1) $KE = \frac{1}{2}mv^2$ $\quad PE = mgh$ $\quad E = \frac{1}{2}mv^2 + mgh$ conserved.

initial: $v_0 = 5\ m/s$

$h_0 = 0$

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final: $v_2 = 0$

$h_2 = ?$ ← want

$$\frac{1}{2}mv_0^2 + mgh_0 = \frac{1}{2}mv_2^2 + mgh_2$$

$$\frac{1}{2}mv_0^2 = mgh_2 \rightarrow \boxed{v_0^2 = 2gh_2}$$

$$5^2 = 2(9.8)h_2$$

$$h_2 = \frac{5^2}{2(9.8)} = 1.27551$$

$$\simeq \boxed{1.28\ m}$$

2) Given: $m = 2\ kg$

$k = 5447\ N/m$

$\Delta x = L = 0.1\ m$

Want: $h_f = h_{final}$

$E_i = \frac{1}{2}kx^2$ (PE in springs)

$E_f = mgh$ (gravitational PE)

$$\frac{1}{2}kL^2 = mgh_f \rightarrow h_f = \frac{kL^2}{2mg} =$$

$$= \frac{(5447)(.1)^2}{(2)(2)(9.8)} = 1.3895\ m \simeq \boxed{1.39m}$$

$$\frac{1}{2}mv_1^2 + mgh_1 = \frac{1}{2}mv_2^2 + mgh_2$$

v_1: .14 m/s ; h_1: 2.2 m ; v_2: zero ; h_2: ?

$$\frac{v_1^2}{2} + gh_1 = gh_2$$

$$h_2 = h_1 + \frac{v_1^2}{2g} = 2.2 + \frac{(.14)^2}{2(9.8)}$$

$$\boxed{h_2 = 2.201 \text{ m}}$$