}$$

c) $V_0 = ?$

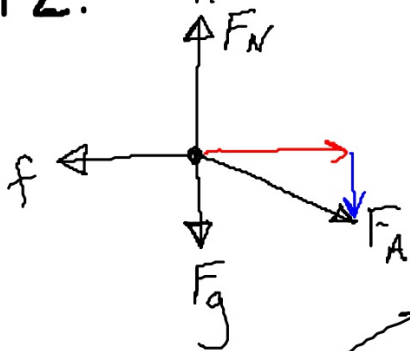
$$\underbrace{U_0 + K_0 + W_{NC}}_{\text{as it reaches spring}} = \underbrace{U_f + K_f}_{\text{stopped}}$$

$$0 + \frac{1}{2}mv^2 + W_f = U_{sf}$$
$$\frac{1}{2}(2.5)(v)^2 - 0.459 = 0.9$$

$$1.25v^2 = 1.359$$

$$\underline{V = 1.04 \text{ m/s}}$$

42. $W_A = ?$ $\mu = 0.2$



$$W_A = (F_A)(\Delta x) \cos 32^\circ$$

$$a_x = 0, \text{ so } \dots$$

$$\dots \mu F_N = F_A \cos 32^\circ$$

$$a_x = 0$$

$$F_{Ax} = f = \mu F_N \quad \mu(mg + F_A \sin 32^\circ) = F_A \cos 32^\circ$$

$$F_{Ay} + F_g = F_N$$

$$0.2mg + 0.2F_A \sin 32^\circ = F_A \cos 32^\circ$$

$$0.2mg = F_A \cos 32^\circ - 0.2F_A \sin 32^\circ$$

$$0.2(27)(9.8) = F_A (\cos 32^\circ - 0.2 \sin 32^\circ)$$

$$F_A = 71.3 \text{ N}$$

$$W_A = (71.3 \text{ N}) (9.2) \cos 32^\circ$$

$$W_A = 556.4 \text{ J}$$

$$b) \quad a=0 \quad \Delta K=0$$

$$\text{so } W_f = -W_A = -556.4 \text{ J}$$

$$\Delta E_{th} = +556.4 \text{ J}$$