



CANDIDATE
NAME

CENTRE
NUMBER

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CANDIDATE
NUMBER

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0625/52

October/November 2023

1 hour 15 minutes

You will need: The materials and apparatus listed in the confidential 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.

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [].

For Examiner's Use	
1	
2	
3	
4	
Total	

This document has **12** pages. Any blank pages are indicated.

- 1 In this experiment, you will investigate the period of a pendulum.

Complete the following instructions, referring to Fig. 1.1 and Fig. 1.2.

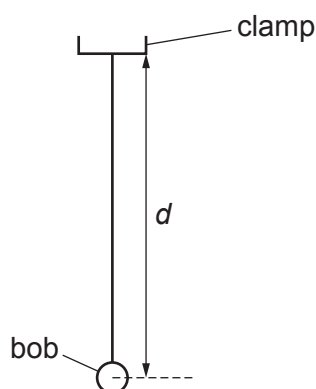


Fig. 1.1

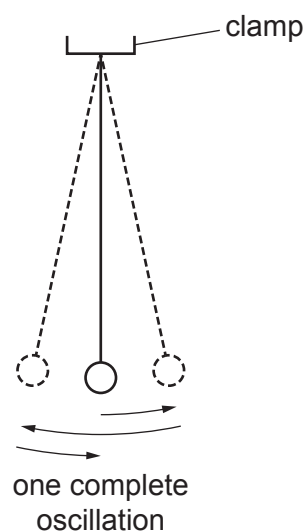


Fig. 1.2

A pendulum has been set up for you as shown in Fig. 1.1.

- (a) The distance d is measured from the bottom of the clamp to the centre of the bob.
- Adjust the length of the pendulum until $d = 50.0\text{ cm}$.
 - Displace the bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.
 - Measure, and record in Table 1.1, the time t for 10 complete oscillations.
 - Calculate, and record in Table 1.1, the period T of the pendulum. The period is the time for one complete oscillation.
 - Calculate T^2 and record the value in Table 1.1.
 - Write the unit for T^2 in the column heading.

[3]

Table 1.1

d/cm	t/s	T/s	$T^2/$
50.0			
100.0			

- (b) Repeat the procedure in (a) using $d = 100.0\text{ cm}$.

[3]

- (c) A student suggests that T^2 is directly proportional to d .

Explain briefly how to test the suggestion using the results in Table 1.1.

.....
..... [2]

- (d) Describe how you measure the distance d as accurately as possible. Draw a diagram to help your explanation.

.....
..... [2]

- (e) Explain why timing 10 oscillations gives a more accurate result for the period T than timing one oscillation.

.....
..... [1]

[Total: 11]

- 2 In this experiment, you will investigate the resistance of a wire.

Complete the following instructions, referring to Fig. 2.1.

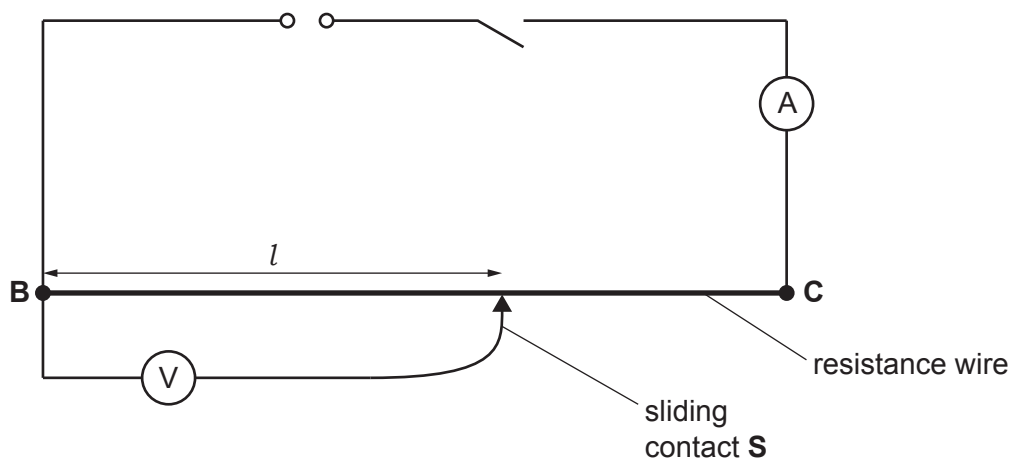


Fig. 2.1

- (a) Close the switch.

Measure the current I in the circuit.

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

- (b) Place the sliding contact at a distance $l = 10.0\text{ cm}$ from B.

Measure, and record in Table 2.1, the potential difference (p.d.) V across the length l of resistance wire BC.

Open the switch.

Calculate, and record in Table 2.1, the resistance R of 10.0 cm of the resistance wire using the equation

$$R = \frac{V}{I}$$

where I is the current recorded in (a).

Close the switch.

Repeat the procedure using $l = 20.0\text{ cm}$, 30.0 cm , 40.0 cm and 50.0 cm .

Open the switch.

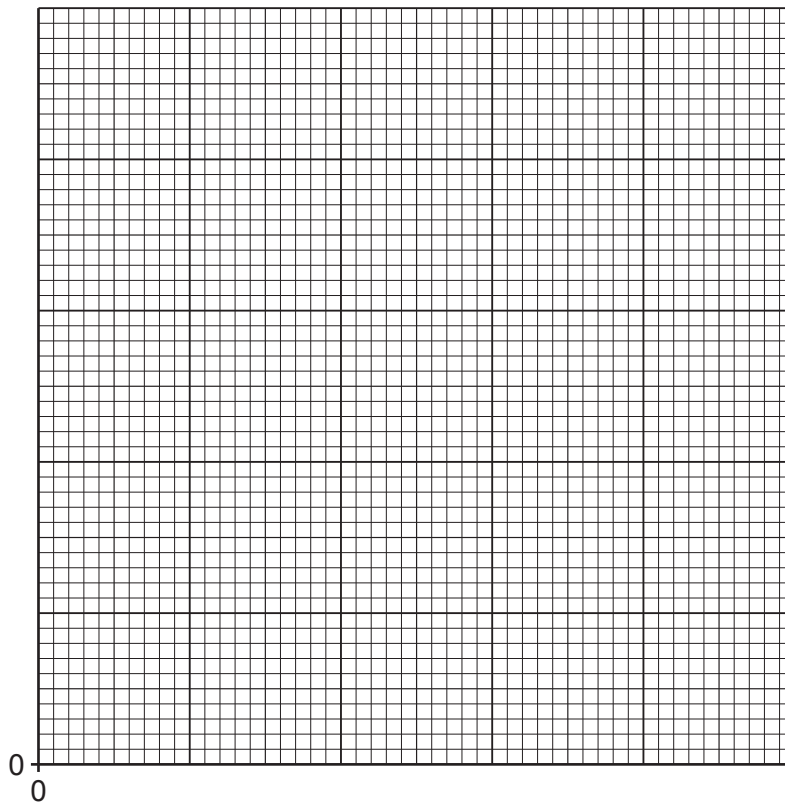
Table 2.1

l/cm	V/V	R/Ω
10.0		
20.0		
30.0		
40.0		
50.0		

[4]

(c) Plot a graph of R/Ω (y -axis) against V/V (x -axis). Start both axes at the origin (0,0).

Draw the best-fit line.



[4]

(d) Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

$G = \dots\dots\dots$ [2]

[Total: 11]

- 3 In this experiment, you will investigate the cooling of hot water.

Complete the following instructions, referring to Fig. 3.1.

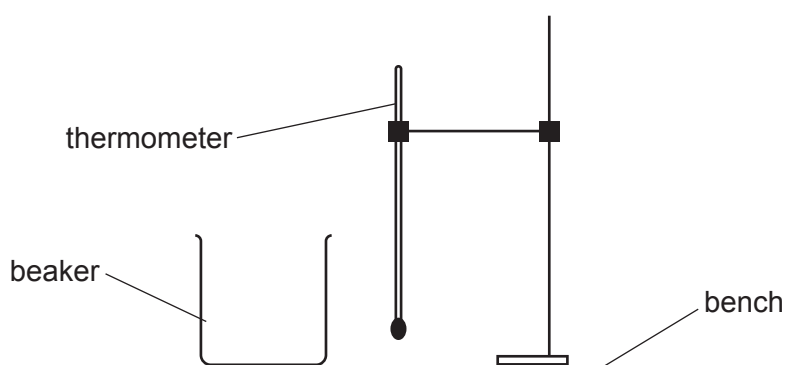


Fig. 3.1

- (a) Use the thermometer to measure the room temperature θ_R .

$\theta_R = \dots\dots\dots$ [1]

- (b) (i) Pour 200cm^3 of hot water into the beaker. Place the thermometer in the water in the beaker.

Record in Table 3.1 the temperature θ of the hot water at time $t = 0$. Immediately start the stop-watch.

Continue recording the temperature and the time in Table 3.1 at 30s intervals until you have seven sets of readings. [2]

- (ii) Complete the column headings in Table 3.1.

Table 3.1

$t/$	$\theta/$

[1]

- (c) (i) Calculate the decrease in temperature $\Delta\theta_1$ between time $t = 0$ and time $t = 90$ s.

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

- (ii) Calculate the difference in temperature $\Delta\theta_S$ between the temperature at time $t = 0$ and room temperature θ_R .

$$\Delta\theta_S = \dots\dots\dots [1]$$

- (iii) Calculate the decrease in temperature $\Delta\theta_2$ between time $t = 90$ s and time $t = 180$ s.

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

Calculate the difference in temperature $\Delta\theta_T$ between the temperature at time $t = 90$ s and room temperature θ_R .

$$\Delta\theta_T = \dots\dots\dots [1]$$

- (d) A student suggests that the decrease in temperature of the water in 90 s should be greater when the starting temperature is greater.

- (i) State whether your results agree with this suggestion. Justify your statement by reference to your results.

statement

justification

.....

.....

[2]

- (ii) Suggest how you would continue the experiment, using the same apparatus and method, to investigate the suggestion.

.....

.....

.....

..... [2]

[Total: 11]

- 4 A student investigates the effect of changing the colour of light on the focal length of a lens.

The focal length f of a lens is given by the equation $f = \frac{uv}{(u + v)}$.

The distance u is the distance between an object and the lens. The distance v is the distance between the lens and the image that is formed on a screen.

Plan an experiment to investigate the effect of changing the colour of light on the focal length of a lens.

You are **not** required to do this experiment.

The following apparatus is available to the student:

- illuminated object
- a selection of coloured filters to change the colour of the light
- converging lens
- screen
- metre ruler.

Other apparatus normally available in a school laboratory can also be used.

In your plan, you should:

- draw a labelled diagram to show the arrangement of the apparatus
- explain briefly how you would do the investigation, including the measurements you would take
- draw a suitable table, with column headings, to show how you would display your readings (you are **not** required to enter any readings in the table)
- state how you would use your results to reach a conclusion.

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