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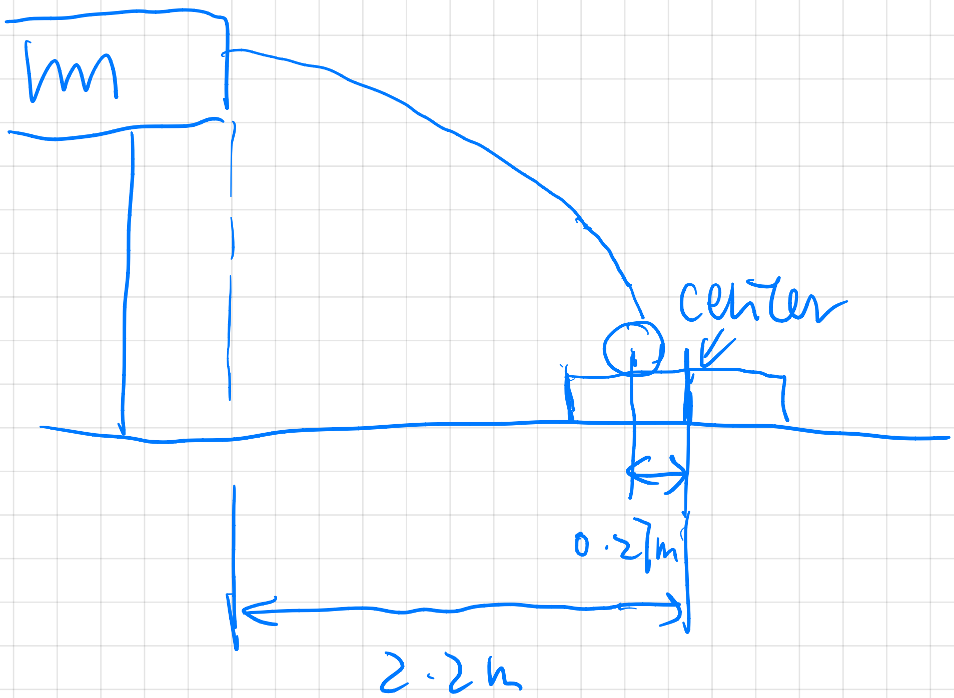
$\Delta x = 1.1cm$



$U_s = \frac{1}{2}kx^2$ $U_g = mgy$ $K = \frac{1}{2}mv^2$

$mgy = \frac{1}{2}mv^2_{virtical}$

$10y = \frac{1}{2}v^2_{virtical}$

$v^2_{vir} = 20y$

$v_{vir} = \sqrt{20y}$

$$v_t = v_0 + at$$

$$= v_0 + gt$$

$$\sqrt{2gy} = gt$$

$$t = \frac{\sqrt{2gy}}{g}$$

$$v = \frac{s}{t} = \frac{2.2 - 0.27}{\frac{\sqrt{2gy}}{10}} = \frac{1.93}{\frac{\sqrt{2gy}}{g}}$$

$$\frac{1}{2}kx^2 = \frac{1}{2}m v_{horizontal}^2$$

$$k(0.01)^2 = m \cdot \left(\frac{1.93}{\frac{\sqrt{2gy}}{g}}\right)^2$$

$$k = \frac{m \cdot \left(\frac{1.93}{\frac{\sqrt{2gy}}{10}}\right)^2}{(0.01)^2}$$

$$\frac{1}{2} k x_f^2 = \frac{1}{2} m v_f^2$$

$$v_f = \frac{s}{t} = \frac{2.2}{\frac{\sqrt{20y}}{10}}$$

$$x_f^2 = m \cdot \left(\frac{2.2}{\frac{\sqrt{20y}}{10}}\right)^2 \cdot \frac{(0.011)^2}{m \cdot \left(\frac{1.93}{\frac{\sqrt{20y}}{10}}\right)^2}$$

$$x_f = \sqrt{\frac{(2.2)^2 \times (0.011)^2}{(1.93)^2}}$$

$$= \frac{2.2 \times 0.011}{1.93}$$

$$= 0.0125 \text{ m}$$