

## Physics Practical Summary

### 1. Measurement

Apparatus	Precision
Meter rule	0.001 m
Vernier caliper	0.0001 m ( <u>repeated readings</u> )
Micrometer	0.00001 m ( <u>repeated readings</u> )
Protractor	1°
Thermometer	0.5 °C
Measuring cylinder	0.5 mL
Spring balance	0.05 N
Multimeter	As displayed
Stopwatch	As displayed ( <u>repeated readings</u> )

### 2. Estimating error

Generally,  $\Delta x \geq \text{precision}$ ; For stopwatch,  $\Delta x \geq 0.3 \text{ s}$ .

Absolute errors have 1 s.f.; percentage errors have 2 s.f..

### 3. Tabulation of data

Headings in the form of quantity/unit.

	I/mA	V/V	R/ $\Omega$
	102.2	0.745	7.29
	90.3	0.630	6.98
	80.4	0.520	6.47
	...	...	...
	...	...	...
	...	...	...

At least 6 sets of data.

Calculated values follow the least s.f. of raw data.

### 4. Plotting of graphs

- Graph should be at least 6 by 4 big squares.
- Plot all point to the nearest half a division.
- There should be at most 1 anomalous point, which needs to be circled and labelled.

- Gradient triangle must be at least half of the drawn best-fit line.
- Read to the nearest half a division (no rounding).

### 5. Analysis

Gradient and y-intercept do not need units. Quantities need units. Answers can be left to 3 s.f..

### 6. Other questions

- If the line cuts the y-axis close to the origin, the relationship can be said to be proportional.
- If a new line is asked to be drawn, and the y-intercept cannot be shown, you can annotate on the graph.
- Errors and improvements cannot be due to wind blowing/human reaction time/parallax error.

### 7. Planning question format

<b>Name of step</b>	<b>Note</b>
Aim	
Variables	<ul style="list-style-type: none"> <li>- Independent variable.</li> <li>- Dependent variable.</li> <li>- 3 controlled variables (that will directly affect the dependent variable).</li> </ul>
Diagram	<ul style="list-style-type: none"> <li>- Diagrams must be well-labelled.</li> </ul>
Procedure	<ul style="list-style-type: none"> <li>- Use what to measure what.</li> <li>- How to collect 1 set of dependent variable for independent variable.</li> <li>- Repeat Step (X) to Step (X) to collect 10 sets of data.</li> </ul>
Analysis	<ul style="list-style-type: none"> <li>- Show the working of linearisation.</li> <li>- Tabulate XXX into a table.</li> <li>- Plot the graph of XXX against XXX.</li> <li>- Observation/Inference from the table (gradient/y-intercept).</li> </ul>
Safety precaution	<ul style="list-style-type: none"> <li>- 1 or 2 is enough.</li> </ul>
Additional details	<ul style="list-style-type: none"> <li>- To ensure accuracy and reliability (e.g. do a preliminary experiment/take repeated readings and take average).</li> </ul>