

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS

0625/05

Paper 5 Practical Test

May/June 2003

1 hour 15 minutes

Additional Materials: As specified in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Follow the instructions on the front cover of the Answer Booklet.
Write your answers in the spaces provided in the Answer Booklet.

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 **7** printed pages, **1** blank page and an inserted Answer Booklet.



- 1** In this experiment, you are to investigate the heating of thermometer bulbs under different conditions.

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

You are provided with two thermometers labelled A and B. Thermometer B has a thin layer of cotton wool around the bulb. Do not remove this cotton wool. The thermometers are arranged with their bulbs at equal distances from a lamp. Do not move the lamp or the thermometers.

Carry out the following instructions referring to Fig. 1.1.

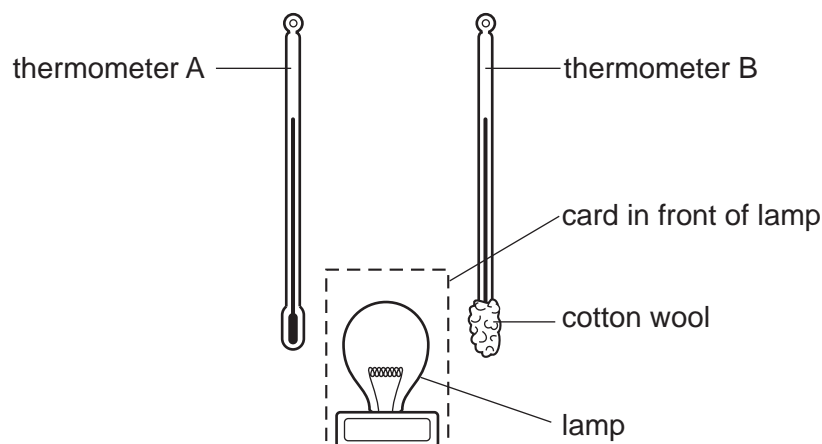


Fig. 1.1

During the experiment, you will read temperature values from thermometers. You may find it more comfortable to use the card provided to shield your eyes from the direct light from the lamp. Do not place the card between the lamp and a thermometer.

- (a)** Take the room temperature readings on both thermometers and record them at time 0 s in the table.
- (b)** Switch on the lamp and start the stopwatch.
 - (i)** Record in the table T_A , the temperature reading on thermometer A after 30 s.
 - (ii)** After a further 30 s (i.e. at time $t = 60$ s) record T_B , the temperature reading on thermometer B.
 - (iii)** Continue taking temperature readings from the thermometers in turn at 30 s intervals, as indicated in the table, up to 300 s.
 - (iv)** Switch off the lamp.
- (c)** Complete the column headings in the table.
- (d)**
 - (i)** Using the readings obtained for thermometer A, plot a graph of temperature / °C (y-axis) against time / s (x-axis). Label the line 'A'.
 - (ii)** Using the same axes, plot a graph using the readings obtained for thermometer B. Label the line 'B'.
- (e)** State which thermometer bulb heated up more quickly. Justify your answer by reference to your graph.

- 2** *In this experiment, you are to make two sets of measurements as accurately as you can in order to determine the volume of a beaker.*

Record all of your observations and answers on pages 4 and 5 of the Answer Booklet.

You are provided with a beaker, a rule, a length of string and two blocks of wood.

Carry out the following instructions.

Method 1

- (a)** Use the two blocks of wood and the rule to measure the external diameter d of the middle part of the beaker.
- (b)** Draw a labelled diagram to show how you used the blocks of wood and the rule to find, as accurately as possible, a value for the diameter.
- (c)** Calculate the external radius r of the beaker.
- (d)** Measure the height h of the beaker.
- (e)** Calculate the external volume V of the beaker using the equation

$$V = \pi r^2 h.$$

Method 2

- (f)** Use the string and the rule to measure, as accurately as possible, the circumference c of the middle part of the beaker.
- (g)** Calculate a second value of the external volume V of the beaker using the equation

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

- (h)** Calculate A , the average of your two values for V .
- (i)** Estimate the maximum volume of water v that the beaker could hold.
- (j)** Calculate the approximate volume G of the glass used to make the beaker, using the equation

$$G = A - v.$$

- 3 In this experiment, you are to compare the combined resistance of lamps arranged in series or in parallel.

Record all of your observations and readings on page 6 of your Answer Booklet.

Carry out the following instructions, referring to Fig. 3.1 and Fig. 3.2.

The circuit shown in Fig. 3.1 has been set up for you.

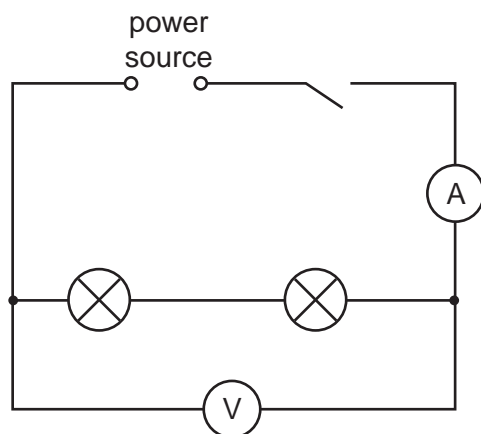


Fig. 3.1

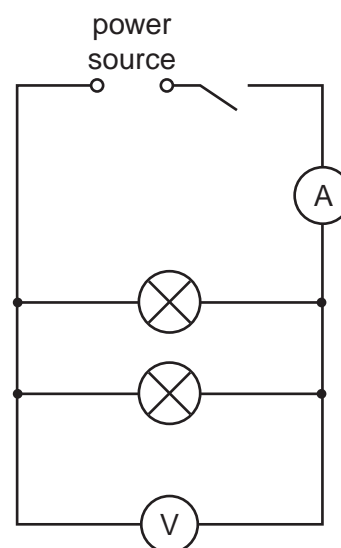


Fig. 3.2

- (a) Switch on. Measure and record in the table the current I in the circuit and the p.d. V across the two lamps. Switch off.
- (b) Calculate the combined resistance R of the two lamps using the equation

$$R = \frac{V}{I}.$$

Record this value of R in the table.

- (c) Complete the column headings in the table.
- (d) Disconnect the lamps and the voltmeter. Set up the circuit shown in Fig. 3.2.
- (e) Switch on. Measure and record in the table the current I in the circuit and the p.d. V across the two lamps. Switch off.
- (f) Calculate the combined resistance R of the two lamps using the equation

$$R = \frac{V}{I}.$$

Record this value of R in the table.

- (g) Using the values of resistance obtained in parts (b) and (f), calculate the ratio

$$\frac{\text{resistance of lamps in series}}{\text{resistance of lamps in parallel}}.$$

(h) Fig. 3.3 shows a cell connected to two motors. Copy and complete the circuit diagram to show

- a voltmeter connected to measure the p.d. across the motors,
- an ammeter connected to measure the total current in the circuit,
- a variable resistor connected to vary the current in one of the motors.

You are not asked to set up this circuit.

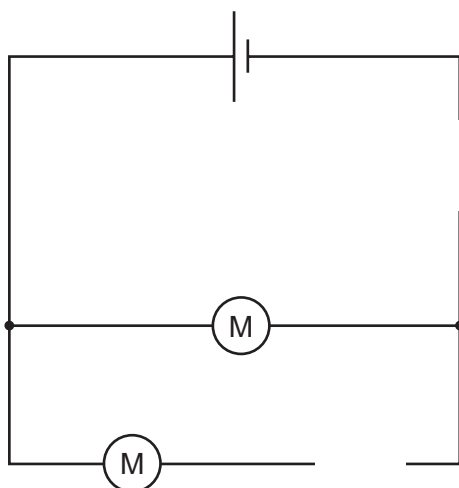


Fig. 3.3

- 4 In this experiment, you are to investigate the reflection of light by a plane mirror.

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

Carry out the following instructions referring to Fig. 4.1. Use the diagram printed on page 7 of your Answer Booklet as a ray trace sheet.

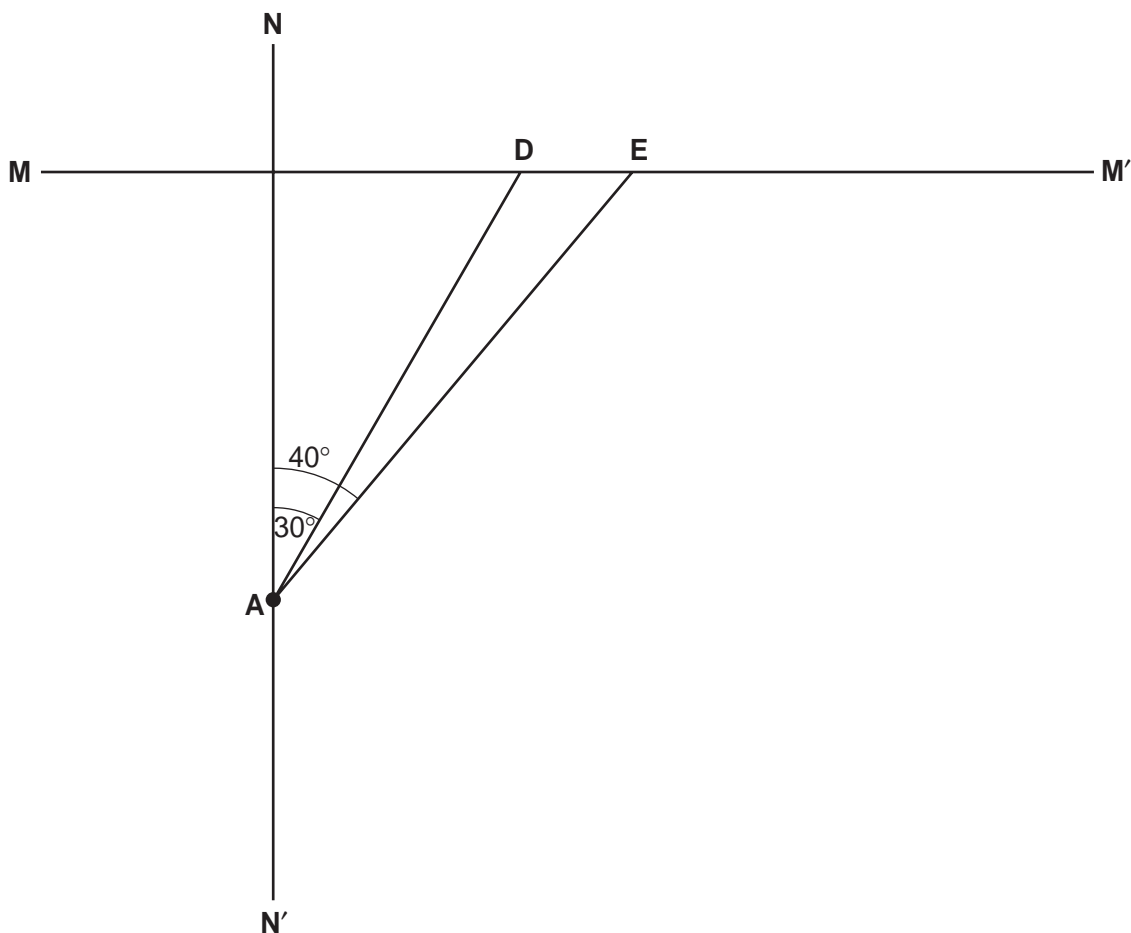


Fig. 4.1

- On the ray trace sheet, draw a line from point **A** to the line MM' . The line is to be at an angle of 30° from the line NN' . Label with the letter **D** the point at which the line you have drawn meets line MM' .
- Draw another line from point **A** to the line MM' . This line is to be at an angle of 40° from the line NN' . Label with the letter **E** the point at which the line you have drawn meets line MM' .
- Place the mirror so that its reflecting surface lies along the line MM' . Place a pin at point **A**. Place another pin **B** close to the mirror and along the line AD .
- View the images of pins **A** and **B** in the mirror. Place two pins **F** and **G** between your eye and the mirror so that **F**, **G** and the images of **A** and **B** appear exactly one behind the other.
- Mark the positions of pins **B**, **F** and **G** on the ray trace sheet. Remove the pins and the mirror. Using a rule draw a line joining **G** and **F**, and continue the line to meet the line MM' .
- Repeat the steps (c) to (e) using the same position of pin **A** but placing pin **B** on line AE .

- (g) Draw a line from line **AD** to line **AE** that is parallel to and 2.0 cm from **MM'**. Record the length x of the line.
- (h) Draw a line between the two reflected ray lines that is parallel to and 4.0 cm from **MM'**. Record the length y of the line.
- (i) Calculate the ratio $\frac{x}{y}$.

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