

Answer on Question #70677 Physics / Other

A simple pendulum in a certain planet is found to vibrate $N = 50$ times in $t_1 = 100$ s. find its period, its frequency. When $d = 1.5$ m of its length is cut, it vibrates 50 times on $t_2 = 50$ s. find the original length of the pendulum.

Solution:

The period of vibrations

$$T_1 = \frac{t_1}{N} = \frac{100}{50} = 2 \text{ s}, \quad T_2 = \frac{t_2}{N} = \frac{50}{50} = 1 \text{ s}$$

The frequency

$$f = \frac{1}{T} = 0.5 \text{ Hz}$$

Let l is the original length of the pendulum

$$T_1 = 2\pi \sqrt{\frac{l}{g}} = 2 \text{ s}$$

$$T_2 = 2\pi \sqrt{\frac{l-d}{g}} = 1 \text{ s}$$

$$\frac{T_1}{T_2} = \sqrt{\frac{l}{l-d}} = 2, \quad l = 4(l-d), \quad l = \frac{4}{3}d = 2 \text{ m}$$

Answers: 2s, 0.5 Hz, 2 m.

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