



Physics. *You work it out.*

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Essential Pre-Uni Physics E1.4

A Level

P

P

P

Quantity being measured	Absolute uncertainty	Heading of column in results table (with units)	Number of decimal places for measured values
A time where you are manually operating a stopwatch that reads to the nearest hundredth of a second.	(a)	(b)	(c)

Part A Absolute uncertainty

a) What is the absolute uncertainty in the time?

- ☐ $\pm 0.1\text{ s}$
- ☐ $\pm 1\text{ s}$
- ☐ $\pm 0.1\text{ ms}$

Part B Column heading

b) What is the heading of the column in the results table?

- ☐ Time / s
- ☐ Weight / kg
- ☐ Length / m

Part C Decimal places

c) What is the number of decimal places for the measured values?

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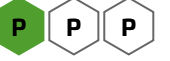


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Essential Pre-Uni Physics E1.5

A Level



You measure the time taken for a pendulum to complete 20 full swings, using an electronic timer accurate to the nearest 0.1 s. You then divide your answer by 20 to get the time for just 1 swing. What is the absolute uncertainty on your value for just 1 swing?

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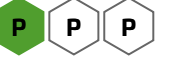


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Essential Pre-Uni Physics E1.9

A Level



If you measured a resistance using an ohmmeter and obtained the following results, what would you do next? Give a value for the absolute uncertainty and the average that you would use for this set of results: $10.5\ \Omega$, $10.3\ \Omega$, $10.9\ \Omega$, $14.7\ \Omega$, $10.6\ \Omega$.

- ☐ Repeat the anomalous $14.7\ \Omega$ reading. Absolute uncertainty = $0.3\ \Omega$. Average reading = $10.6\ \Omega$
- ☐ Repeat the whole experiment. Absolute uncertainty = $0.2\ \Omega$. Average reading = $10.5\ \Omega$
- ☐ Repeat the anomalous $14.7\ \Omega$ reading. Absolute uncertainty = $0.2\ \Omega$. Average reading = $10.5\ \Omega$
- ☐ Repeat the whole experiment. Absolute uncertainty = $0.3\ \Omega$. Average reading = $10.6\ \Omega$

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Essential Pre-Uni Physics E2.6



Your answer will be marked incorrect for an inappropriate number of significant figures (e.g. giving an uncertainty to 3 significant figures, or giving a measurement to 2 decimal places if the uncertainty is ± 0.1 would be inappropriate).

Please make sure that the unit of absolute uncertainty is clear - so $20.34 \text{ mA} \pm 20 \mu\text{A}$ or $(20.34 \pm 0.02) \text{ mA}$ are both appropriate, but $20.34 \text{ mA} \pm 20$ would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of $\pm 0.5 \text{ mm}$ not $\pm 1 \text{ mm}$.

An experiment is conducted to find the acceleration of a dropped object (which should be 9.81 m s^{-2}). The measurement obtained is $9.62 \text{ m s}^{-2} \pm 1.5 \%$. Is the experiment accurate?

☐ Yes

☐ No

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Essential Pre-Uni Physics E3.1



You will be penalized for an inappropriate number of significant figures (e.g. giving an uncertainty to 3 significant figures, or giving a measurement to 2 decimal places if the uncertainty is ± 0.1).

Please make sure that the unit of absolute uncertainties is clear - so $20.34 \text{ mA} \pm 20 \mu\text{A}$ or $(20.34 \pm 0.02) \text{ mA}$ are both appropriate, but $20.34 \text{ mA} \pm 20$ would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of $\pm 0.5 \text{ mm}$ not $\pm 1 \text{ mm}$.

Calculate the relative uncertainty, in percent, of a resistance which is worked out from a voltage known to 3 % and a current known to 7 %. (Equation: $R = \frac{V}{I}$)

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Essential Pre-Uni Physics E3.3



You will be penalized for an inappropriate number of significant figures (e.g. giving an uncertainty to 3 significant figures, or giving a measurement to 2 decimal places if the uncertainty is ± 0.1).

Please make sure that the unit of absolute uncertainties is clear - so $20.34 \text{ mA} \pm 20 \mu\text{A}$ or $(20.34 \pm 0.02) \text{ mA}$ are both appropriate, but $20.34 \text{ mA} \pm 20$ would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of $\pm 0.5 \text{ mm}$ not $\pm 1 \text{ mm}$.

Calculate the relative uncertainty, in percent, of the density of a cuboid block of iron whose lengths are known to 2 % and whose mass is known to 0.1 %. (Equation: $\text{density} = \frac{\text{mass}}{\text{volume}}$)

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Essential Pre-Uni Physics E3.4



You will be penalized for an inappropriate number of significant figures (e.g. giving an uncertainty to 3 significant figures, or giving a measurement to 2 decimal places if the uncertainty is ± 0.1).

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Calculate the relative uncertainty, in percent, of the time taken for a marble to fall by a distance known to 4 %.
(Equation: distance = $\frac{1}{2}gt^2$)

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