UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/05**

Paper 5 Practical Test

October/November 2006

1 hour 15 minutes

Additional Materials: As specified in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
You are expected to record all your observations as soon as these observations are made.
An account of the method of carrying out the experiments is **not** required.

At the end of the examination, hand in only the Answer Booklet.

This document consists of **6** printed pages, **2** blank pages and **1** inserted Answer Booklet.

MML 10779 4/05 T04064/2
© UCLES 2006

1 *In this experiment you are to determine the density of a type of wood.*

Record all your observations on pages 2 and 3 of your Answer Booklet.

You are provided with a bundle of wooden rods. You have access to a balance. Carry out the following instructions, referring to Fig. 1.1.

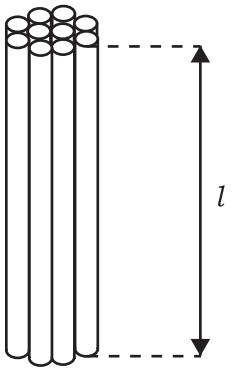

Fig. 1.1

(a) Measure and record the mass m of the bundle of wooden rods.

(b) Measure and record, in cm, the lengths of a sufficient number of the rods to enable the average length to be calculated.

(c) Calculate the average length l. Show your working.

(d) Use the metre rule and the piece of string provided to determine the circumference c, in cm, of the bundle of rods.

(e) Calculate the volume V of the bundle of rods using the equation

$$V = \frac{c^2 l}{4\pi} .$$

(f) The equation used in **(e)** assumes that the bundle is a solid cylinder. However there are air gaps between the rods. Consider your value of the volume V of the bundle of rods and estimate the total volume V_r of the rods themselves.

(g) Calculate the density d of the wood using the equation

$$d = \frac{m}{V_r} .$$

© UCLES 2006

2 *In this experiment you are to investigate the swing of a loaded metre rule.*

Record all your observations and answers on page 4 of the Answer Booklet.

Carry out the following instructions referring to Fig. 2.1.

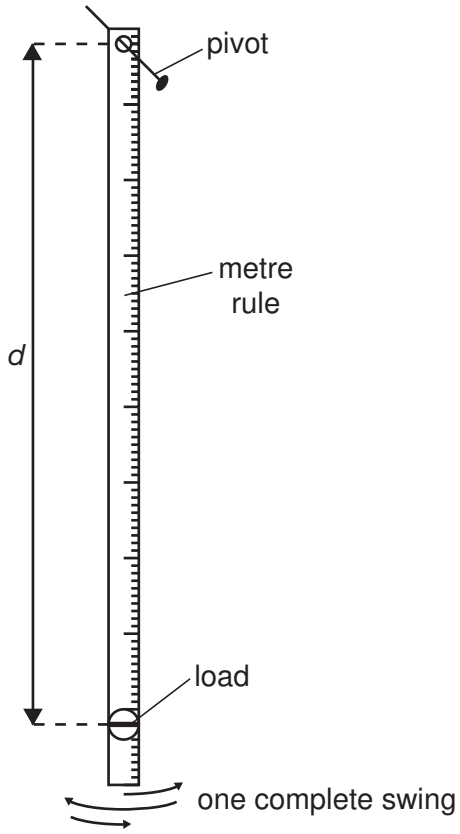

Fig. 2.1

The loaded metre rule has been set up for you.

(a) Adjust the position of the load attached to the metre rule so that its centre is 90.0 cm from the pivot.

(b) Displace the rule a small distance to one side and allow it to swing. Measure and record the time t taken for 10 complete swings. A complete swing is shown in Fig. 2.1.

(c) Calculate the time T taken for one complete swing.

(d) Repeat steps **(a)** – **(c)** to obtain a total of five sets of readings. Use values of d of 85.0 cm, 80.0 cm, 75.0 cm and 70.0 cm.

(e) Plot a graph of T/ s (y-axis) against d/ cm (x-axis).

(f) A student suggests that T is proportional to d. State whether your results support this suggestion and give a reason for your answer.

(g) Suggest one way that you could improve the accuracy of your results. (You are **not** asked to carry out any additional experimental work.)

© UCLES 2006

[Turn over

3 *In this experiment you are to investigate reflection in a plane mirror.*

Record all your observations and answers on page 5 of the Answer Booklet.

Carry out the following instructions referring to Fig. 3.1.

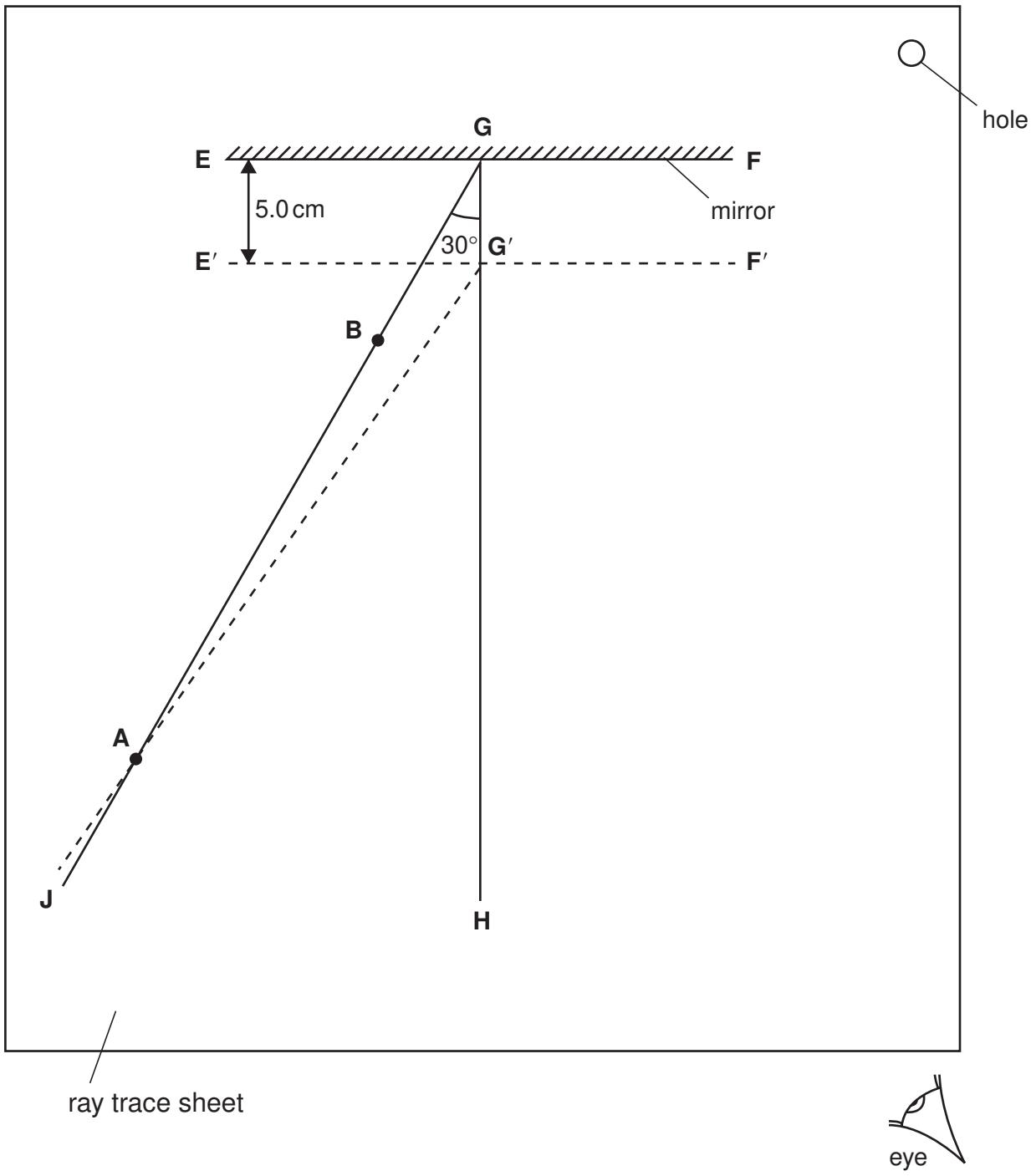

Fig. 3.1

© UCLES 2006

(a) Draw a straight line **EF** across the ray trace sheet, about 5 cm from the top of the sheet.

(b) Draw a normal **GH** to line **EF** so that point **G** is approximately at the centre of line **EF**.

(c) Draw a line **GJ** at an angle of 30° to the normal as shown in Fig. 3.1.

(d) Mark a point **A** on line **GJ** so that the distance **AG** is 11.5 cm.

(e) Place the ray trace sheet on the pin board. Place the mirror so that its front surface stands along the line **EF**.

(f) Push a pin P_1 into the surface at point **A**.

(g) Push another pin P_2 into the surface at a point on **GJ** closer to the mirror. Label this point **B**.

(h) View the images of the pins P_1 and P_2 from the direction indicated in Fig. 3.1. Push two pins P_3 and P_4 into the surface between your eye and the mirror so that P_3, P_4 and the images of P_1 and P_2 appear exactly one behind the other.

(i) Mark the positions of pins P_3 and P_4 on the ray trace sheet with letters **C** and **D**. Remove the pins and the mirror. Using a rule, draw a line joining **C** and **D** and continue this line to meet the line **EF**.

(j) Measure and record the angle of reflection r_1 between lines **GH** and **CD**.

(k) Draw a line **E′F′** that is parallel to and 5.0 cm below line **EF**. (See Fig. 3.1.) Label the point **G′** where the normal crosses line **E′F′**.

(l) Draw a line from **G′** through the point **A**. (See Fig. 3.1.)

(m) Place the ray trace sheet on the pin board. Place the mirror so that its front surface stands along line **E′F′**.

(n) Push a pin P_1 into the surface at point **A**.

(o) Push another pin P_2 into the surface on line **AG′** closer to the mirror. Label this point **B′**.

(p) Repeat steps **(h)** and **(i)**, marking the pin positions **C′** and **D′**. Draw a line joining **C′** and **D′** that continues to meet the line **E′F′**.

(q) Measure and record the angle of reflection r_2 between lines **GH** and **C′D′**.

(r) State whether it is best to view the tops, bases or central parts of the pins in order to obtain accurate results for this experiment. Give a reason for your answer.

Tie your ray trace sheet into your Answer Booklet between pages 4 and 5.

© UCLES 2006

[Turn over

4 *In this experiment you are to investigate the conditions affecting the rate of cooling of a beaker of hot water.*

Record all your observations and answers on pages 6 and 7 of the Answer Booklet.

You are provided with a supply of hot water. Carry out the following instructions referring to Fig. 4.1.

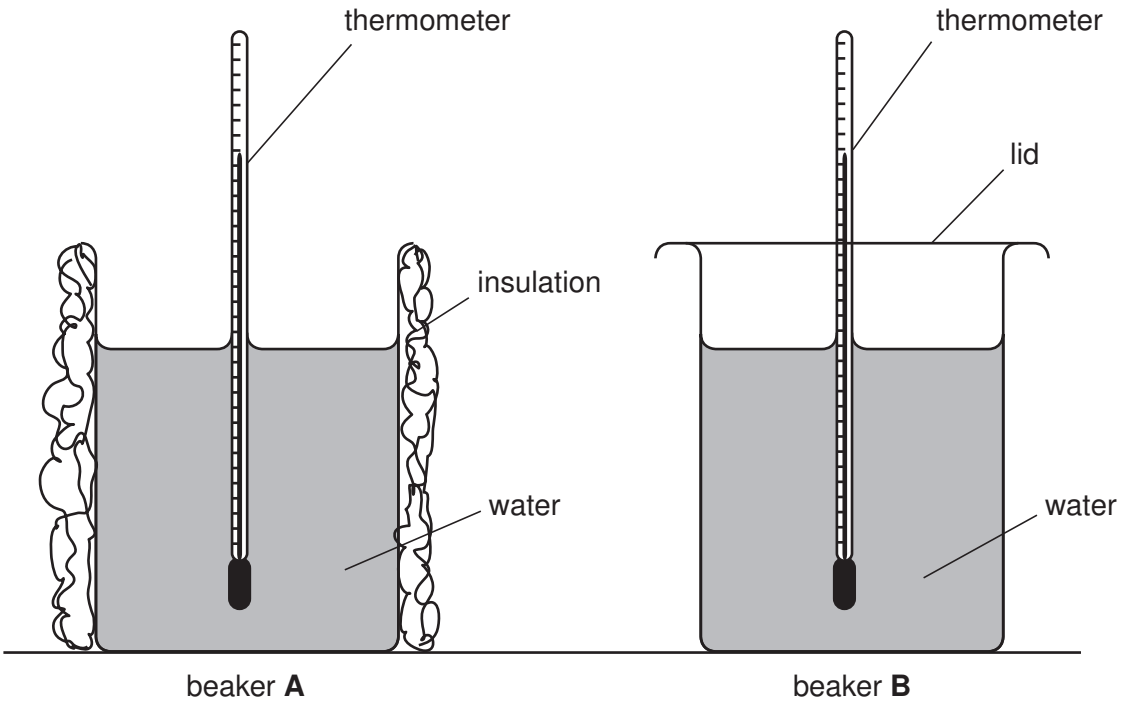

Fig. 4.1

(a) Pour hot water into beaker **A** until it is about two-thirds full. Beaker **A** is insulated. Do **not** remove the insulation.

(b) Measure and record the temperature θ of the hot water and at the same time start the stopwatch. Record the temperature at time $t = 0$ s in the table.

(c) Measure and record the temperature of the water in beaker **A** every 30 s for a total of five minutes.

(d) Pour the water from beaker **A** into the measuring cylinder. Measure and record the volume V of the water.

(e) Repeat steps **(a)** – **(c)** using beaker **B**. This beaker has a lid. As soon as you have poured the hot water into the beaker, replace the lid as shown in Fig. 4.1 and do **not** remove the lid during the experiment.

(f) Look at the temperature readings obtained. State whether the insulation round beaker **A** or the lid on beaker **B** or neither of these is more effective in keeping the water hot. Justify your answer by reference to the readings in your table.

(g) To obtain reliable results in this experiment, it is important that variables are controlled. State three variables that could have affected the results of this experiment.

© UCLES 2006

BLANK PAGE

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.