

# Essential Pre-Uni Physics E1.4



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 <b>manually</b> 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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# 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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## 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 E2.1

A Level



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  $\pm 0.1$  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  $\pm 1 \text{ mm}$ .

Calculate the relative uncertainty, in percent, of:

## Part A Length

a) A length of  $50.4 \text{ cm}$  measured using a metre rule to  $\pm 0.5 \text{ mm}$ .

## Part B Current

b) A current of  $240 \text{ mA}$  measured to the nearest milliamp.

## Part C Time

c) A time of  $0.62 \text{ s}$  measured using a stopwatch to the nearest  $0.01 \text{ s}$ .

## Part D    Angle

d) An angle of  $43^\circ$  measured to the nearest degree with a protractor.

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## Part E    Time

e) A time of 4 minutes 32 seconds measured to the nearest second.

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## Essential Pre-Uni Physics E2.6

A Level



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  $\pm 0.1$  would be inappropriate).

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An experiment is conducted to find the acceleration of a dropped object (which should be  $9.81 \text{ m s}^{-2}$ ). 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  $\pm 0.1$ ).

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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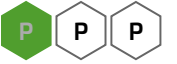


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# Essential Pre-Uni Physics E3.3

A Level



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  $\pm 0.1$ ).

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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  $\pm 0.1$ ).  
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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:  $\text{distance} = \frac{1}{2}gt^2$ )

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# Essential Pre-Uni Physics E3.5



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  $\pm 0.1$ ).

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 resistivity of a constantan wire if the resistance is known to 8 %, the diameter to 2 % and the length to 5 %. (Equation:  $\text{resistivity} = \frac{RA}{L}$ , where  $A$  is the cross sectional area.)

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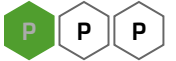


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## Essential Pre-Uni Physics E4.6

A Level



You obtain the following results for the time period of a pendulum:  $(561, 563, 569, 562, 565) \text{ ns}$ . None of these results are anomalous. You are then told that the accepted value is  $560.5 \text{ ns}$ . Does this lie within your error bars?

☐ Yes

☐ No

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