Joseph Suter #2 Xihe Han

time to fall is same both cases

$U_{spring} = \frac{1}{2} k x_s^2$ $\quad v = \frac{\Delta x}{t}$

$KE_x = \frac{1}{2} m v^2$

$\frac{1}{2} k x_{s1}^2 = \frac{1}{2} m v_1^2$

$k x_{s1}^2 = m \frac{\Delta x_1^2}{t^2}$

$t = \sqrt{\frac{k x_{s1}^2}{m \Delta x_1^2}}$

$\sqrt{\frac{k x_{s1}^2}{m \Delta x_1^2}} = \sqrt{\frac{k x_{s2}^2}{m \Delta x_2^2}}$

$\frac{x_{s1}}{\Delta x_1} = \frac{x_{s2}}{\Delta x_2}$

$x_{s2} = \frac{\Delta x_2 \cdot x_{s1}}{\Delta x_1} = \frac{2.2 \cdot 0.011}{(2.2 - 0.27)} = 0.0125 \text{ m}$

The spring should be compressed 1.25 cm.