Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME				
CENTRE NUMBER			CANDIDATE NUMBER	

6354412285

PHYSICS **0625/53**

Paper 5 Practical Test **May/June 2024**

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 modelling clay by two methods.

Refer to Fig. 1.1.

Method 1

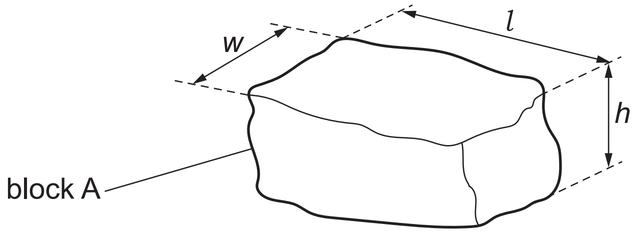

Fig. 1.1

(a) **(i)** Measure the length l, width w and height h of block A. Record your values in centimetres to the nearest millimetre.

l = ... cm

w = ... cm

h = ... cm
[1]

(ii) Calculate the volume V_A of block A. Use your measurements from **(a)(i)** and the equation $V_A = l \times w \times h$.

V_A = ... cm^3 [1]

(b) Suggest a possible source of inaccuracy in measuring the dimensions of the block.

Describe how the accuracy of these measurements can be improved.

You are **not** required to do this improved investigation.

suggestion ....

....

improvement ....

....
[2]

(c) Measure the mass m_A of block A. Use the top-pan balance.

m_A = ... g [1]

(d) Calculate a value ρ_A for the density of the modelling clay. Use your results from **(a)(ii)** and **(c)** and the equation $\rho_A = \frac{m_A}{V_A}$. Include the unit for the density.

ρ_A = ... [2]

Method 2

(e) Measure the weight W_B of block B, as shown in Fig. 1.2.

W_B = ... N [1]

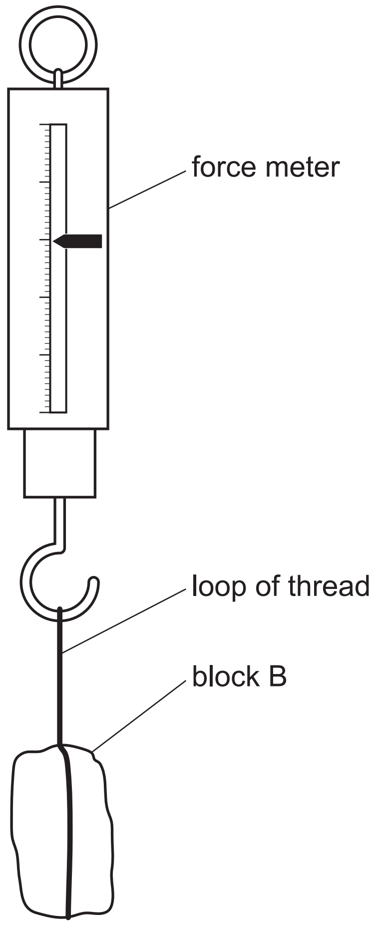

Fig. 1.2

(f) **(i)** Pour approximately 60 cm^3 of water into the measuring cylinder.

Measure and record the actual volume V_1 of the water in the measuring cylinder.

V_1 = ... cm^3

Remove the loop of thread from the force meter and lower block B carefully into the water in the measuring cylinder, as shown in Fig. 1.3.

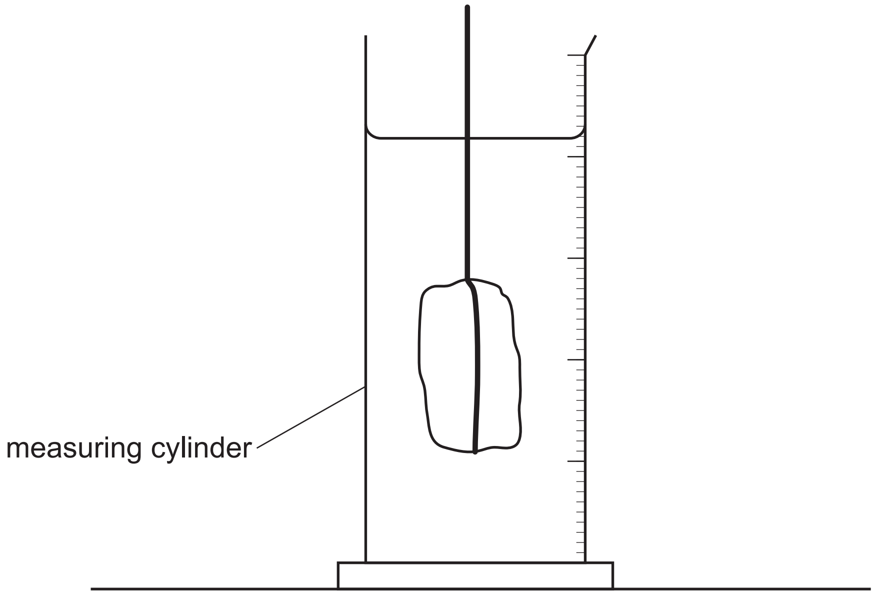

Fig. 1.3

Measure and record the new reading V_2 of the measuring cylinder.

V_2 = ... cm^3
[1]

(ii) Draw an arrow on Fig. 1.4 to show the correct line of sight to obtain the value for the volume of water in the measuring cylinder.

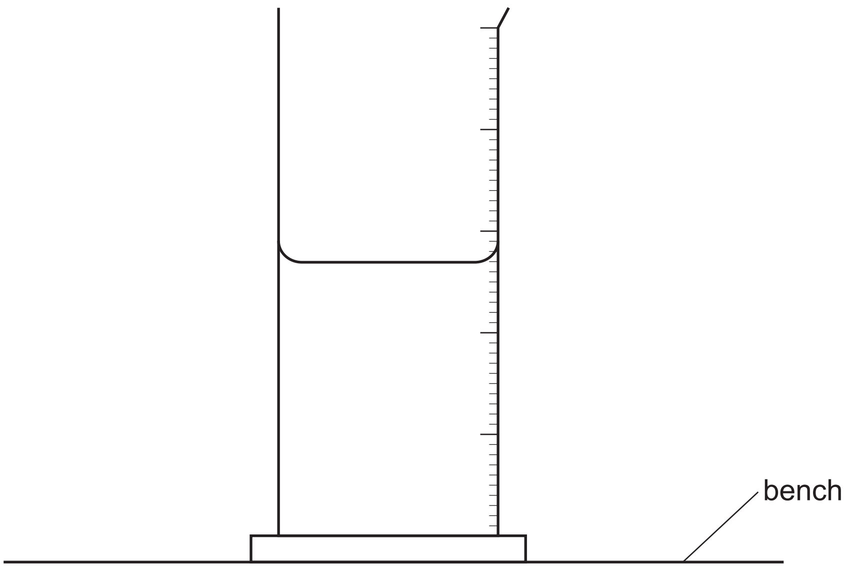

Fig. 1.4

[1]

(g) Calculate another value ρ_B for the density of modelling clay. Use your readings from **(e)** and **(f)** and the equation $\rho_B = \frac{W_B \times k}{(V_2 - V_1)}$, where k = 100 g / N.

ρ_B = ... [1]

[Total: 11]

2 In this experiment, you will investigate how the volume of water affects the rate at which hot water in a beaker cools.

Refer to Fig. 2.1.

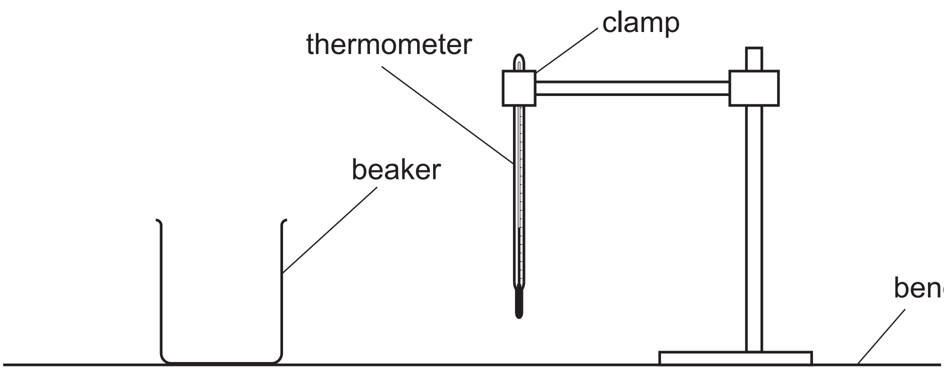

Fig. 2.1

(a) Pour 200 cm^3 of hot water into the beaker. Use the graduations on the beaker as a guide. Place the thermometer in the water.

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 the temperature θ of the water at times t = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s.

Remove the thermometer from the beaker and pour out the water. [1]

(b) **(i)** Repeat **(a)**, using only 75 cm^3 of hot water. [2]

(ii) Add units to the column headings in Table 2.1.

Table 2.1

	beaker with 200 cm^3 of hot water	beaker with 75 cm^3 of hot water
t /	θ /	θ /
0		
30		
60		
90		
120		
150		
180		

[1]

(c) Write a conclusion stating how the volume of hot water affects the rate of cooling of the water. Justify your answer by reference to your results.

....

....

....

.... [2]

(d) **(i)** Using your values for 75 cm^3 of water, calculate the average cooling rate x_1 for 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 = ... [2]

(ii) Using your values for 75 cm^3 of water, calculate the average cooling rate x_2 for the last 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) A student states that it is important to start the two experiments in **(a)** and **(b)** with water at the same initial temperature.

Explain whether your values for x_1 and x_2 support this statement.

....

....

.... [1]

(e) Another student repeats the experiment.

State **one** variable, other than initial water temperature, that she should control to obtain readings that are as close as possible to those in Table 2.1.

....

.... [1]

[Total: 11]

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

Refer to Fig. 3.1.

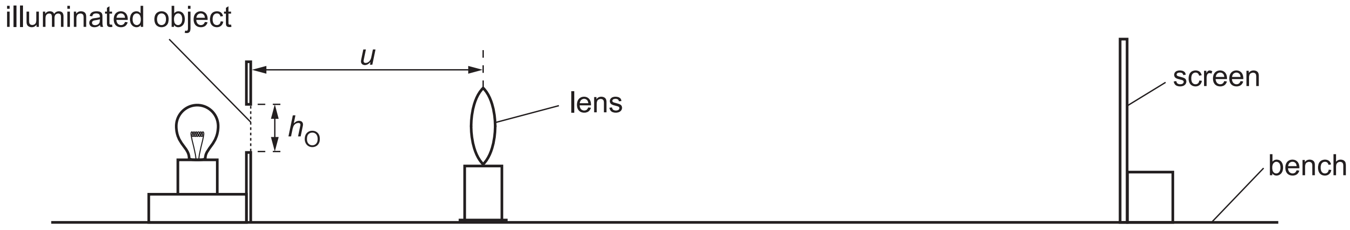

Fig. 3.1

(a) Set up the apparatus as shown in Fig. 3.1.

(i) Measure the height h_O of the illuminated object. Fig. 3.1 shows the height to measure on the illuminated object provided.

h_O = ... cm [1]

(ii) Place the lens a distance u = 20.0 cm from the illuminated object.
Place the screen near the lens.
Switch on the lamp.
Move the screen until a focused image of the illuminated object is seen on the screen.

Measure, and record in Table 3.1, the height h_I of the image on the screen.

Repeat the procedure for u = 25.0 cm, 30.0 cm, 35.0 cm and 40.0 cm.

Switch off the lamp.

Table 3.1

u / cm	h_I / cm	W
20.0		
25.0		
30.0		
35.0		
40.0		

[1]

(iii) Describe a technique for obtaining an image that is as sharp as possible.

....

....

.... [1]

(b) For each distance *u*, calculate, and record in Table 3.1, a value *W*. Use your results from **(a)** and the equation $W = \frac{h_O}{h_I}$.

[1]

(c) Plot a graph of *u* / cm (*y*-axis) against *W* (*x*-axis). You do **not** need to start your axes at the origin (0, 0). Draw the best-fit line.

[4]

(d) **(i)** Determine the gradient *G* of the line. Show clearly on the graph how you obtained the necessary information.

G = ... [1]

(ii) The focal length *f* of the lens is numerically equal to the gradient *G*.

Record a value of *f* for this experiment.

f = ... cm [1]

(e) A student decides to continue the experiment using larger values of *u*.

Explain why this produces less accurate values for *W*.

....

....

.... [1]

[Total: 11]

4 A student investigates the relationship between the diameter of a wire and the electrical resistance of the wire.

Plan an experiment which enables him to investigate how the diameter of a wire affects the resistance of the wire.

Resistance R is calculated from 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 experiment.

The apparatus available includes wires of different known diameters.

In your plan:

- list any additional apparatus needed
- complete Fig. 4.1 to show a circuit suitable for measuring the resistance of a wire
- explain briefly how to do the experiment, including the measurements to take so that the resistance can be determined
- state the key variables 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.

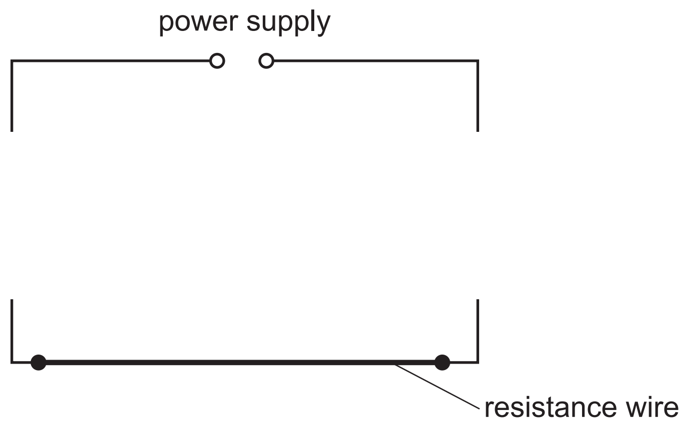

Fig. 4.1

[7]

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