Answer on Question #64616-Physics-Classical Mechanics

A spiral spring produces an extension of 0.05m when a load of 500g was hung from it. Calculate the extension that will be produced if the load is increased to 800g assuming Hooke's law is obeyed.

Solution

From the Hooke's law in the first case:

$$F_1 = kx_1.$$

From the Hooke's law in the second case:

$$F_2 = kx_2.$$

For the equilibrium:

$$F_1 = m_1 g,$$

$$F_2 = m_2 g.$$

Thus,

$$\frac{x_2}{x_1} = \frac{m_2}{m_1}.$$

The extension that will be produced if the load is increased to 800g is

$$x_2 = \frac{m_2}{m_1} x_1 = \frac{800}{500} 0.05 = 0.08\ m.$$

Answer: $0.08\ m$.