

# Q9 Final

1) 

$$E = \frac{1}{2} k (\Delta x)^2$$

$$2.2 \text{ m} - 0.27 \text{ cm} = 1.93 \text{ m}$$

$$1.93 = v \Delta t$$

~~$$\Delta x = 1.93$$~~
~~$$v_i =$$~~
~~$$v_f =$$~~
~~$$\Delta y =$$~~
~~$$v_i = 0$$~~
~~$$v_f =$$~~

$$\frac{1}{2} k (\Delta x)^2 \quad \frac{1}{2} m v^2 \quad m g \Delta y$$

$$\frac{1}{2} k (\Delta x)^2 = \frac{1}{2} m v^2$$

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

~~$$\Delta t = \frac{\Delta x}{v}$$~~

~~$$\Delta x$$~~

$$1.1 \text{ cm} \rightarrow 1.93 \text{ m}$$

$$\Delta x = v \Delta t$$

$$2.2 \text{ m} = v_R \cdot \Delta t$$

$$1.93 \text{ m} = v_B \cdot \Delta t$$

$$2.2 \text{ m} = v_R \cdot \frac{1.93 \text{ m}}{v_B}$$

$$2.2 \text{ m} = v_R \cdot \frac{1.93}{\sqrt{\frac{k (\Delta x^2)}{m}}}$$

$$\frac{2.2}{1.93} \sqrt{\frac{k (\Delta x^2)}{m}} = v_R$$

$$\frac{2.2}{1.93} \sqrt{\frac{k (\Delta x)^2}{m}} = \sqrt{\frac{k (\Delta x_R)^2}{m}}$$

$$\left(\frac{2.2}{1.93}\right)^2 \frac{k (\Delta x)^2}{m} = \frac{k (\Delta x_R)^2}{m}$$

$$\left(\frac{2.2}{1.93}\right)^2 (\Delta x)^2 = (\Delta x_R)^2$$

$$\left(\frac{2.2}{1.93}\right)^2 (\Delta x)^2 = \Delta x_R^2$$

$$\boxed{\Delta x_R = 1.25 \text{ cm}}$$