Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/06**

Paper 6 Alternative to Practical

May/June 2005

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 in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
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This document consists of **10** printed pages and **2** blank pages.

SPA (MML 8431 5/04) S81555/2

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 The IGCSE class is investigating the change in temperature of hot water as cold water is added to it.

The students are provided with 100 cm^3 of hot water and a supply of cold water at room temperature.

(a) The thermometer in Fig. 1.1 shows the temperature of the cold water.

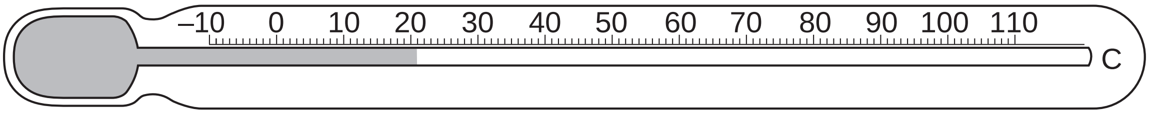


Fig. 1.1

Record the temperature of the cold water, as shown in Fig. 1.1.

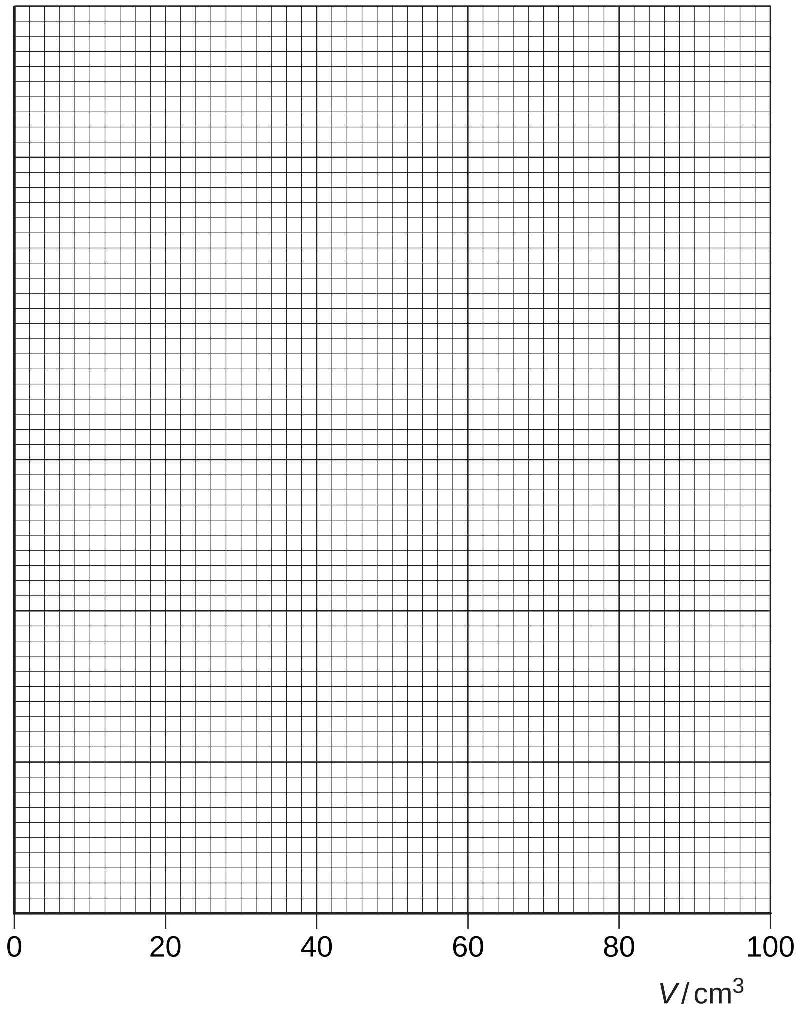
.... [1]

(b) A student records the temperature of the hot water. He then pours 20 cm^3 of the cold water into the beaker containing the hot water. He records the temperature θ of the mixture of hot and cold water and the volume V of cold water added. He then repeats the process four times until he has added a total of 100 cm^3 of cold water. The table shows the readings.

V /	θ /
0	80.0
20	58.0
40	48.0
60	40.5
80	34.0
100	29.0

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

(ii) Use the data in the table to plot a graph of temperature θ (y-axis) against volume V (x-axis).



[5]

Question 1 continues on page 4

[Turn over

(c) A sketch graph of the readings taken by another student carrying out a similar experiment is shown in Fig. 1.2.

The theoretical line shows the results expected by the student after calculating the values of θ. The student assumed that all the heat lost by the hot water was gained by the cold water when the cold water was poured into the beaker.

The other line shows the experimental results.

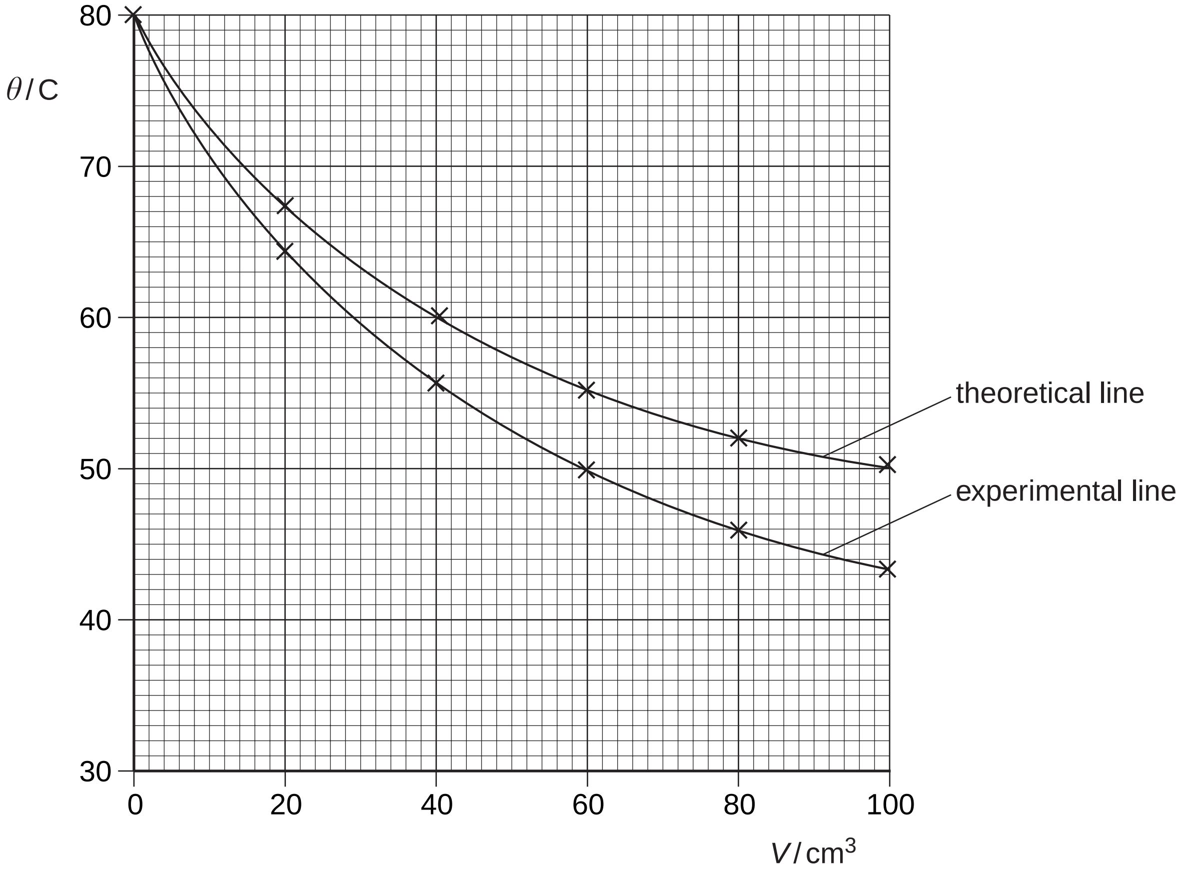


Fig. 1.2

The student carried out the experiment with care. Suggest a practical reason why the experimental line differs from the theoretical line.

....

.... [1]

2 **(a)** The table below shows some measurements taken by three IGCSE students. The second column shows the values recorded by the three students. For each quantity, underline the value most likely to be correct. The first one is done for you.

quantity measured	recorded values
thickness of a metre rule	0.25 mm 2.5 mm 25 mm
volume of a test-tube	12 mm^3 12 cm^3 12 m^3
current in a 12 V ray box lamp at less than normal brightness	0.5 A 5.0 A 50 A
the surface area of the base of a 250 cm^3 beaker	0.3 cm^2 3 cm^2 30 cm^2
the mass of a wooden metre rule	0.112 kg 1.12 kg 11.2 kg
the weight of an IGCSE student	6 N 60 N 600 N

[5]

(b) A student is to find a value of the resistance of a wire by experiment. Potential difference V and current I can be recorded. The resistance is then calculated using the equation

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

State, with a reason, one example of good experimental practice that the student could use to obtain a reliable result.

statement ....

reason .... [2]

3 A student investigates the resistance of wire in different circuit arrangements.

The circuit shown in Fig. 3.1 is used.

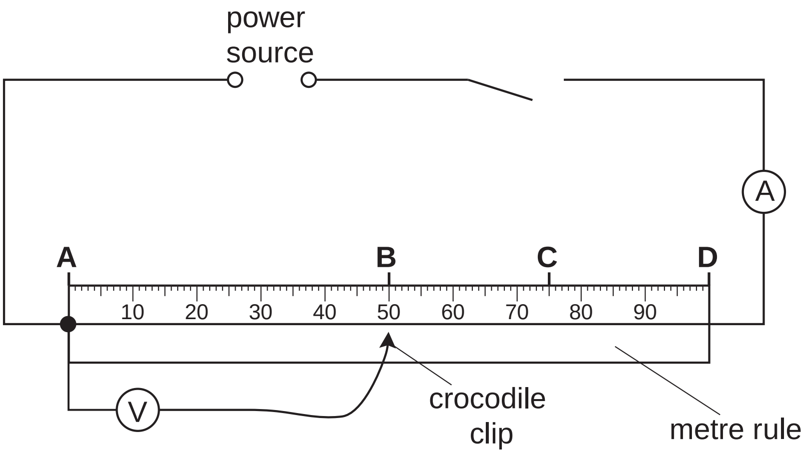


Fig. 3.1

The student measures the current I in the wire. She then measures the p.d. V across **AB**, **AC** and **AD**.

The student's readings are shown in the table below.

section of wire	l / cm	I / A	V / V	R /
AB		0.375	0.95	
AC		0.375	1.50	
AD		0.375	1.95	

(a) Using Fig. 3.1, record in the table the length l of each section of wire. [1]

(b) On Fig. 3.2, show the positions of the pointers of the ammeter reading 0.375 A, and the voltmeter reading 1.50 V.

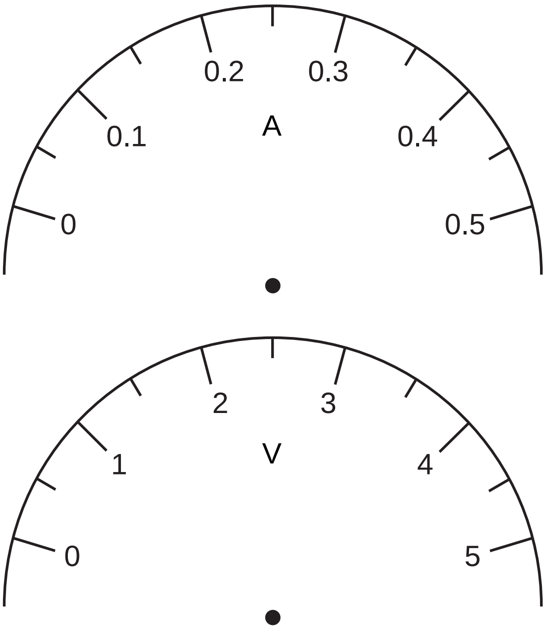


Fig. 3.2

[2]

(c) Calculate the resistance *R* of the sections of wire **AB**, **AC** and **AD** using the equation

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

Record these values of *R*, to a suitable number of significant figures, in the table. [2]

(d) Complete the column heading for the *R* column of the table. [1]

(e) Use your results to predict the resistance of a 1.50 m length of the same wire. Show your working.

resistance = ... [2]

4 A student investigates the period of oscillation of a mass attached between two springs.

The apparatus used is shown in Fig. 4.1.

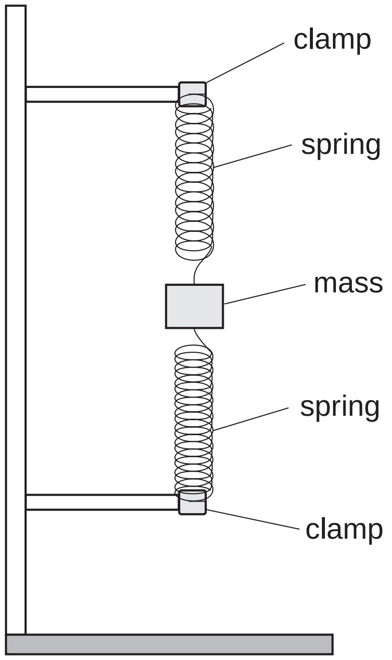


Fig. 4.1

A 400 g mass *m* is attached between two springs, displaced a small distance downwards, and then released so that it oscillates. The time *t* taken for 10 complete oscillations of the mass is recorded. The experiment is repeated using values for *m* of 300 g and 200 g. The readings are shown in the table below.

m / g	t / s	T / s	$\frac{T}{m}$ / $\frac{\text{s}}{\text{g}}$
400	9.0		
300	7.8		
200	6.3		

(a) Calculate the period *T* of the oscillations. *T* is the time for one complete oscillation. Enter the values in the table. [2]

(b) Calculate and enter in the table the values of $\frac{T}{m}$. [2]

(c) The student suggests that *T* should be directly proportional to *m*. State with a reason whether the results in the table support this suggestion.

statement ....

reason ....

.... [2]

(d) In this experiment, the mass oscillates rapidly so that it is difficult to take the times accurately. A technique has been included in this experiment to obtain an accurate value for the period *T*. State, briefly, what this technique is and any calculation involved to obtain the *T* value.

....

....

.... [2]

(e) Another student carried out the same experiment using a wider range of masses. Suggest why, when the mass was 900 g, it could not oscillate freely.

.... [1]

5 A student investigates the refraction of light through a transparent block.

He places the transparent block on a sheet of plain paper, largest face down, and draws a line round the block. He draws a line to represent an incident ray and places two pins **W** and **X** in the line. Fig. 5.1 shows the outline of the block and the incident ray.

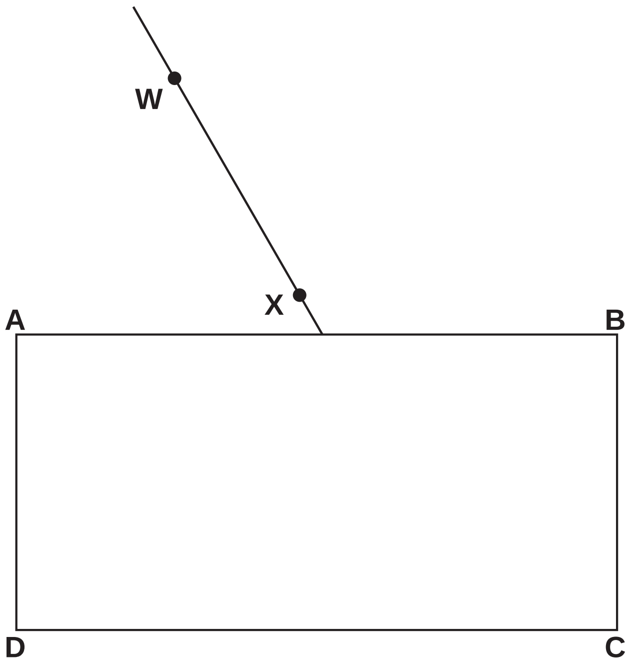


Fig. 5.1

(a) On Fig. 5.1, draw a normal to line **AB** at the point where the incident ray meets the block. The incident ray is drawn on the diagram. The positions of the two pins **W** and **X** that mark the incident ray are shown. [1]

(b) Measure the angle of incidence *i*.

i = ... [1]

(c) Draw in the refracted ray with an angle of refraction of 20°. Continue this line until it meets the line **CD**. [2]

(d) The ray emerges from the block in a direction that is parallel to the incident ray. Draw in this emergent ray. [2]

(e) Two pins **Y** and **Z** are placed so that the pins **W** and **X**, viewed through the block, and the pins **Y** and **Z** all appear exactly in line with each other. Mark on the diagram, with the letters **Y** and **Z**, where you would place these two pins. [2]

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