

A pendulum has a period of 1.8 s. The original pendulum is taken to a planet where  $g = 16 \text{ m/s}^2$ . What is its period on that planet?

The period of a pendulum can be approximated by:

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

where  $L$  is the length of the pendulum and  $g$  is the local acceleration of gravity.

On the Earth  $g = g_0 = 9.8 \frac{\text{m}}{\text{s}^2}$ , therefore period equals:

$$T_0 = 2\pi \sqrt{\frac{L}{g_0}}$$

And on the planet where  $g = 16 \frac{\text{m}}{\text{s}^2}$ :

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

Therefore:

$$\frac{T}{T_0} = \sqrt{\frac{g_0}{g}}$$

$$T = T_0 \sqrt{\frac{g_0}{g}} = 1.8 \text{ s} \sqrt{\frac{9.8}{16}} \cong 1.4 \text{ s}$$

Answer: 1.4 s