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Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

CANDIDATE NAME										
CENTRE NUMBER						CANDIDATE NUMBER				

* 7 5 7 5 2 9 1 4 7 1 *

PHYSICS **0972/51**

Paper 5 Practical Test **May/June 2025**

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 determine the density of a ball.

(a) Place the ball between the two blocks as seen from above in Fig. 1.1.

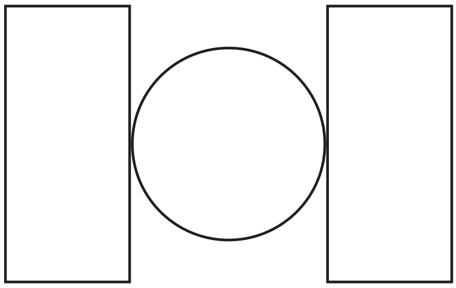

Fig. 1.1

(i) Describe how to use the apparatus in Fig. 1.1 to take **two** measurements to determine the diameter d of the ball. You may draw on Fig. 1.1 to help your description.

....

.... [2]

(ii) Using the blocks as shown in Fig. 1.1, take **two** measurements to determine the diameter d of the ball.

measurement 1 = ... cm

measurement 2 = ... cm [1]

(iii) Use your measurements to calculate a value for the diameter d of the ball. Show your working.

d = ... cm [1]

(b) Calculate the volume V of the ball using the equation $V = 0.52d^3$.

Include the unit.

V = ... [2]

(c) **(i)** Use the balance to measure the mass m_D of the dish provided.

m_D = ... g [1]

(ii) Place the ball in the dish and record the combined mass m_C of the dish and the ball.

m_C = ... g [1]

(iii) Calculate the mass m_B of the ball. Show your working.

m_B = ... g [1]

(d) Calculate the density ρ of the ball using the equation:

$$\rho = \frac{m_B}{V}.$$

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

ρ = ... g/cm^3 [2]

[Total: 11]

2 In this experiment, you will investigate the cooling of hot water in a beaker. Refer to Fig. 2.1.

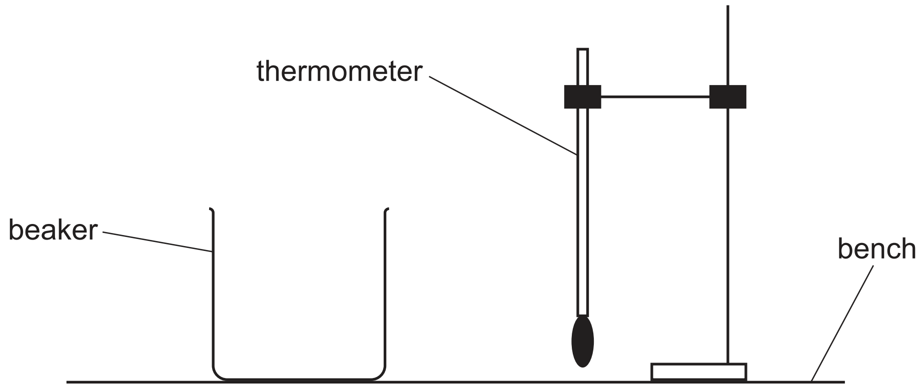

Fig. 2.1

(a) Use the thermometer to measure the temperature θ_R of the water in the container labelled 'cold water'.

θ_R = ... [1]

(b) **(i)** V is the total volume of water in beaker **A**.

Complete the column headings in Table 2.1.

Table 2.1

V /	θ /
100	
120	
140	
160	
180	
200	

[1]

(ii)
- Pour 100 cm^3 of hot water into beaker **A**.
- Place the thermometer in the hot water in beaker **A**.
- Record in Table 2.1 the temperature θ of the hot water.
- Without delay, use the measuring cylinder to add 20 cm^3 of the cold water to the water in beaker **A**.
- Stir the water in beaker **A**.
- Record in Table 2.1 the temperature of the mixture of hot and cold water.
- Repeat the procedure, adding 20 cm^3 of cold water each time, until you have a total of 200 cm^3 of water in beaker **A**.

[3]

(c) Plot a graph of temperature θ (y-axis) against total volume of water V (x-axis).
You do **not** need to start the axes at the origin $(0, 0)$.

Draw the best-fit curve.

[4]

(d) Suggest **two** ways to minimise the loss of thermal energy from the beaker during the experiment.

1 ....

....

2 ....

....
[2]

[Total: 11]

3 In this experiment, you will investigate the position of the image in a plane mirror.

Use the ray-trace sheet supplied, referring to Fig. 3.1 for guidance.

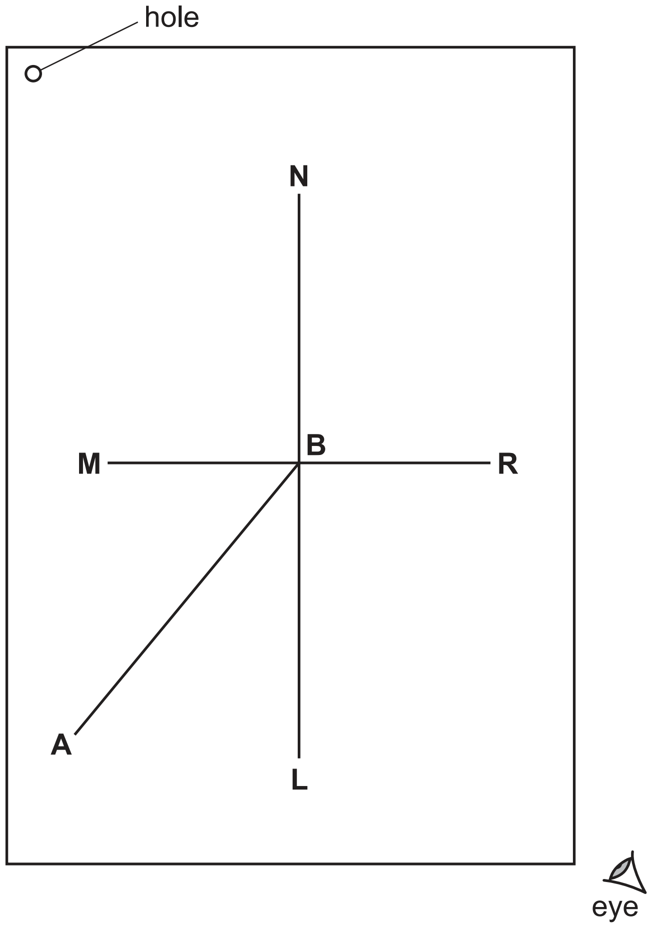

Fig. 3.1

(a)
- Draw a line 10.0 cm long near the middle of the ray-trace sheet. Label the line **MR**. Draw a normal to this line that passes through its centre. Label the normal **NL**. Label the point at which **NL** crosses **MR** with the letter **B**.
- Draw a line below **MR**, 10.0 cm long from **B** at an angle of incidence $i = 40°$ to the normal and to the left of the normal. Label the end of this line **A**.
- Place the reflecting face of the mirror vertically on the line **MR**.
- Place two pins, P_1 and P_2, on line **AB** at a suitable distance apart for this type of ray-trace experiment. Label the positions of P_1 and P_2.
- View the images of pins P_1 and P_2 from the direction indicated by the eye in Fig. 3.1. Place two pins, P_3 and P_4, so that pins P_3 and P_4 and the images of P_2 and P_1 all appear exactly one behind the other. Label the positions of P_3 and P_4.

[3]

(b) Remove the pins and the mirror. Draw a line through the positions of P_3 and P_4. Continue the line until it meets **MR**.

Measure the acute angle α between this line and the normal **NL**. An acute angle is an angle less than 90°.

α = ...° [1]

(c) Turn the ray-trace sheet through 180°. See Fig. 3.2.

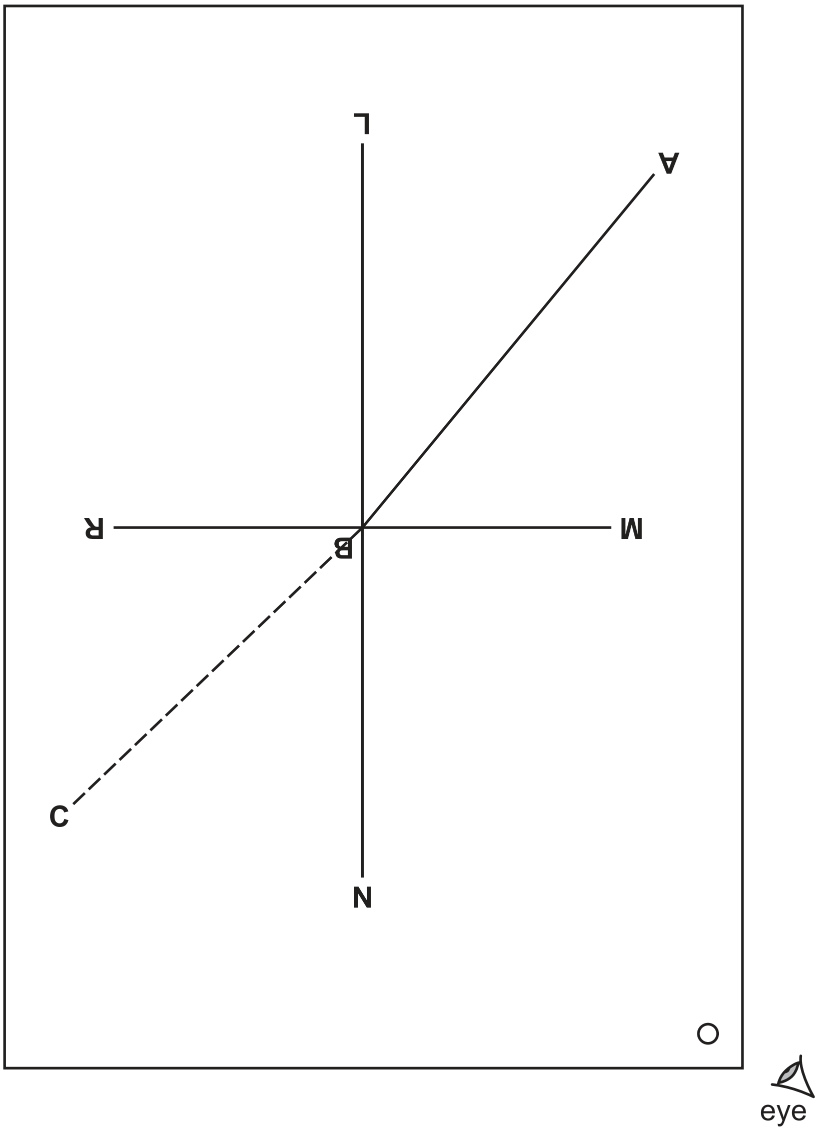

Fig. 3.2

- Draw a line below **MR**, 10.0 cm long from **B** at an angle of incidence *i* = 50° to the normal and to the left of the normal. Label the end of this line **C**.
- Place pins P_1 and P_2 on line **CB** at a suitable distance apart for this type of ray-trace experiment.
- Place the reflecting face of the mirror vertically on the line **MR** with the centre of the mirror at **B**.
- View the images of pins P_1 and P_2 from the direction indicated by the eye in Fig. 3.2.
- Place pins P_3 and P_4 so that pins P_3 and P_4 and the images of P_2 and P_1 all appear exactly one behind the other. Label the new positions of P_3 and P_4.

[2]

(d) Remove the pins and the mirror.

Draw a line through the new positions of P_3 and P_4. Continue the line until it meets **NL**.

Measure the acute angle β between this line and the **horizontal** line **MR**.

β = ...° [1]

(e) Suggest a relationship between α and β. Justify your answer by reference to the results.

relationship ....

justification ....

....

....
[2]

(f) State **two** techniques that you use to obtain an accurate ray trace.

1 ....

....

2 ....

....
[2]

[Total: 11]

Write your name, centre number and candidate number on your ray-trace sheet.
Tie your ray-trace sheet into this question booklet between pages 8 and 9.

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4 A student investigates the relationship between the diameter and the resistance of wires.

The following apparatus is available:

- wires with different diameters
- instrument for measuring the diameter of a wire
- metre ruler
- ammeter
- voltmeter
- power supply.

Other apparatus normally found in a school laboratory is also available.

Plan an experiment to investigate how the diameter of a wire affects its resistance.

Resistance R is given by the equation $R = \frac{V}{I}$, where V is the potential difference (p.d.) across the wire and I is the current in the wire.

You are **not** required to do this investigation. You do **not** need to write about safety precautions.

In your plan:

- draw a circuit diagram to show the circuit you use
- explain briefly how to do the investigation
- state **one** key variable to keep constant
- draw a table, or tables, with column headings, to display the readings (you are **not** required to enter any readings in the table)
- explain how to use your results to reach a conclusion.

DO NOT WRITE IN THIS MARGIN

[7]

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