21-P-WE-AG-034

Two springs are hanging from the ceiling. Each has a spring constant of *k* N/m and an unstretched length of *l*. A *m* kg block is attached to the springs in their current position. Then, the block is let go and it begins to fall. How far will the springs stretch to hold the block up? Neglect the mass of the springs and consider the steady state.

ANSWER:

First, we write down the equation for conservation of energy.

$$mgh_1 + 2 \cdot \frac{1}{2} k s_1^2 = mgh_2 + 2 \cdot \frac{1}{2} k s_2^2$$

Then, we input all the variables we know and rearrange to solve for the extra length.

$$0 + 0 = -mgx + kx^2$$

$$kx^2 = mgx$$

$$kx = mg$$

$$x = \frac{mg}{k}$$