Answer on Question #42205

Physics – Mechanics | Kinematics | Dynamics

Question:

The 200g mass is replaced with 100g mass. What is the new length of the spring?

Solution:

The Hook's law for a spring is

$$F = k\Delta x.$$

In our case extension of a spring is caused by gravity. So, if $m_1 = 200\ g$, the initial length of a spring can be determined by the following procedure:

$$k\Delta x_1 = m_1 g \Rightarrow \Delta x_1 = \frac{m_1 g}{k}.$$

The same for the second mass $m_2 = 100\ g$:

$$\Delta x_2 = \frac{m_2 g}{k}.$$

So, one conclude that

$$\frac{\Delta x_2}{\Delta x_1} = \frac{m_2 g/k}{m_1 g/k} = \frac{m_2}{m_1} = 0.5.$$

Answer:

The length of a spring is a half of the initial length.