Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2511656142

PHYSICS **0625/53**

Paper 5 Practical Test **October/November 2023**

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

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1 In this experiment, you will determine the density of sand by two methods.

Carry out the following instructions, referring to Fig. 1.1 and Fig. 1.2.

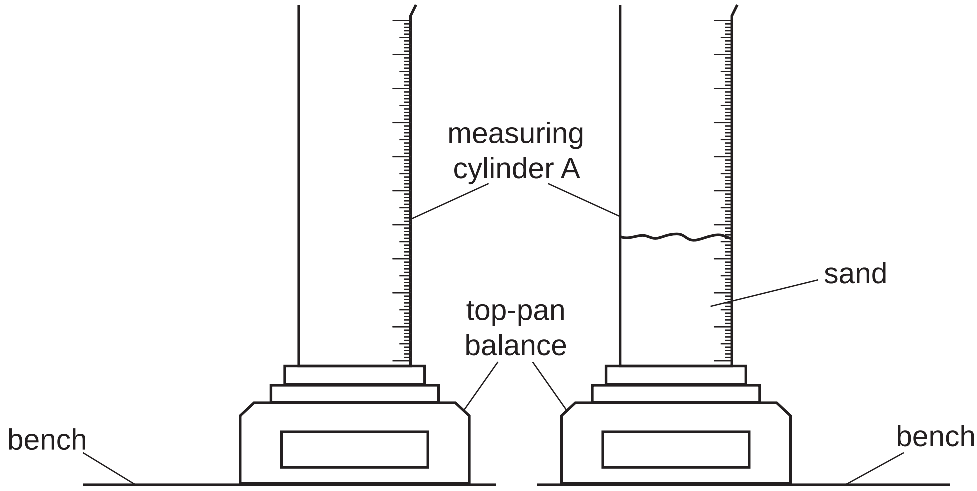

Fig. 1.1 **Fig. 1.2**

Method 1

(a) **(i)** Measure the mass m_1 of measuring cylinder A using the top-pan balance, as shown in Fig. 1.1.

m_1 = ... g

Pour approximately 100 cm^3 of sand into **measuring cylinder A**.
The sand is to remain in the measuring cylinder for the rest of the experiment.
Measure the volume V_1 of sand in measuring cylinder A.

V_1 = ... cm^3

Measure the mass m_2 of measuring cylinder A and the sand using the top-pan balance, as shown in Fig. 1.2.

m_2 = ... g

Use your values of m_1 and m_2 to calculate the mass m_3 of the sand.

m_3 = ... g
[2]

(ii) Calculate a value for the density ρ_1 of the sand. Use your values from **(a)(i)** and the equation $\rho_1 = \frac{m_3}{V_1}$. Include a unit.

ρ_1 = ... [2]

(iii) Describe **one** possible source of inaccuracy in the measurements taken in **method 1**. You may assume that all measurements are taken carefully and involve good experimental practice.

....

.... [1]

Method 2

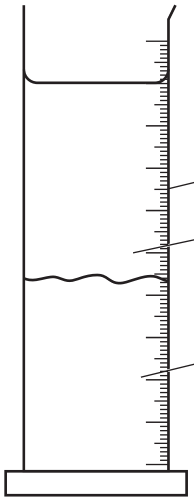

Fig. 1.3

(b) **(i)** Pour exactly 100 cm^3 of water into **measuring cylinder B**.

Pour this water into measuring cylinder A, as shown in Fig. 1.3.
Wait until the water level is constant then record the reading V_2 of the water level in measuring cylinder A.

V_2 = ... cm^3 [1]

(ii) On Fig. 1.3, draw an arrow showing the correct line of sight for reading the water level in measuring cylinder A. [1]

(iii) Calculate another value for the density ρ_2 of the sand.

Use your values from **(a)(i)** and **(b)(i)** and the equation $\rho_2 = \dfrac{m_3}{(V_2 - k)}$, where k = 100 cm^3.

ρ_2 = ... [2]

(c) Another student wants to determine the density of the particles in a sample of sand.

(i) Explain why **method 1** would **not** be a suitable method for her to use.

....

.... [1]

(ii) Explain why **method 2** would give a more accurate value for the density of the particles in the sample of sand.

....

.... [1]

[Total: 11]

2 In this experiment, you will investigate the cooling of hot water in surroundings with different temperatures.

Carry out the following instructions, referring to Fig. 2.1 and Fig. 2.2.

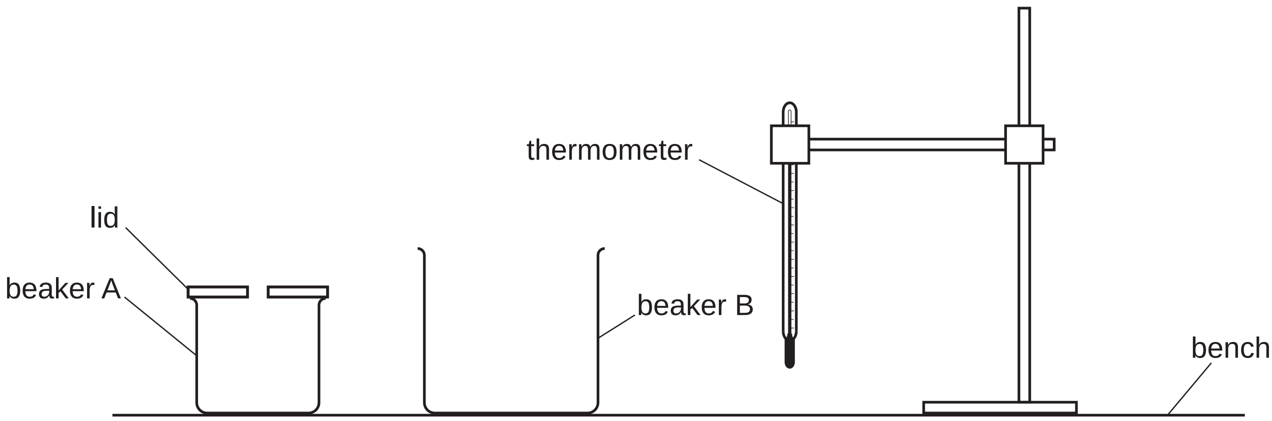

Fig. 2.1

(a) (i) Pour 100 cm^3 of cold water into beaker B.
Place the thermometer in the water.

Measure, and record in the appropriate column heading of Table 2.1, the temperature θ_1 of the water. [1]

(ii) Remove the thermometer from the water in beaker B.
Remove the lid from beaker A.
Place beaker A inside beaker B, as shown in Fig. 2.2, so that the water in beaker B rises between the sides of the two beakers.

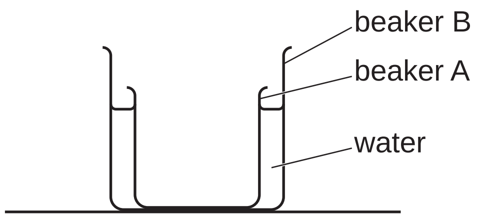

Fig. 2.2

Pour 150 cm^3 of hot water into beaker A and replace the lid.
Place the thermometer in the water in beaker A.

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

Record the temperature θ_A of the water at t = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s. [1]

(b) **(i)** Remove the thermometer and lid from beaker A.
Remove beaker A from beaker B and empty both beakers.

Pour 50 cm^3 of cold water and 50 cm^3 of hot water into beaker B.
Place the thermometer in the water.

Measure, and record in the appropriate column heading of Table 2.1, the temperature θ_2 of the water.

[1]

(ii) Repeat **(a)(ii)** for this arrangement. [2]

Table 2.1

	beaker A in **cold** water θ_1 = ...°C	beaker A in **warm** water θ_2 = ...°C
t / s	θ_A / °C	θ_A / °C
0		
30		
60		
90		
120		
150		
180		

(c) Write a conclusion stating in what way the temperature of the water surrounding beaker A affects the rate of cooling of the hot water in beaker A.
Justify your answer by reference to values from your readings.

....

....

....

.... [2]

(d) Calculate the average cooling rate R for beaker A cooling in **cold** water. Use your readings for beaker A from Table 2.1 and the equation

$$R = \frac{\theta_{A0} - \theta_{A180}}{T}$$

where T = 180 s and θ_{A0} and θ_{A180} are the temperatures of the water in beaker A at t = 0 and t = 180 s. Include the unit for the cooling rate.

R = ... [2]

(e) Another student repeats this experiment at the same room temperature.

State **one** other variable that she controls in order to obtain readings as close as possible to your readings.

....

.... [1]

(f) During the experiment, the increase in temperature of the water surrounding beaker A affects the results of the investigation.

Suggest **one** change to the experiment to reduce this effect.

....

....

.... [1]

[Total: 11]

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

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

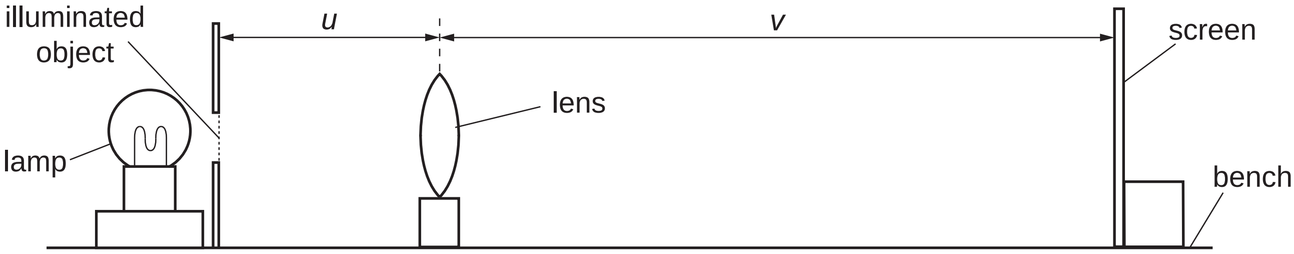


Fig. 3.1

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

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

Repeat the procedure for u = 30.0 cm, 40.0 cm, 50.0 cm and 60.0 cm.

Switch off the lamp.

Table 3.1

u / cm	v / cm	$\frac{u}{v}$
20.0		
30.0		
40.0		
50.0		
60.0		

[2]

(ii) Describe a technique to obtain an image on the screen that is as sharp as possible in this experiment.

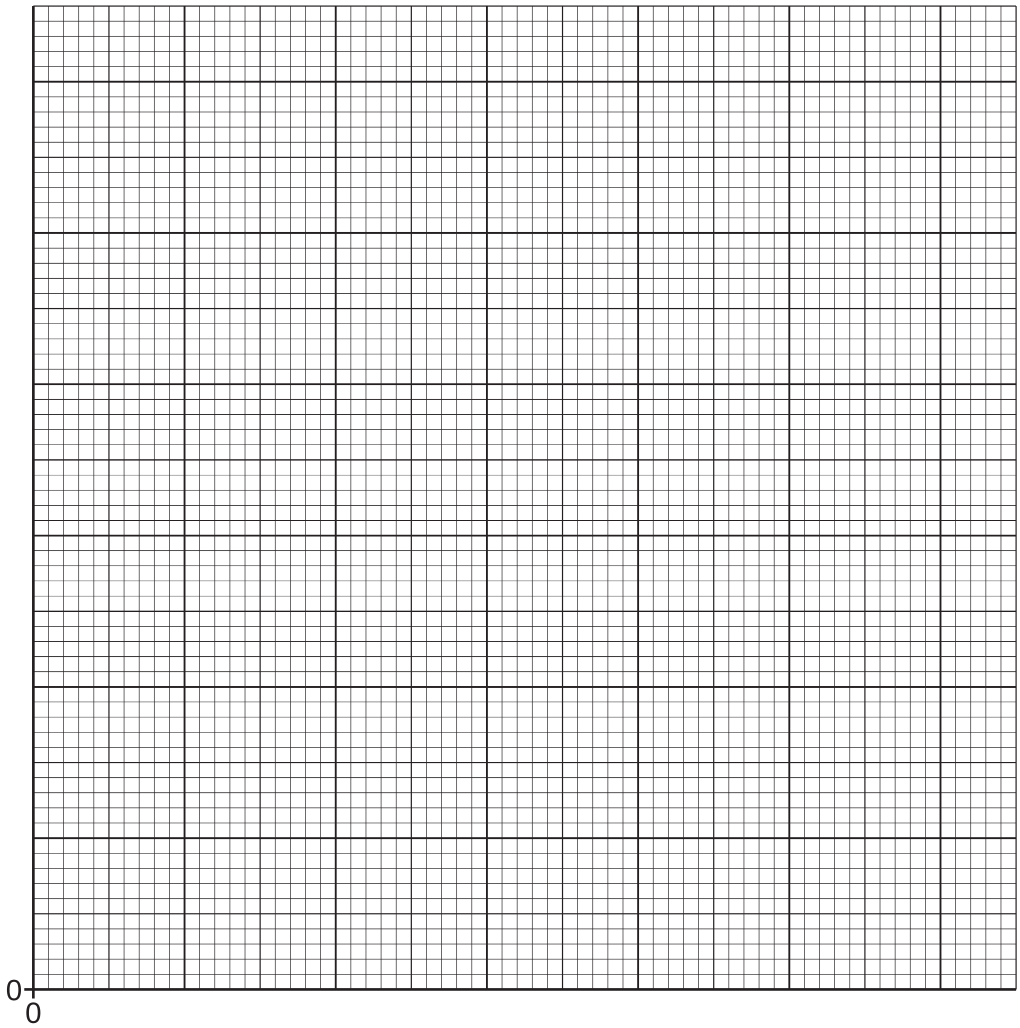
....

.... [1]

(b) For each distance u, calculate, and record in Table 3.1, a value for $\frac{u}{v}$. [1]

(c) Plot a graph of u / cm (y-axis) against $\frac{u}{v}$ (x-axis). Start your graph at the origin (0,0).

Draw the best-fit line.



[4]

(d) **(i)** Determine the value u_0 of u when $\frac{u}{v} = 0$.

u_0 = ... [1]

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

Determine the value of f for this experiment.

Show clearly on the graph how you obtained the necessary information to determine the gradient.

f = ... [2]

[Total: 11]

4 A student investigates the brightness of a lamp.

Plan an experiment to investigate how the intensity (brightness) of the light produced by the lamp is affected by the current in the lamp.

The apparatus available includes:

- a lamp and power supply
- a light meter which measures the intensity of light arriving at it
- an ammeter
- a variable resistor.

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

In your plan, you should:

- complete the circuit diagram in Fig. 4.1 to show the variable resistor connected to control the current in the lamp
- state the key variables to be kept constant
- explain briefly how to do the experiment
- draw a table 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.

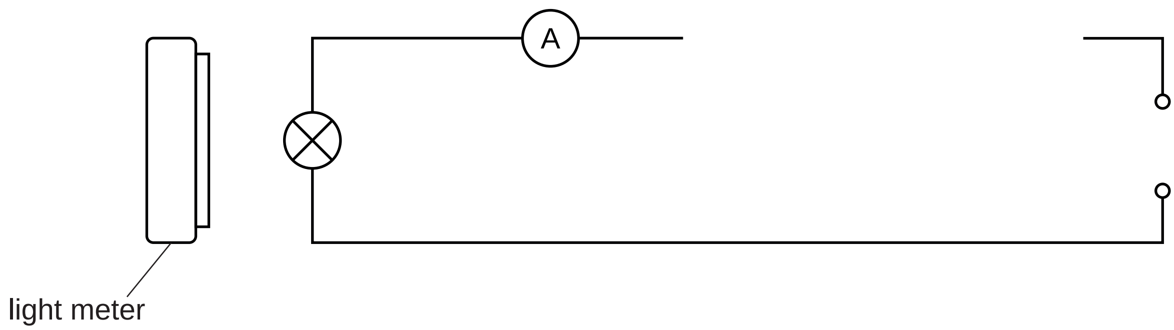


Fig. 4.1

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