

$$\mu = 0.25$$

$$F_g = mg = 176.4 \text{ N}$$

$$d = 15 \text{ m}$$

vert

$$F_{\text{NET}} = 0$$

$$F_N + F_a \sin 30 - F_g = 0$$

$$F_N = F_g - F_a \sin 30$$

$$F_N = 153.9 \text{ N}$$

hor

$$F_{\text{NET}} = ma$$

$$F_a \cos 30 - F_f = ma$$

$$a = \frac{0.49}{18}$$

$$a = 2.7 \times 10^{-2} \text{ m/s}^2$$

$$F_f = \mu F_N$$

$$= 0.25 (153.9)$$

$$F_f = \del{38.5} \text{ N } 38.48 \text{ N}$$

a) $W_c = F \cdot d = Fd \cos \theta$
 $= (45)(15) \cos 30^\circ$
 $W_c = 585 \text{ J}$

b) $W_f = F \cdot d = Fd \cos \theta$
 $= (38.5)(15) \cos 180^\circ$
 $W_f = -578 \text{ J}$

c) $W_T = W_c + W_f$
 $= 585 + (-578)$
 $W_T = 7 \text{ J}$

d) ~~$W = F \cdot d = Fd \cos \theta$~~
 ~~$7 = F_{\text{NET}} (15) \cos 0^\circ$~~
 ~~$F_{\text{NET}} = \dots$~~

$$\Delta E_k = 7 \text{ J}$$

$$E_k = \frac{mv^2}{2}$$

$$v^2 = \frac{2E_k}{m} = \frac{2(7)}{18}$$

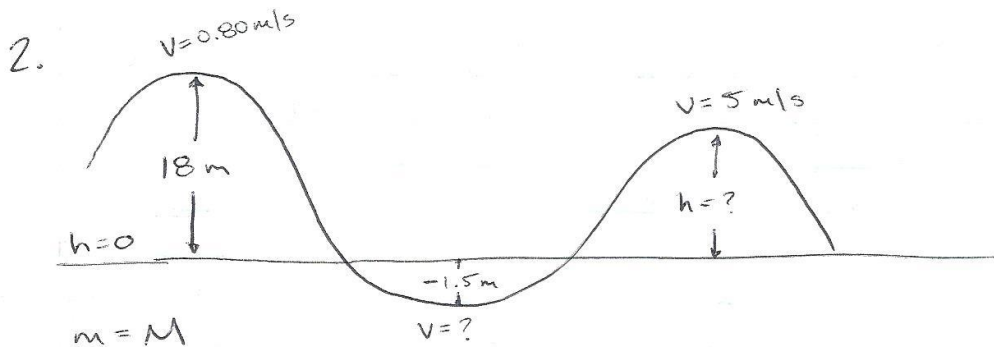
$$v = 0.88 \text{ m/s}$$

$$W = \Delta E$$

all work done was in
the horizontal ($\Delta E_g = 0$)

$$\Delta E_k = E_{kf} - E_{ki}$$

$$E_{ki} = 0 \text{ (from rest)}$$



Hill 1

$$E_g = mgh$$

$$= M(9.8)(18)$$

$$E_g = 176.4 M$$

$$E_k = \frac{mv^2}{2}$$

$$= M\left(\frac{1}{2}\right)(0.80)^2$$

$$E_k = 0.32 M$$

$$E_T = E_g + E_k$$

$$= 176.4 M + 0.32 M$$

$$E_T = 176.72 M$$

Hill 2

$$E_g = mgh$$

$$= M(9.8)(-1.5)$$

$$E_g = -14.7 M$$

$$E_k = E_T - E_g$$

$$= 176.72 M - (-14.7 M)$$

$$E_k = 191.42 M$$

$$E_k = \frac{mv^2}{2}$$

$$v^2 = \frac{2E_k}{m} = 2(191.42)$$

$$v = 19.6 \text{ m/s}$$

Hill 3

$$E_k = \frac{mv^2}{2}$$

$$= M\left(\frac{1}{2}\right)(5)^2$$

$$E_k = 12.5 M$$

$$E_g = E_T - E_k$$

$$= 176.72 M - 12.5 M$$

$$E_g = 164.22 M$$

$$E_g = mgh$$

$$h = \frac{E_g}{mg}$$

$$h = 16.8 \text{ m}$$