	Centre Number	Candidate Number
Candidate Name ______________________		

General Certificate of Education Advanced Subsidiary

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 8702/3

PAPER 3 Practical Test

OCTOBER/NOVEMBER SESSION 2001 1 hour 15 minutes

Candidates answer on the question paper.
Additional materials:
As listed in Instructions to Supervisors
Electronic calculator
Graph paper

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page and on any separate answer paper used.

Write your answers in the spaces provided on the question paper.

You are expected to record all your observations as soon as these observations are made and to plan the presentation of the records so that it is not necessary to make a fair copy of them. The working of the answers is to be handed in. Marks are mainly given for a clear record of the observations actually made, their suitability and accuracy, and for the use made of them.

At the end of the examination, fasten any separate answer paper used securely to the question paper.

INFORMATION FOR CANDIDATES

Additional answer paper and graph paper should be submitted **only** if it becomes **necessary** to do so.

You are reminded of the need for good English and clear presentation in your answers.

FOR EXAMINER'S USE

This question paper consists of 6 printed pages and 2 blank pages.

SB (KN/KN) QK12050

For Examiner's Use

1 In this experiment, you will determine the radius of a semicircular card.

You are provided with the following items.

a semicircular card
a pair of scissors
a ruler
a pin
a retort stand, boss and clamp
a cork
a small mass attached to a thread, with a loop
a protractor

(a) Determine the position of the centre O of the straight side of the semicircular piece of card, as shown in Fig. 1.1.

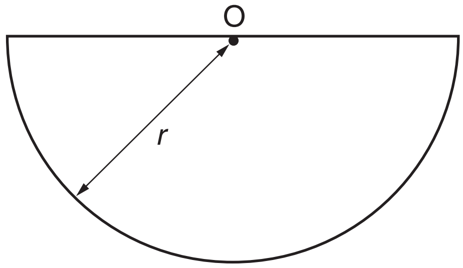

Fig. 1.1

Mark this position on the card. Explain how you determined the position of O.

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....

(b) (i) Measure the radius *r*, as shown in Fig. 1.1. Note its value.

r = ...

(ii) Determine the percentage uncertainty in this value of *r*.

percentage uncertainty = ...

(c) Use the pin to make a small hole in the card at A, as shown in Fig. 1.2.

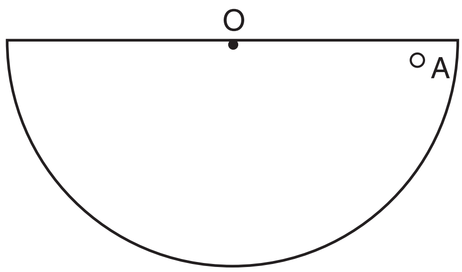

Fig. 1.2

For Examiner's Use

(d) Referring to Fig. 1.3, place the pin horizontally through A and into a cork which is held firmly in the clamp.

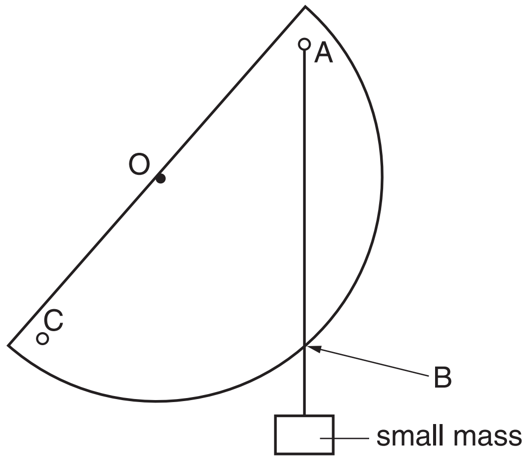

Fig. 1.3

The hole should be large enough for the card to hang freely. Place the loop of thread over the pin so the small mass hangs vertically below A. Mark the point B on the card where the thread crosses the bottom of the card.

(e) Remove the loop and the card from the pin. Draw the line AB on the card.

(f) Make another hole at C, as shown in Fig. 1.3. Repeat steps **(d)** and **(e)** with the pin going through the point C.

(g) The two lines drawn on the card cross at a point D. Measure the distance y between O and D and note its value, (see Fig. 1.4).

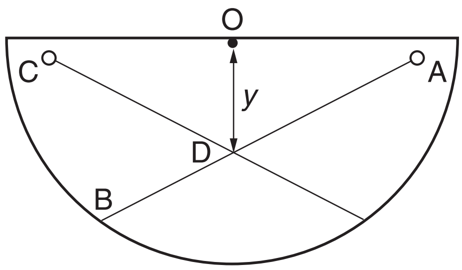

Fig. 1.4

y = ...

(h) Cut the card so that the angle shown as 2α in Fig. 1.5 is now 160°.

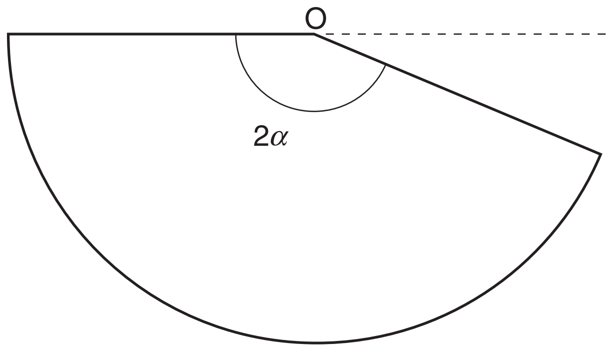

Fig. 1.5

(i) Repeat steps **(c)**, **(d)**, **(e)**, **(f)**, **(g)** and **(h)** until you have six sets of readings for 2α and y, with 2α ranging from 180° to 80° in steps of 20°. (If you make a mistake in cutting the card, ask the Supervisor for another one. You will not be penalised for this.) You can use both sides of the card. Record all readings in the space provided.

Tabulate values of 2α, y, $\sin\alpha$ and $\dfrac{\sin\alpha}{\alpha}$.

(j) Plot a graph of y (y-axis) against $\dfrac{\sin\alpha}{\alpha}$ (x-axis).

For Examiner's Use

(k) Determine the gradient of the line.

(l) Theory suggests that $y = \left(\dfrac{120r}{\pi}\right)\left(\dfrac{\sin\alpha}{\alpha}\right)$.

(i) Use your answer from **(k)** to determine *r*.

(ii) Comment on your value of *r*.

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