

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS

Paper 4 Alternative to Practical Test



5054/04

October/November 2006

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required

Candidate
Name

Centre
Number

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Candidate
Number

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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 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.

For Examiner's Use	
1	
2	
3	
4	
Total	

This document consists of **9** printed pages and **3** blank pages.



- 1 A student measures the volume V of the glass prism shown in Fig.1.1. A displacement method is used five times.

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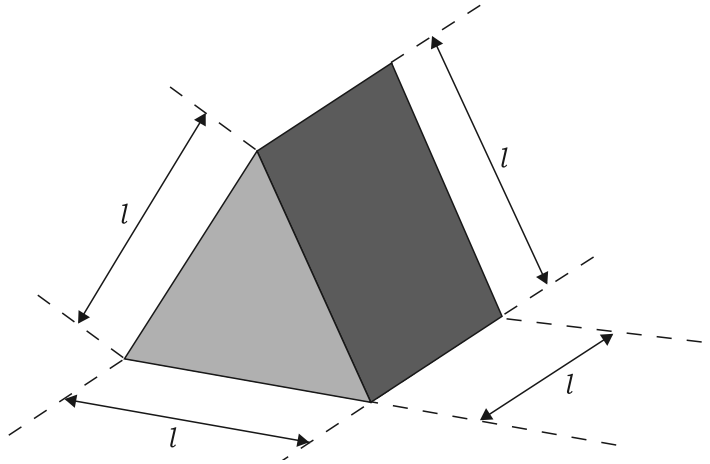


Fig. 1.1

The volumes measured were

24.8 cm³ 27.8 cm³ 24.5 cm³ 24.3 cm³ 25.0 cm³.

- (a) (i) Circle the measurement that is **not** consistent with the others. [1]
 (ii) Suggest a possible reason for the error in this measurement.
 [1]
 (iii) Calculate the average value for V , ignoring the inconsistent measurement.

$V =$ [2]

- (b) The volume of the prism is given by

$$V = 0.433l^3$$

where l is the length of the side of the prism.

Use your average value for V to obtain a value for l . Give your answer to a suitable number of significant figures.

$l =$ [2]

- 2 A pendulum hangs from two wooden blocks as shown in Fig. 2.1. A wooden rod is fixed so that it just touches the string of the pendulum when it is hanging vertically. The pendulum bob is pulled to point A and then released. As it swings, the string makes contact with the rod for part of the swing.

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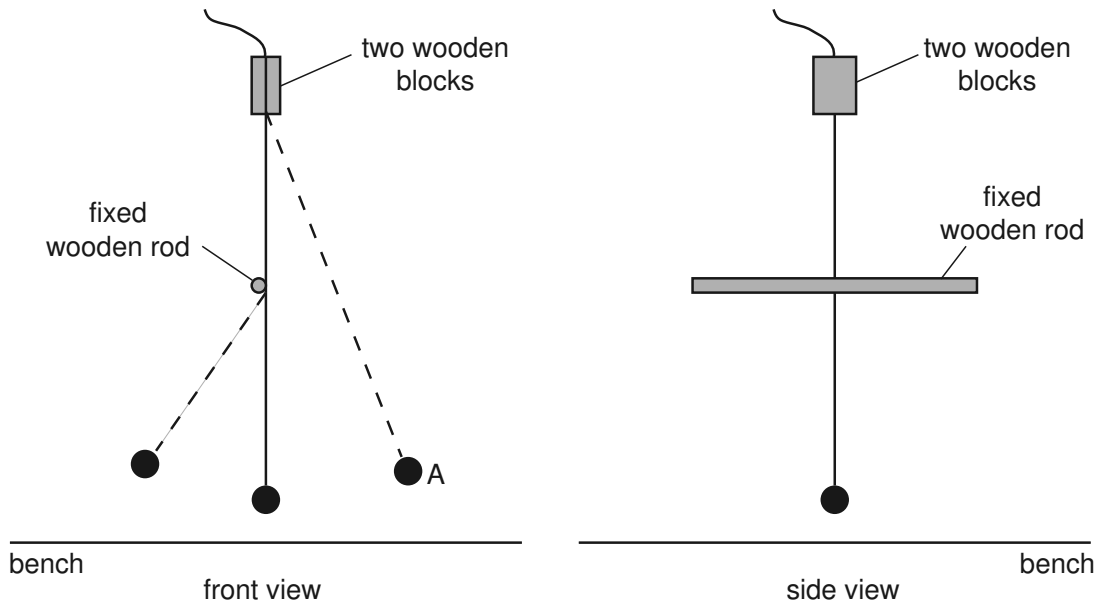


Fig. 2.1

In the experiment, the height h of the centre of the wooden rod above the bench is varied. The time t for one complete oscillation is obtained for each value of h .

- (a) On Fig. 2.1, mark accurately
- (i) the height h , [1]
 - (ii) where the student's eye should be positioned when measuring t . [1]
- (b) (i) Describe how the student could ensure that the wooden rod is horizontal. You may draw on the diagram if you wish.
-
- [1]
- (ii) Suggest why the wooden rod should be horizontal.
-
- [1]
- (c) The value of t is approximately 1 s. Describe how the student could obtain precise values for t .
-
- [1]

Question 2 continues on page 4

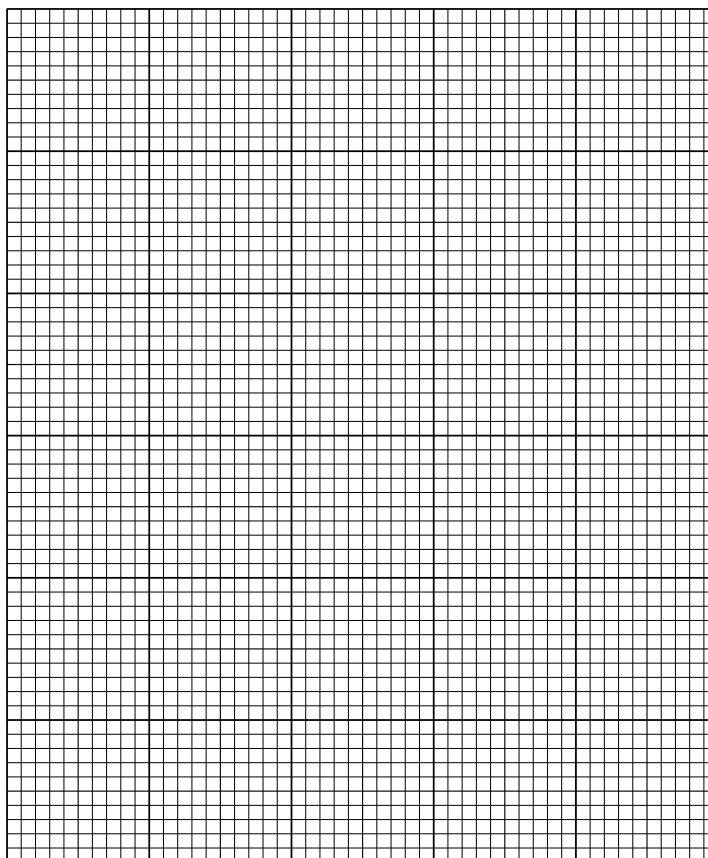
(d) The readings obtained by the student are shown in Fig. 2.2.

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h/cm	t/s
40	1.26
35	1.22
30	1.18
25	1.12
20	1.05
15	0.98
10	0.90

Fig. 2.2

On the grid below, plot a graph of t on the y -axis against h on the x -axis. Start your graph at $t = 0.8\text{s}$ and $h = 0$. Draw the best fit curve. [4]



(e) Describe the relationship between h and t .

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

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(f) Use the graph to determine the value of h when $t = 1.00$ s. Show on the graph how you obtained your answer.

$h =$ [1]

- 3 A cathode-ray oscilloscope (CRO) is used to measure the frequency and peak voltage of an a.c. supply, as shown in Fig. 3.1.

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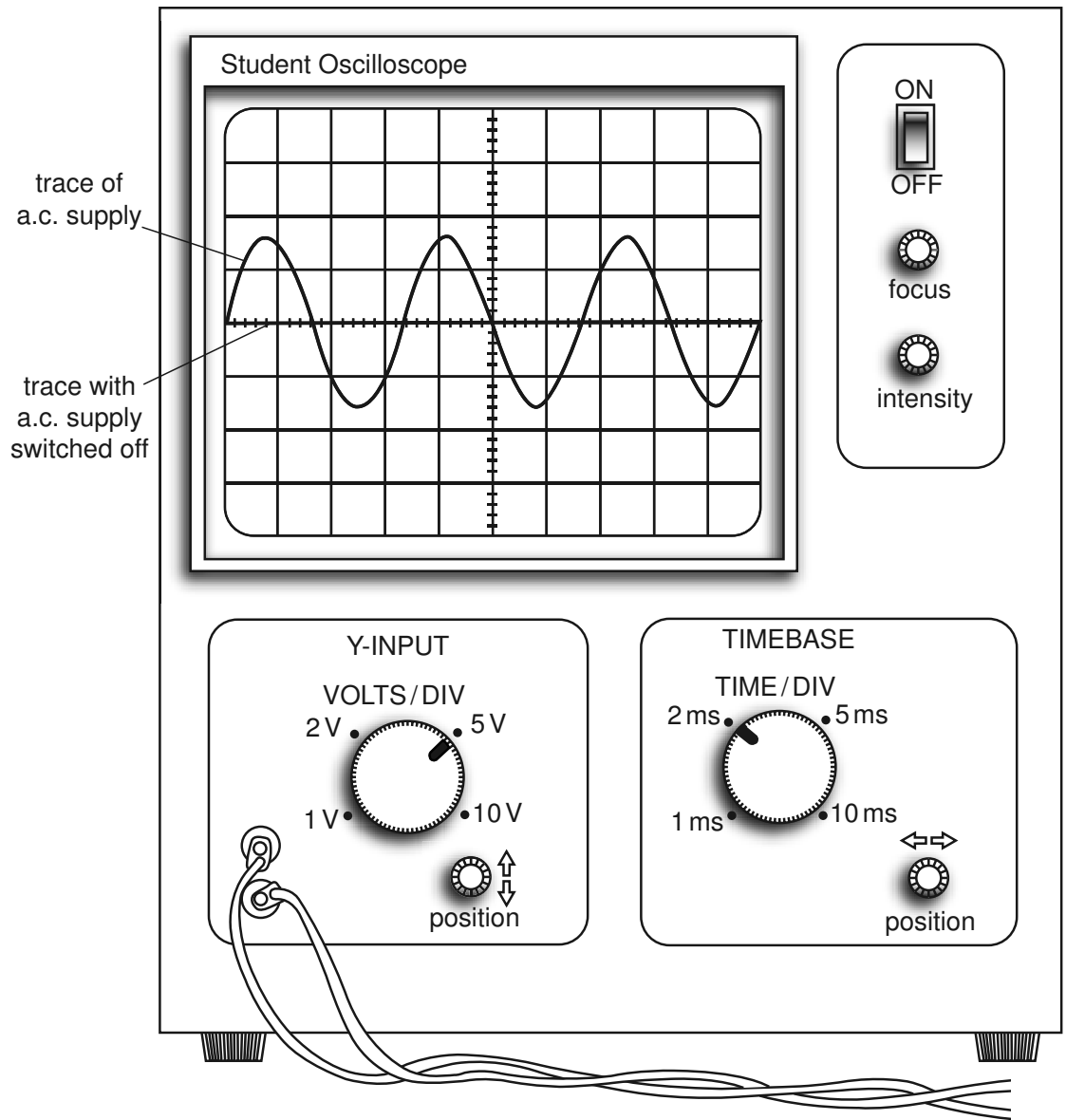


Fig. 3.1

(a) By taking measurements from the screen shown in Fig. 3.1, obtain values for

(i) the peak voltage V_p of the a.c. supply,

$V_p = \dots\dots\dots [1]$

(ii) the time T for one cycle.

$T = \dots\dots\dots [2]$

(b) Use the relationship $f = \frac{1}{T}$ to find the frequency f of the a.c. supply.

$f = \dots\dots\dots [1]$

(c) (i) Explain why it would **not** be possible to measure the frequency of an a.c. supply of frequency 15 Hz using the CRO on these settings.

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

(ii) Suggest which setting for the time-base could be used when measuring a frequency of 15 Hz.

..... [1]

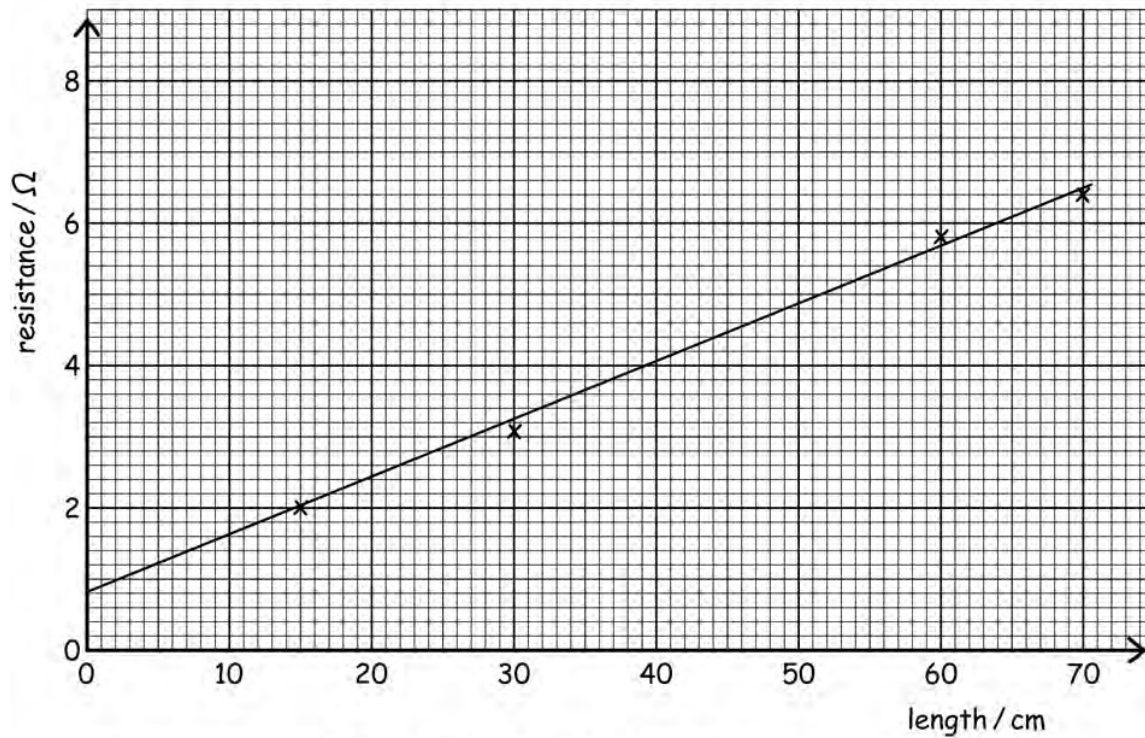
- 4 A student performs an experiment to find out how the resistance of a wire varies with its length.

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The student loses the table of results, but finds the graph he drew.

The graph is shown in Fig. 4.1.

Graph of the Resistance of a wire against length.



My conclusion: This graph shows that the resistance is directly proportional to the length of the wire.

Fig. 4.1

- (a) By taking readings from the graph, draw a table showing the results the student obtained.

(b) Suggest two ways in which the student could have obtained a better set of readings.

1.

.....

2.

..... [2]

(c) The student concludes that the resistance is directly proportional to the length of the wire. Explain why this is an incorrect conclusion.

.....

.....

..... [1]

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