* 0000800000001 *

Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

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PHYSICS **0625/53**

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 **16** pages. Any blank pages are indicated.

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1 In this experiment, you will investigate a suspended metre ruler and determine the weight of the metre ruler.

Refer to Fig. 1.1. Do **not** change the position of the loops of thread attached to the force meters.

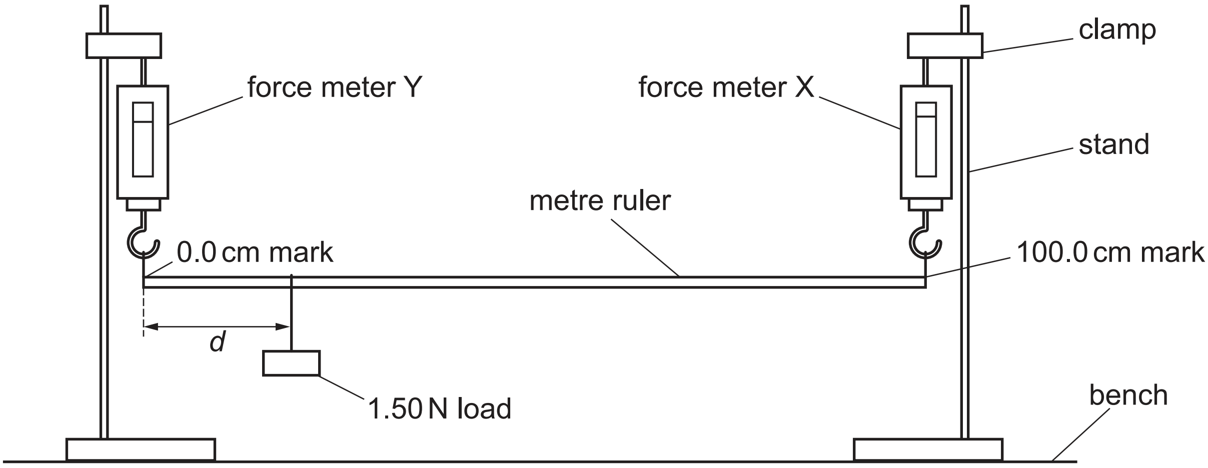

Fig. 1.1

(a) **(i)** Move the 1.50 N load to a distance d = 40.0 cm from the 0.0 cm end of the ruler. Raise or lower one clamp slightly, if necessary, so that the metre ruler is as near to horizontal as possible.

Read the value F_X on force meter X and the value F_Y on force meter Y.

F_X = ... N

F_Y = ... N

Calculate a value W_X using the equation $W_X = F_X + F_Y - k$, where k = 1.50 N.

W_X = ... N
[1]

(ii) Briefly describe how to check that the ruler is horizontal before taking the reading. You may draw a diagram.

....

....

.... [1]

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(b) Move the 1.50 N load to a distance d = 10.0 cm from the 0.0 cm end of the ruler.
Ensure that the metre ruler is as near to horizontal as possible.

Read, and record in Table 1.1, the value F_X on force meter X.

Repeat this procedure for d = 30.0 cm, 50.0 cm, 70.0 cm and 90.0 cm.

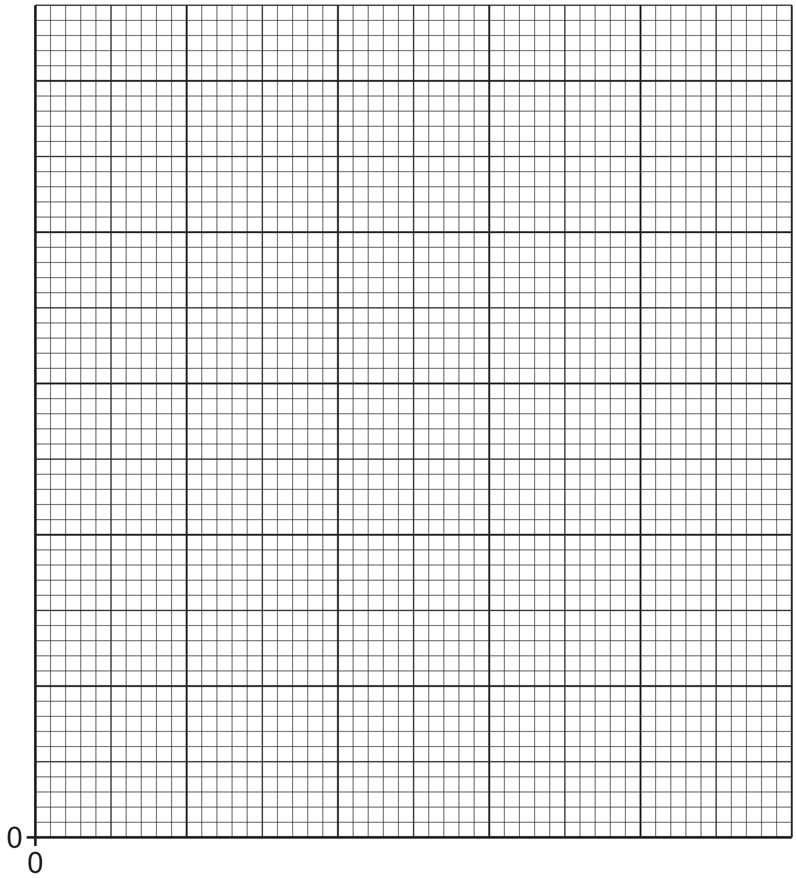
Table 1.1

d / cm	F_X / N
10.0	
30.0	
50.0	
70.0	
90.0	

[2]

(c) Plot a graph of F_X / N (y-axis) against d / cm (x-axis). Start the axes at the origin (0, 0).

Draw a best-fit straight line.



[4]

(d) From your graph, determine F_0, the value of F_X when d = 0.0 cm.

F_0 = ...

Calculate the weight W_R of the metre ruler, using the equation $W_R = 2 \times F_0$.

W_R = ... N
[2]

(e) State and explain whether your plots made it easy to choose the best-fit line.
Justify your answer with reference to your plots.

statement ....

explanation ....

....

....
[1]

[Total: 11]

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

Refer to Fig. 2.1.

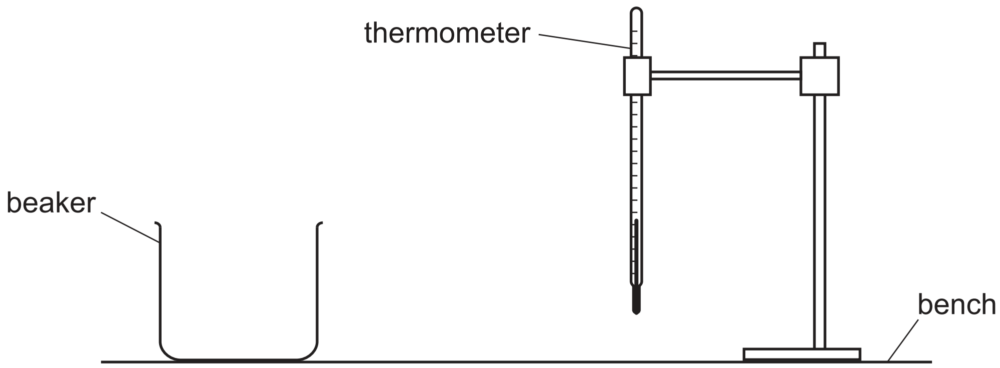

Fig. 2.1

(a) **(i)** Measure the room temperature θ_R shown on the thermometer.

θ_R = ... [1]

(ii) Describe **one** technique for ensuring that this reading is accurate.

....

.... [1]

(b) Pour 200 cm^3 of hot water into the beaker.
Place the thermometer into the water in the beaker.

In the first row of Table 2.1, record the temperature θ of the water at time t = 0 and immediately start the stop-watch.

Record, in Table 2.1, the temperature θ of the water every 30 s until t = 270 s.

Table 2.1

t / s	θ / °C
0	
30	
60	
90	
120	
150	
180	
210	
240	
270	

[1]

(c) **(i)** Calculate the average cooling rate x_1 during the first 90 s of the experiment. Use your readings from Table 2.1 and the equation:

$$x_1 = \frac{\theta_0 - \theta_{90}}{T}$$

where T = 90 s and θ_0 and θ_{90} are the temperatures at t = 0 and t = 90 s.
Include the unit for the cooling rate.

x_1 = ... [1]

(ii) Calculate the average cooling rate x_2 during the middle 90 s of the experiment. Use your readings from Table 2.1 and the equation:

$$x_2 = \frac{\theta_{90} - \theta_{180}}{T}$$

where T = 90 s and θ_{90} and θ_{180} are the temperatures at t = 90 s and t = 180 s.

x_2 = ... [1]

(iii) Calculate the average cooling rate x_3 during the last 90 s of the experiment. Use your readings from Table 2.1 and the equation:

$$x_3 = \frac{\theta_{180} - \theta_{270}}{T}$$

where T = 90 s and θ_{180} and θ_{270} are the temperatures at t = 180 s and t = 270 s.

x_3 = ... [1]

(d) **(i)** The temperature of the water decreases over time.

Use your results from **(c)** to describe the overall pattern of the rate of cooling of the water in the experiment. Justify your answer by reference to your results.

....

....

.... [1]

(ii) Estimate the final temperature θ_F of the water after several hours.

θ_F = ... [1]

(e) **(i)** Another student does the same experiment. She starts with the hot water at a lower initial temperature.

Suggest how her cooling rates are likely to compare with yours. Use your results to explain your answer.

suggestion ....

....

explanation ....

....

....
[2]

(ii) State **one** variable, other than initial water temperature, that the student needs to control.

....

.... [1]

[Total: 11]

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3 In this experiment, you will investigate circuits containing different combinations of resistors.

Circuit A has been set up for you.
Refer to Fig. 3.1.

Resistor R_P must remain in place throughout the experiment.

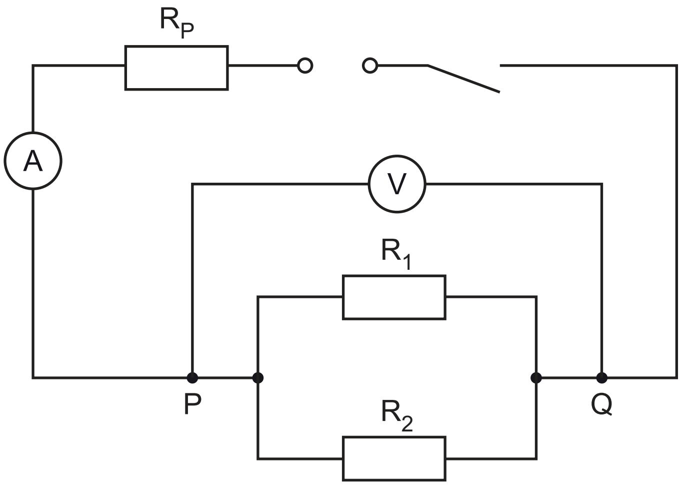

Fig. 3.1

Circuit A

(a) (i) Close the switch.

Measure, and record in Table 3.1:
- the potential difference (p.d.) V across terminals P and Q
- the current I in the circuit.

Open the switch.

Table 3.1

	V/V	I/A	R/Ω
circuit A			
circuit B			
circuit C			

[2]

(ii) Calculate, and record in Table 3.1, resistance R. Use your values of V and I and the equation $R = \frac{V}{I}$. [1]

Circuit B

(b) Disconnect R_2 from circuit A. Resistor R_1 remains connected between terminals P and Q, as shown in Fig. 3.2.

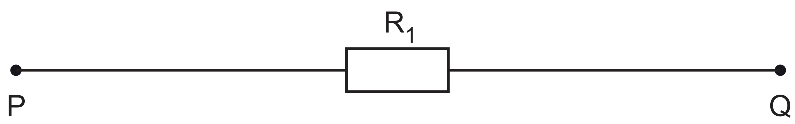

Fig. 3.2

Repeat the procedures in **(a)(i)** and **(a)(ii)**. [1]

Circuit C

(c) Connect R_2 in series with R_1 between terminals P and Q, as shown in Fig. 3.3.

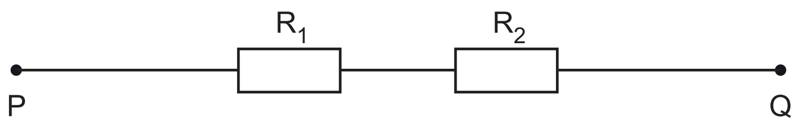

Fig. 3.3

Repeat the procedures in **(a)(i)** and **(a)(ii)**. [1]

(d) **(i)** Calculate resistance R_A. Use the value of R from circuit A and the equation:

$$R_A = 2R.$$

R_A = ... Ω

Record resistance R_B. R_B is equal to the value of R from circuit B.

R_B = ... Ω

Calculate resistance R_C. Use the value of R from circuit C and the equation:

$$R_C = \frac{R}{2}.$$

R_C = ... Ω [2]

(ii) A student suggests that R_A, R_B and R_C should all be equal.

State whether your results support this suggestion. Justify your statement with reference to values from your results.

statement ....

justification ....

.... [2]

(e) Briefly explain why resistor R_P, shown in Fig. 3.1, must remain in place throughout the experiment.

R_P has a resistance of $3\,\Omega$. Use your values in Table 3.1 to support your answer.

....

....

.... [1]

(f) A student determines the resistance of R_1. He uses a variable resistor in circuit B to control the current and draws a graph of V against I.

Briefly explain **one** advantage of using a variable resistor to control the current.

....

....

.... [1]

[Total: 11]

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4 A student investigates the refraction of light.

Refraction is the change in direction of a ray of light when passing into a transparent substance, as shown in Fig. 4.1.

Plan an experiment which enables him to investigate how the concentration of a gel affects the angle at which light is refracted when passing from air into the gel.

A transparent gel block can be made by dissolving gel powder in hot water in a mould and allowing it to cool. Changing the amount of powder will change the concentration.

Concentration is measured in g/cm^3.

You are **not** required to do the experiment.

The apparatus available includes:

- samples of gel made at different concentrations and labelled with those concentrations
- a ray-lamp which produces a narrow ray of light.

In your plan:

- list any additional apparatus needed
- explain briefly how to do the experiment, including the measurements to take
- state the key variable to keep constant
- draw a table, or tables, with column headings, to show how to display the readings (you are **not** required to enter any readings in the table)
- explain how to use the readings to reach a conclusion.

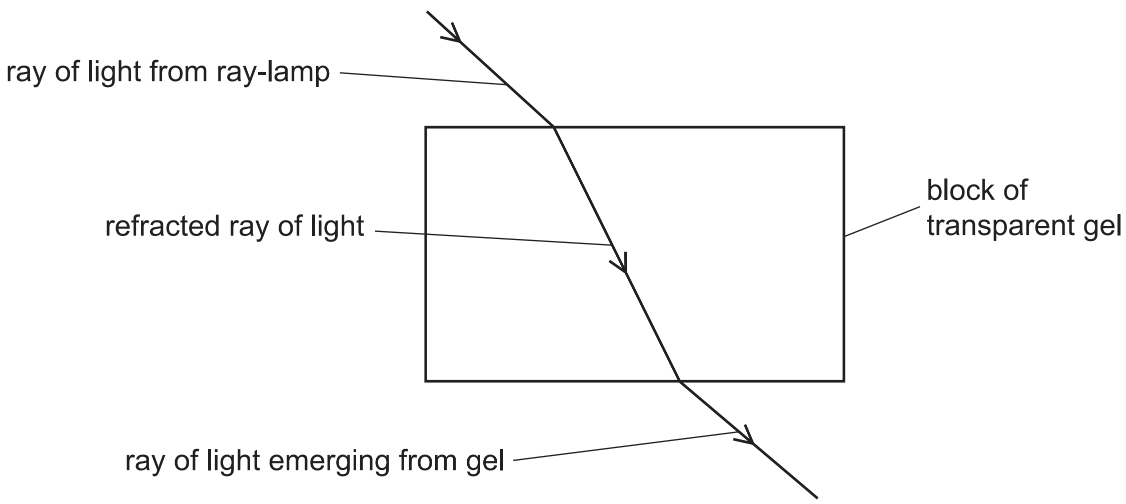

Fig. 4.1

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[7]

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