International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS **0625/6**

PAPER 6 Alternative to Practical

OCTOBER/NOVEMBER SESSION 2001 1 hour

Candidates answer on the question paper.
No additional materials required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

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

INFORMATION FOR CANDIDATES

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	
5	
TOTAL	

This question paper consists of 11 printed pages and 1 blank page.

[Turn over

1 Fig. 1.1 shows a strip of wood approximately 1 m long, clamped at each end to rigid supports so that the strip is horizontal and about 50 cm above the floor. A small loop of string is fixed at the centre of the strip.
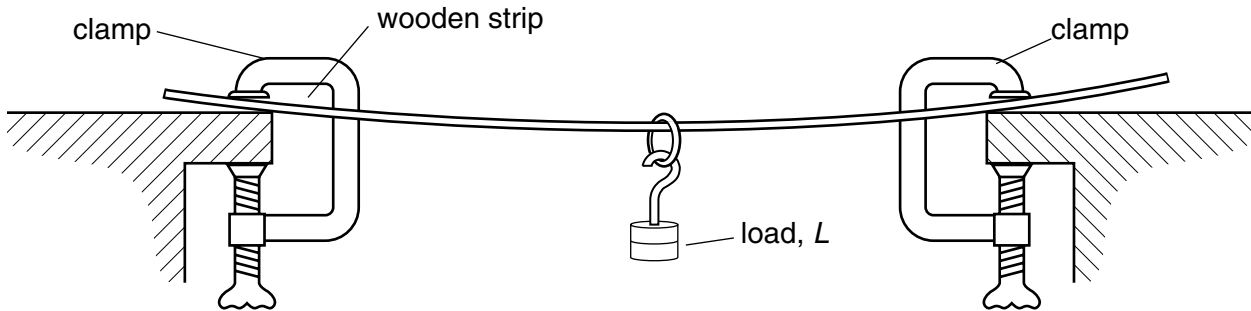

Fig. 1.1

A student investigates how the bending of the strip of wood depends on the load hung from the loop of string. The depression d of the strip at the centre is measured for each load L. The readings obtained are shown in the table below.

L/N	d/mm
0.0	0.0
1.0	11.5
2.0	23.0
3.0	34.0
4.0	46.0
5.0	57.5

(a) (i) Plot a graph of d/mm (y-axis) against L/N (x-axis). Draw the line of best fit. [6]

(ii) From the graph, determine the depression that would be produced by a load of 2.5 N. Show clearly on the graph how you obtained the necessary information.

depression produced by a load of 2.5 N = ... [2]

(b) Draw a diagram in the space below to show how you would measure the depression produced by a load. You may assume that simple standard laboratory apparatus is available.

[2]

[Turn over
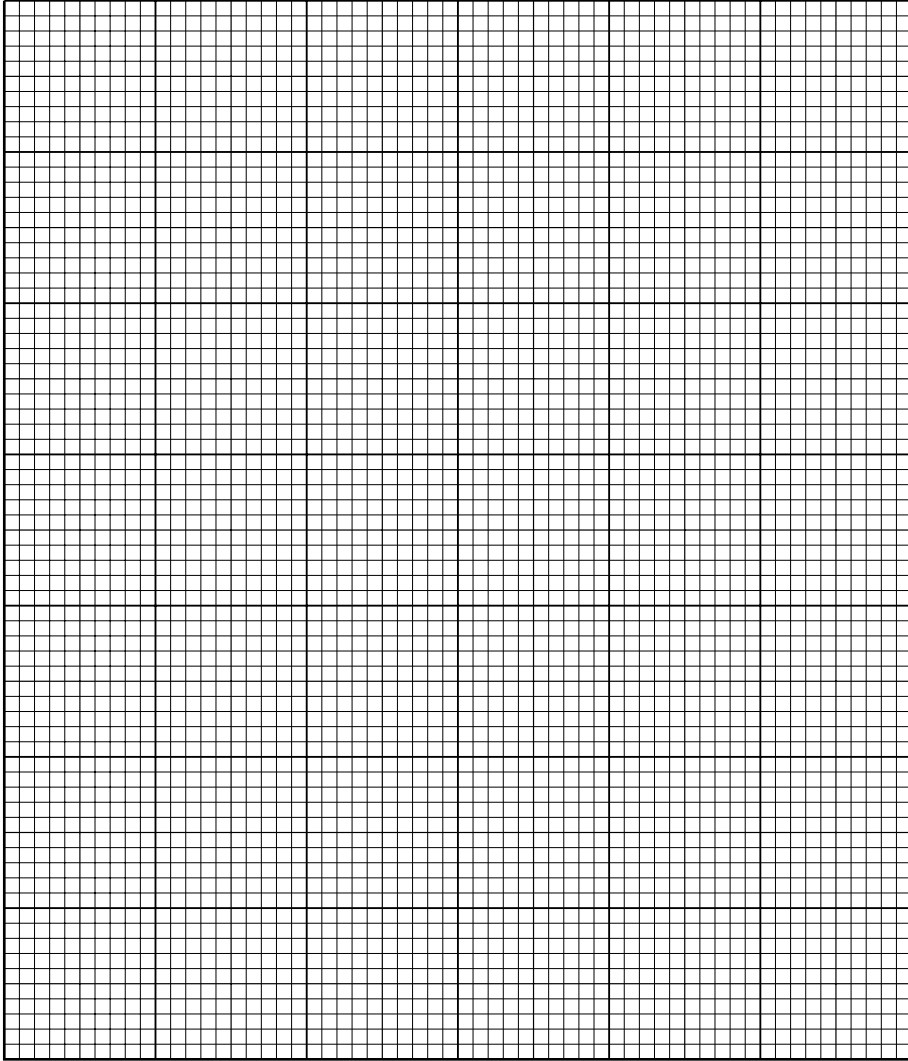
2 Fig. 2.1 shows a circuit in which lamps are connected to a d.c. power supply.
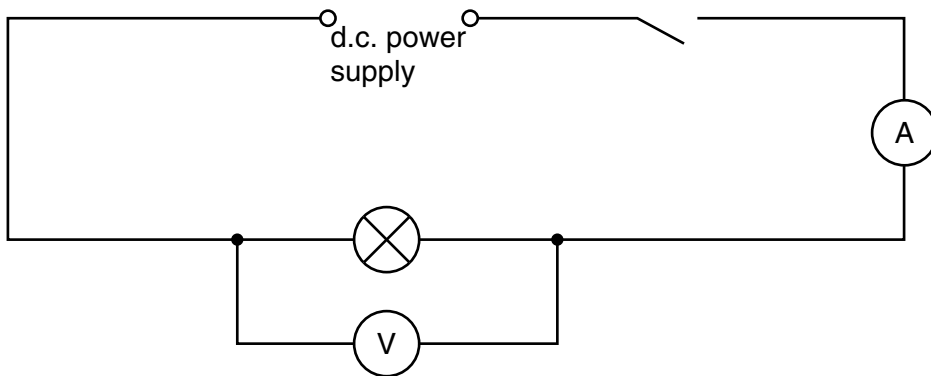
Fig. 2.1

Three lamps **B**, **C** and **D** are available and are connected in the circuit in turn. Each time the potential difference *V* across the lamp and the current *I* through the lamp are measured. A 0–0.5 A ammeter is used to measure the current. Fig. 2.2 represents the face of the ammeter when reading the current values.
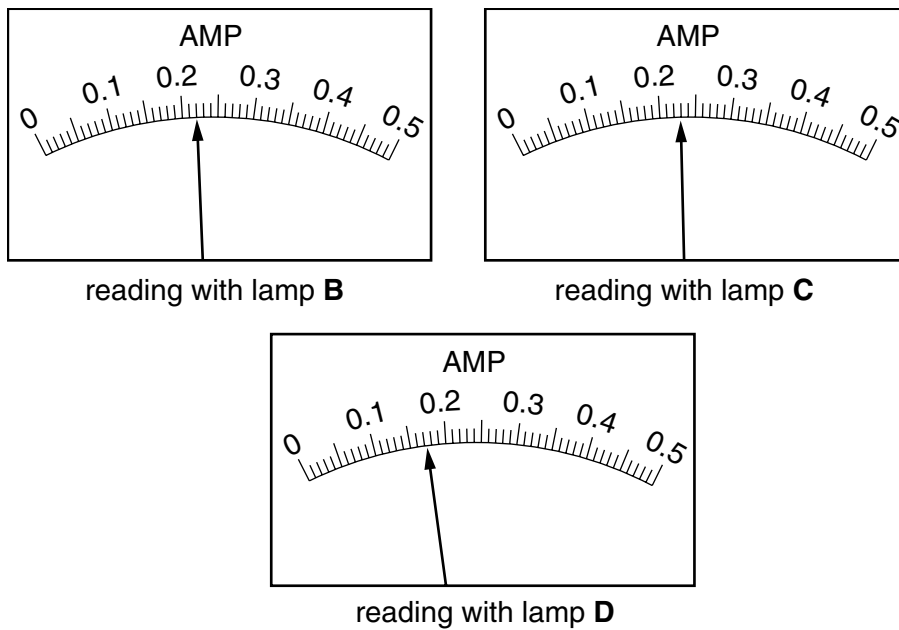
reading with lamp **B**

reading with lamp **C**

reading with lamp **D**

Fig. 2.2

(a) (i) In the table below, record each ammeter reading shown in Fig. 2.2.

lamp	$V/$V	$I/$A
B	2.0	
C	2.1	
D	1.9	

[3]

(ii) Using the values in the table and the equation $R = V/I$, calculate the resistance of each lamp.

resistance of lamp **B** = ...

resistance of lamp **C** = ...

resistance of lamp **D** = ...   [2]

(b) In the space below, draw a new circuit diagram showing
the power source and switch,
the three lamps in parallel,
the voltmeter connected to measure the voltage across the lamps,
the ammeter connected to measure the current through lamp **C**.

[3]

[Turn over

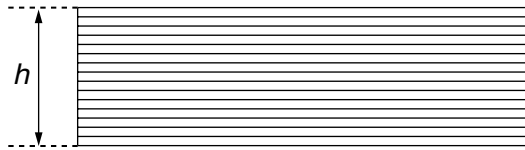**3** Fig. 3.1 shows a pile of 15 glass microscope slides, drawn actual size.

h

Fig. 3.1

(a) (i) On Fig. 3.1, use your rule to measure h, the height in mm of the pile of slides.

h = ...

(ii) Calculate the thickness t of **one** slide.

t = ...

[2]

(iii) The surface area A of each slide is 1200 mm². Calculate the volume V of one slide using the equation
$$V = A \times t.$$

V = ... [2]

(iv) The mass of one microscope slide is 3.7 g. Calculate the density d of the glass, in g/mm³, using the equation
$$d = m/V.$$
Give your answer to an appropriate number of significant figures.

d = ... [2]

(b) Fig. 3.2 shows the pile of microscope slides being used in a balancing experiment. The metre rule is to be balanced, at the 50.0 cm mark, on the pivot. The pile of slides has a mass of 55.5 g and is placed with its centre of mass on the rule at a distance 20.0 cm from the pivot.

On Fig. 3.2, show clearly the **approximate** position of a 100 g mass placed on the rule to make it balance. (You are **not** expected to carry out a calculation.)
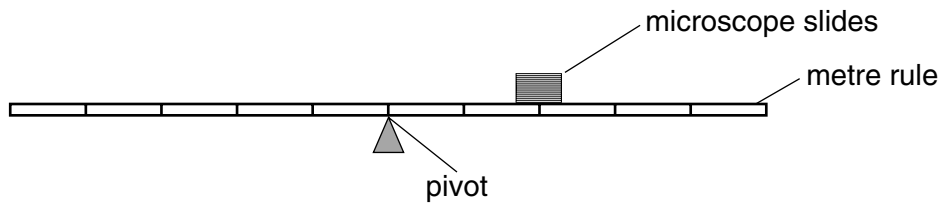
microscope slides

metre rule

pivot

Fig. 3.2

[2]

[Turn over

4   Fig. 4.1 shows three metal cans **A**, **B** and **C**. The cans are all drawn to one quarter actual size.
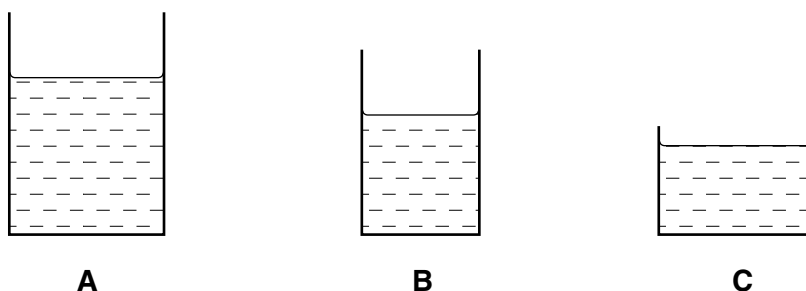

Fig. 4.1

Each can contains water at room temperature. The outer surfaces of the cans are as follows:

A – painted white
B – painted black
C – polished metal (no paint).

(a) A student carries out an experiment to investigate how the colour of the surface affects the rate of heating of the water when the cans are placed close to a radiant heater. Her readings are shown below.

can	initial water temperature/°C	final water temperature/°C	heating time/min	temperature change/°C
A	20	55	20	
B	20	43	23	
C	20	52	18	

   (i) Calculate the temperature change for each can and record the values in the table above.   [1]

   (ii) The student realises that the variables have not been controlled, so that it is not possible to draw reliable conclusions about the effect of the colour of the surface on the rate of heating.

   Suggest **two** changes you would make to obtain a more reliable set of readings.

   1. ....

   2. ....[2]

(b) Another student carries out a similar experiment, with proper control of the variables, and takes temperature readings every 60 s. All the cans reach a steady temperature within 25 minutes of the start of timing. She plots a graph of temperature against time to show the heating of the water in each can. Fig. 4.2 shows the graph obtained.
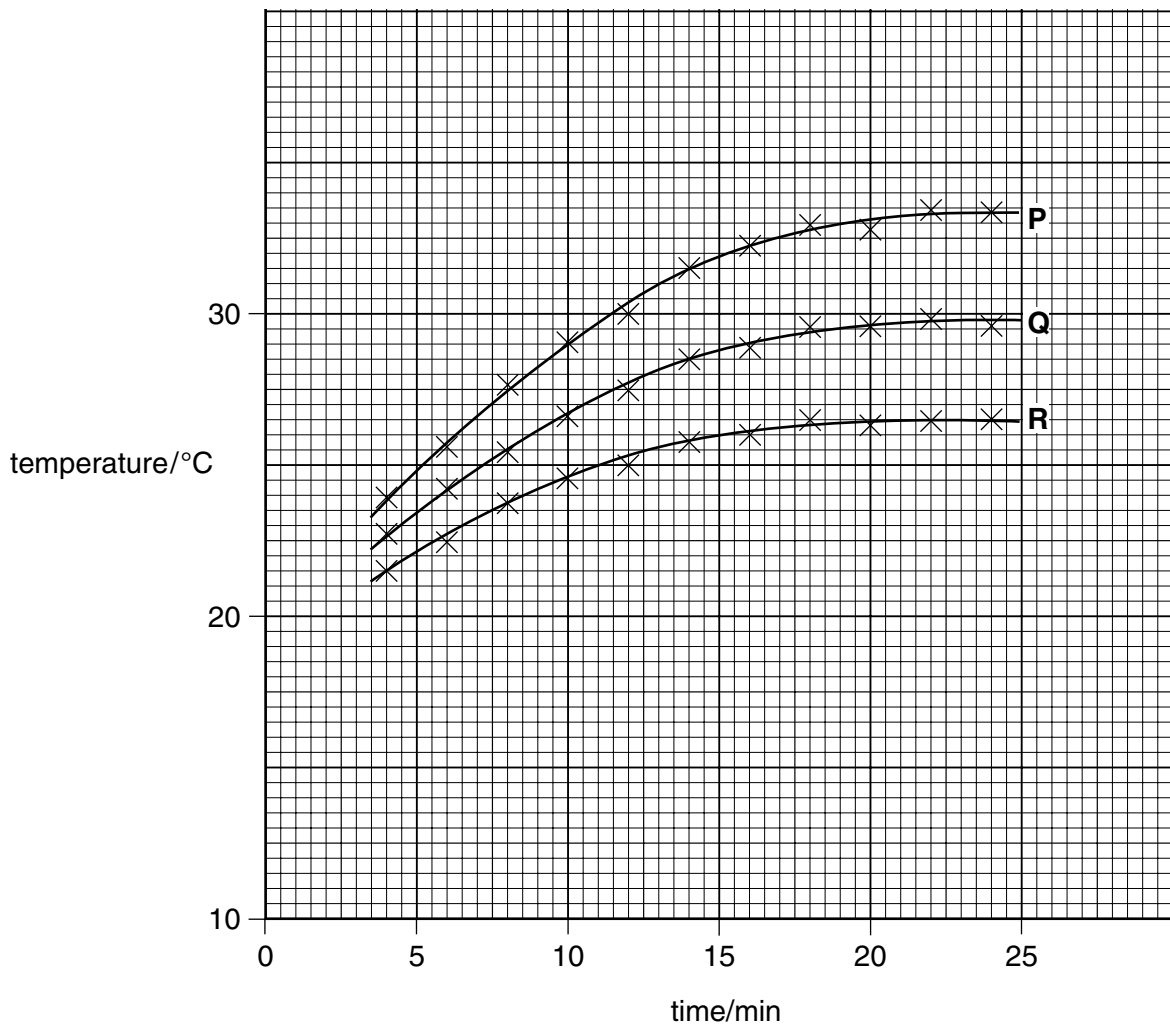

Fig. 4.2

(i) From the graph, which can, **P**, **Q** or **R**, reached its final temperature most quickly?

.... [1]

(ii) Using the graph, determine the temperature of the water at the start of the experiment. Show clearly on the graph how you obtained the necessary information.

temperature = ... [2]

[Turn over

5 Fig. 5.1 shows the outline of a transparent perspex block used in an experiment to determine the value of a quantity called the refractive index of perspex. The block is placed on a sheet of plain paper that is mounted on a cork mat. Two pins P_1 and P_2 are viewed through the block and two additional pins P_3 and P_4 are stuck into the mat so that P_3, P_4 and the images of P_1 and P_2 appear to be exactly in line, one behind the other.
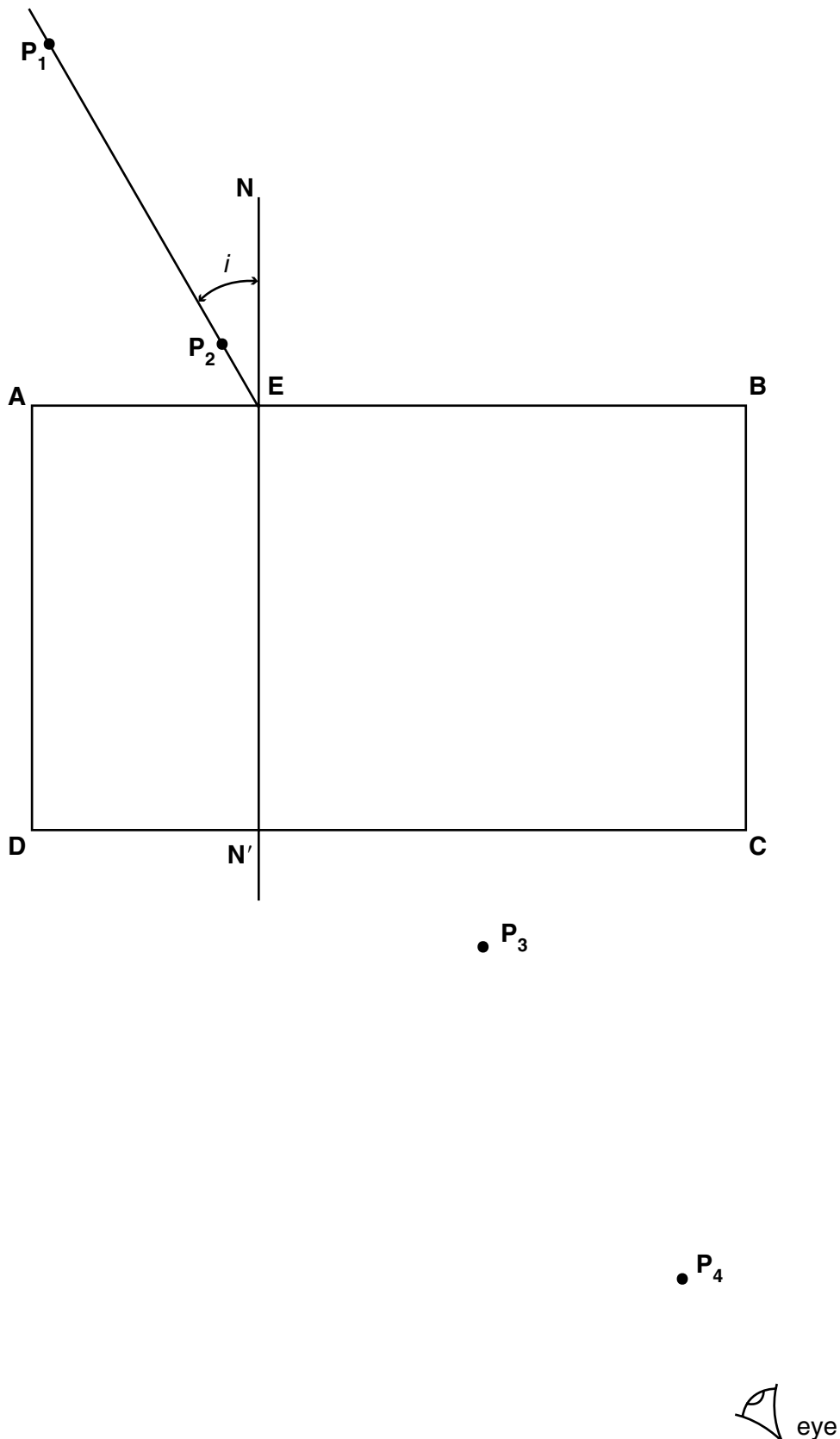
Fig. 5.1

(a) (i) On Fig. 5.1, draw a line through the positions of P_3 and P_4 and extend the line until it meets **CD**. Mark this point as **F**.

Show the path of the ray of light through the block by joining point **E** to point **F**. [1]

(ii) Measure the angle *i*.

i = ... [1]

(b) Give **two** precautions that you would take to obtain an accurate path for the ray of light. You should consider the positioning of the pins P_3 and P_4 and how they are viewed. You may assume that simple laboratory apparatus is available, if required.

first precaution ....

....

second precaution ....

....[2]

(c) (i) Measure the distance **N′F**.

N′F = ...

(ii) Measure the distance **EF**.

EF = ...

(iii) Calculate the refractive index *n* of perspex using the equation

$$n = 0.5 \times \frac{\textbf{EF}}{\textbf{N′F}}.$$

n = ... [4]

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