Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8880412447

PHYSICS **0625/51**

Paper 5 Practical Test **October/November 2016**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of the page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
You are advised to spend about 20 minutes on each of questions 1 to 3, and 15 minutes on question 4.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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	

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **10** printed pages and **2** blank pages.

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1 In this experiment, you will use a pendulum to determine a value for the acceleration of free fall *g*.

Carry out the following instructions, referring to Figs. 1.1 and 1.2.

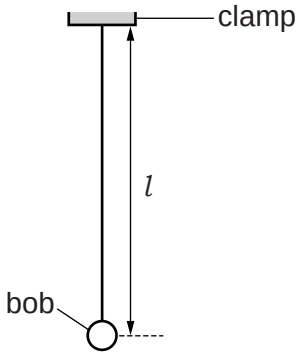


Fig. 1.1

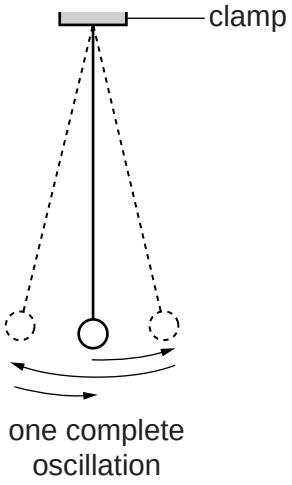


Fig. 1.2

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

(a) Adjust the pendulum until its length l = 50.0 cm. The length l is measured to the centre of the bob.

Explain briefly how you avoided a parallax (line of sight) error when measuring the length l.

.....

.....

.....[1]

(b) Displace the pendulum bob slightly and release it so that it swings. Fig. 1.2 shows one complete oscillation of the pendulum.

(i) Measure the time *t* for 20 complete oscillations.

t = ...[1]

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

T = ...[2]

(iii) Measuring the time for a large number of oscillations, rather than for 1 oscillation, gives a more accurate value for T.

Suggest one practical reason why measuring the time for 200 oscillations, rather than 20 oscillations, may not be suitable.

.....

.....[1]

(c) (i) Calculate T^2.

T^2 = ...[1]

(ii) Calculate the acceleration of free fall g using the equation $g = \frac{4\pi^2 l}{T^2}$. Give your answer to a suitable number of significant figures for this experiment.

g = ... m/s^2 [2]

(d) A student checks the value of the acceleration of free fall g in a text book. The value in the book is 9.8 m/s^2.

(i) Suggest a practical reason why the result obtained from the experiment may be different.

.....

.....

.....[1]

(ii) Suggest two improvements to the experiment.

1. .....

.....

2. .....

.....
[2]

[Total: 11]

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2 In this experiment, you will investigate the cooling of water.

(a)
- Pour 100 cm^3 of the hot water provided into beaker **A**.
- Measure the temperature θ_H of the water in beaker **A**.

θ_H = ...

- Pour 100 cm^3 of the cold water provided into beaker **B**.
- Measure the temperature θ_C of the water in beaker **B**.

θ_C = ...

- Calculate the average temperature θ_{AV} using the equation $\theta_{AV} = \frac{\theta_H + \theta_C}{2}$.

θ_{AV} = ...
[3]

(b) Add the water from beaker **B** to the hot water in beaker **A**. Stir briefly.

Measure the temperature θ_M of the mixture.

θ_M = ...[1]

(c) State one precaution that you took to ensure that the temperature readings are as reliable as possible.

.....

.....[1]

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(d) Empty both beakers.

You are provided with

- a lid, with a hole for the thermometer,
- some insulating material,
- two elastic bands.

(i) In the space below, draw a labelled diagram to show how you will use these items to reduce the loss of thermal energy when the procedure is repeated.

[2]

(ii) Using the improvements shown in your diagram, repeat the procedure in parts **(a)** and **(b)**.

θ_H = ...

θ_C = ...

θ_{AV} = ...

θ_M = ...

[1]

(iii) Comment on whether the improvements made to the apparatus have significantly changed the value of the temperature θ_M. Use your results to justify your answer.

.....

.....

.....[1]

(iv) Suggest two conditions that should be kept constant for all parts of this experiment.

1. .....

2. .....

[2]

[Total: 11]

3 In this experiment, you will investigate refraction using a transparent block.

Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 3.1 for guidance.

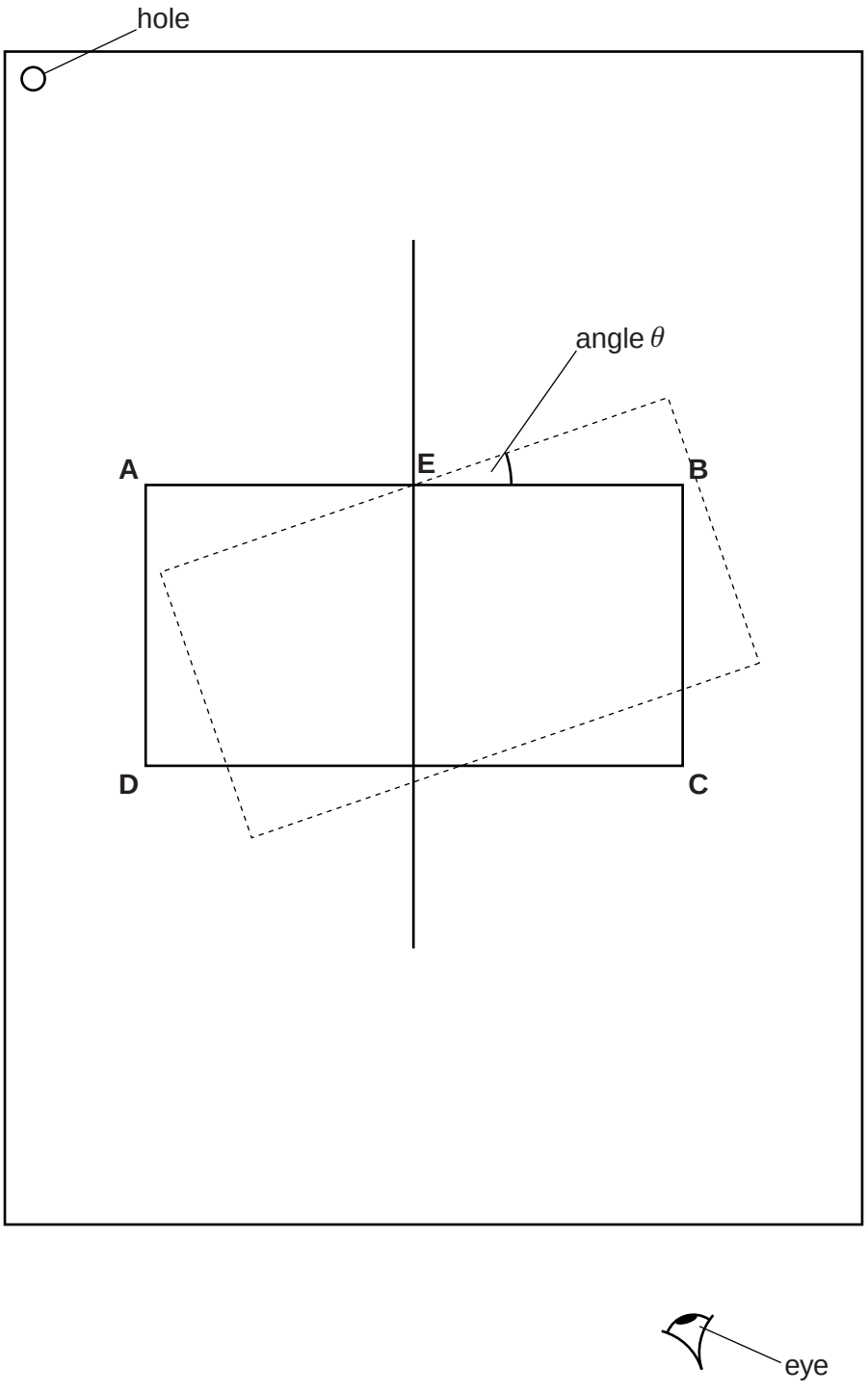


Fig. 3.1

(a)

- Place the transparent block, largest face down, on the ray-trace sheet supplied. The block should be approximately in the middle of the paper. Draw the outline of the block **ABCD**.
- Remove the block and draw a normal at the centre of side **AB**. Label the point **E** where the normal crosses **AB**.
- Draw a line **FE** to the left of the normal and at an angle $i = 20°$ to the normal.
- Place a pin P on the line **FE**, at a suitable distance from the block for producing an accurate ray trace.
- There are vertical lines $\mathbf{L_1}$ and $\mathbf{L_2}$ drawn on the block. Replace the block so that line $\mathbf{L_1}$ is at point **E**.
- Observe the images of $\mathbf{L_1}$ and P through side **CD** of the block. Carefully move the block, keeping line $\mathbf{L_1}$ at point **E**, until the vertical line $\mathbf{L_2}$ and the images of $\mathbf{L_1}$ and P appear one behind the other. This is indicated by the dashed position of the block shown in Fig. 3.1.
- Draw a line along side **AB** of the block to mark its new position.
- Remove the block.
- Measure the angle θ between the original position of **AB** and the new position of **AB**, as indicated in Fig. 3.1.
- Record $i = 20°$ and θ in Table 3.1.
- Repeat the procedure using values of $i = 30°$, 40°, 50° and 60°.

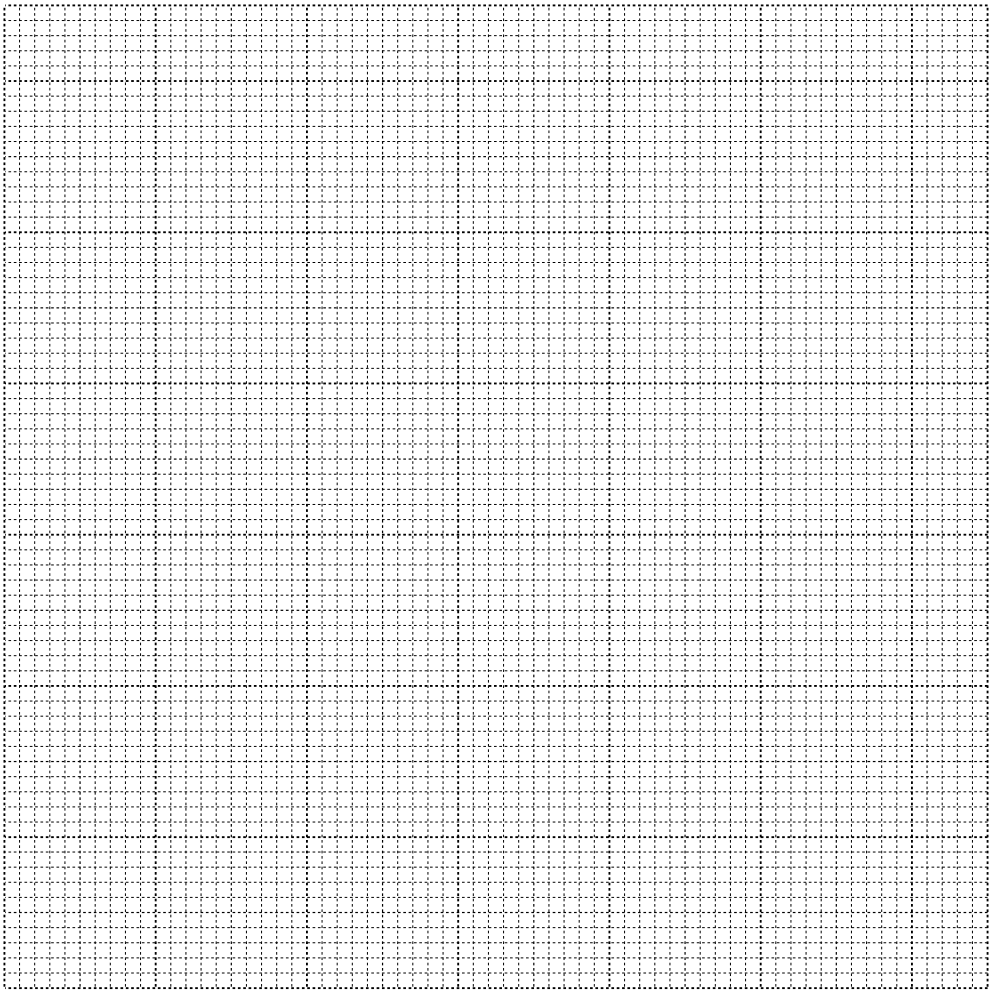
Table 3.1

i/°	θ/°

[4]

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(b) Plot a graph of θ/° (y-axis) against i/° (x-axis).



[4]

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

G = ...[2]

(d) Referring to your graph, comment on the quality of your measurements.

.....

.....[1]

Tie your ray-trace sheet into this Booklet between pages 8 and 9.

[Total: 11]

4 A student is investigating resistors connected in parallel.

The following apparatus is available to the student:

ammeter
voltmeter
power supply
variable resistor
switch
connecting leads
a box of identical resistors.

Plan an experiment to investigate how the combined resistance of the resistors, connected in parallel, depends on the number of resistors. You are **not** required to carry out this investigation.

You should:

- draw a diagram of the circuit you could use to determine the resistance of resistors connected in parallel (show only two resistors in your diagram)
- explain briefly how you would carry out the investigation
- draw a table or tables, with column headings, to show how you would display your readings. You are **not** required to enter any readings into the table.

.....

.....

.....

.....

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[7]

[Total: 7]

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