Cambridge Assessment
International Education

# Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

**PHYSICS** **0625/52**

Paper 5 Practical Test **May/June 2022**

**1 hour 15 minutes**

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

## INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

## INFORMATION
- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [  ].

| For Examiner's Use | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| Total | |

This document has **12** pages. Any blank pages are indicated.

1   In this experiment, you will investigate the balancing of a metre rule.

    Carry out the following instructions, referring to Fig. 1.1.
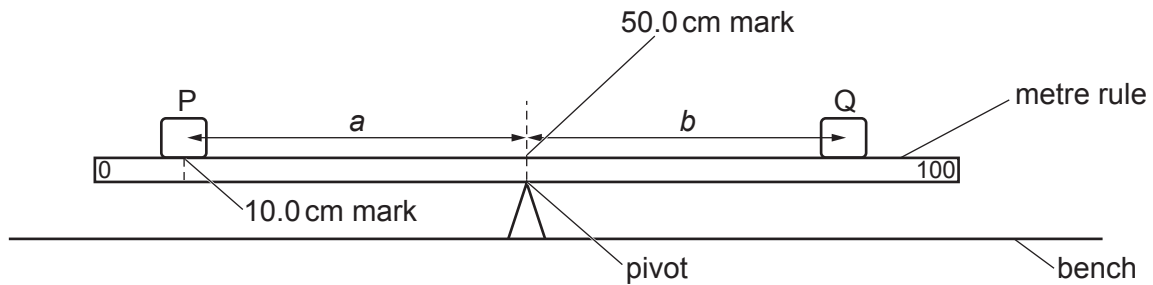


**Fig. 1.1**

**(a)** • Place the metre rule on the pivot at the 50.0 cm mark.

    • Place object P with its centre on the metre rule at the 10.0 cm mark.

    **(i)** Record, in Table 1.1, the distance $a$ from the centre of object P to the pivot.   [1]

    **(ii)** • Place object Q on the metre rule.

    • Keep object P at the 10.0 cm mark and adjust the position of object Q until the metre rule is as close to balancing as possible.

    Record, in Table 1.1, the distance $b$ between the centre of object Q and the pivot.   [1]

    **(iii)** Repeat the steps above with object P placed at the 15.0 cm mark, 20.0 cm mark, 25.0 cm mark and 30.0 cm mark.

    Record all the values of $a$ and $b$ in Table 1.1.

**Table 1.1**

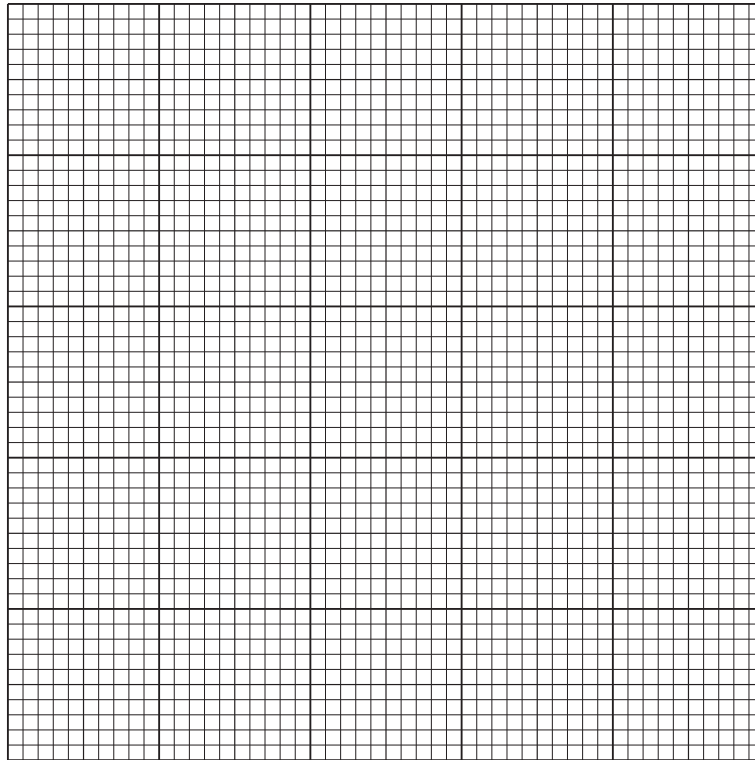| $a$/cm | $b$/cm |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

[2]

**(b)** Plot a graph of $a$/cm ($y$-axis) against $b$/cm ($x$-axis). You do **not** need to start your graph from the origin (0,0).



[4]

**(c)** Determine the gradient $G$ of the graph.

Show clearly on the graph how you obtained the necessary information.

$G$ = ........................................................ [3]

[Total: 11]

2  In this experiment, you will investigate the resistances of combinations of resistors.

Carry out the following instructions, referring to Fig. 2.1. The circuit has been set up for you.
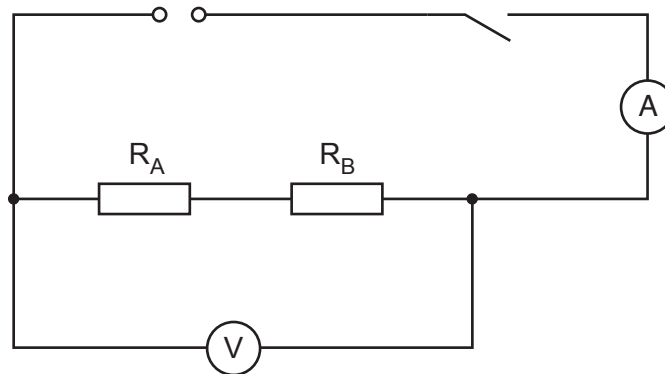


**Fig. 2.1**

**(a)** Close the switch.

    **(i)** Measure the current $I_1$ in the circuit.

$$I_1 = \text{...................................................... A [1]}$$

    **(ii)** Measure the potential difference (p.d.) $V_1$ across resistors $R_A$ and $R_B$ in series.

$$V_1 = \text{...................................................... V [1]}$$

    **(iii)** Open the switch.

        Calculate the resistance $R_1$ of the combination of resistors in series. Use the equation

$$R_1 = \frac{V_1}{I_1}.$$

        Include the unit.

$$R_1 = \text{......................................................... [1]}$$

**(b)** Disconnect the voltmeter. Connect resistor $R_C$ in parallel with resistors $R_A$ and $R_B$.

Do **not** change the series combination of resistors $R_A$ and $R_B$.

Connect the voltmeter across the combination of all three resistors.

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**(i)** Draw a circuit diagram showing the circuit described in **(b)**.

[2]

**(ii)** Close the switch.

Measure the current $I_2$ in the circuit.

$I_2$ = ............................................................ A

Measure the potential difference $V_2$ across the combination of the three resistors.

$V_2$ = ............................................................ V

Open the switch.

Calculate the resistance $R_2$ of the combination of resistors. Use the equation

$$R_2 = \frac{V_2}{I_2}.$$

Include the unit.

$R_2$ = ............................................................
[2]

**(c)** Disconnect the voltmeter. Rearrange the resistors to set up the circuit shown in Fig. 2.2.
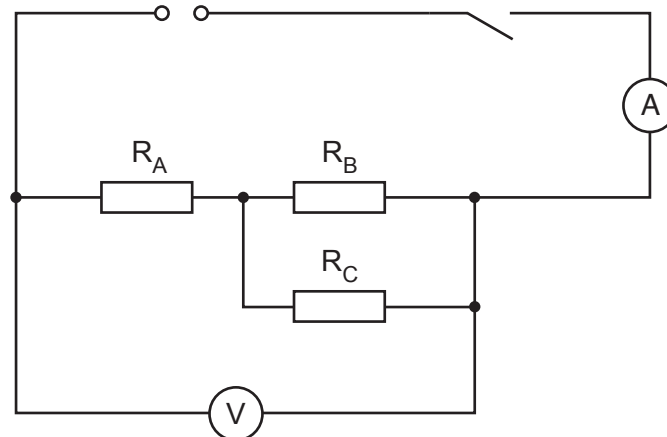


**Fig. 2.2**

Close the switch.

Measure the current $I_3$ in the circuit.

$I_3 =$ ........................................................... A

Measure the potential difference $V_3$ across the combination of the three resistors.

$V_3 =$ ........................................................... V

Open the switch.

Calculate the resistance $R_3$ of the combination of resistors. Use the equation

$$R_3 = \frac{V_3}{I_3}.$$

Include the unit. Give your answer to a suitable number of significant figures for this experiment.

$R_3 =$ ...........................................................
[2]

**(d)** A student thinks the three resistors $R_A$, $R_B$ and $R_C$ have the same resistance within the limits of experimental accuracy.

Suggest how the student could use the apparatus provided to test his idea.

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........................................................................................................................... [2]

[Total: 11]

**3** In this experiment, you will determine the focal length *f* of a lens.

Carry out the following instructions, referring to Fig. 3.1.
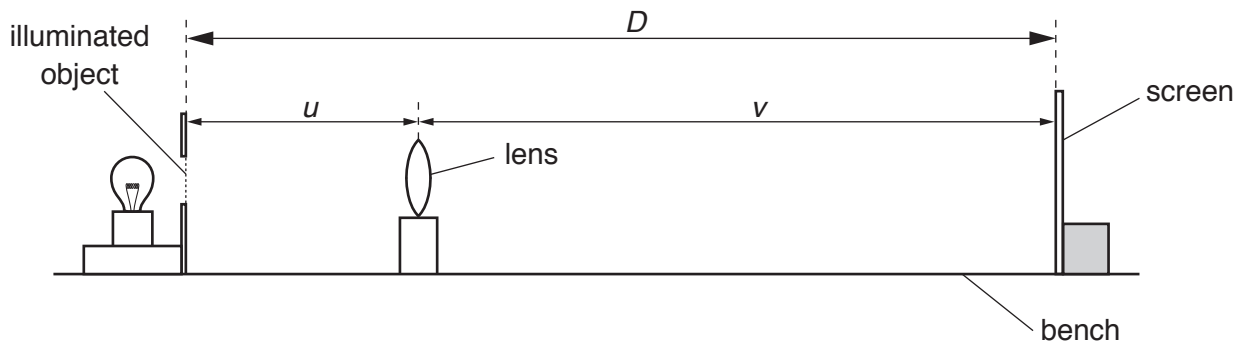


**Fig. 3.1**

**(a)** • Place the screen a distance *D* = 75.0 cm from the illuminated object.

• Place the lens between the object and the screen so that the lens is close to the illuminated object.

• Move the lens away from the object until a clearly focused image is formed on the screen.

**(i)** Measure, and record in Table 3.1, the distance *u* between the centre of the lens and the illuminated object. [1]

**(ii)** Measure, and record in Table 3.1, the distance *v* between the centre of the lens and the screen. [1]

**(iii)** Calculate, and record in Table 3.1, the focal length *f* of the lens using the equation

$$f = \frac{uv}{D}.$$

[1]

**(b)** • Place the screen at a distance *D* = 85.0 cm from the illuminated object.

• Place the lens between the object and the screen so that the lens is close to the illuminated object.

• Move the lens until a clearly focused image is formed on the screen.

Measure, and record in Table 3.1, the distance *u* between the centre of the lens and the illuminated object.

Measure, and record in Table 3.1, the distance *v* between the centre of the lens and the screen.

Calculate, and record in Table 3.1, the focal length $f$ of the lens using the equation

$$f = \frac{uv}{D}.$$

**Table 3.1**

| $D$/cm | $u$/cm | $v$/cm | $f$/cm |
|--------|--------|--------|--------|
| 75.0   |        |        |        |
| 85.0   |        |        |        |

[2]

**(c)** Calculate the average value $f_A$ of the focal length of the lens. Show your working.

$f_A$ = .................................................. cm  [2]

**(d)** State **two** precautions that you took to obtain accurate readings in this experiment.

1. ...........................................................................................................................................

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2. ...........................................................................................................................................

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[2]

**(e)** A student states that a more accurate value for the focal length $f$ of the lens can be determined by plotting a graph of $uv$ against $D$. The gradient of the graph is numerically equal to the focal length.

**(i)** Suggest a suitable number of sets of readings that the student should take.

............................................................................................................................... [1]

**(ii)** Explain briefly how this graphical method can give a more accurate value for the focal length.

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............................................................................................................................... [1]

[Total: 11]

**9**

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**4** A student investigates insulators.

Plan an experiment to list insulating discs in order from best insulator to worst insulator.

You are **not** required to carry out this investigation.

The following apparatus is available:

- five discs made from different insulating materials
- a thermometer
- a stop-watch
- a heated metal cylinder (see Fig. 4.1)
- a second metal cylinder with a hole for the thermometer (see Fig. 4.1).
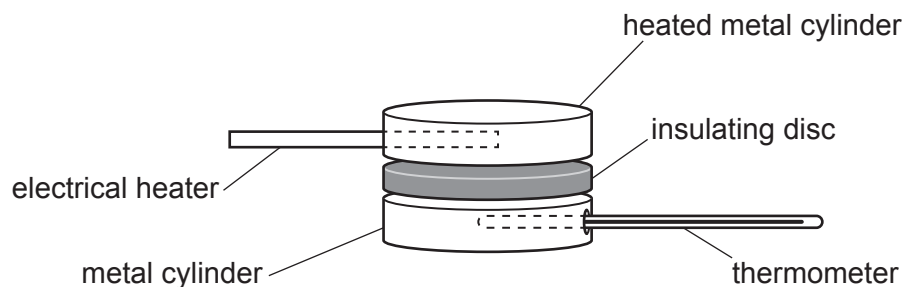


**Fig. 4.1**

You can also use other apparatus and materials that are usually available in a school laboratory.

In your plan, you should:

- explain briefly how you would carry out the investigation

- state the key variables that you would control

- draw a table, or tables, with column headings, to show how you would display your readings (you are **not** required to enter any readings in the table)

- explain how you would use your readings to reach a conclusion.

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