

Part C

**Decimal places** 

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

Quantity being measured

Gameboard Physics Skills Uncertainties Essential Pre-Uni Physics E1.4

## Essential Pre-Uni Physics E1.4



Number of decimal places for

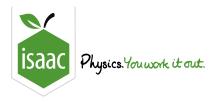
measured values

A time where you are <b>manually</b> operating a stopwatch that reads to the nearest hundredth of a second.	(a)	(b)	(c)
art A Absolute uncertainty			
a) What is the absolute uncertainty in the time?			
$\bigcirc$ ±0.1 s			
$\bigcirc$ ±1s			
$\bigcirc$ $\pm 0.1\mathrm{ms}$			
art B Column heading			
Part B Column heading  b) What is the heading of the column in the results table?			
b) What is the heading of the column in the results table?			

**Absolute** 

uncertainty

Heading of column in results table (with units)



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### Essential Pre-Uni Physics E1.5



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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**STEM SMART Physics 37 - Uncertainties** 



Gameboard Physics Skills Uncertainties Essential Pre-Uni Physics E1.9

# Essential Pre-Uni Physics E1.9



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 you would use for this set of results: $10.5\Omega$ , $10.3\Omega$ , $10.9\Omega$ , $14.7\Omega$ , $10.6\Omega$ .	ge that
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 $=10.6\Omega$	

Gameboard:

**STEM SMART Physics 37 - Uncertainties** 



Gameboard Physics Skills Uncertainties Essential Pre-Uni Physics E2.6

### 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  $\pm\ 0.1$  would be inappropriate).

Please make sure that the unit of absolute uncertainty is clear - so  $20.34\,\mathrm{mA} \pm 20\,\mu\mathrm{A}$  or  $(20.34\pm0.02)\,\mathrm{mA}$  are both appropriate, but  $20.34\,\mathrm{mA} \pm 20$  would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of  $\pm~0.5\,\mathrm{mm}$  not  $\pm~1\,\mathrm{mm}$ .

An experiment is conducted to find the acceleration of a dropped object (which should be $9.81\mathrm{ms^{-2}}$ ). The measurement obtained is $9.62\mathrm{ms^{-2}}\pm1.5\%$ . Is the experiment
accurate?
Yes
○ No

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Gameboard Physics Skills Uncertainties Essential Pre-Uni Physics E3.1

### 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  $20.34\,\mathrm{mA} \pm 20\,\mu\mathrm{A}$  or  $(20.34\pm0.02)\,\mathrm{mA}$  are both appropriate, but  $20.34\,\mathrm{mA} \pm 20$  would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of  $\pm~0.5\,\mathrm{mm}$  not  $\pm~1\,\mathrm{mm}$ .

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  $\pm$  0.1).

Please make sure that the unit of absolute uncertainties is clear - so  $20.34\,\mathrm{mA} \pm 20\,\mu\mathrm{A}$  or  $(20.34\pm0.02)\,\mathrm{mA}$  are both appropriate, but  $20.34\,\mathrm{mA} \pm 20$  would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of  $\pm$   $0.5\,\mathrm{mm}$  not  $\pm$   $1\,\mathrm{mm}$ .

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:  $\frac{mass}{volume}$ )

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**STEM SMART Physics 37 - Uncertainties** 



Gameboard Physics Skills Uncertainties Essential Pre-Uni Physics E3.4

### 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  $\pm~0.1$ ).

Please make sure that the unit of absolute uncertainties is clear - so  $20.34\,\mathrm{mA} \pm 20\,\mu\mathrm{A}$  or  $(20.34\pm0.02)\,\mathrm{mA}$  are both appropriate, but  $20.34\,\mathrm{mA} \pm 20$  would not be clear. Note that 'nearest millimetre' implies an absolute uncertainty of  $\pm~0.5\,\mathrm{mm}$  not  $\pm~1\,\mathrm{mm}$ .

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