Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1926427520

PHYSICS **0625/63**

Paper 6 Alternative to Practical **May/June 2014**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **13** printed pages and **3** blank pages.

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1 The IGCSE students are carrying out measurements in order to determine the density of water using two methods.

(a) Method 1

Fig. 1.1 shows an empty measuring cylinder on a balance and Fig. 1.2 shows the measuring cylinder containing water.

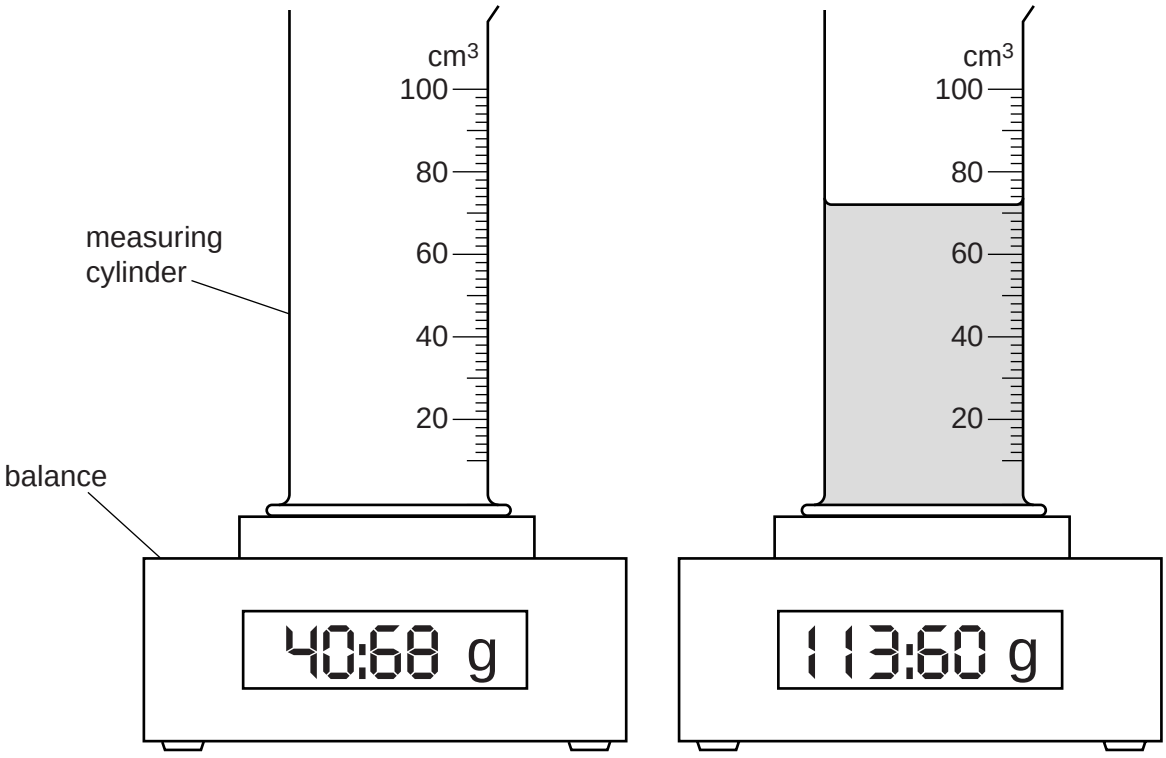


Fig. 1.1 **Fig. 1.2**

(i) Read and record the mass m_1 of the empty measuring cylinder.

m_1 = ... g

(ii) Read and record the mass m_2 of the measuring cylinder and water.

m_2 = ... g

(iii) Read and record the volume V_1 of water, as shown in Fig. 1.2.

V_1 = ... cm^3

(iv) Calculate a value ρ_1 for the density of water using your readings from **(a)(i)**, **(ii)** and **(iii)** and the equation $\rho_1 = \frac{m_2 - m_1}{V_1}$. Give an appropriate unit.

ρ_1 = ...
[3]

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(b) Method 2

In this method, a test-tube is floated in the water left in the measuring cylinder from Method 1 and the change in water level is measured.

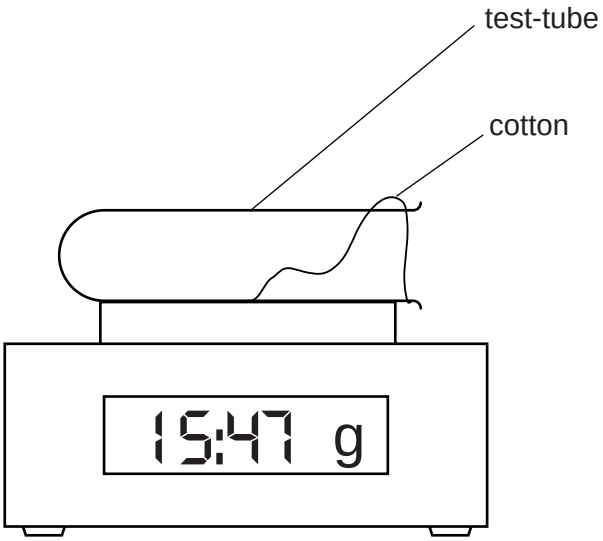


Fig. 1.3

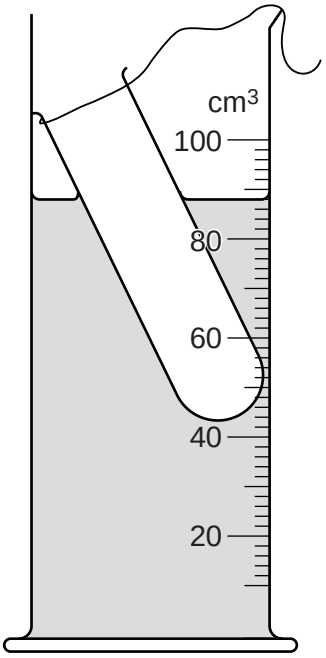


Fig. 1.4

(i) Read and record the mass m_3 of the test-tube, as shown in Fig. 1.3.

m_3 = ...

(ii) The test-tube is carefully lowered, by means of a piece of cotton, into the measuring cylinder until it floats as shown in Fig. 1.4. Read and record the new water level V_2 in the measuring cylinder.

V_2 = ...

(iii) Using your results from **(a)(iii)** and **(b)(ii)**, calculate V_3, the change in the water level, where $V_3 = (V_2 - V_1)$.

V_3 = ...

(iv) Calculate and record a value ρ_2 for the density of water using the equation $\rho_2 = \frac{m_3}{V_3}$.

ρ_2 = ...
[3]

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(c) Calculate an average value ρ_{AV} for the density of water using your results from **(a)(iv)** and **(b)(iv)**.

ρ_{AV} = ... [1]

(d) Suggest a precaution that should be taken in **Method 1** to ensure that the volume reading is as accurate as possible.

.....

.....

.....[1]

(e) Suggest a possible source of experimental inaccuracy in **Method 2**, other than with the volume reading.

State and explain the effect that this would have on your value for ρ_2.

suggestion .....

.....

effect and explanation .....

.....
[2]

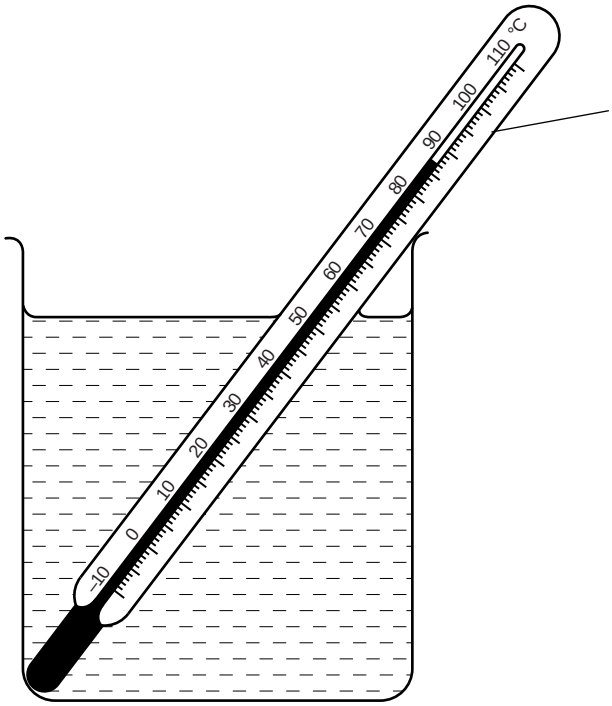
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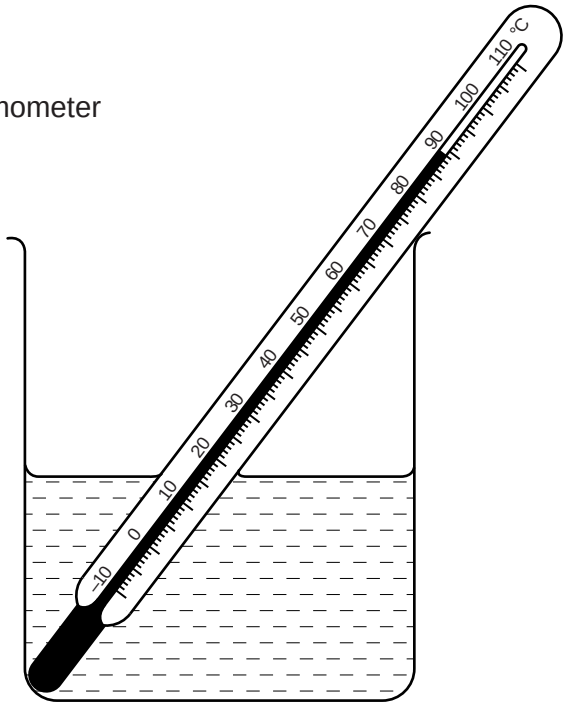
2 The IGCSE class is investigating the cooling of water.

The apparatus is shown in Figs. 2.1 and 2.2.



beaker A

Fig. 2.1



beaker B

Fig. 2.2

(a) Approximately 200 cm^3 of hot water is poured into beaker **A** and, after a short while, the thermometer reading rises to the value shown in Fig. 2.1.

Read, and record in the top row of Table 2.1, this temperature θ at time $t = 0$.

(b) Approximately 100 cm^3 of hot water is poured into beaker **B**. The thermometer reading rises to the value shown in Fig. 2.2.

Read, and record in the top row of Table 2.1, this temperature θ at time $t = 0$.

(c) The temperatures θ of the thermometer in each experiment at times t = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s are shown in Table 2.1.

Complete the column headings and record the values of t in the table.

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Table 2.1

	beaker **A** with approximately 200 cm^3 of water	beaker **B** with approximately 100 cm^3 of water
t /	θ /	θ /
	85.0	86.0
	83.0	83.0
	81.5	80.5
	80.0	78.0
	78.5	75.5
	77.5	74.0

[3]

(d) Describe a similarity in the patterns of temperature change of the two volumes of water, apart from the fact that the temperature of each decreases.

.....

.....

.....[1]

(e) A student suggests that the rate of cooling is less for a larger volume of water than for a smaller volume of water.

State whether the readings support this suggestion. Justify your answer by referring to the readings.

statement .....

justification .....

.....

.....

[2]

(f) Another IGCSE student wants to repeat the experiment in order to check the results. Suggest two factors that should be kept the same in order for the comparison to be fair.

1. .....

.....

2. .....

.....

[2]

[Total: 8]

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[Turn over

3 Some IGCSE students are investigating resistance using a set of wires.

The circuit they are using is shown in Fig. 3.1.

They measure the potential difference and current for three wires **A**, **B** and **C** inserted in turn between the crocodile clips. All three wires have the same diameter and are made from the same material.

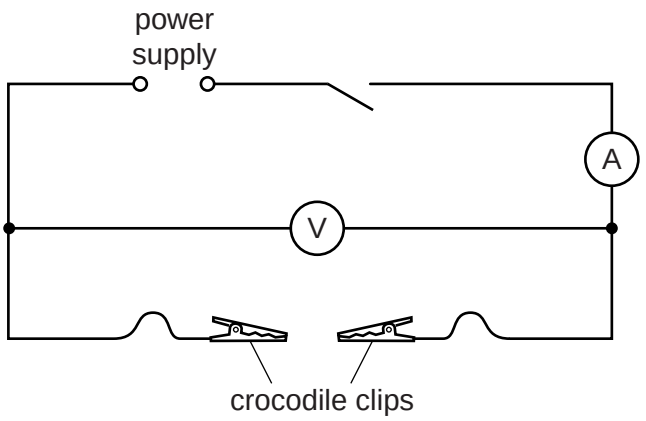


Fig. 3.1

(a) The crocodile clips are connected to the ends of wire **A** and the circuit is switched on. The readings on the voltmeter and ammeter are shown in Fig. 3.2.

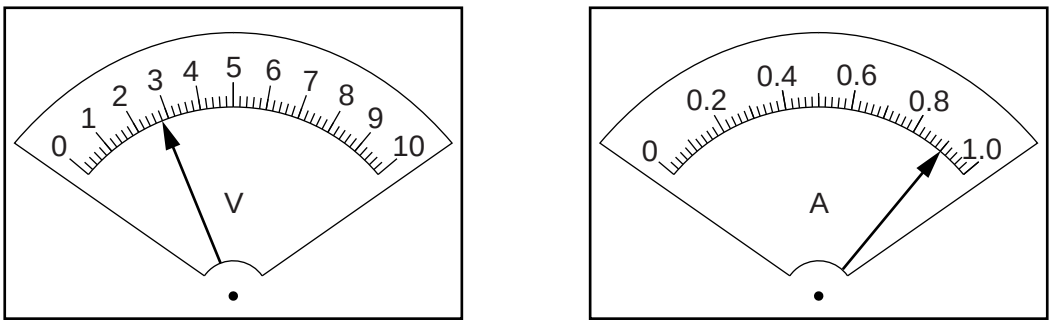


Fig. 3.2

Read, and record in Table 3.1, the potential difference *V* and the current *I*.

Table 3.1

wire	length / cm	*V* /	*I* /
A	90.0		
B	60.0	2.6	1.33
C	30.0	2.3	2.31

[3]

(b) The procedure is repeated for wire **B** and for wire **C** and the readings are as shown in the table.

Complete the column headings in the table.

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(c) **(i)** Calculate and record the resistance R of each wire, using the readings from Table 3.1 and the equation $R = \frac{V}{I}$.

resistance of wire **A**, R_A = ...

resistance of wire **B**, R_B = ...

resistance of wire **C**, R_C = ...

[2]

(ii) One student suggests that R_A should be equal to $(R_B + R_C)$.

State whether the findings support this suggestion. Justify your answer by reference to the results.

statement .....

.....

justification .....

.....

.....

[1]

(d) One problem encountered in this type of investigation is that resistance can be affected by a rise in temperature of the wire.

Suggest one way in which this effect could be kept to a minimum.

.....

.....

.....[1]

[Total: 7]

4 The IGCSE students are investigating the effect of an electromagnet.

Fig. 4.1 shows part of the equipment they are using.

The current *I* in the coil of the electromagnet is gradually increased and the reading *m* on the balance is recorded.

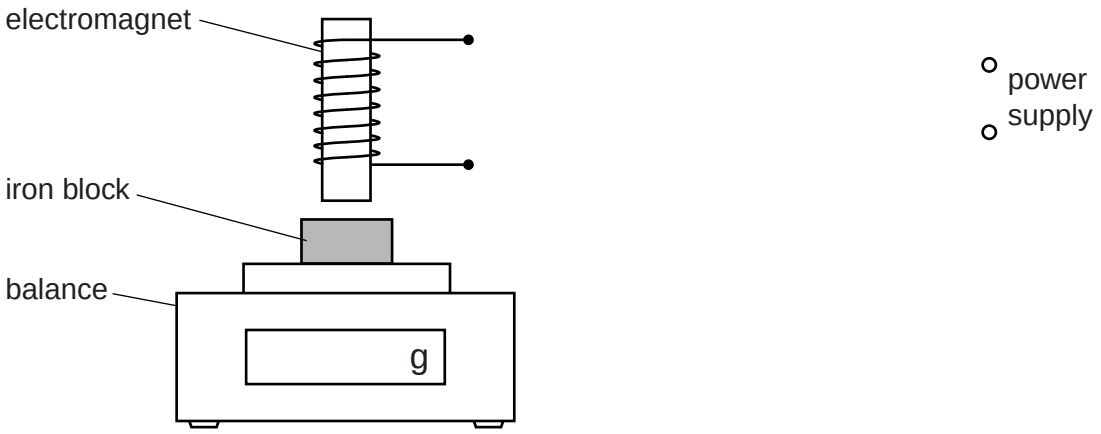


Fig. 4.1

(a) The students are using a variable resistor (rheostat) to change the current in the series circuit that is connected to the electromagnet.

On Fig. 4.1, use standard symbols to draw a circuit containing a variable resistor and an ammeter connected in a way that would be suitable for the experiment. [2]

(b) The readings are shown in Table 4.1.

Table 4.1

I / A	*m* / g	*M* / g
0.00	61.37	0.00
1.00	57.25	4.12
2.00	53.13	
3.00	49.01	

(i) At each current, a value *M* is calculated.

$M = m_0 - m$, where $m_0 = 61.37$ g, the balance reading when $I = 0.00$ A.

Complete the table by calculating and recording *M* for currents of 2.00 A and 3.00 A. [1]

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(ii) State whether the results suggest that M is proportional to I.

Justify your statement with reference to the results.

statement .....

.....

justification .....

.....

.....

[2]

[Total: 5]

5 An IGCSE student is investigating shadows.

The apparatus she is using is shown in Fig. 5.1.
The object and the screen are square, with dimensions as shown in Fig. 5.1.

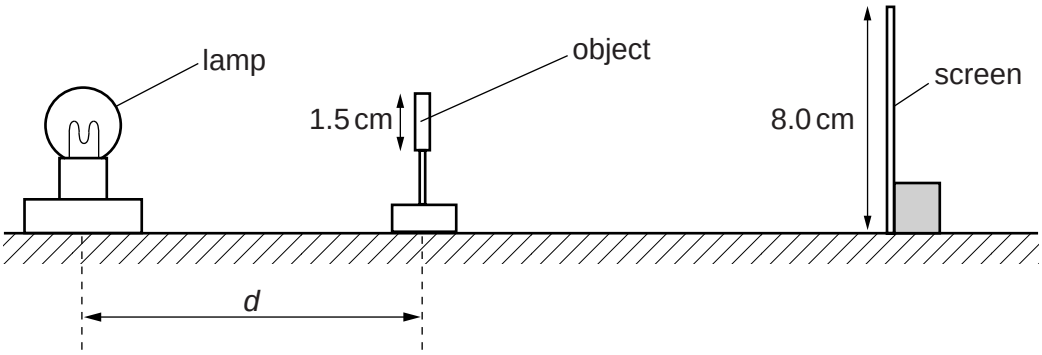


Fig. 5.1

She places the object at a distance *d* from the centre of the lamp so that it produces a shadow on the screen.

For various values of *d*, she measures the width *w* and height *h* of the shadow and records them in Table 5.1.

For each distance *d*, she calculates a value *s*, the average side length of the shadow, using her readings for *w* and *h* and the equation $s = \frac{w + h}{2}$.

(a) Fig. 5.2 shows the shadow produced on the screen when *d* = 35 cm. The shadow and screen are shown full size.

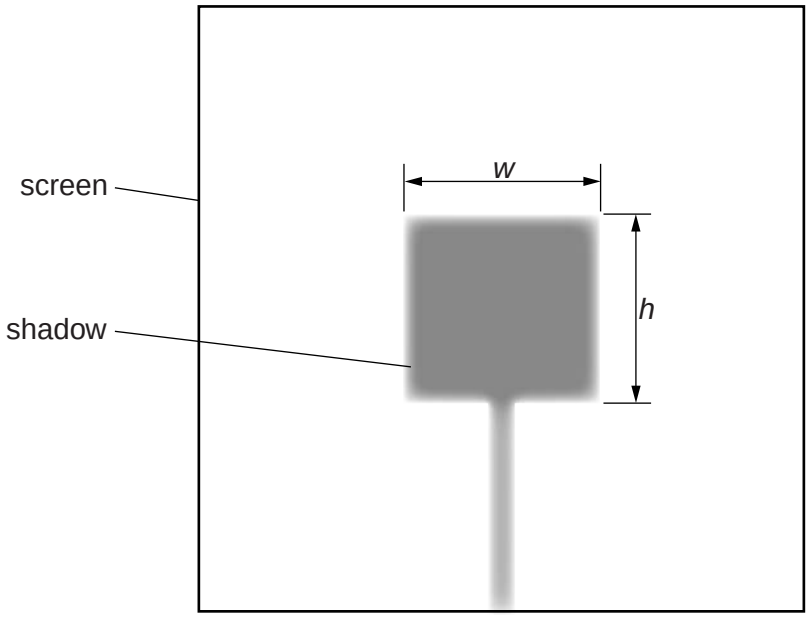


Fig. 5.2

(i) Measure, and record in Table 5.1, the width *w* and the height *h* of the shadow.

Table 5.1

d / cm	*w* / cm	*h* / cm	*s* / cm
55	1.7	1.7	1.7
45	2.0	2.0	2.0
35			
25	3.8	3.9	3.9
20	4.4	4.6	4.5
15	5.8	6.2	6.0

[2]

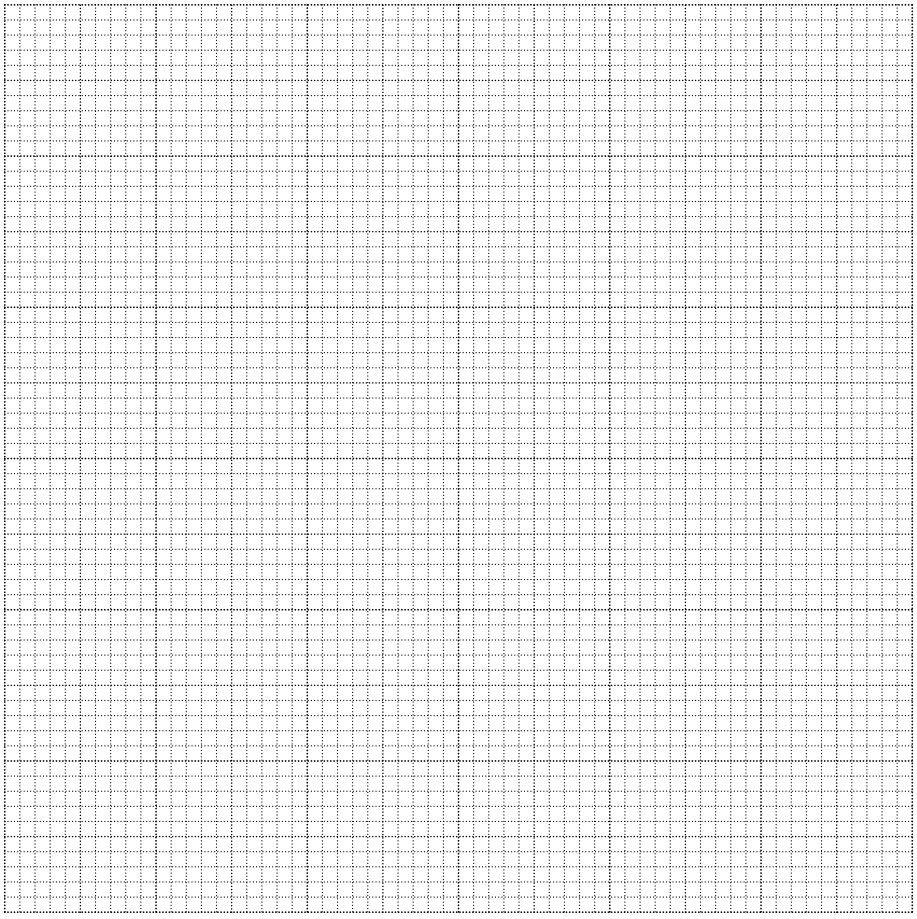
(ii) Calculate, and record in the table, the value of *s* when *d* = 35 cm.

(iii) The object is square in shape. State a practical reason why it is useful to calculate *s* rather than just rely on *w* or *h* to show the size of the shadow.

.....

.....[1]

(b) Plot a graph of *s* / cm (*y*-axis) against *d* / cm (*x*-axis).



[5]

(c) A value of d = 20 cm has been inserted between d = 25 cm and d = 15 cm. This does not follow the pattern of the gaps of 10 cm between the other distances.

Explain why it is useful to have this value when drawing the line on the graph.

.....

.....[1]

(d) A student suggests that the distance between the lamp and the object in this experiment should be no less than 15 cm.

From your observations of the readings and the apparatus being used, give a reason why this is a sensible suggestion.

.....

.....[1]

[Total: 10]

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