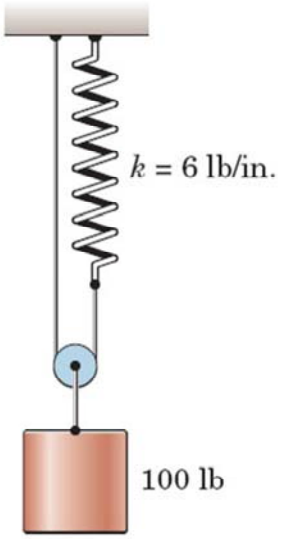
Work-Energy: Exercise 2



The system is released from rest with the spring initially ***stretched 3 in***.

Determine the ***velocity v*** of the cylinder after it has ***dropped 0.5 in***.

3/154 For the system, $T_1 + V_1 + U'_{1-2} = T_2 + V_2$

$\frac{1}{2}mv_1^{2\to 0} + \frac{1}{2}kx_1^2 + 0 = \frac{1}{2}mv^2 + \frac{1}{2}kx_2^2 - mgh$,

where the datum is the initial position and h is the drop distance. Note that the spring deflection runs at twice that of the cylinder. Numbers:

$$\tfrac{1}{2}6(12)\left[\tfrac{3}{12}\right]^2 = \tfrac{1}{2}\tfrac{100}{32.2}v^2 + \tfrac{1}{2}6(12)\left[\tfrac{3+2(\frac{1}{2})}{12}\right]^2 - 100\left(\tfrac{1/2}{12}\right)$$

$$v = 1.248 \text{ ft/sec}$$