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

Candidate Number

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.

UNIVERSITY of CAMBRIDGE
International Examinations

[Turn over

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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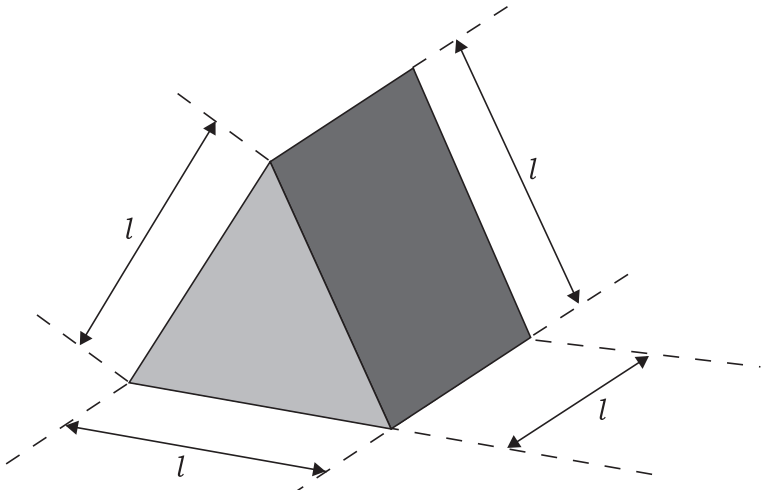

Fig. 1.1

The volumes measured were

24.8 cm^3 27.8 cm^3 24.5 cm^3 24.3 cm^3 25.0 cm^3.

(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

$$V = 0.433\,l^3$$

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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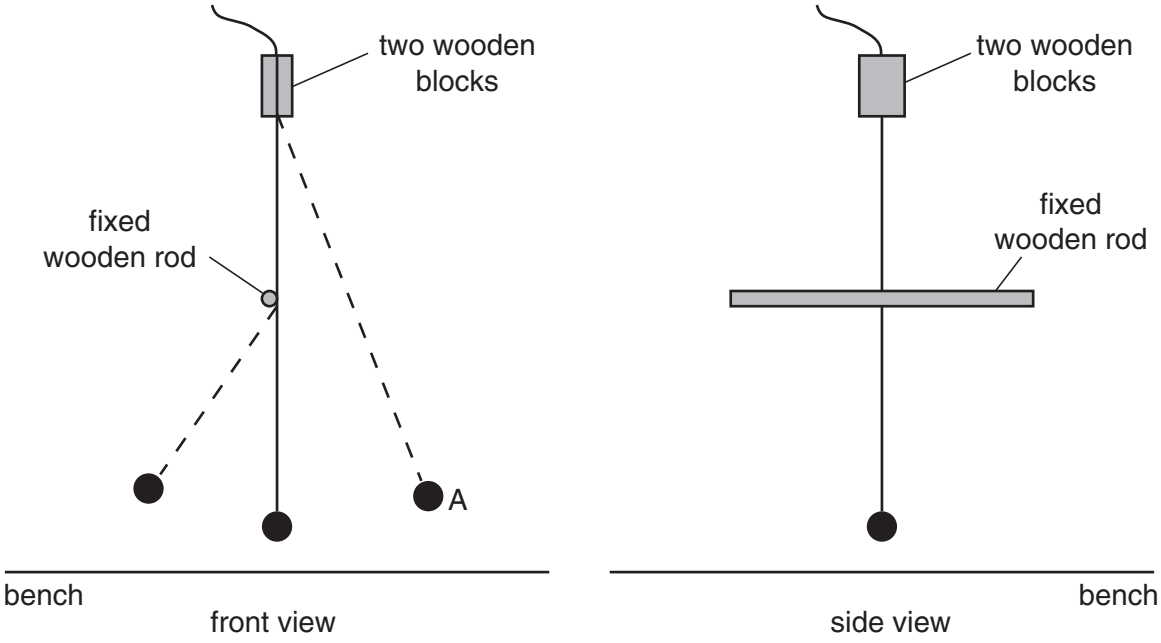

Fig. 2.1

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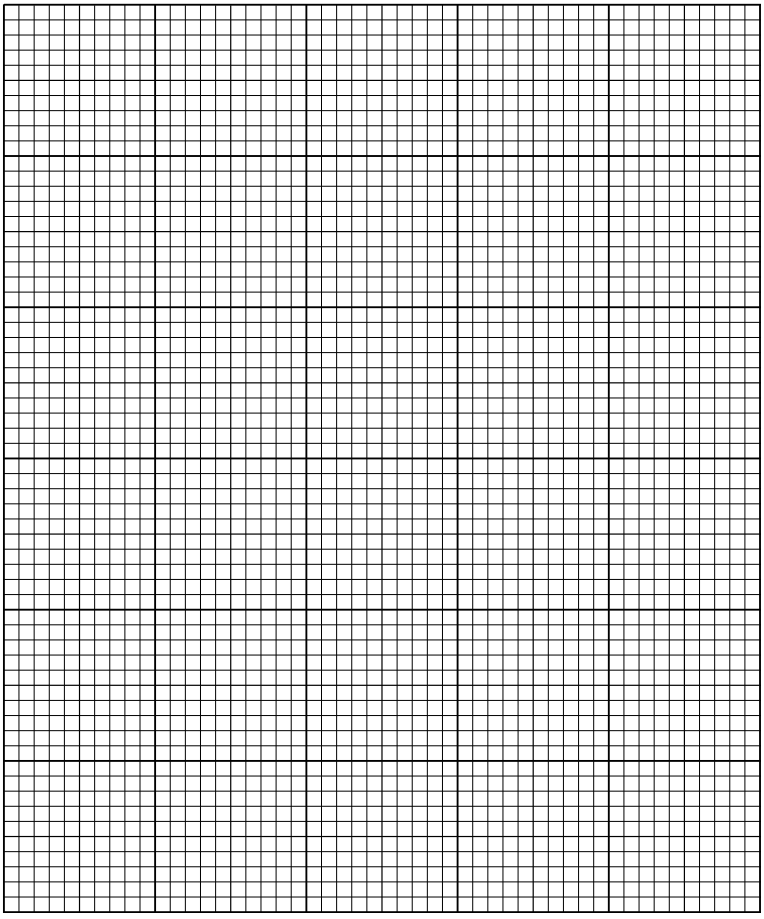
h / cm	t / s
40	1.26
35	1.22
30	1.18
25	1.12
20	1.05
15	0.98
10	0.90

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 $t = 0.8$ s and $h = 0$. Draw the best fit curve. [4]



(e) Describe the relationship between h and t.

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.....

..... [2]

(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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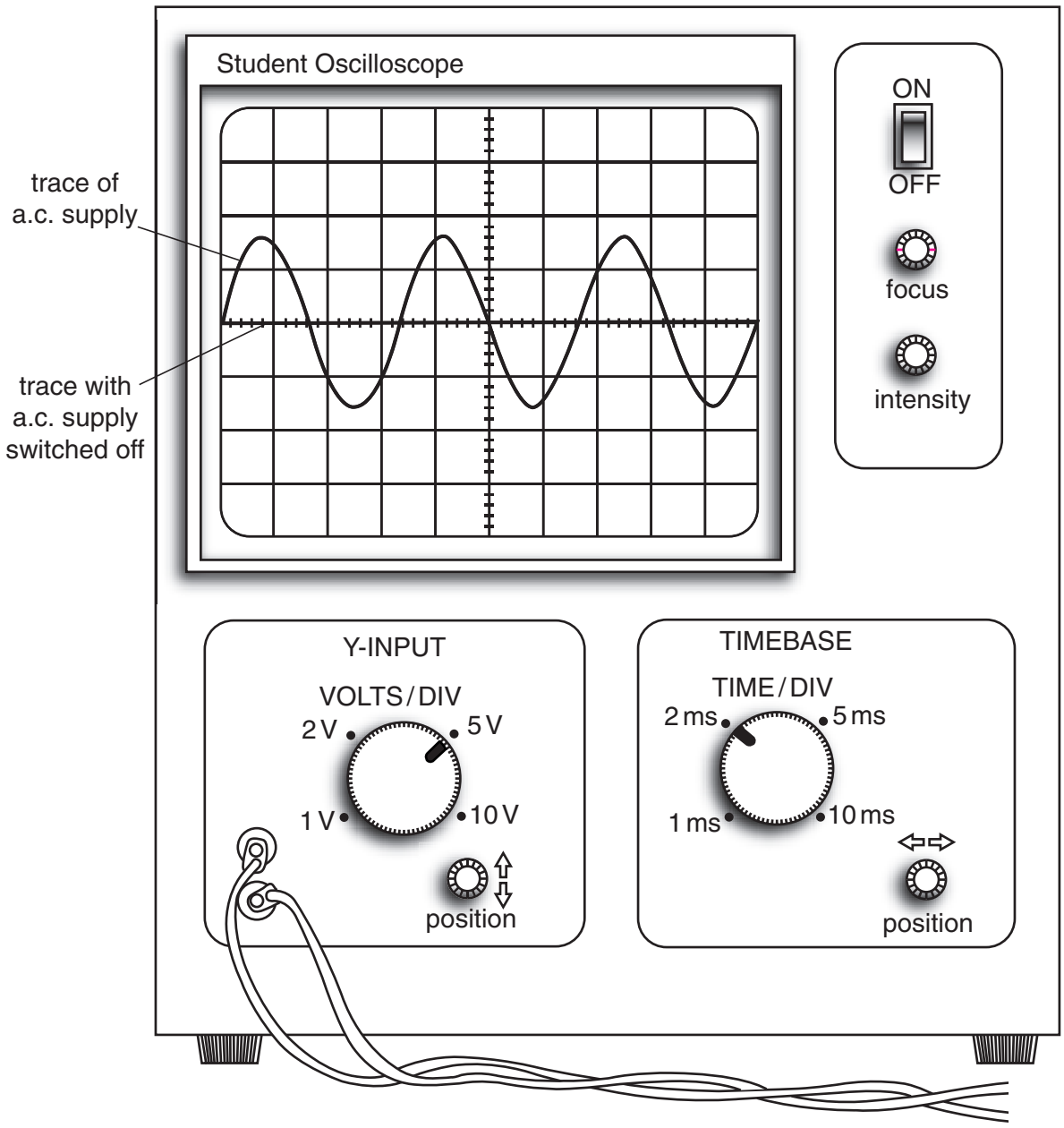

Fig. 3.1

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

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

V_p = ... [1]

(ii) the time T for one cycle.

T = ... [2]

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

f = ... [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.

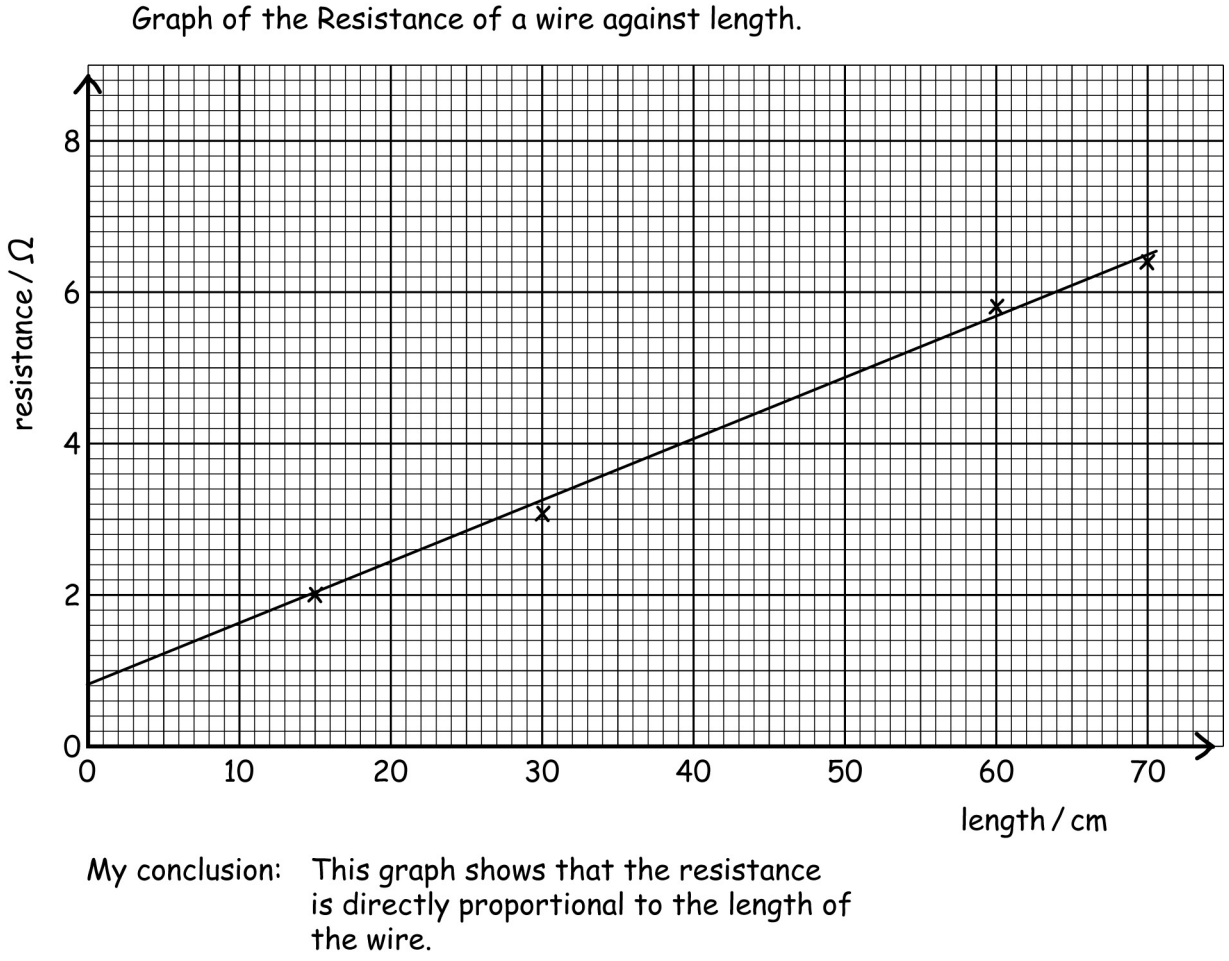

Fig. 4.1

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

[3]

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

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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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