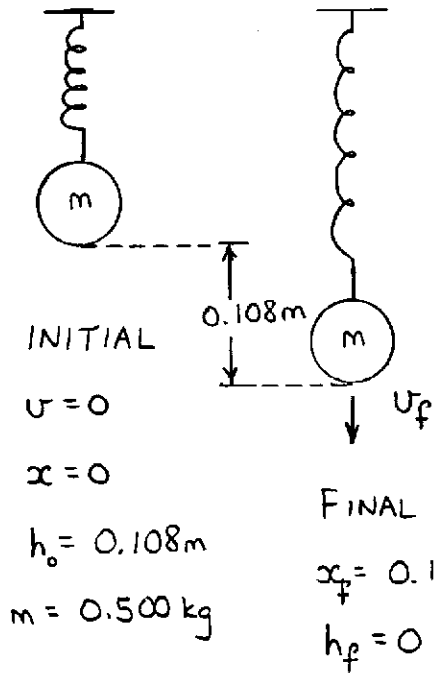


C3.



(a) Mechanical Energy is Conserved.

$$E_f = E_0$$

$$KE_f + PE_{\text{elas}_f} + PE_{\text{grav}_f}$$

$$= KE_0 + PE_{\text{elas}_0} + PE_{\text{grav}_0}$$

$$\frac{1}{2} m v_f^2 + \frac{1}{2} k x_f^2 + 0$$

$$= 0 + 0 + m g h_0$$

$$m v_f^2 + k x_f^2 = 2 m g h_0$$

$$k x_f^2 = m (2 g h_0 - v_f^2)$$

$$k = \frac{m(2gh_0 - v_f^2)}{x_f^2} = \frac{(0.500 \text{ kg}) [2(9.80 \text{ m/s}^2)(0.108 \text{ m}) - (1.30 \text{ m/s})^2]}{(0.108 \text{ m})^2}$$

$$k = 18.3 \text{ N/m}$$

(b)  $\omega = \sqrt{\frac{k}{m}}$  and  $\omega = \frac{2\pi}{T}$ .

$$\therefore T = \frac{2\pi}{\omega} = 2\pi \sqrt{\frac{m}{k}} = 2\pi \sqrt{\frac{0.500 \text{ kg}}{18.3 \text{ N/m}}}$$

$$T = 1.04 \text{ s}$$