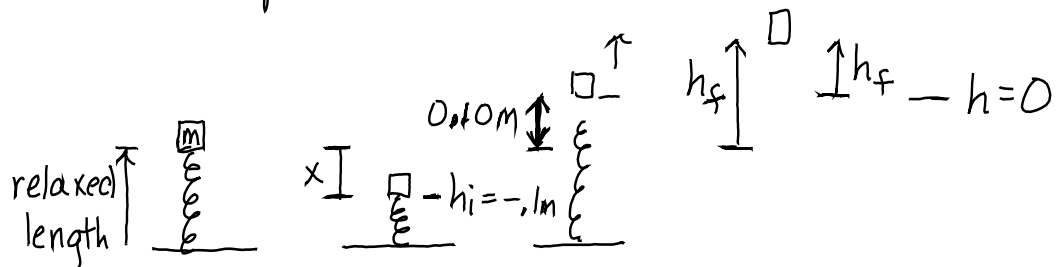


## Chapter 5 Review - Work and energy

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A 0.250 kg block on a vertical spring with a spring constant of 5000 N/m is pushed downward, compressing the spring 0.100 m. When released, the block leaves the spring and travels upward vertically. How high does it rise above the point of release?



$$\begin{aligned} m &= 0.25 \text{ kg} \\ x &= 0.1 \text{ m} \\ h_i &= -0.1 \text{ m} \\ h_f &= ? \end{aligned}$$

$$\begin{aligned} v_i &= 0 \frac{\text{m}}{\text{s}} \\ v_f &= 0 \frac{\text{m}}{\text{s}} \end{aligned}$$

$$ME_i = ME_f$$

$$\begin{aligned} &\downarrow \\ PE_{gi} + PE_{ei} &= PE_{gf} \\ &\downarrow \quad \downarrow \quad \downarrow \\ \frac{mgh_i}{mg} + \frac{\frac{1}{2}kx^2}{mg} &= \frac{mgh_f}{mg} \end{aligned}$$

$$h_i + \frac{kx^2}{2mg} = h_f$$

$$h_f = -0.1 \text{ m} + \frac{(5000 \frac{\text{N}}{\text{m}})(0.1 \text{ m})^2}{2(0.25 \text{ kg})(9.81 \frac{\text{m}}{\text{s}^2})}$$

$$\boxed{h_f = 10.2 \text{ m}}$$