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0625/62

October/November 2013

1 hour

No Additional Materials are required.

DO **NOT** WRITE IN ANY BARCODES.

The number of marks is given in brackets [] at the end of each question or part question.

[Turn over

- 1 The IGCSE class is investigating pendulums.

The apparatus is shown in Figs. 1.1 and 1.2.

For
Examiner's
Use

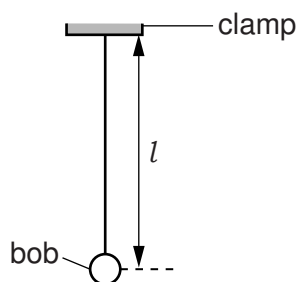


Fig. 1.1

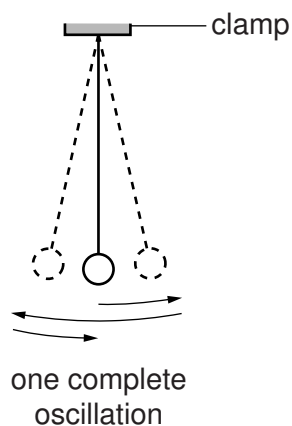


Fig. 1.2

- (a) (i) On Fig. 1.1, measure the length l of the pendulum.

$l = \dots\dots\dots$ [1]

- (ii) The pendulum is drawn 1/10th of actual size.

Write the actual length of the pendulum in the first row of Table 1.1.

- (b) A student displaces the pendulum bob slightly and releases it so that it swings.

Fig. 1.2 shows one complete oscillation of the pendulum bob.

The student uses a stopwatch to record the time t for 20 complete oscillations of the pendulum. The reading is recorded in the table.

- (i) Calculate the period T of the pendulum. The period is the time for one complete oscillation.

Record the value of T in Table 1.1.

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

Table 1.1

l/cm	$t/$	$T/$
	22.4	
61.9	31.6	1.58

[3]

- (c) The student adjusts the length of the pendulum until its length $l = 61.9\text{ cm}$. He repeats the procedure in (b) and calculates T . The results are shown in Table 1.1.

The student suggests that doubling the length l of the pendulum should double the period T .

State whether the results support this suggestion and justify your answer by reference to the results.

statement

justification

..... [2]

- (d) The student repeats the procedure in (b) four more times with different lengths of the pendulum.

The student plots a graph of l against T^2 .

State two pieces of information from the graph that would indicate that l is directly proportional to T^2 .

1.

2.

[2]

- (e) The student uses another pendulum.

This pendulum has a mass that is double the mass of the first pendulum. Its length is 61.9 cm . The period $T = 1.61\text{ s}$.

Suggest a conclusion about the effect of doubling the mass of the pendulum.

.....

..... [1]

[Total: 9]

- 2 The IGCSE class is investigating the cooling of water.

A student cools some water by four different methods.

For
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Experiment A (cooling with stirring)

- (a) The student pours approximately 200 cm^3 of hot water into a beaker.

She measures the temperature θ_1 . Fig. 2.1 shows the thermometer.

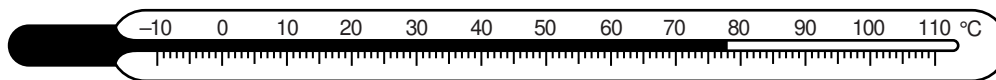


Fig. 2.1

Write down the temperature θ_1 shown on the thermometer in Fig. 2.1.

$$\theta_1 = \dots\dots\dots [1]$$

- (b) The student stirs the water for one minute. She then records the temperature θ_2 of the water.

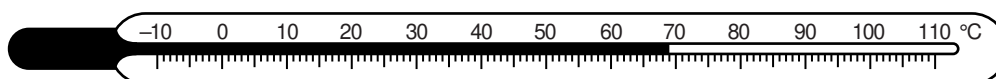


Fig. 2.2

- (i) Write down the temperature θ_2 shown on the thermometer in Fig. 2.2.

$$\theta_2 = \dots\dots\dots$$

- (ii) Calculate the temperature difference ($\theta_1 - \theta_2$).

$$(\theta_1 - \theta_2) = \dots\dots\dots [1]$$

Experiment B (cooling with pouring)

- (c) The student starts again with approximately 200 cm^3 of hot water at the same initial temperature θ_1 .

She carefully pours the water from the beaker into another beaker. She pours the water back into the first beaker. She repeats this process four times.

She measures the temperature θ_3 of the water. Fig. 2.3 shows this temperature.

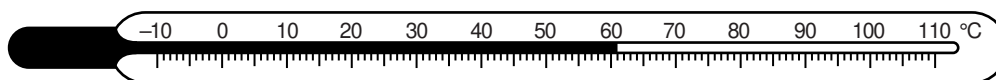


Fig. 2.3

- (i) Write down the temperature θ_3 shown on the thermometer in Fig. 2.3.

$\theta_3 =$

- (ii) Calculate the temperature difference ($\theta_1 - \theta_3$).

$(\theta_1 - \theta_3) =$
[1]

Experiment C (cooling with a lid) and Experiment D (cooling without a lid)

- (d) The student pours approximately 200 cm³ of the hot water into each of two beakers. The initial temperature of the water in each beaker is θ_1 .

She places a lid on one of the beakers. She allows both beakers to cool for 5 minutes.

At the end of the cooling period, she calculates the temperature differences.

temperature difference of **C** (with a lid) = 11°C

temperature difference of **D** (without a lid) = 31°C

Rank the experiments **A**, **B**, **C** and **D** in order, with the one that produced the greatest temperature drop first.

greatest temperature drop 1.

2.

3.

smallest temperature drop 4.

[1]

- (e) If this laboratory investigation is to be repeated many times to check the results, suggest two conditions that should be kept constant in order to provide reliable results.

1.

2.

[2]

- (f) A student complains that the investigation is not a fair comparison.

Suggest one way in which the investigation could be more fair.

.....

..... [1]

[Total: 7]

- 3 The IGCSE class is investigating the resistance of a wire.

The circuit used is shown in Fig. 3.1.

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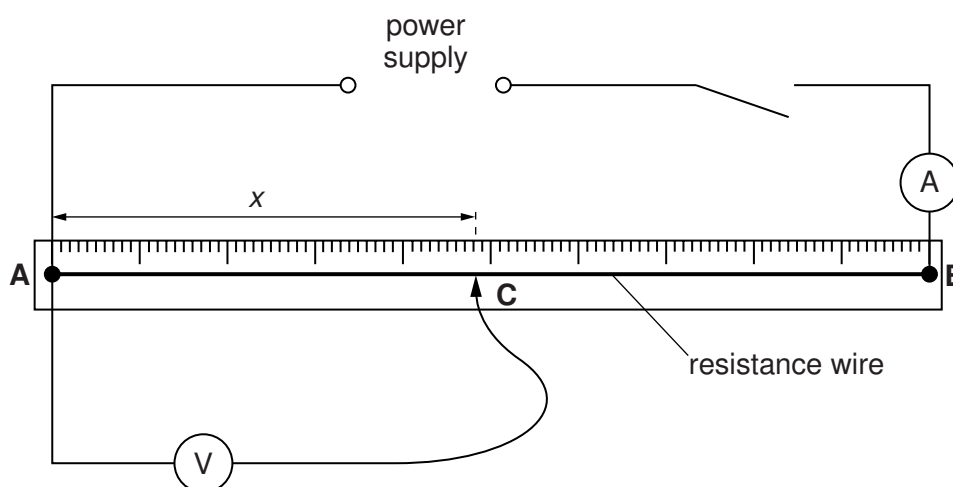


Fig. 3.1

- (a) A student places the sliding contact **C** on the resistance wire **AB** at a distance x from **A**, where $x = 0.200$ m.
- (i) He measures the current I in the wire. Fig. 3.2 shows the ammeter.

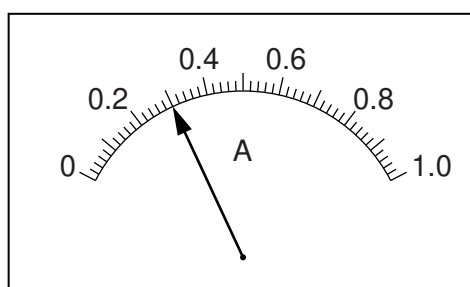


Fig. 3.2

Record the value of I .

$I = \dots\dots\dots$ [1]

- (ii) The student measures the potential difference V across the wire between **A** and **C**. Fig. 3.3 shows the voltmeter.

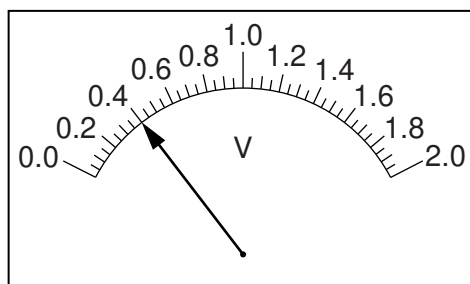


Fig. 3.3

In the first row of Table 3.1 record the value of V .

- (iii) Calculate the resistance R of the section **AC** of the wire using the equation $R = \frac{V}{I}$.

For
Examiner's
Use

Record R in the first row of the table.

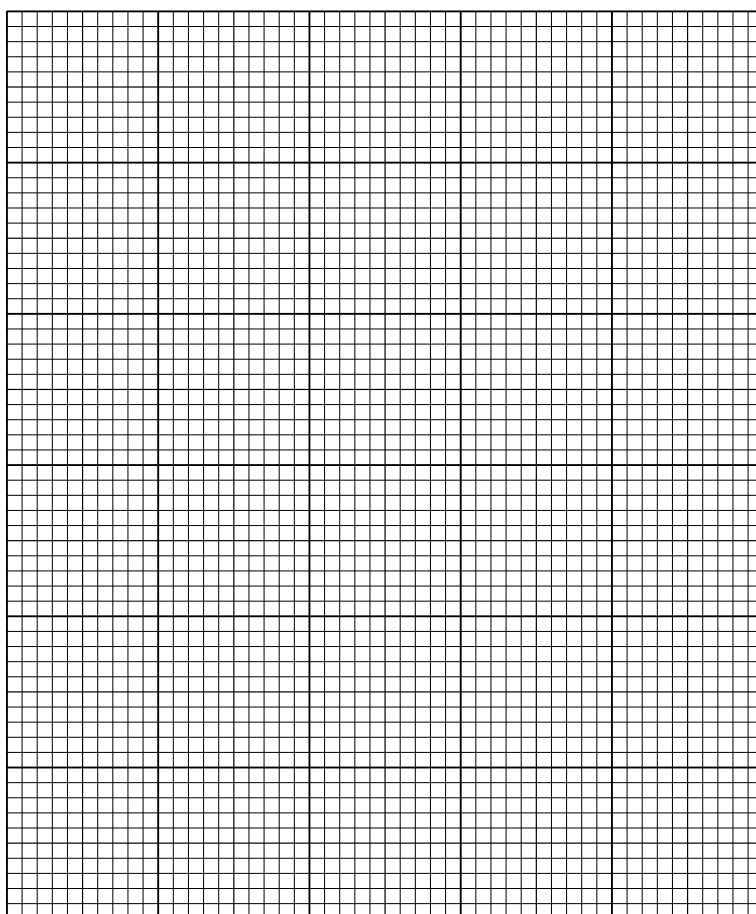
Table 3.1

x/m	V/V	R/Ω
0.200		
0.350	0.80	2.67
0.500	1.00	3.33
0.650	1.25	4.17
0.800	1.60	5.33

[2]

- (b) The student records the voltmeter readings using a range of x values. The readings are shown in Table 3.1.

Plot a graph of R/Ω (y -axis) against x/m (x -axis).



[5]

- (c) Using your graph, determine the length l of the resistance wire necessary to make a resistor of resistance $1.20\,\Omega$. Show clearly on your graph how you obtained the necessary information.

For
Examiner's
Use

$l = \dots\dots\dots$ [1]

- (d) Predict the resistance Z of 1.50 m of the resistance wire. Show your working.

$Z = \dots\dots\dots$ [1]

[Total: 10]

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- 4 The IGCSE class is determining the focal length of a converging lens.

Fig. 4.1 shows the apparatus.

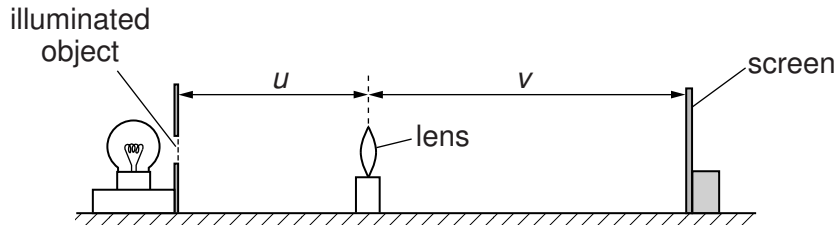


Fig. 4.1

- (a) (i) On Fig. 4.1, measure and record the distance u , in mm, between the illuminated object and the lens.

$u = \dots\dots\dots$ mm

- (ii) Measure and record the distance v , in mm, from the centre of the lens to the image on the screen.

$v = \dots\dots\dots$ mm
[1]

- (iii) Calculate the value of uv .

$uv = \dots\dots\dots$

- (iv) Calculate the value of $(u + v)$.

$(u + v) = \dots\dots\dots$

- (v) Calculate a value f_1 for the focal length of the lens, using the equation $f_1 = \frac{uv}{(u + v)}$.

$f_1 = \dots\dots\dots$
[2]

- (b) A student does not move the position of the screen or the illuminated object. She moves the lens towards the screen until a smaller, sharply focused image of the object is seen on the screen.

The new values of u and v are

$u = \dots\dots\dots 42 \text{ mm}$

$v = \dots\dots\dots 25 \text{ mm}$

- (i) Calculate the value of uv .

$uv = \dots\dots\dots$

- (ii) Calculate the value of $(u + v)$.

$(u + v) = \dots\dots\dots$

- (iii) Calculate a second value f_2 for the focal length of the lens, using the equation

$$f_2 = \frac{uv}{(u + v)}.$$

$$f_2 = \dots\dots\dots [1]$$

- (c) A student suggests that f_1 should be equal to f_2 .

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

statement

justification

..... [2]

- (d) State two precautions that you could take in this experiment to obtain reliable results.

1.

.....

2.

..... [2]

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

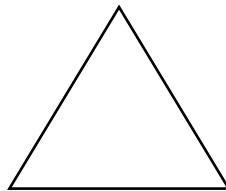


Fig. 4.2

Sketch the image you would see on the screen.

[1]

[Total: 9]

- 5 The IGCSE class is investigating pressure.

A student places a rectangular block on a sheet of paper on the bench and draws the outline.

Fig. 5.1 shows the outline.

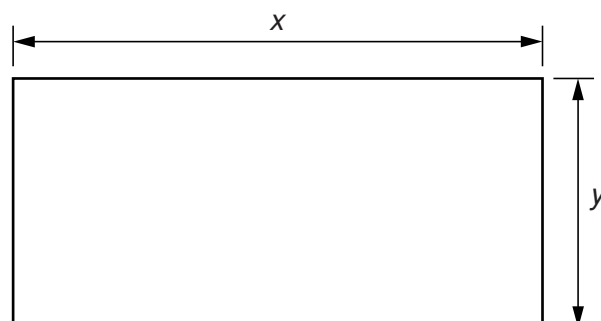


Fig. 5.1

- (a) (i) On Fig. 5.1, measure the length x of the block.

$x =$ [1]

- (ii) On Fig. 5.1, measure the width y of the block.

$y =$ [1]

- (b) Fig. 5.2 shows the block being weighed using a forcemeter.

- (i) Using Fig. 5.2, write down the weight W of the block.

$W =$ [1]

For
Examiner's
Use

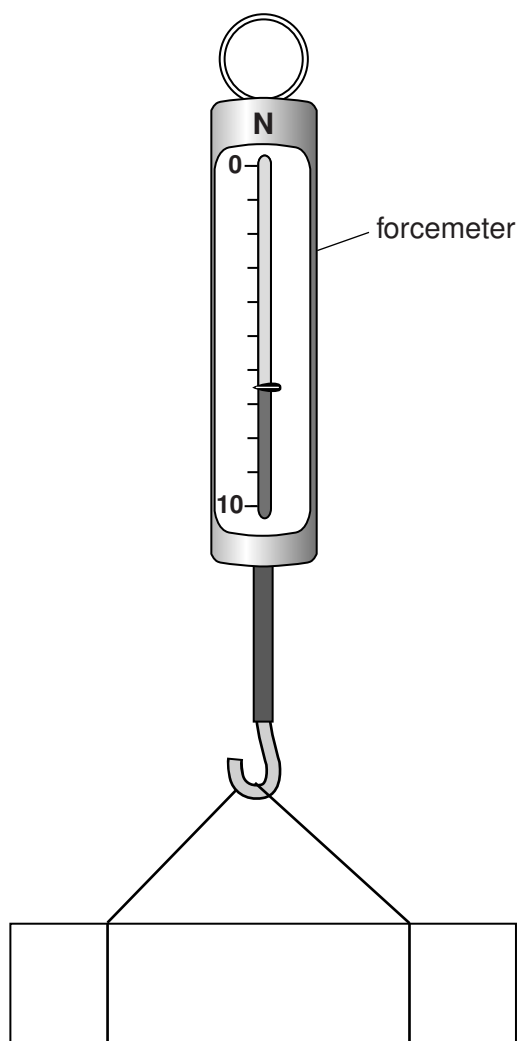


Fig. 5.2

- (ii) Calculate the pressure P that the block exerts on the bench. Use the equation $P = \frac{W}{A}$ where A is the area of the block in contact with the bench ($A = xy$).

$P =$ [1]

- (c) The value calculated for P is slightly too small.

Suggest one practical source of inaccuracy that would account for this.

.....
 [1]

[Total: 5]

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