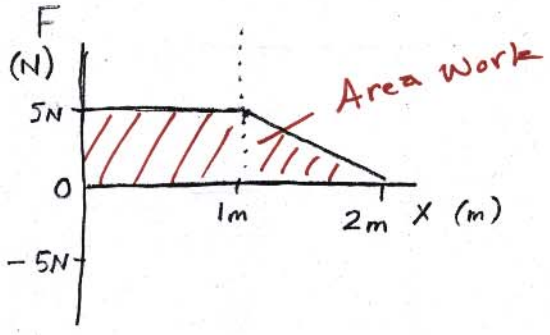
AP1 Energy Graphs

1) 

a) How much work is done by the force over 2m?

Area
7.5J

b) During what positions is the force changing?

1m to 2m

c) What is the F_{avg} from x=0 to x=1m?

$F_{avg} = 5N$

d) What is the F_{avg} from x=1m to x=2m?

$F_{avg} = 2.5N$

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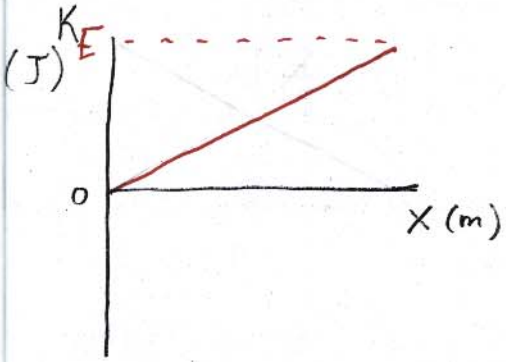
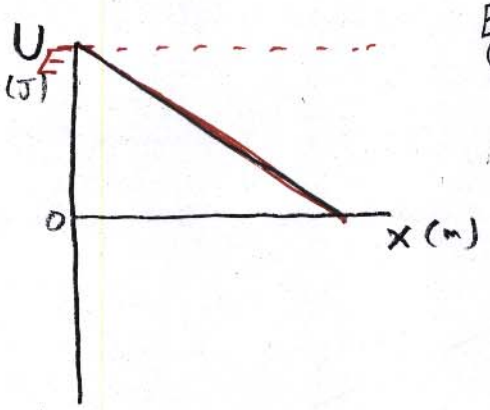
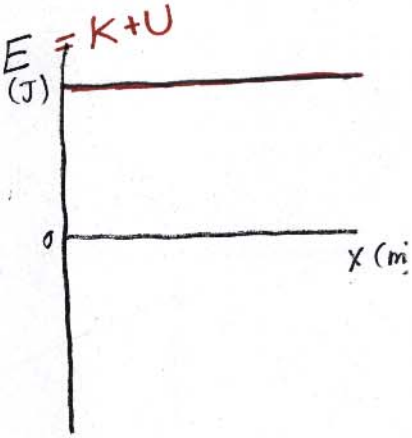
2) Graph a ball dropped from rest w/o air resistance in respect to position.







a) Write a function for the K vs. X and U vs. X graphs.

$v = \sqrt{2gh}$ $K = \frac{1}{2}mv^2 = \frac{1}{2}m\left(\sqrt{2gh}\right)^2 = \frac{1}{2}m2gh = mgh$

intercept

$U = E_0 - mgh$

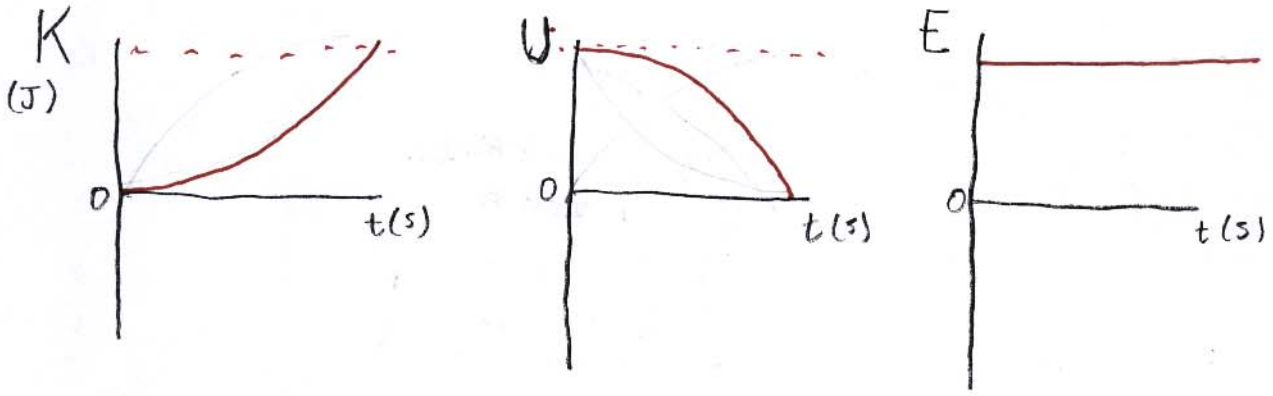
b) What does the slope of these equations represent?

Force of gravity (mg)

$E = mgh$

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

3. Graph a ball dropped in respect to time!



a) Write a function for the K vs. t and U vs. t graph.

$K = \frac{1}{2}mv^2$

$K = \frac{1}{2}m(-gt)^2$

$K = \frac{1}{2}mg^2t^2$ ← quadratic

$v = v_0 - gt$

$U = mgh = mg\frac{1}{2}gt^2$

$U = \frac{1}{2}mg^2t^2$

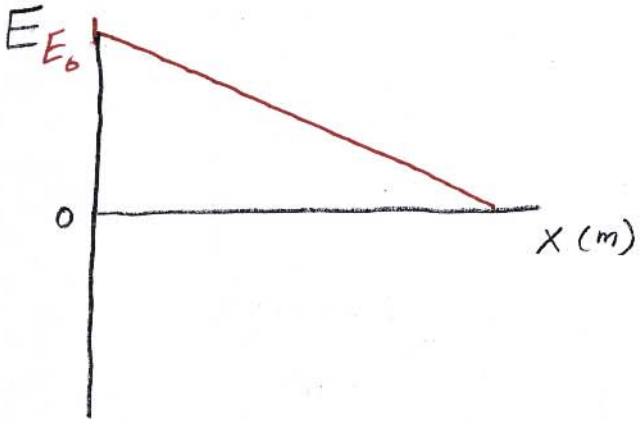
$h = \frac{1}{2}gt^2$

$U = E_0 - \frac{1}{2}mg^2t^2$

4.

heat loss so $E_0 \neq E$

Graph the sled's energy in respect to distance.



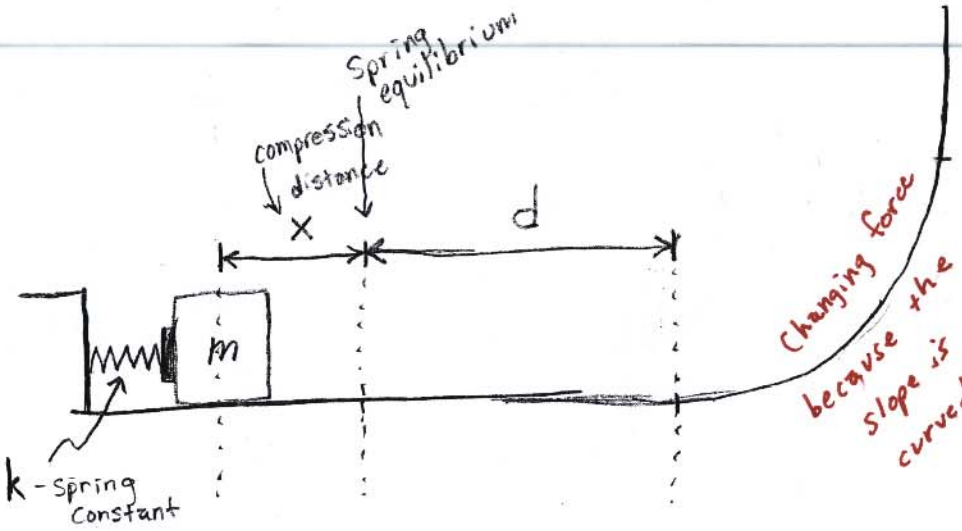
a) Write a function for the energy graph.

$K_0 + U_0 + W = K + U$

$K_0 - W_f = 0$

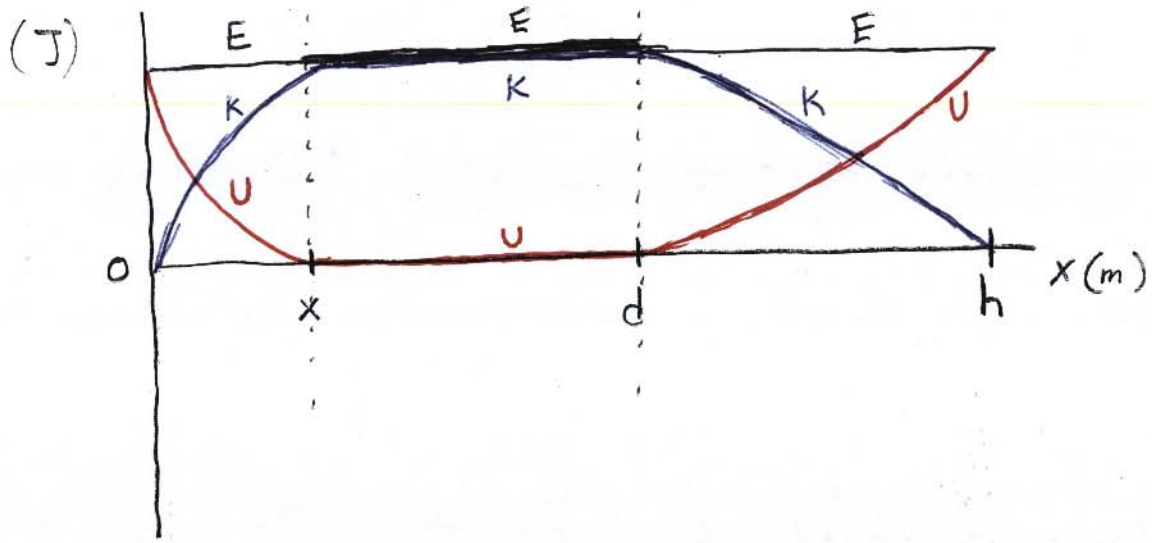
$K_0 = E_0 = F_f \cdot d$

$K = E_0 - \mu mgd$



All (Frictionless)

Graph the energy in respect to position. Draw a line for E, U, K



— U
— K
— E

a) Derive an expression for the max height in terms of given quantities and constants.

$K_f + U_0 = K + U$

$\frac{1}{2}kx^2 = mgh$

$$h = \frac{kx^2}{2mg}$$