

# MEASUREMENT-QUANTITY-ACURACY

- 1 (a)** The table below shows some measurements taken by three IGCSE students. The second column shows the values recorded by the three students. For each quantity, underline the value most likely to be correct. The first one is done for you.

quantity measured	recorded values
thickness of a metre rule	0.25 mm <u>2.5 mm</u> 25 mm
volume of a test-tube	12 mm <sup>3</sup> 12 cm <sup>3</sup> 12 m <sup>3</sup>
current in a 12 V ray box lamp at less than normal brightness	0.5 A 5.0 A 50 A
the surface area of the base of a 250 cm <sup>3</sup> beaker	0.3 cm <sup>2</sup> 3 cm <sup>2</sup> 30 cm <sup>2</sup>
the mass of a wooden metre rule	0.112 kg 1.12 kg 11.2 kg
the weight of an IGCSE student	6 N 60 N 600 N

[5]

- (b)** A student is to find a value of the resistance of a wire by experiment. Potential difference  $V$  and current  $I$  can be recorded. The resistance is then calculated using the equation

$$R = \frac{V}{I} .$$

State, with a reason, one example of good experimental practice that the student could use to obtain a reliable result.

statement .....

reason ..... [2]

- |            |                    |            |
|------------|--------------------|------------|
| <b>(a)</b> | 12 cm <sup>3</sup> | <b>[1]</b> |
|            | 0.5 A              | <b>[1]</b> |
|            | 30 cm <sup>2</sup> | <b>[1]</b> |
|            | 0.112 kg           | <b>[1]</b> |
|            | 600 N              | <b>[1]</b> |

- |            |   |            |
|------------|---|------------|
| <b>(b)</b> | repeats   | <b>[1]</b> |
|            | to spot anomalous results/to calculate average                                  | <b>[1]</b> |
|            | <u>or</u> series of different V and I, plot graph                               |            |
|            | <u>or</u> switch on/off, prevent temp rise                                      |            |
|            | <u>or</u> low current, minimise temp rise                                       |            |
|            | <u>or</u> avoidance of parallax, action and reason                              |            |
|            | <u>or</u> clean wires, resistance caused by dirt                                |            |
|            | <u>or</u> tap meter, prevent sticking   |            |
|            | <u>or</u> check zero error, accuracy  |            |
|            | (in each case the reason must support the statement<br>to gain the second mark) |            |

**[total: 7]**

- 2 Table 5.1 shows some measurements taken by three IGCSE students. The second column shows the values recorded by the three students. For each quantity, underline the value most likely to be correct.

The first one is done for you.

**Table 5.1**

quantity measured	recorded values
the mass of a wooden metre rule	<u>0.112 kg</u> 1.12 kg 11.2 kg
the diameter of a test tube	0.15 cm 1.5 cm 15 cm
the volume of a coffee cup	10 cm <sup>3</sup> 100 cm <sup>3</sup> 1000 cm <sup>3</sup>
the area of a computer keyboard	0.07 m <sup>2</sup> 0.70 m <sup>2</sup> 7.0 m <sup>2</sup>
the current in a 1.5V torch lamp at normal brightness	0.12 A 12 A 120 A
the circumference of a 250 cm <sup>3</sup> beaker	2.3 cm 23 cm 230 cm

[5]

[Total: 5]

MARKING SCHEME:

1.5 cm  
100 cm<sup>3</sup>  
0.07 m<sup>2</sup>  
0.12 A  
23 cm

[1]  
[1]  
[1]  
[1]  
[1]

[Total: 5]

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- 3 (a) Table 5.1 shows some measurements taken by three IGCSE students. The second column shows the values recorded by the three students. For each quantity, underline the value most likely to be correct.

The first one is done for you.

**Table 5.1**

Quantity measured	Recorded values
The mass of a wooden metre rule	<u>0.112 kg</u> 1.12 kg 11.2 kg
The weight of an empty 250 cm <sup>3</sup> glass beaker	0.7 N 7.0 N 70 N
The volume of one sheet of this examination paper	0.6 cm <sup>3</sup> 6.0 cm <sup>3</sup> 60 cm <sup>3</sup>
The time taken for one swing of a simple pendulum of length 0.5 m	0.14 s 1.4 s 14 s
The pressure exerted on the ground by a student standing on one foot	0.4 N/cm <sup>2</sup> 4.0 N/cm <sup>2</sup> 40 N/cm <sup>2</sup>

[4]

- (b) (i) A student is to find the value of the resistance of a wire by experiment. Potential difference  $V$  and current  $I$  can be recorded. The resistance is then calculated using the equation  $R = V/I$ .

The student knows that an increase in temperature will affect the resistance of the wire. Assuming that variations in room temperature will not have a significant effect, suggest two ways by which the student could minimise temperature increases in the wire during the experiment.

1. ....

2. .... [2]

- (ii) Name the circuit component that the student could use to control the current.

..... [1]

[Total: 7]

- (a) 0.7 N [1]  
6 cm<sup>3</sup> [1]  
1.4 s [1]  
4.0 N/cm<sup>2</sup> [1]
- (b) (i) minimum current/turn down power supply/increase resistance [1]  
switch off between readings/carry out without delay [1]
- (ii) variable resistor/rheostat [1]

**[Total: 7]**