

Answer on Question #57823 - Physics - Mechanics

Task.

A 4kg block extends a spring by 16cm. The block is removed and the body of mass 0.5kg is hung from the same spring. If the body is then pulled slightly downwards and released find the period of resulting oscillatory motion.

Solution.

Period of oscillatory motion can be found as $T = 2\pi\sqrt{\frac{m}{k}}$, where m – is mass of a body, that is hung on spring, k – Hooke's constant.

From first part of problem we can get Newton's third law equation: $m_0g = kx$, where x – spring extension, m_0 - mass of initial body, g – free fall acceleration (assume $g=10 \text{ m/s}^2$), k – Hooke's constant. From there

$$k = \frac{m_0g}{x}$$

And then we should put k into initial formula:

$$T = 2\pi\sqrt{\frac{mx}{m_0g}}$$

Result.

$$T = 2\pi\sqrt{\frac{mx}{m_0g}} = 2 \cdot 3.14 \cdot \sqrt{\frac{0.5 \cdot 0.16}{4 \cdot 10}} = 0.28 \text{ s}$$