Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
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0123456789

PHYSICS **0625/06**

Paper 6 Alternative to Practical **For examination from 2023**

SPECIMEN PAPER **1 hour**

You must answer on the question paper.

No additional materials are needed.

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 [ ].

This document has **14** pages. Any blank pages are indicated.

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1 A student investigates how partly covering the top of a beaker of water affects the rate at which the water cools.

The apparatus used is shown in Fig. 1.1.

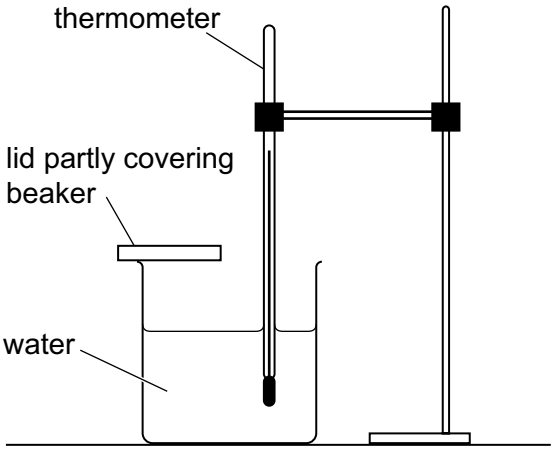


Fig. 1.1

(a)

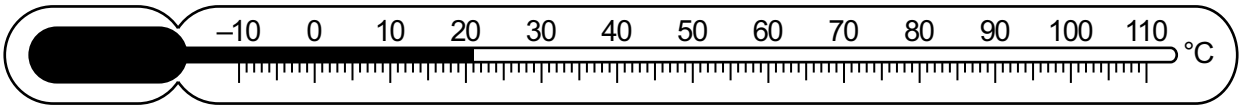


Fig. 1.2

Read and record the room temperature θ_R, shown on the thermometer in Fig. 1.2.

θ_R = ... [1]

(b) The student pours 100 cm^3 of hot water into a beaker. She places lid **A** on the beaker. This leaves half of the top of the beaker uncovered, as shown in Fig. 1.3.

She records the temperature of the water in the beaker and immediately starts a stopwatch. She records the temperature θ of the water every 30 s. Her readings are shown in Table 1.1.

She repeats the procedure using lid **B**. This leaves a quarter of the top of the beaker uncovered, as shown in Fig. 1.4.

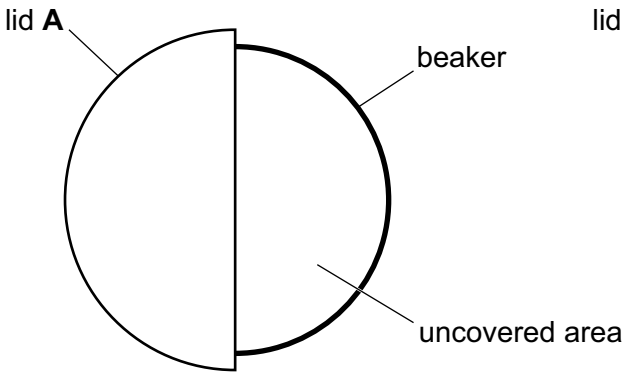


Fig. 1.3

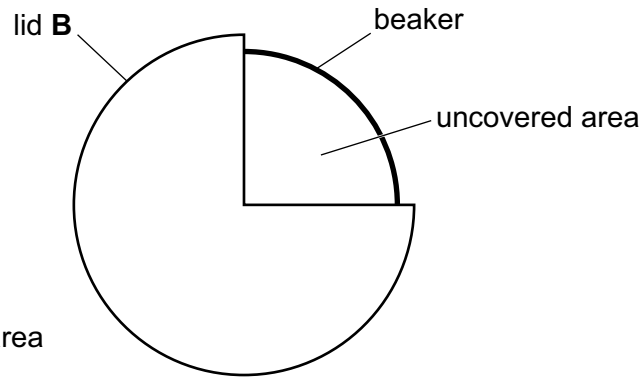


Fig. 1.4

Complete the headings row in Table 1.1.
Complete the time *t* column in Table 1.1.

Table 1.1

	beaker with lid **A**	beaker with lid **B**
t /	θ /	θ / .....
0	80.0	81.0
	77.0	79.0
	74.5	77.5
	72.5	76.0
	70.5	75.0
	69.0	74.0
	68.0	73.5

[2]

(c) Describe a precaution that should be taken to ensure that the temperature readings are as accurate as possible in the experiment.

.....

..... [1]

(d) **(i)** Write a conclusion to this experiment, stating for which lid the rate of cooling is greater. Justify your answer with reference to the results.

.....

.....

.....

..... [2]

(ii) Suggest a change to the **apparatus** that produces a greater difference between the rates of cooling for lid **A** and lid **B**. Explain why the change produces a greater difference.

change .....

.....

explanation .....

.....

[2]

(e) Another student thinks that the cooling rate is directly proportional to the percentage of the surface area uncovered. He draws a graph of cooling rate against the percentage of uncovered area to investigate this.

Describe how his graph line shows whether the rate of cooling and the percentage of uncovered surface area are directly proportional.

.....

.....

..... [2]

(f) Students in other countries are doing the same experiment.

State **one** factor they must keep the same to obtain similar readings.

.....

..... [1]

[Total: 11]

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2 A student is investigating a resistance wire. She uses the circuit shown in Fig. 2.1.

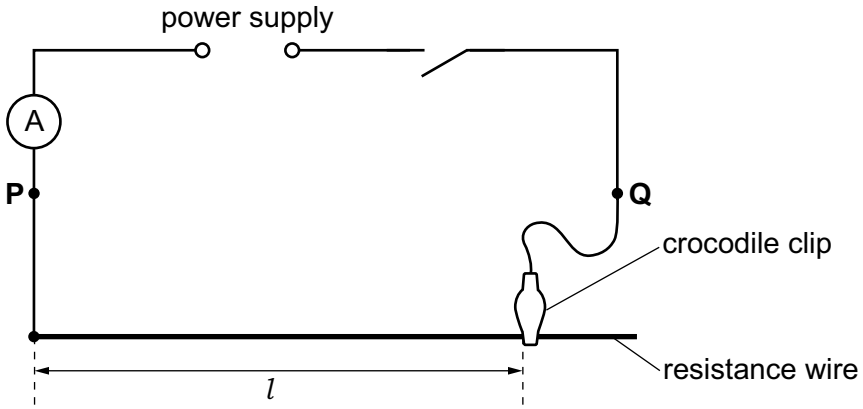


Fig. 2.1

(a) (i) On Fig. 2.1, draw a voltmeter connected to measure the potential difference (p.d.) V across terminals **P** and **Q**. [1]

(ii) The student connects the crocodile clip to a length l = 90.0 cm of the resistance wire and measures the potential difference V across terminals **P** and **Q** and the current I in the circuit.

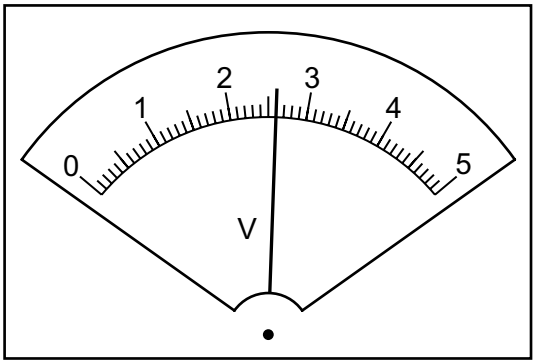


Fig. 2.2

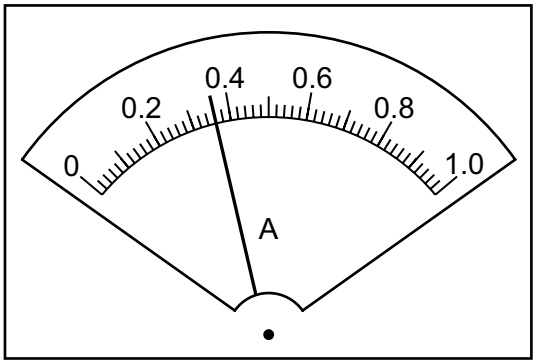


Fig. 2.3

Read, and record in Table 2.1, the values of V and I shown on the meters in Fig. 2.2 and Fig. 2.3. [2]

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(b) The student then connects the crocodile clip to lengths l = 60.0 cm and l = 40.0 cm of the resistance wire. She measures the potential difference V across terminals **P** and **Q** and the current I in the circuit. Her readings are shown in Table 2.1.

Complete the column headings in Table 2.1.

Table 2.1

l / cm	V /	I /	R / Ω	$\frac{R}{l}$ / $\frac{\Omega}{\text{cm}}$
90.0				
60.0	2.5	0.49		
40.0	2.3	0.74		

[1]

(c) **(i)** Calculate, and record in Table 2.1, the resistance R of each length l of the wire.
Use the readings from the table and the equation $R = \frac{V}{I}$.

[2]

(ii) Calculate, and record in Table 2.1, the value of $\frac{R}{l}$ for each length l of the wire.

[1]

(d) Another student suggests that the values of $\frac{R}{l}$ for each length of wire should be the same.

State whether the results support this suggestion.

Justify your statement with reference to values from the results.

statement .....

justification .....

.....

.....

[1]

(e) Suggest **one** difficulty which explains why different students, doing the experiment carefully with the same equipment, may **not** obtain identical results.

.....

.....

..... [1]

(f) A student finds that during the experiment, the wire becomes hot because there is a high current.

He decides to use a variable resistor to prevent this.

(i) Draw an **X** on the circuit in Fig. 2.1 to show where a variable resistor is connected for this purpose in the experiment.

[1]

(ii) In the space below, sketch the circuit symbol for a variable resistor.

[1]

[Total: 11]

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3 A student investigates the magnification produced by a converging lens.

He is using the apparatus shown in Fig. 3.1.



Fig. 3.1

(a) The illuminated object consists of a triangular-shaped hole in a piece of card. Fig. 3.2 shows, full size, the illuminated object.

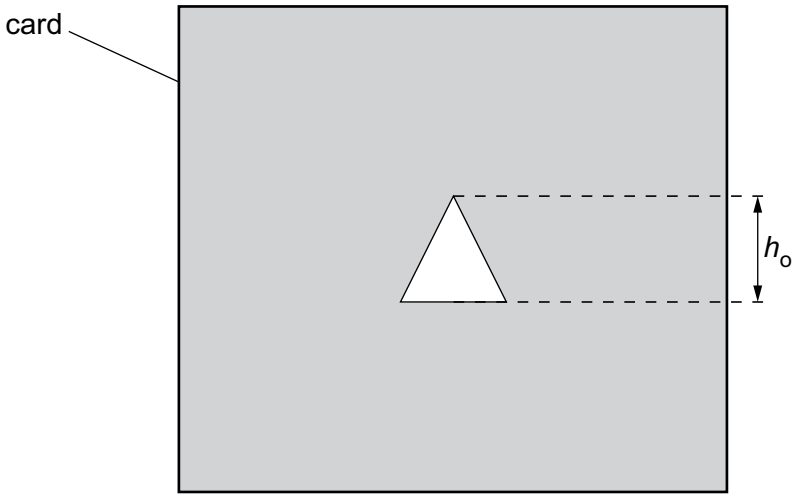


Fig. 3.2

Measure and record the height h_O of the triangular-shaped hole.

h_O = ... cm [1]

(b) The distance between the illuminated object and the centre of the lens is set to u = 20.0 cm. The screen is moved until a focused image of the illuminated object is seen, as shown in Fig. 3.3.

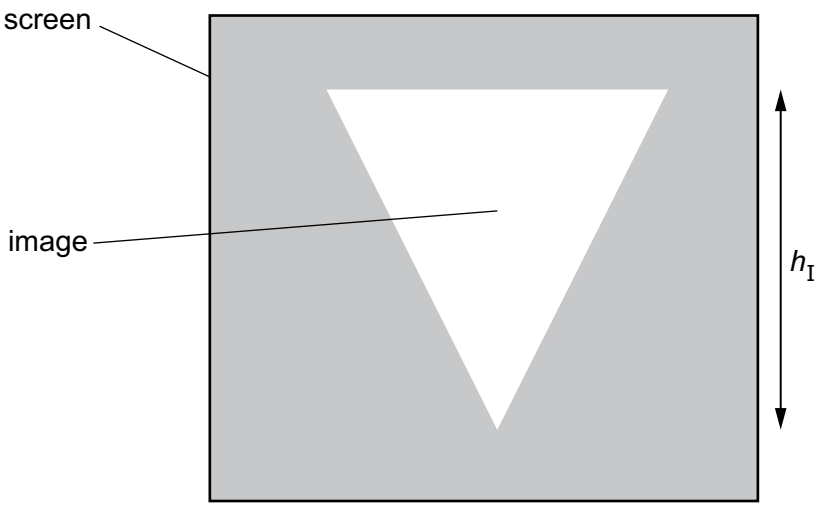


Fig. 3.3

The student repeats the procedure for u = 30.0 cm, u = 40.0 cm, u = 50.0 cm and u = 60.0 cm. His results are shown in Table 3.1.

Measure, and record in the first row of Table 3.1, the height h_I of the image.

Using your results from **(a)** and the equation $M = \frac{h_O}{h_I}$, calculate a value M and record this value in Table 3.1.

Table 3.1

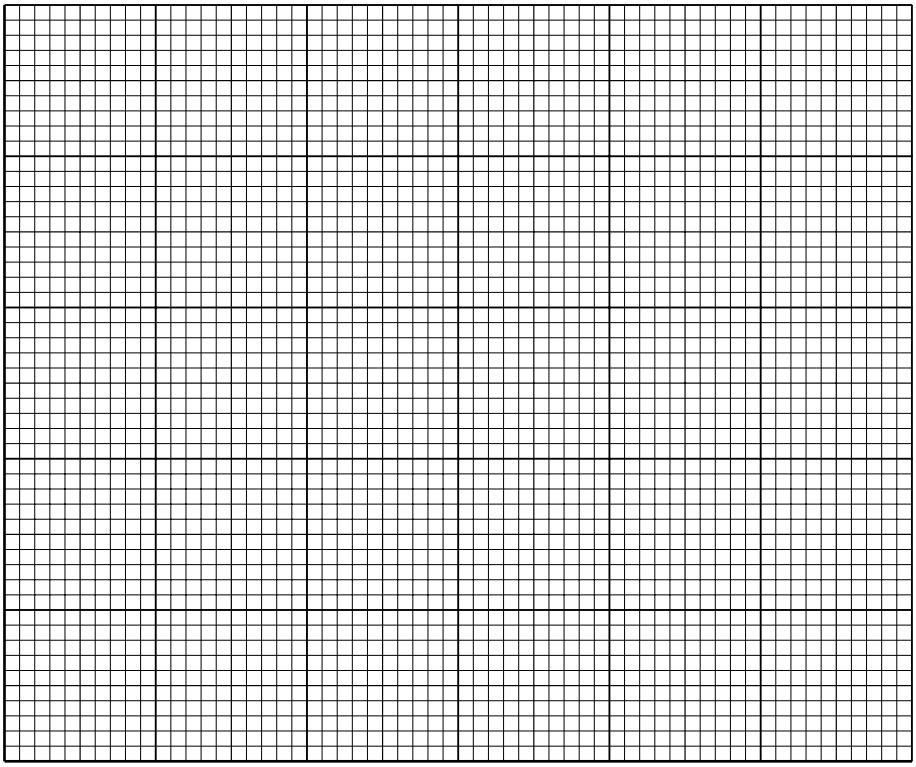
u / cm	h_I / cm	M
20.0		
30.0	1.5	0.93
40.0	0.9	1.6
50.0	0.6	2.3
60.0	0.5	2.8

[2]

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(c) Plot a graph of u / cm (y-axis) against M (x-axis).

You do **not** have to start your axes at the origin (0, 0).



[4]

(d) Determine the gradient G of the graph.

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

G = ...[2]

(e) Describe **one** difficulty that might be experienced when measuring the height of the image h_I.

Suggest an improvement to the **apparatus** to reduce this difficulty.

difficulty .....

.....

improvement .....

.....

[2]

[Total: 11]

4 A student is investigating the factors that affect the size of the crater (hole) a ball makes when it is dropped into sand.

Plan an experiment to investigate **one** factor that affects the size of the crater.

The apparatus available includes:

metal balls of different sizes
a tray of dry sand.

Write a plan for the experiment.

In your plan, you should:

- state which factor is being investigated
- state a key variable to keep constant
- list any additional apparatus needed
- explain briefly how to do the experiment, including what is measured and how this is done
- state how to obtain reliable results for this experiment
- suggest a suitable graph to be drawn from the results.

You may draw a diagram if it helps to explain your plan.

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[7]

[Total: 7]

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