UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3068816922

PHYSICS **0625/63**

Paper 6 Alternative to Practical **May/June 2013**

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.

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[Turn over

1 Some IGCSE students are investigating the cooling of water.

For Examiner's Use

Fig. 1.1 shows how the apparatus is set up.

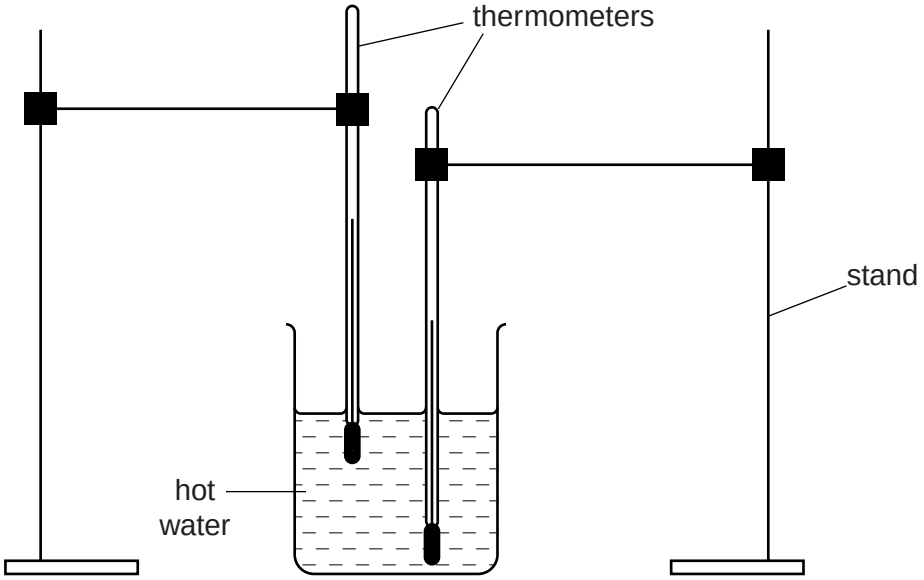


Fig. 1.1

(a) A thermometer is placed on the bench so that room temperature can be measured.

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

θ_R = ...[1]

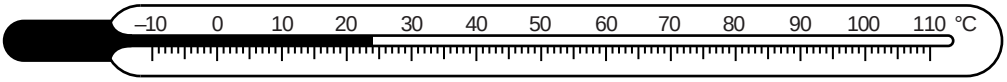


Fig. 1.2

(b) A student pours hot water into the beaker so that the level is as shown in Fig. 1.1.

In Table 1.1, he then records the temperatures θ every minute as the water cools until time t = 6 minutes.

Complete the column headings and complete the time column in Table 1.1. [2]

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Table 1.1

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	thermometer bulb near the bottom of the beaker	thermometer bulb near the surface of the water
t /	θ /	θ /
0	82.0	76.0
	79.5	74.0
	77.0	72.0
	75.0	70.0
	73.0	68.0
	70.5	66.0
	69.0	64.5

(c) State in which position of the thermometer bulb the average rate of cooling is the greater.

Justify your answer by referring to the results.

position .....

justification .....

.....

.....

[2]

(d) What precaution do the results suggest should be taken when measuring the temperature of a liquid?

Explain how the results show that this is a sensible precaution.

precaution .....

.....

explanation .....

.....

.....

[2]

(e) A student in a different school wants to repeat the experiment in order to check the results.

For Examiner's Use

Suggest two experimental conditions which should be kept the same.

1. .....

.....

2. .....

.....

[2]

[Total: 9]

2 The IGCSE class is investigating the oscillation of a pendulum.

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The apparatus is set up as shown in Fig. 2.1.

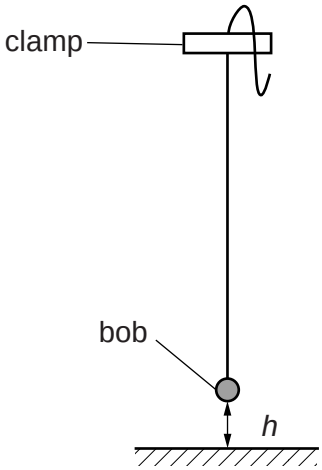


Fig. 2.1

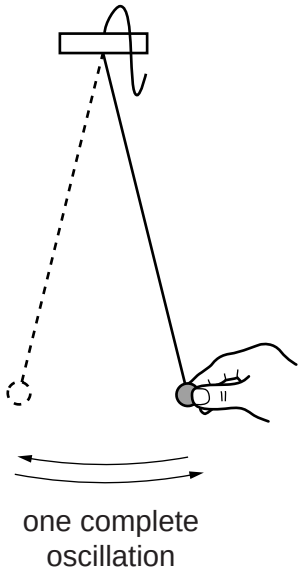


Fig. 2.2

The height *h* of the pendulum bob above the bench is measured and recorded.

This is repeated, to obtain a total of five different values of *h*, by shortening the string of the pendulum but without changing the height of the clamp.

For each value of *h*, the pendulum bob is pulled to one side by a small distance, as shown in Fig. 2.2.

The pendulum is then released and the time *t* for 10 complete oscillations is measured and recorded.

(a) Describe a precaution which the IGCSE students might have taken in order to measure *h* as accurately as possible. You may draw a diagram.

.....

.....

.....[1]

(b) Figs. 2.3 to 2.7 are scale diagrams showing the height *h* of the pendulum bob above the bench for each of the five experiments.

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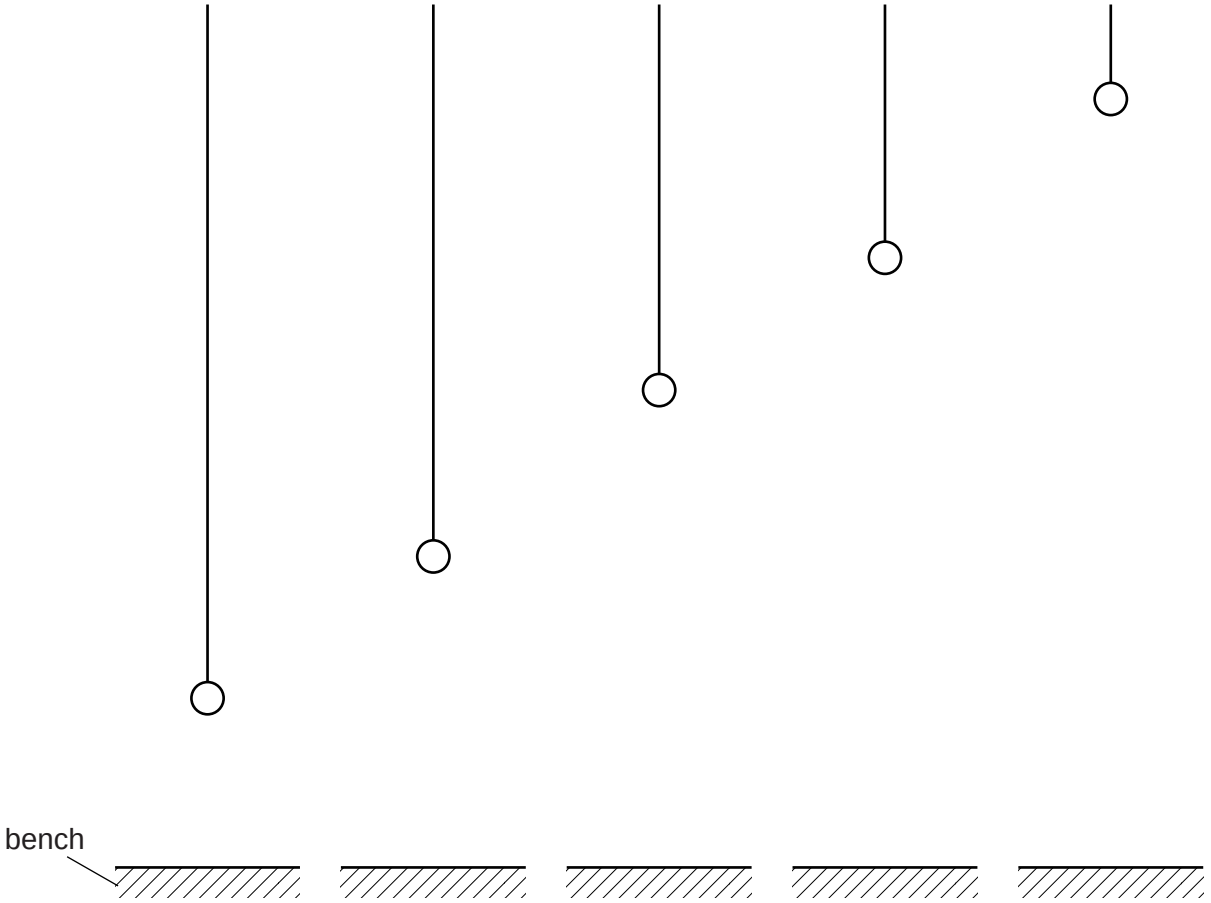


Fig. 2.3 **Fig. 2.4** **Fig. 2.5** **Fig. 2.6** **Fig. 2.7**

(i) Measure, and record in Table 2.1, the height *h* in each experiment.

(ii) The diagrams are drawn to 1/5 scale.

Calculate, and record in Table 2.1, the actual heights *H* of the pendulum bob above the bench. [2]

Table 2.1

	h/cm	*H*/cm	*t*/s	*T*/s	T^2/s^2
Fig. 2.3			14.01		
Fig. 2.4			12.39		
Fig. 2.5			10.85		
Fig. 2.6			8.93		
Fig. 2.7			6.30		

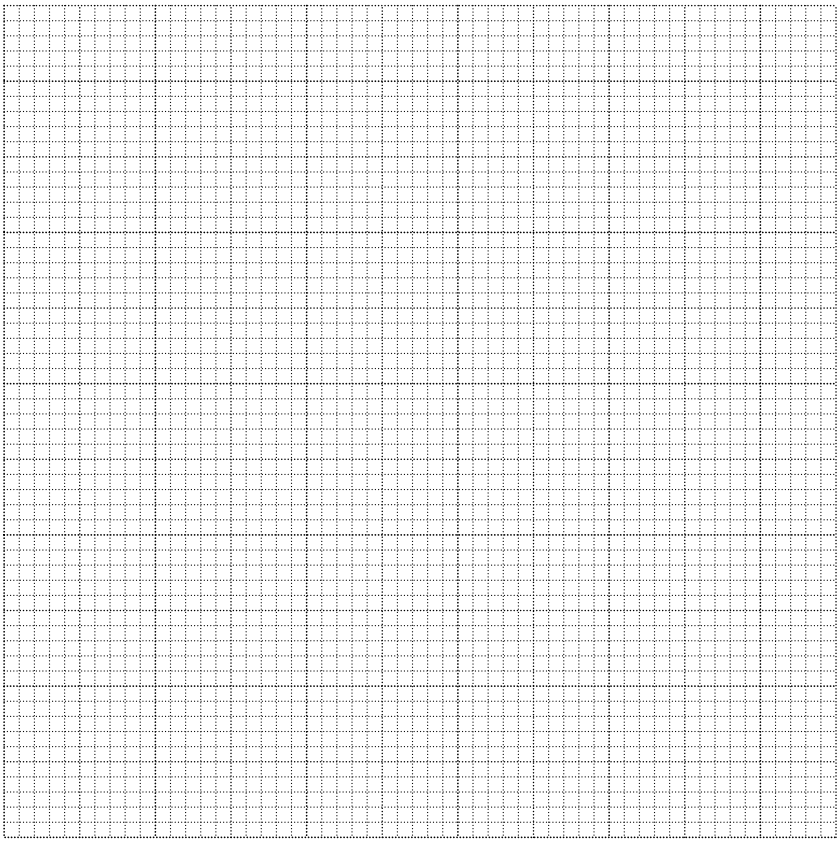
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(c) **(i)** For each value of height h, calculate the time T for one complete oscillation, using the equation $T = \frac{t}{10}$. Record these values in Table 2.1.

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(ii) Calculate the values of T^2 and record these in the table. [1]

(d) Plot a graph of T^2/s^2 (y-axis) against H/cm (x-axis).



[4]

(e) Determine the gradient G of the graph.

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

G = ...

[1]

(f) One of the students wishes to carry out the experiment again to obtain results which are more reliable.

For Examiner's Use

Describe one change she might make to the method to achieve this.

.....

.....

.....[1]

[Total: 10]

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3 Students in the IGCSE class are investigating the resistance of electric circuits with parallel branches.

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The apparatus has been set up as shown in Fig. 3.1.

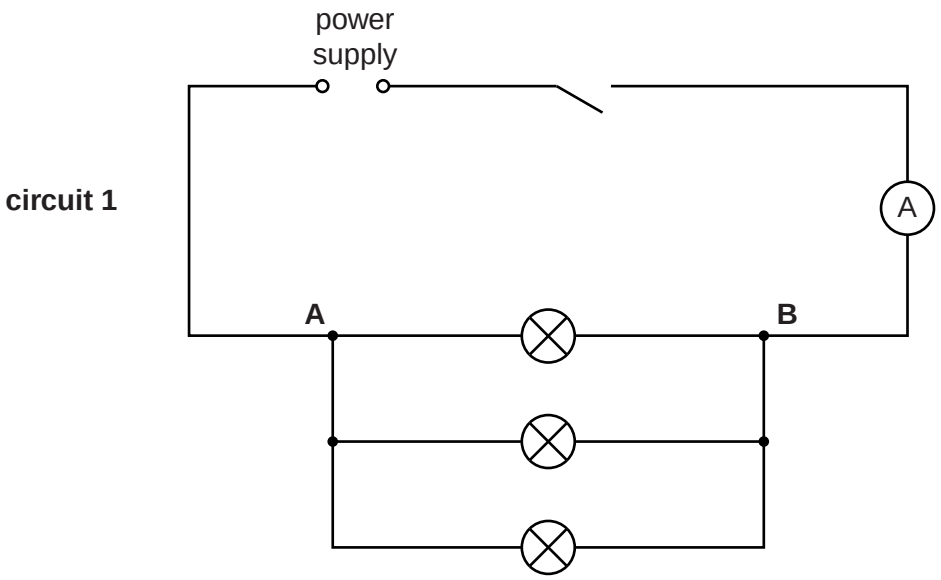


Fig. 3.1

The current in the circuit and the potential difference across the combination of lamps connected between **A** and **B** are to be measured.

(a) On Fig. 3.1, draw the symbol for a voltmeter, connected to measure the potential difference *V* between **A** and **B**.

[1]

For Examiner's Use

(b) The values of potential difference *V* across AB and current *I* for **circuit 1** are recorded in Table 3.1.

The lamps are then reconnected as shown in Fig. 3.2 and then Fig. 3.3 and the experiment is repeated.

circuit 2

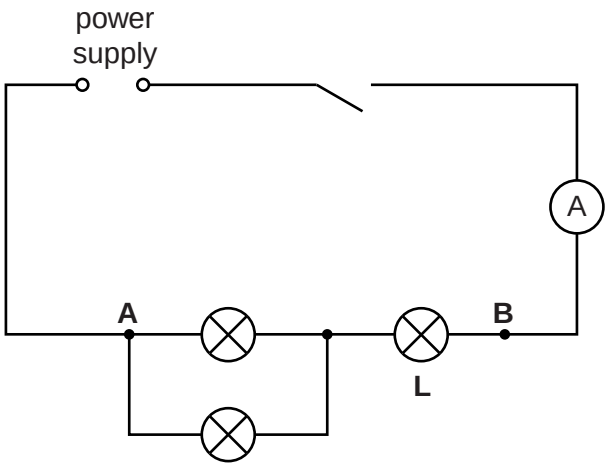


Fig. 3.2

circuit 3

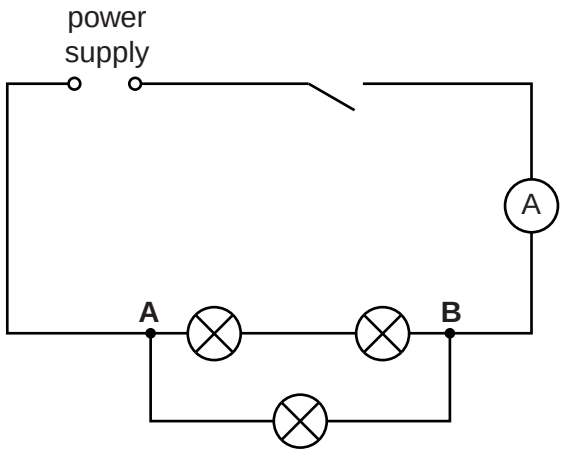


Fig. 3.3

(i) Calculate, and record in the table, the total resistance *R* of each combination of lamps, using the equation $R = \frac{V}{I}$. [2]

(ii) Complete the column headings in the table. [1]

Table 3.1

circuit	*V* /	*I* /	*R* /
1	1.81	0.70	
2	1.76	0.22	
3	1.72	0.44	

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(c) If each of the lamps had the same resistance, the total resistance of the lamps in circuit 3 would be twice the total resistance of the lamps in circuit 1.

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State whether the results in the table show this to be the case. Justify your answer by reference to the results.

statement .....

.....

justification .....

.....

.....

.....

[2]

(d) An IGCSE student wants to measure the potential difference across the lamp marked **L** in **circuit 2**.

On the diagram for **circuit 2**, Fig. 3.2, show how a voltmeter should be connected to measure this potential difference. [1]

[Total: 7]

4 The IGCSE class has been asked to determine the density of an object.

For Examiner's Use

One student is finding the volume of the object using a measuring cylinder containing water in which the object is to be placed.

The measuring cylinder containing only water is shown in Fig. 4.1.

The measuring cylinder after the object has been placed in the water is shown in Fig. 4.2.

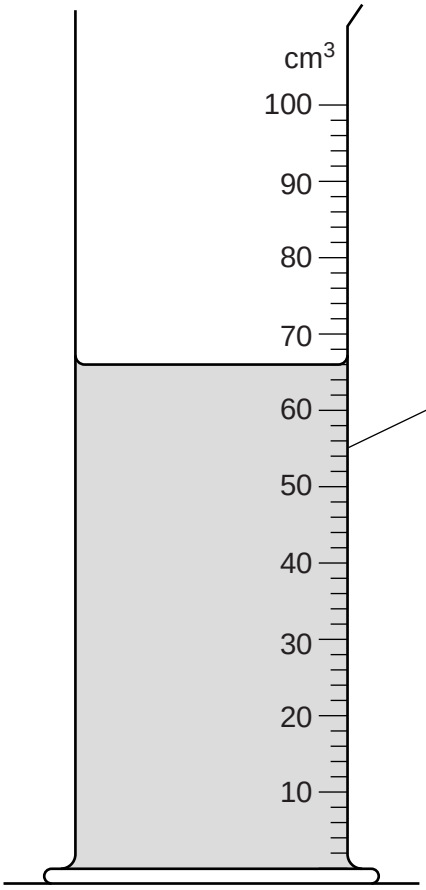


Fig. 4.1

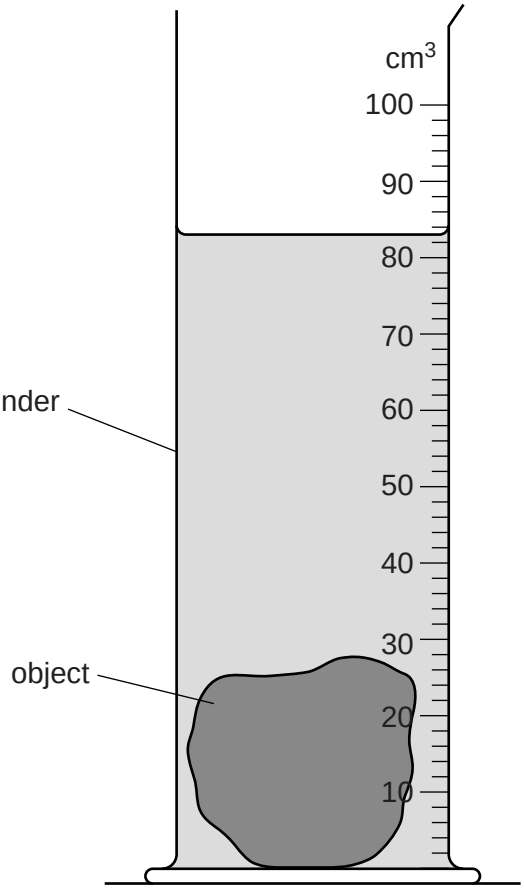


Fig. 4.2

(a) (i) Read and record the volume V_1 of the water in the measuring cylinder shown in Fig. 4.1.

V_1 = ...

(ii) Read and record the volume V_2 of the water in the measuring cylinder shown in Fig. 4.2.

V_2 = ...
[2]

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(b) The student then uses a balance to measure the mass *m* of the object, as shown in Fig. 4.3.

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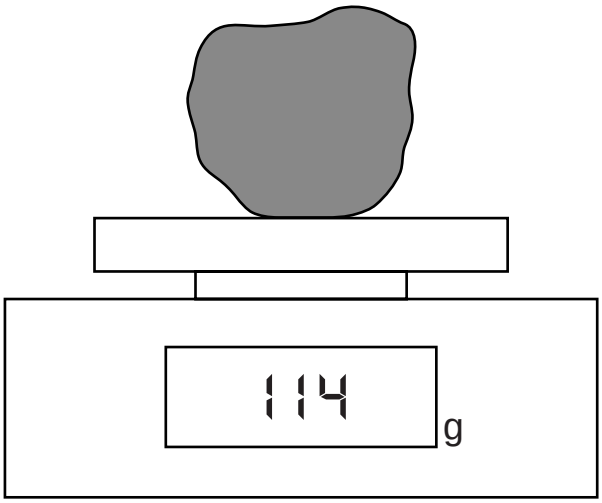


Fig. 4.3

Calculate the density of the object using the equation

$$\text{density} = \frac{m}{(V_2 - V_1)} .$$

density = ...[2]

(c) Suggest a possible practical cause of inaccuracy in this method.

.....

.....

.....[1]

[Total: 5]

5 IGCSE students are investigating the magnification produced by a converging lens.

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The apparatus is set up as shown below.

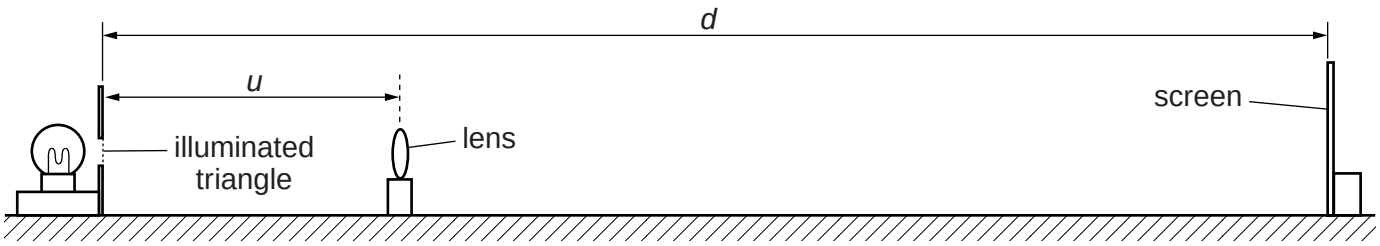


Fig. 5.1

The screen is moved until a sharp image of the object is seen on the screen.

(a) (i) On Fig. 5.1, carefully measure *u* and record the value.

u = ...

(ii) On Fig. 5.1, carefully measure *d*, the distance between the illuminated triangle and the screen when the image is sharp, and record the value.

d = ...

(iii) Calculate a value *m* for the magnification, using your answers to **(a)(i)** and **(a)(ii)**, and the equation $m = \frac{d - u}{u}$.

m = ...
[2]

(b) The illuminated triangle is shown in Fig. 5.2. The image of the triangle seen on the screen is shown in Fig. 5.3.

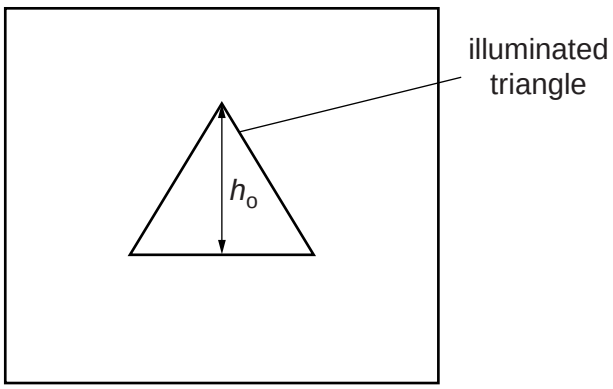


Fig. 5.2

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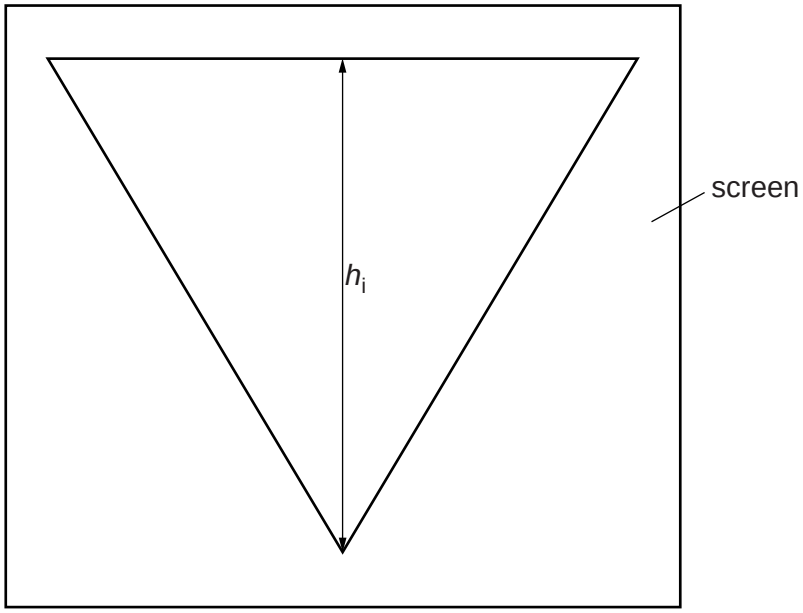


Fig. 5.3

(i) Measure h_o, the height of the illuminated triangle, as shown in Fig. 5.2, and record the value.

h_o = ...

(ii) Measure h_i, the height of the image on the screen, as shown in Fig. 5.3, and record the value.

h_i = ...

(iii) Calculate M, another value for the magnification, using your answers to **(b)(i)** and **(b)(ii)**, and the equation $M = \frac{h_i}{h_o}$.

M = ...
[2]

(c) A student says that the values of m and M should be the same.

State whether your findings support this. Justify your answer by reference to your results for m and M.

statement .....

.....

justification .....

.....

.....
[2]

(d) (i) Describe one difficulty the students might have found when measuring the height of the image on the screen.

Suggest a solution for the problem.

difficulty .....

.....

solution .....

.....
[2]

(ii) Suggest one further precaution which should be taken to make the experiment reliable.

.....

.....

.....[1]

[Total: 9]

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