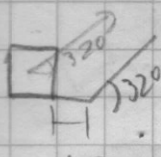
HW: W = U pt 2.

1) 

$m = 13\,kg$ $T = 60\,N$ $d = 7.5\,m$

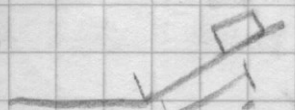
1. $\sum F_x = T_x = T\cos 32^\circ = 60 \cdot .8828\,N \cdot 7.5m = \boxed{381.6\,J}$

$\sum F_y = 0$

2. $W = \Delta K = K_f - K_i$ $\quad 381.6\,J = K_f - K_i$ $\quad K_f = 381.6$

$\frac{1}{2}mv^2 = 381.6$ $\quad v = \sqrt{2\frac{381.6}{m}}$

$v = 7.6623\,m/s$

3. 

$f_k = N\mu_k = -mg\cos 32 \cdot 0.31 = 33.4928$

$f_k \cdot d = 33.49 \cdot 4.5 = \boxed{150\,J}$

4. $W_g \rightarrow W_{g_y} = 0$ $\quad W_{g_x} = -(mg\sin 32^\circ) \cdot 4.5 = \boxed{-303.8\,J}$

5. $\Delta K = \Delta U_g$ $\quad 381.6 = mg_1h = 13(9.8)h$

$h = 2.9984m$

$\sin 32^\circ = \frac{2.9984}{x}$ $\quad x = \frac{2.9984}{\sin 32^\circ} \approx 5.66$

2)

1. $E_0 = \frac{1}{2}m_0v^2 - G\frac{m_e m_s}{r_e}$ $\quad \frac{1}{2}v^2 = G\frac{m_e}{r}$ $\quad r = 2G\frac{m_e}{v^2}$

$E = -G\frac{m_e m_s}{r_f}$

$\Rightarrow 2G\frac{m_e}{r_f} = 2G\frac{m_e}{r_e}\cdot v^2$ $\quad r_f = \frac{2Gm_e r_e}{2Gm_e - r_e v^2} = \boxed{5.45 \times 10^{\ldots}}$

2. $v_0 = 11068\,m/s$

$E_0 = \frac{1}{2}m_s v_0^2 - G\frac{m_e m_s}{r_e}$ $\quad \frac{1}{2}m_s v_0^2 - G\frac{m_e m_s}{r_e} = \frac{1}{2}m_s v_f^2 - G\frac{m_e m_s}{d - r_e}$

$E_f = \frac{1}{2}m_s v_f^2 - G\frac{m_e m_s}{d - r_e} - G\frac{m_m m_s}{r_m}$ $\quad v_f = \sqrt{v_0^2 + 2G\left(\frac{m_e}{d - r_e} + \frac{m_m}{r_m} - \frac{m_e}{r_e}\right)}$

$v_f \approx 22.87.45\,m/s$