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0625/06

May/June 2007

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 work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE ON ANY BARCODES.

Answer **all** questions.

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.

For Examiner's Use	
1	
2	
3	
4	
5	
Total	

This document consists of **10** printed pages and **2** blank pages.

- 1 The IGCSE class is investigating the temperature changes that occur when hot and cold water are mixed.

- (a) A student pours 50cm^3 of water into a beaker. He then measures the temperature θ_1 of the water in the beaker. Write down the value of θ_1 shown on the thermometer in Fig. 1.1.

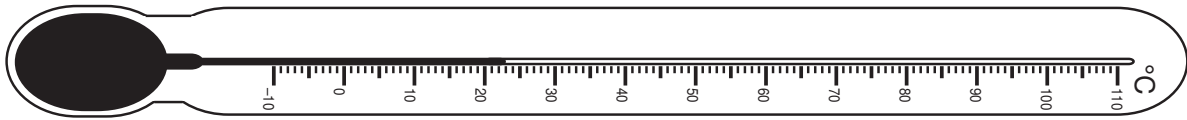


Fig. 1.1

$\theta_1 = \dots\dots\dots$ [2]

- (b) The student then measures the temperature θ_2 of some hot water. He pours 50cm^3 of this hot water into the beaker of water at room temperature. He then records the temperature θ_3 of the water in the beaker. His readings are

$$\theta_2 = 76^\circ\text{C},$$

$$\theta_3 = 42^\circ\text{C}.$$

Calculate

- (i) the temperature rise of the cold water, $\dots\dots\dots$
 (ii) the temperature fall of the hot water. $\dots\dots\dots$

[2]

- (c) A theoretical calculation based on the equation

$$\text{thermal energy lost by hot water} = \text{thermal energy gained by cold water}$$

predicts a higher value for the temperature θ_3 than the value that is obtained by this experiment. Suggest

- (i) a practical explanation for the difference in values,
 $\dots\dots\dots$
 (ii) two practical improvements that you could make to the procedure for this experiment to obtain a result that is closer to the theoretical result.

1. $\dots\dots\dots$

2. $\dots\dots\dots$ [3]

[Total: 7]

- 2 A student is investigating the position of a sheet of card that is hanging from a pivot.

Fig. 2.1 shows the apparatus drawn full size.

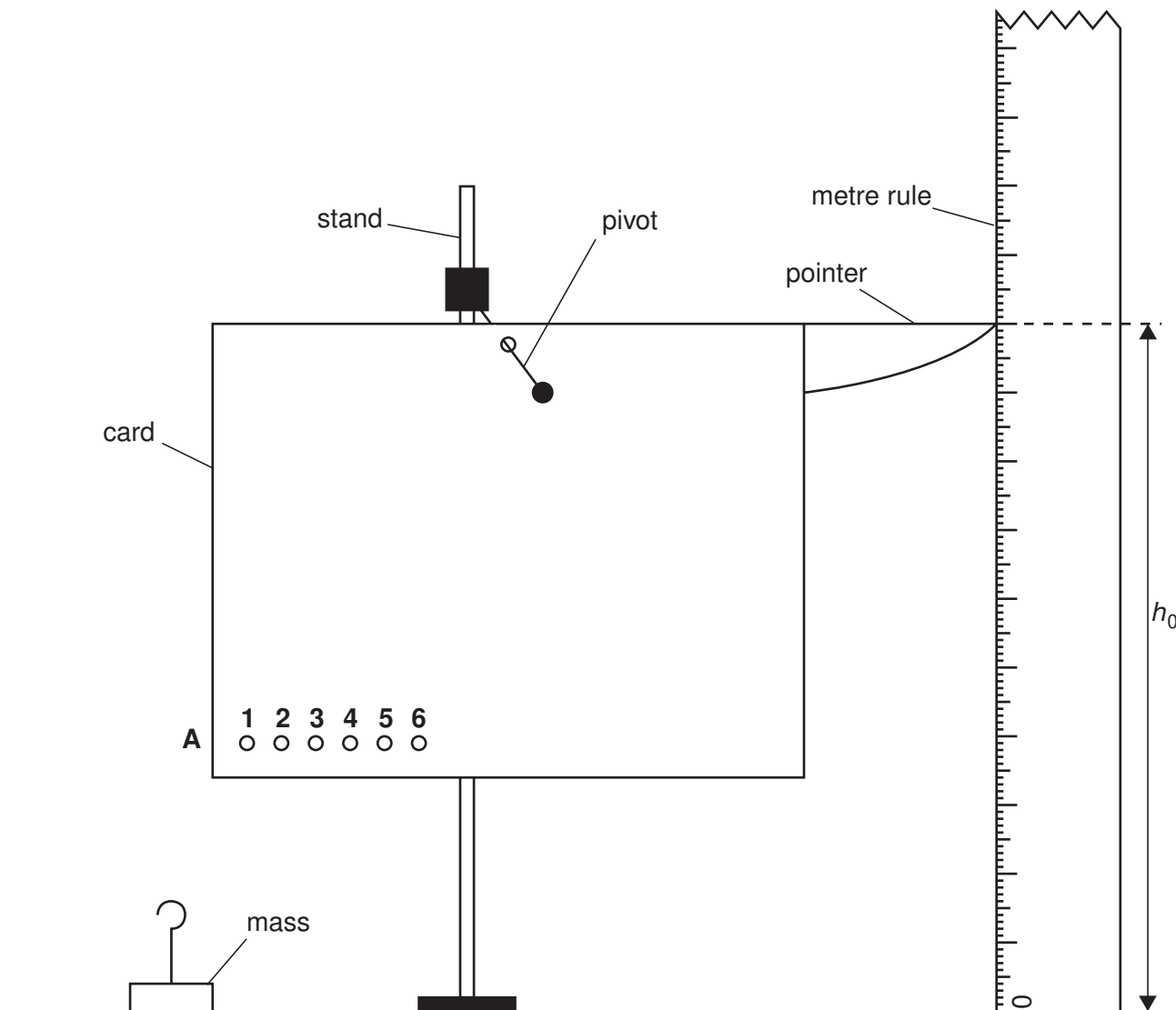


Fig. 2.1

- (a) On Fig. 2.1 measure the distance d between the centre of the hole labelled **1** and the edge of the card at **A**. Record this value in the table.

hole	d/mm	h/mm	b/mm
1		140	
2		135	
3		132	
4		128	
5		124	
6		120	

[3]

- (b) Repeat step (a) for each of the remaining holes **2 – 6**.
- (c) On Fig. 2.1 measure the height h_0 of the pointer above the bench.

$$h_0 = \dots\dots\dots$$

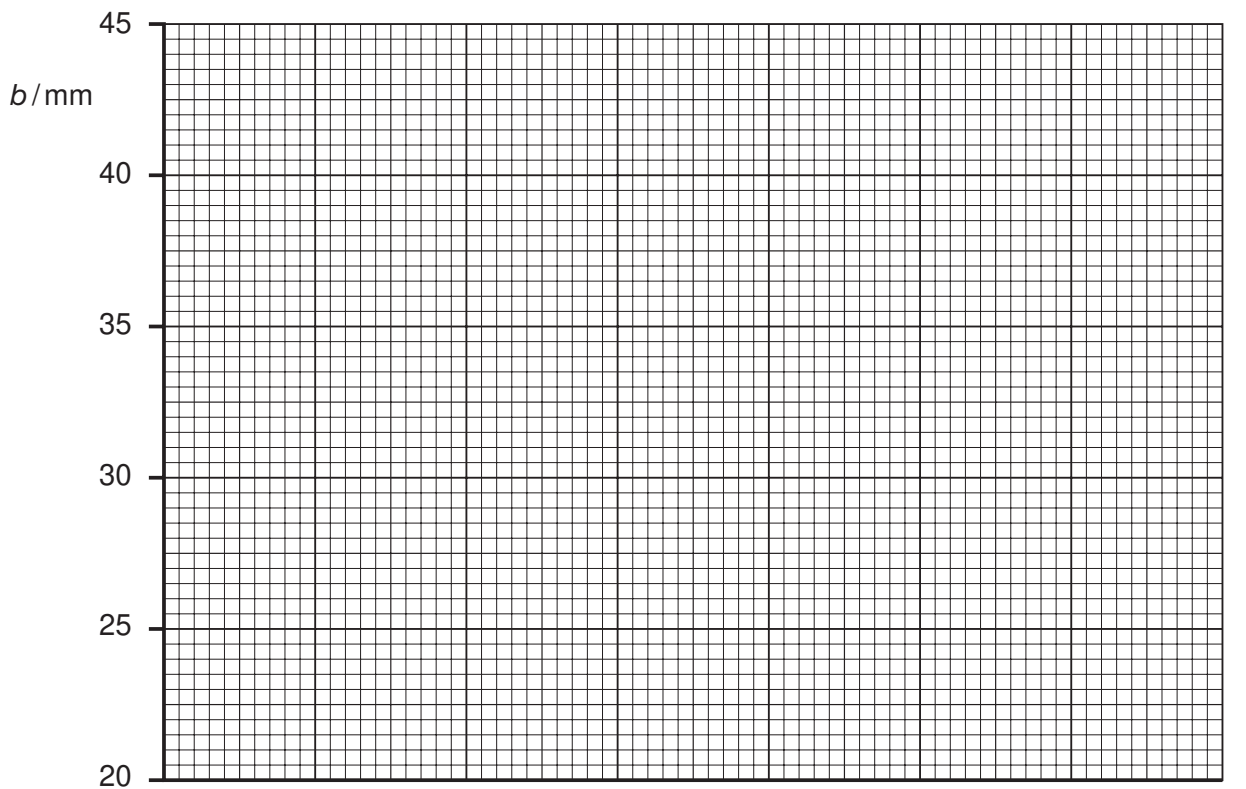
[1]

- (d) A student hangs a 10g mass from the hole **1** in the card. She records the height h of the end of the pointer above the bench. She then repeats this procedure by hanging the mass from each hole in turn. Her results are shown in the table above.
- (e) Calculate the differences in heights b using the equation

$$b = (h - h_0)$$

and record the results in the table above.

- (f) Plot the graph of b/mm (y -axis) against d/mm (x -axis).



[4]

- (g) The student suggests that b is directly proportional to d . By reference to your graph, state whether or not the results support the student's suggestion. Give a reason for your answer.

Statement

Reason

.....

..... [2]

- (h) It is important when recording the heights that the rule is vertical. State briefly how you would check that the rule is vertical.

.....

..... [1]

[Total: 11]

- 3 The IGCSE class is investigating the resistance of a wire. The circuit is as shown in Fig. 3.1.

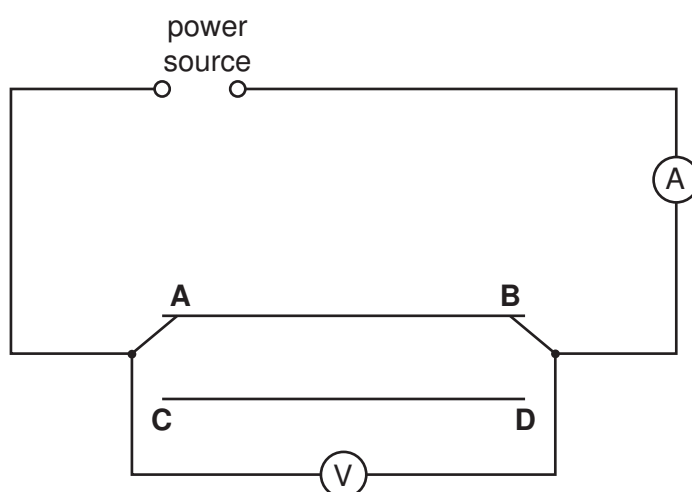


Fig. 3.1

- (a) A student uses the switches to connect the wire **AB** into the circuit and records the p.d. V across the wire between **A** and **B**. He also records the current I in the wire.

The student then repeats the measurements using the wire **CD** in place of wire **AB**.

The readings are shown in the table below.

wire	$V/$	$I/$	$R/$
AB	1.9	0.24	
CD	1.9	0.96	

[3]

- (i) Calculate the resistance R of each wire, using the equation

$$R = V/I.$$

Record the values in the table.

- (ii) Complete the column headings in the table.

- (b) The two wires **AB** and **CD** are made of the same material and are of the same length. The diameter of wire **CD** is twice the diameter of wire **AB**.

- (i) Look at the results in the table. Below are four possible relationships between R and the diameter d of the wire. Tick the relationship that best matches the results.

R is proportional to d

☐

R is proportional to $\frac{1}{d}$

☐

R is proportional to d^2

☐

R is proportional to $\frac{1}{d^2}$

☐

- (ii) Explain briefly how the results support your answer in part (b)(i).

.....

.....

.....

..... [2]

- (c) Following this experiment, the student wishes to investigate whether two lamps in parallel with each other have a smaller combined resistance than the two lamps in series. Draw one circuit diagram showing

- (i) two lamps in parallel with each other connected to a power source,
- (ii) an ammeter to measure the total current in the circuit,
- (iii) a voltmeter to measure the potential difference across the two lamps.

[3]

[Total: 8]

- 4 The IGCSE class is investigating the formation of images by a lens.

Fig. 4.1 shows the apparatus that is being used.

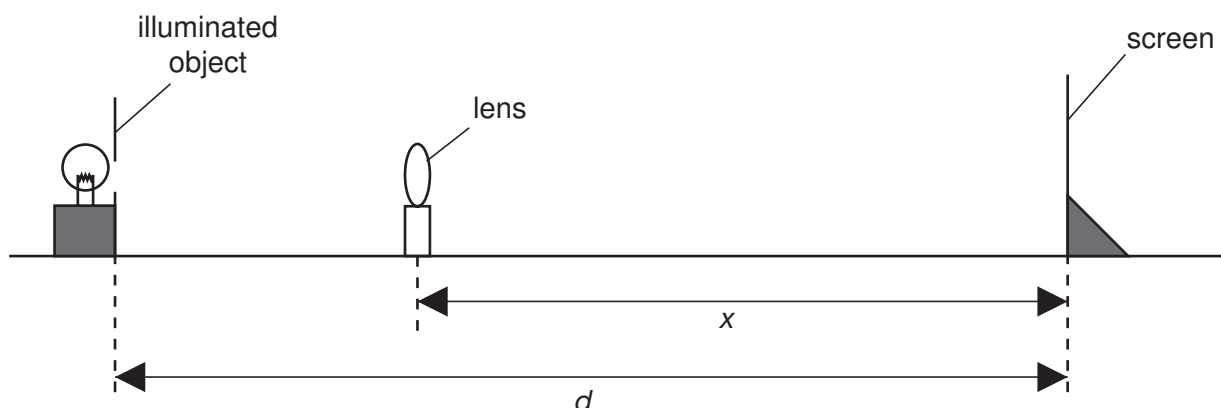


Fig. 4.1

- (a) A student places the screen at a distance $d = 0.800$ m from the illuminated object. She adjusts the position of the lens until a clearly focused magnified image is formed on the screen. She measures the distance x between the centre of the lens and the screen. Without moving the illuminated object or the screen, she moves the lens towards the screen until a second clearly focused (but diminished) image is formed on the screen. She measures the distance y between the centre of the lens and the screen. She repeats the experiment with the distance d increased to 0.900 m. The readings are shown in the table.

x/m	y/m	d/m	f/m
0.205	0.600	0.800	
0.180	0.720	0.900	

- (i) For each set of readings calculate the focal length f of the lens using the equation

$$f = \frac{xy}{d}.$$

Enter the values in the table.

- (ii) Calculate the average value of the focal length f .

average value of the focal length $f = \dots\dots\dots$ [4]

- (b) Suggest two precautions that can be taken in this experiment in order to obtain an accurate result.

1.

.....

2.

..... [2]

- (c) The illuminated object is triangular in shape, as shown in Fig. 4.2.

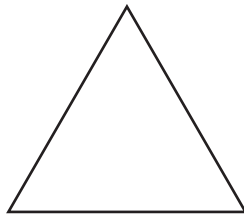


Fig. 4.2

In the space below, sketch the appearance of one of the images on the screen.

[1]

[Total: 7]

- 5 (a) An IGCSE student is investigating the relationship between the extension of a spring of unstretched length l_0 and the load hung on the spring. The apparatus is shown in Fig. 5.1 below. The spring is shown larger than its actual size.

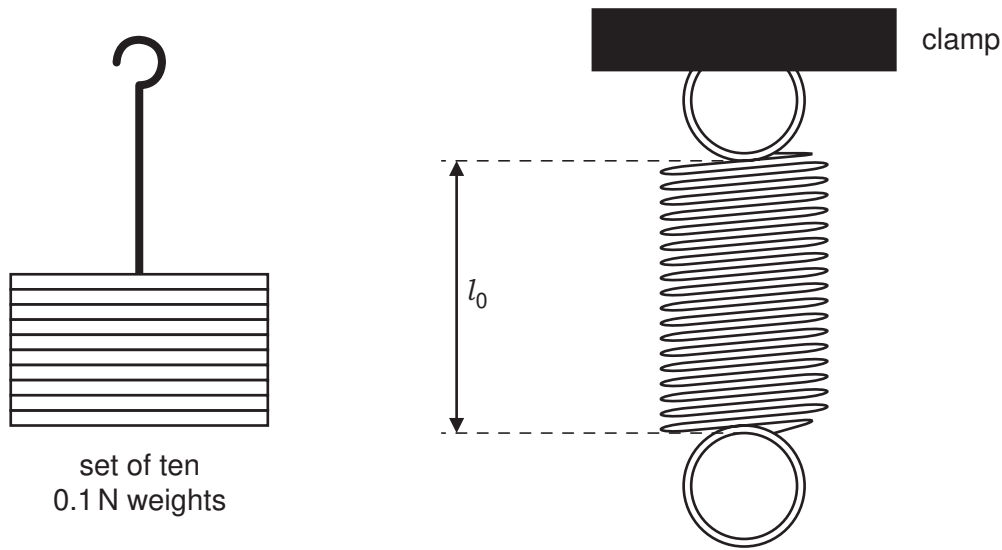


Fig. 5.1

Consider the readings that the student should take and write appropriate column headings, with units, in the table below.

$$l_0 = 25 \text{ mm}$$

0.0	25	0
0.1	30	5
0.2	36	11
0.3	43	18
0.4	50	25

[4]

- (b) The student decides to repeat the experiment using a spring made of a different metal in order to study how the extension may be affected by the metal from which the spring is made. To make a fair comparison, other variables must be kept constant. Suggest three variables that the student should keep constant.

1.

2.

3. [3]

[Total: 7]

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