



General Certificate of Secondary Education  
2025

Centre Number

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Candidate Number

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# Physics

Unit 3: Practical Skills

Booklet A

Foundation Tier



[GPY31]

\*GPY31\*

## TIME

2 hours.

## INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete questions in black ink and use a dark HB pencil for drawings and graphs.

**Do not write with a gel pen.**

Answer **all** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is **30**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Follow all health and safety instructions.

You may use a ruler and scientific calculator if required.

The apparatus and materials required to complete the task(s) are provided.

## FOR TEACHER USE ONLY

In experiment 2, please tick the box below to indicate that the candidate did **not** require any help to complete the circuit.

**No help was given**

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## Experiment 1 Density of wood

### Introduction

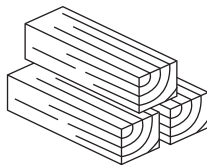
Density is the mass per unit volume. To calculate the density of any solid, its mass in grammes (g) is divided by its volume in cubic centimetres (cm<sup>3</sup>).

### Aim

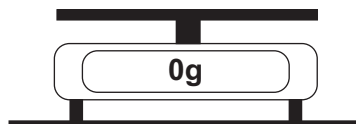
The aim of this experiment is to use measurements of volume and mass to find the density of wood.

### Apparatus

The diagram below shows the equipment that you will use for this experiment.



Blocks of wood



Electronic balance



Ruler

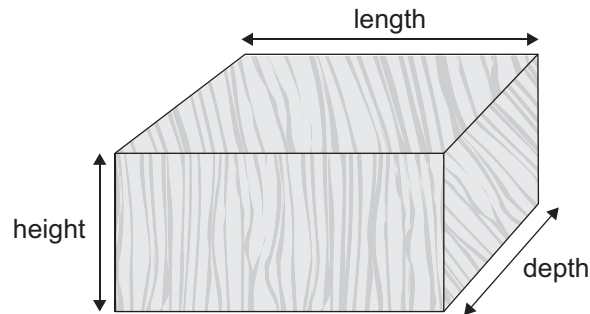
*Source: Chief Examiner*



During (a)(i) to (a)(iii), you may work on your own or as part of a group of two or three.

### Procedure

(a) (i)



Source: Chief Examiner

Use the ruler to measure the length of each block of wood.  
Record each measurement **to the nearest whole number** in **Column 1** of **Table 1**.

The measurements of height and depth have already been added to the table.

**Table 1**

	Column 1	Column 2	Column 3
<b>Block</b>	<b>Length /cm</b>	<b>Height /cm</b>	<b>Depth /cm</b>
A		4	6
B		4	6
C		4	6
D		4	6
E		4	6

[2]



- (ii) Calculate the volume of each block.  
Record this result to the **nearest whole number** in **Column 4** of **Table 2**.  
Add the unit for volume to the heading of **Column 4** of **Table 2**.

**Table 2**

	Column 4	Column 5
<b>Block</b>	<b>Volume /</b>	<b>Mass /</b>
A		
B		
C		
D		
E		

← Insert units for each column

[3]

Use the space below for your calculations.

- (iii) Use the balance to measure the mass of each block of wood.  
Record each measurement to the **nearest whole number** in **Column 5** of **Table 2**.  
Add the unit for mass to the heading of **Column 5** of **Table 2**.

[3]

[Turn over



**When you have taken all the measurements, or when your teacher tells you that 30 minutes are over, stop using the apparatus.**

**To complete the remainder of the assessment you must work alone.  
Your teacher will direct you to a place to do this.**



**(b) Analysis of data**

The density of wood is calculated using the equation below.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Using the values in **Table 2** complete **Table 3** below by calculating the density of each block. Record your values of density, to one decimal place, in **Column 6** of **Table 3**.

Add a heading with unit to **Column 6** of **Table 3**.

**Table 3**

Column 6

Block	
A	
B	
C	
D	
E	



Insert column heading here with unit

[5]

Use the space below for your calculations.

[Turn over



## Interpretation of data

(c) (i) Explain how a reliable value for the density of the wood can be calculated.

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[1]

(ii) Calculate a reliable value for the density of the wood using your results.

Reliable value for the density of the wood = \_\_\_\_\_ [1]





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**(Questions continue overleaf)**

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**[Turn over**



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## Experiment 2 Electrical resistance

### Introduction

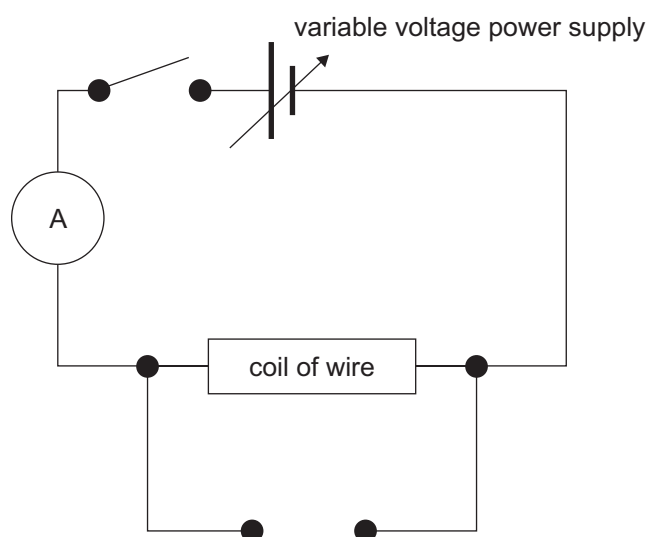
The current passing through a coil of resistance wire depends on the voltage applied across the wire. The wire has electrical resistance.

### Aim

The aim of this experiment is to use measurements of current and voltage to find the resistance of a coil of wire.

### Apparatus

The diagram below shows the circuit that has been set up. The voltmeter has not been connected.



Source: Chief Examiner



During (a)(i) to (a)(iv), you may work on your own or as part of a group of two or three.

### Procedure

(a) (i) Complete the circuit by adding the voltmeter.  
**Your teacher must check your circuit before you continue.** [1]

(ii) You are going to measure the voltage across the coil of wire and the current flowing through the coil of wire, keeping the temperature of the wire constant. Add headings with units to **Column 1** and **Column 2** of **Table 4**. [2]

(iii) Close the switch and measure the voltage and current. Record your measurements to **one decimal place** in **Column 1** and **Column 2** of **Table 4**.  
Open the switch.  
**You must switch off the current for 10 seconds to allow the coil of wire to cool.** [2]

(iv) Close the switch.  
Increase the voltage by approximately 0.5V or 1.0V by adjusting the output of the power supply.  
Measure the new voltage and current and record your measurements in **Column 1** and **Column 2** of **Table 4**.  
Record your measurements to **one decimal place**.  
Open the switch after you take each measurement of voltage and current.  
**You must switch off the current for 10 seconds to allow the coil of wire to cool.**  
Repeat until you have a total of **5 sets of voltage and current**.  
Switch off the power supply when you have taken all your measurements. [4]

[Turn over



## Results

**Table 4**

Column 1	Column 2	Column 3



Insert column heading here with unit

**When you have taken all the measurements, or when your teacher tells you that 30 minutes are over, stop using the apparatus.**

**To complete the remainder of the assessment you must work alone. Your teacher will direct you to a place to do this.**





## Analysis of data

- (b) Calculate the resistance of the wire for each set of values and record to one decimal place in **Column 3** of **Table 4**.  
Add a heading with unit to **Column 3** of **Table 4**.

Use the space below for your calculations.

[3]

[Turn over

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## Interpretation of data

- (c) (i) Calculate the range of the resistance by subtracting the smallest value from the largest value.

Range of resistance = \_\_\_\_\_ [1]

- (ii) If the range of values for the resistance is more than  $1.0\Omega$  we say the resistance has changed significantly.  
Depending on your answer to (c)(i), answer **either** A or B.

- A** Explain why the resistance has **not** changed significantly.

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- B** Explain why the resistance has changed significantly.

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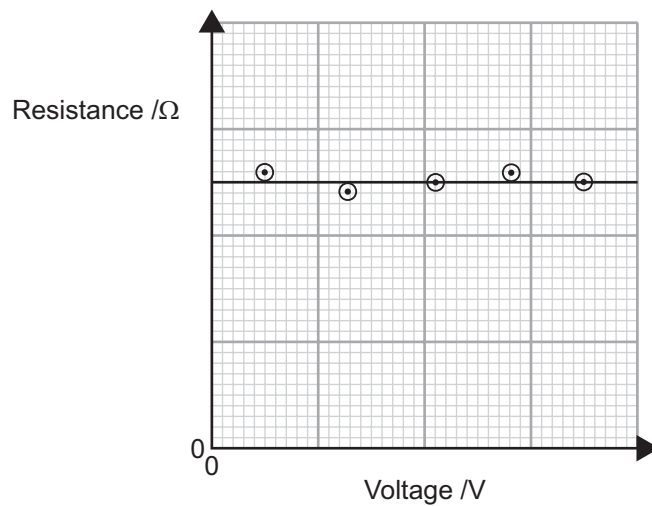
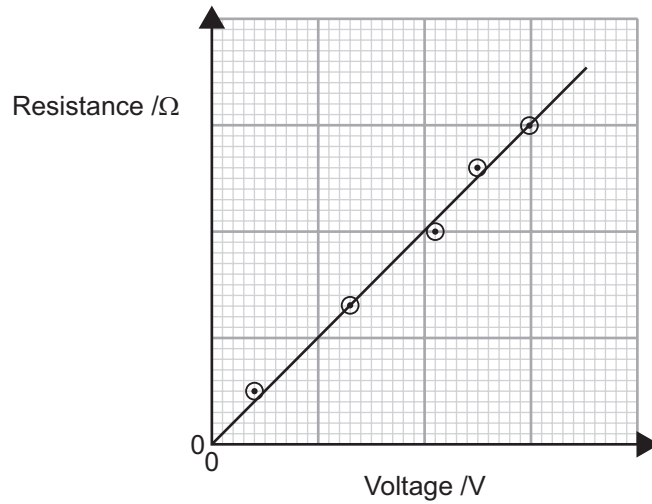
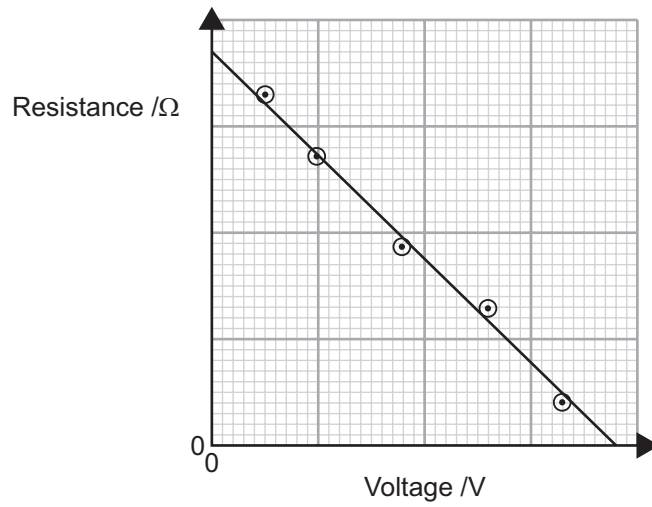
[1]



(iii) The diagrams below show three graphs.

Tick (✓) the graph which **best** shows how the resistance varied with the voltage across the coil of wire.

[1]



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<b>Examiner's use only</b>	<b>Marks</b>
Experiment 1	
Experiment 2	
<b>Total Marks</b>	

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*Rewarding Learning*

**General Certificate of Secondary Education  
2025**

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# **Physics**

Unit 3: Practical Skills

**Booklet A**

**Foundation Tier**

**[GPY31]**

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## **APPARATUS AND MATERIALS LIST AND CONFIDENTIAL INSTRUCTIONS**

**To be accessed by Head of Department only**

It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all practical skills assessments.

## Experiment 1 Density of wood

### Apparatus and Materials List

The list below shows the apparatus required per group.

- Electronic balance to measure up to 1000 g and to the nearest 1 g.
- Plastic ruler 30 cm in length with 1 mm divisions.
- Five blocks of wood, each labelled A, B, C, D and E.

The dimensions of each block are shown below.

A 50 mm × 37 mm × 63 mm

B 100 mm × 37 mm × 63 mm

C 150 mm × 37 mm × 63 mm

D 200 mm × 37 mm × 63 mm

E 250 mm × 37 mm × 63 mm

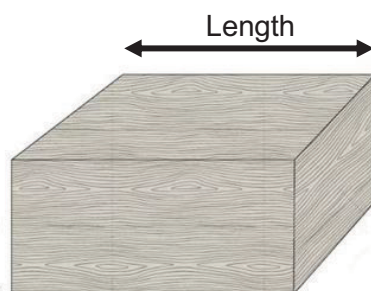
A suitable length of planed whitewood is available from building suppliers or DIY stores, 2.4 m × 37 mm × 63 mm.

These should be cut into the sizes shown above.

Please note: on the candidate's question paper the height and depth measurements will be stated as 4 cm and 6 cm respectively.

Candidates do not have to measure these dimensions.

The length to be measured should be clearly marked on each block as shown below.



### Teachers' instructions

The five blocks should be left on the bench.

Each to be labelled A, B, C, D, and E according to the measurements listed above.

Ensure the electronic balance is set to measure to the nearest 1 g.

It is not necessary for each group to have an electronic balance; these can be positioned so that groups can share.

Action at changeover - ensure electronic balance is reset to zero.

### Supervision of the Practical Skills Assessment

Up to 30 minutes collecting results, with the candidates working individually or collectively in a group of maximum size three.

Then 30 minutes with all candidates working individually under full examination conditions with a high level of control to complete the booklet.

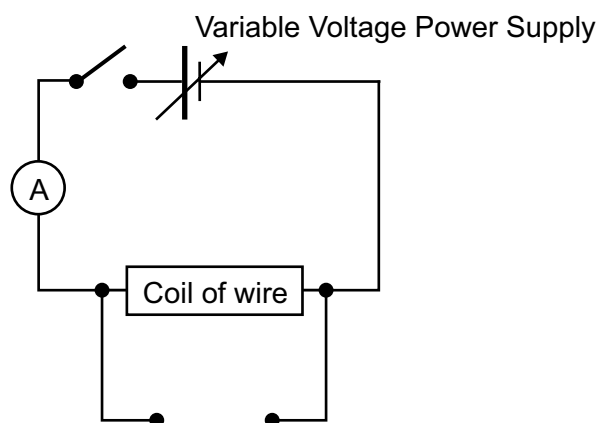
## Experiment 2 Electrical Resistance

### Apparatus and Materials List

- Switch
- A suitable variable power supply
- If you plan to use a stepped power supply, ensure candidates can obtain 5 values of voltage from 0 – 10V
- Digital ammeter capable of measuring 0 – 2A, 0.1A divisions
- Digital voltmeter capable of measuring 0 – 10V, 0.1V divisions
- 50cm of 28SWG Nichrome wire (approx.  $5\Omega$ ) wound into a coil on a wooden dowel (or pencil)
- 2 crocodile clips
- Stackable connecting leads with 4mm plugs
- Warning to candidate on bench 'Do not touch the wire as it may be hot'

### Teachers' instructions

The partial circuit shown below should be set up by the teacher.



A gap is to be left for the voltmeter.

If the candidate is unable to complete the circuit without help, you should connect the voltmeter into the circuit.

If the candidate did **not** require help to complete the circuit, you should tick the box on the front cover of the question paper to indicate this.

**If the box on the front cover is left unticked, it will be assumed that the candidate required help to complete the circuit and will not be awarded this mark.**

When the circuit is complete, switch on the power supply and adjust until the voltmeter reads a low voltage, either 1.0V or 2.0V. Switch off the power supply.

Check that the power supply is switched off when the candidate has finished taking measurements.

Action at changeover – remove the voltmeter from circuit.

### Supervision of the Practical Skills Assessment

Up to 30 minutes collecting results, with the candidates working individually or collectively in a group of maximum size three.

Then 30 minutes with all candidates working individually under full examination conditions with a high level of control to complete the booklet.

