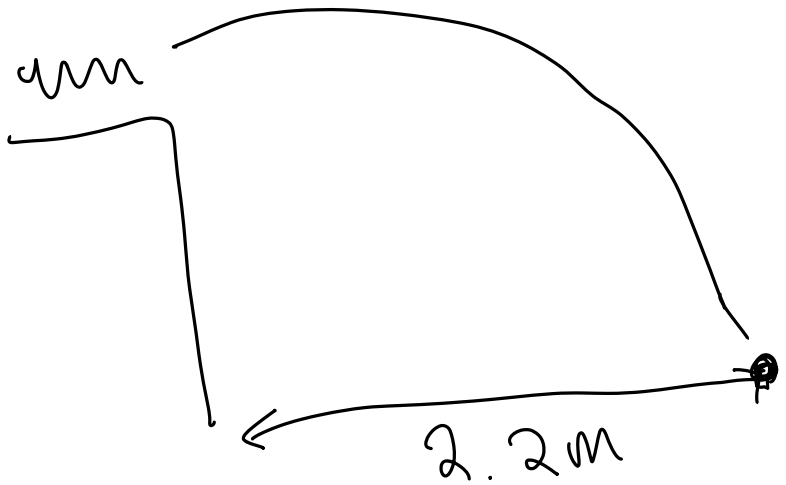
9)



Target is 2.2m away so assuming $y_0 = 0$

$x = .011m$ $\quad U_g = mgh$

$U_s = \frac{1}{2} k x^2$ $\quad$ = Energy from spring

lands $2.2 - .27m$ away

$= 1.93m = \Delta x$

@ time of release $E = \frac{1}{2}kx^2 + mgh + \frac{1}{2}mv^2$

@ time leaving spring $E = \frac{1}{2}kx^2 + mgh + \frac{1}{2}mv^2$

$\Delta E = 0$

so $\frac{1}{2}kx^2 = \frac{1}{2}mv_0^2$

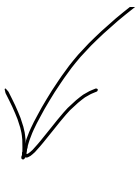
& $\Delta x = v_0 t$ (no a in x direction)

$v_0 = \sqrt{\frac{kx^2}{m}}$

constant

$\Delta x = \sqrt{\frac{kx^2}{m}}\,(t)$

$\frac{2.2}{1.93} = 1.14x$ bigger



if we made $x = 1.14x$

then $\Delta x = \sqrt{\frac{k(1.14)^2 x^2}{m}}$

$= 1.14 \sqrt{\frac{kx^2}{m}}$

$= 1.14\,(1.93)$

$= 2.2\text{m}$

So $x = 1.14\,(0.1)$

$= \underline{1.254\text{cm}}$