Answer on Question #41998, Physics, Other

A pendulum takes 3 minutes to complete 350 swings. What is the length of the pendulum?

Solution:

Given:

$t = 3\,\text{min} = 180\,\text{s}$,

$N = 350\,\text{swings}$,

$L = ?$

A simple pendulum is one which can be considered to be a point mass suspended from a string or rod of negligible mass. For small amplitudes, the period (amount of time it takes for the pendulum to complete one swing) of such a pendulum can be approximated by:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

where L is pendulum length and g = 9.81 m/s^2 is acceleration of gravity

From given data we have that

$$T = \frac{t}{N}$$

Thus,

$$2\pi\sqrt{\frac{L}{g}} = \frac{t}{N}$$

$$L = g\left(\frac{t}{2\pi N}\right)^2$$

$$L = 9.81 \cdot \left(\frac{180}{2 \cdot 3.14159 \cdot 350}\right)^2 = 0.0657 \approx 0.066\,\text{m}$$

Answer. $L = 0.066\,\text{m} = 6.6\,\text{cm}.$