

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**PHYSICS**

**0625/05**

Paper 5 Practical Test

May/June 2006

**1 hour 15 minutes**

Additional Materials: As listed 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.  
The number of marks is given in brackets [ ] at the end of each question or part question.

- 1 In this experiment you are to determine the density of a sample of card.

Record all your observations on page 2 of your Answer Booklet.

You are provided with ten pieces of card. Carry out the following instructions, referring to Fig. 1.1.

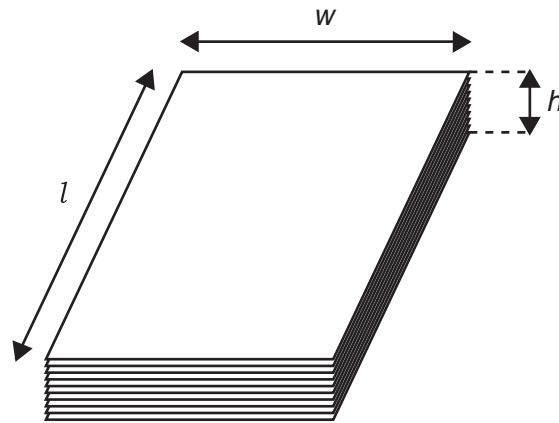


Fig. 1.1

- (a) (i) Measure and record in grams the mass  $M$  of the stack of ten pieces of card.  
(ii) Calculate the average mass  $m$  of one piece of card.
- (b) (i) Measure and record the height  $h$  (in mm) of the stack of cards.  
(ii) Calculate the average thickness  $t$  of one piece of card.
- (c) (i) Measure and record the length  $l$  (in mm) and width  $w$  (in mm) of one piece of card.  
(ii) Calculate the volume  $V$  of one piece of card using the equation

$$V = ltw.$$

- (d) Calculate the density  $d$  of the card using the equation

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

(e) A sample of corrugated card of the same length and width as the card you used in part (d) consists of two thin sheets of card with an air gap in between. The sheets of card are separated by paper as shown in the cross-section in Fig. 1.2. The thickness  $y$  of the paper as shown in Fig. 1.2 is between 2 mm and 3 mm.

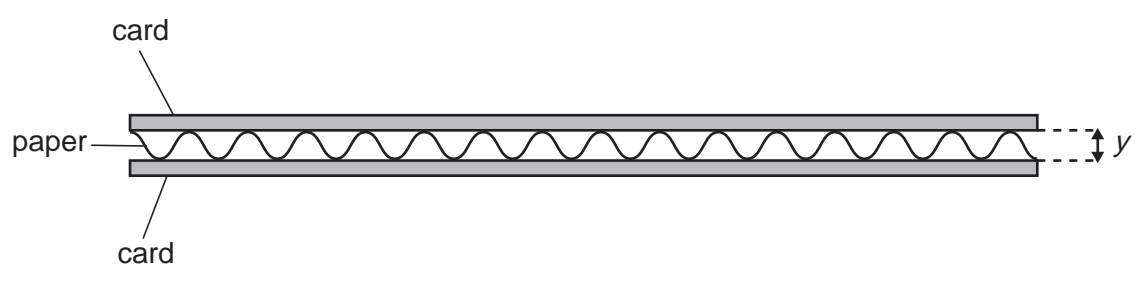


Fig. 1.2

Estimate the volume  $V_a$  of air trapped within the corrugated card shown in Fig. 1.2.

2 In this experiment you are to investigate the resistance of lamps in different circuit arrangements.

Record all your observations and readings on page 3 of your Answer Booklet.

A circuit has been set up for you. You are also provided with an additional lamp and some additional connecting leads.

- (a) Draw a circuit diagram of the circuit that has been set up for you. Use standard circuit symbols.
- (b) (i) Switch on. Measure and record the current  $I_1$  in the circuit and the p.d.  $V_1$  across the lamp. Switch off.
- (ii) Calculate the resistance  $R_1$  of the lamp using the equation

$$R_1 = \frac{V_1}{I_1}.$$

- (c) Connect a second lamp in parallel with the first lamp.
- (i) Switch on. Measure and record the total current  $I_2$  in the circuit and the p.d.  $V_2$  across the lamps. Switch off.
- (ii) Calculate the resistance  $R_2$  of the two lamps in parallel using the equation

$$R_2 = \frac{V_2}{I_2}.$$

- 3 In this experiment you are to determine the weight of a metre rule.

Record all your observations on pages 4 and 5 of your Answer Booklet. Carry out the following instructions, referring to Fig. 3.1. The apparatus has been set up for you.

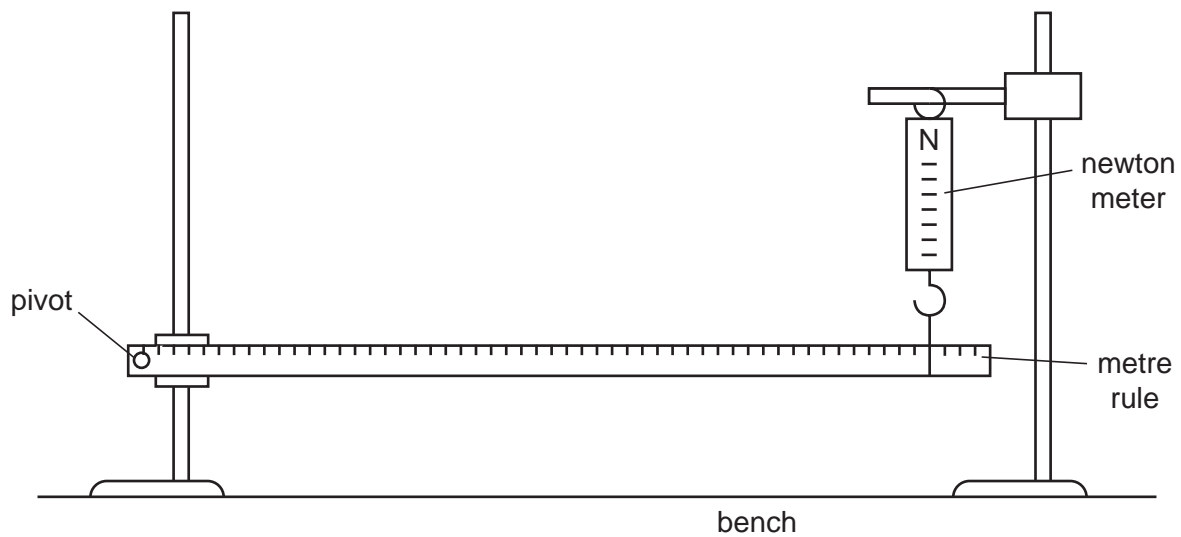


Fig. 3.1

You are provided with a metre rule supported at one end by a pivot through the 1.0 cm mark. The other end is supported by a newton meter hanging from a clamp.

- Adjust the position of the clamp supporting the newton meter so that the rule is supported at the 0.900 m mark and is horizontal. Describe how you checked that the metre rule was horizontal. You may draw a diagram if you wish.
- Record the force  $F$  shown on the newton meter. Also record the distance  $d$  (in m) from the pivot to the 0.900 m mark.
- Calculate and record the value of  $\frac{1}{d}$ .
- Adjust the position of the clamp supporting the newton meter so that the rule is supported at the 0.850 m mark and is horizontal. Check that the metre rule is horizontal.
- Record the force  $F$  shown on the newton meter and the distance  $d$  from the pivot to the 0.850 m mark. Calculate and record the value of  $\frac{1}{d}$ .
- Repeat steps (d) and (e) with the newton meter at the 0.800 m, 0.750 m and 0.700 m marks.
- Plot a graph of  $F/N$  ( $y$ -axis) against  $\frac{1}{d} / \frac{1}{m}$  ( $x$ -axis).
- Determine the gradient  $G$  of the graph.
- Calculate the weight of the metre rule using the equation

$$W = \frac{G}{k},$$

where  $k = 0.490$  m.

4 In this experiment you are to investigate the refraction of light through a transparent material.

Record all your observations and answers on page 6 of the Answer Booklet. Carry out the experiment following the following instructions referring to Fig. 4.1.

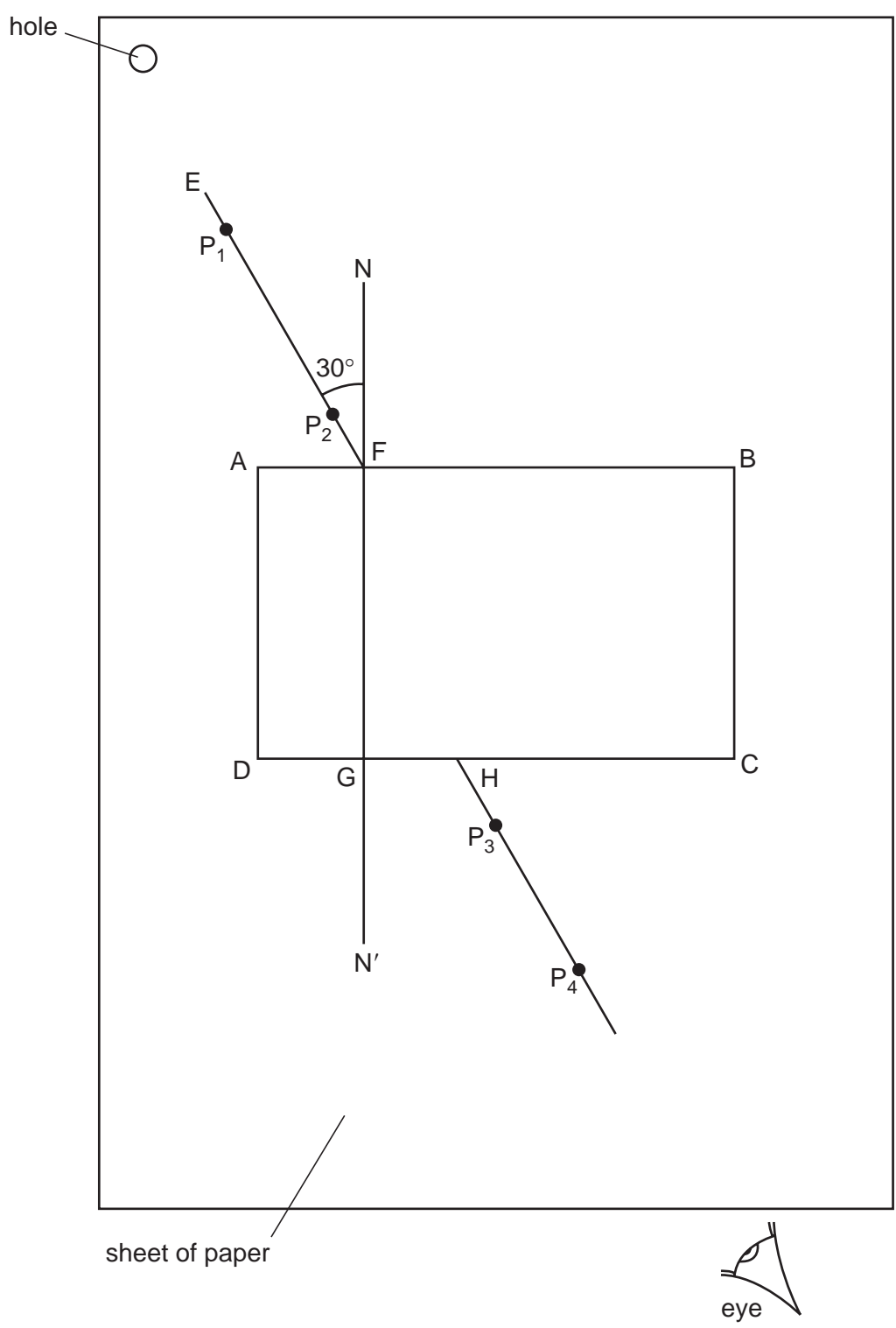


Fig. 4.1

- (a) Place the transparent block, largest face down, on the sheet of plain paper so that the block should be approximately in the middle of the paper. Draw the outline ABCD of the block.
- (b) Remove the block and draw the normal NN' to side AB so that the normal is 2.0 cm from A. Label the point G where NN' crosses DC.
- (c) Draw the line EF at an angle of 30° to the normal, as shown in Fig. 4.1.
- (d) Place the paper on the pin board.
- (e) Place two pins P<sub>1</sub> and P<sub>2</sub> on line EF as shown in Fig. 4.1.
- (f) Replace the block and observe the images of P<sub>1</sub> and P<sub>2</sub> through side CD of the block so that the images of P<sub>1</sub> and P<sub>2</sub> appear one behind the other. Place two pins P<sub>3</sub> and P<sub>4</sub> between your eye and the block so that P<sub>3</sub> and P<sub>4</sub> and the images of P<sub>1</sub> and P<sub>2</sub>, seen through the block, appear one behind the other. Mark the positions of P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub>. Remove the block.
- (g) Draw a line joining the positions of P<sub>3</sub> and P<sub>4</sub>. Continue the line until it meets CD. Label this point H.
- (h) Measure and record the length *a* of the line GH.
- (i) Draw the line HF.
- (j) Measure and record the length *b* of the line HF.
- (k) Extend the straight line EF within the outline of the block to a point I. The distance FI must be exactly equal to *b*.
- (l) From I draw a line that meets NN' at a right angle. Label this position J.
- (m) Measure and record the length *c* of the line IJ.
- (n) Calculate the refractive index *n* of the material of the block using the equation

$$n = \frac{c}{a} .$$

**Tie your sheet of paper into your Answer Booklet opposite page 6.**

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