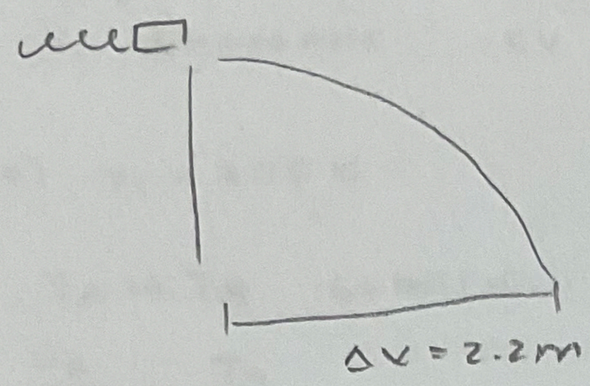
Mairin Gallagher SW 1



x = 1.1cm or 0.011 m

actual Δx = 1.93 m

ENERGY (from spring to before edge)

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

$F = -kx$

$F = -mx$

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

$v_1 = \sqrt{\frac{kx^2}{m}}$

velocity at end of table when compressed $x = 0.011\,m$

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

$v_2 = \sqrt{\frac{ks^2}{m}}$

need to compress it a distance $s = ??$

both only traveling in x-direction

so acceleration in x-direction is 0

$\Delta x = v_0 t + \frac{1}{2}at^2$

① $x = 0.011m$ $\Delta x_1 = v_1 t$

② $s = ??$ $\Delta x_2 = v_2 t$

$\frac{\Delta x_1}{\Delta x_2}$ $\begin{cases} \frac{1.93}{2.2} = \frac{\sqrt{\frac{kx^2}{m}} \cdot \not{t}}{\sqrt{\frac{ks^2}{m}} \cdot \not{t}} \end{cases}$

$0.87727 = \frac{\Delta x_1}{\Delta x_2}$

$0.87727 = \sqrt{\frac{kx^2}{m}} \cdot \sqrt{\frac{m}{ks^2}}$

$0.87727 = \sqrt{\frac{x^2}{s^2}}$

$0.87727 = \frac{x}{s}$ want s

know x = 0.011

$s = \frac{x}{0.87727}$

$s = \frac{0.011}{0.87727}$

$s = 0.0125\,m$

need to compress the spring 0.0125 meters in order to hit the center of the box.