

A simple pendulum is being used to determine the value of gravitational acceleration g at a certain place. The length of the pendulum is 25.0cm and a stopwatch with 1s resolution measures the time taken for 40 oscillation to be 50s. The accuracy in g is:

A 2.40%

B 3.40%

C 5.40%

D 4.40%

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

$$\text{so, } \frac{\Delta T}{T} = \frac{1}{2} \left(\frac{\Delta l}{l} + \frac{\Delta g}{g} \right)$$

$$\text{Givn } \Delta T = 1 \text{ sec } T = 50 \text{ sec}$$

$$\Delta l = 0.1 \text{ cm}$$

$$l = 25 \text{ cm}$$

$$\frac{\Delta g}{g} = \frac{2\Delta T}{T} + \frac{\Delta l}{l}$$

$$\frac{\Delta g}{g} = 2 \times \frac{1}{50} + \frac{0.1}{25} = \frac{1.1}{25}$$

$$\frac{\Delta g}{g} = \frac{1.1}{25}$$

$$\% \frac{\Delta g}{g} = \frac{1.1}{25} \times 100 = 4.4\%$$