Answer on Question 58907, Physics, Other

Question:

A student measures the time period of 100 oscillations of a simple pendulum four times. The data set is $90\ s$, $91\ s$, $95\ s$ and $92\ s$. If the minimum division in the measuring clock is $1\ s$, then the reported mean time should be?

Solution:

Let's first find the mean value of time:

$$t_{mean} = \frac{t_1 + t_2 + t_3 + t_4}{4} = \frac{90\ s + 91\ s + 95\ s + 92\ s}{4} = \frac{368\ s}{4} = 92\ s.$$

Then, we can find the absolute error for each measurement:

$$\Delta t_1 = |t_{mean} - t_1| = |92\ s - 90\ s| = 2\ s,$$

$$\Delta t_2 = |t_{mean} - t_2| = |92\ s - 91\ s| = 1\ s,$$

$$\Delta t_3 = |t_{mean} - t_3| = |92\ s - 95\ s| = 3\ s,$$

$$\Delta t_4 = |t_{mean} - t_4| = |92\ s - 92\ s| = 0\ s.$$

Let's calculate the mean absolute error:

$$\Delta t_{mean} = \frac{\Delta t_1 + \Delta t_2 + \Delta t_3 + \Delta t_4}{4} = \frac{2\ s + 1\ s + 3\ s + 0\ s}{4} = \frac{6\ s}{4} = 1.5\ s \approx 2\ s.$$

Therefore, the reported mean time should be $92 \pm 2\ s$.

Answer:

The reported mean time should be $92 \pm 2\ s$.