UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6173585894

PHYSICS **0625/53**

Paper 5 Practical Test **May/June 2012**

1 hour 15 minutes

Candidates answer on the Question Paper

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of the page.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.
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	
Total	

This document consists of **10** printed pages and **2** blank pages.

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1 In this experiment, you will investigate the effect of a load on a rule attached to a forcemeter.

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Carry out the following instructions, referring to Fig. 1.1. The apparatus has been set up for you.

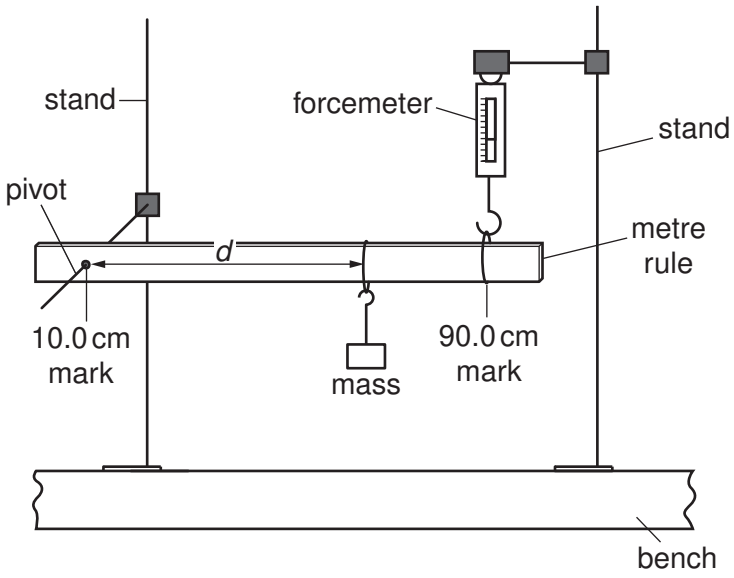

Fig. 1.1

The rule is pivoted near one end. Near the other end, the rule is attached to a forcemeter. A mass is hanging from the rule at a distance *d* from the pivot.

(a) (i) Move the mass to a distance $d = 70.0\,\text{cm}$ from the pivot. Record the distance *d* in Table 1.1.

(ii) Adjust the position of the forcemeter by raising or lowering the clamp until the rule is horizontal and the forcemeter is vertical. Measure and record in the table the reading *F* on the forcemeter.

Table 1.1

d/	*F*/

(iii) Repeat steps **(i)** and **(ii)** using *d* values of 60.0 cm, 50.0 cm, 40.0 cm, 30.0 cm, 20.0 cm and 10.0 cm.

(iv) Complete the column headings in the table. [5]

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(b) A student thinks that F is directly proportional to d.

(i) Suggest the graph that you could plot to test this idea. You are not asked to plot the graph.

..... against .....

(ii) State the properties of the line that would indicate that F is directly proportional to d.

1. .....

2. .....

[3]

(c) A spirit level is a piece of equipment that is placed on a surface to check whether the surface is horizontal.

Suggest why a spirit level balanced on the rule is not suitable for checking whether the rule is horizontal in this experiment.

.....

.....[1]

(d) Describe briefly how you checked that the rule was horizontal. You may draw a diagram.

.....

.....

.....[1]

[Total: 10]

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[Turn over

2 In this experiment, you will investigate the rate of cooling of water.

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You are provided with a supply of hot water. Carry out the following instructions referring to Fig. 2.1.

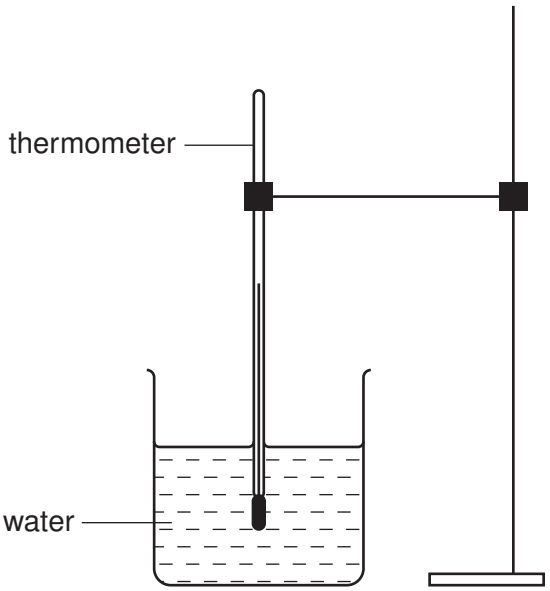

Fig. 2.1

(a) Measure and record room temperature θ_R.

θ_R = ...[1]

(b) (i) Pour approximately 200 cm^3 of the hot water supplied into the beaker. Place the thermometer in the beaker of water.

Measure the temperature θ of the water. Record θ in Table 2.1 at time t = 0 s.

(ii) Start the stopclock and record in the table the temperature of the water at 30 s intervals until you have a total of six values up to time t = 150 s.

Table 2.1

t/s	θ/°C

[2]

(c) Plot a graph of θ/°C (y-axis) against t/s (x-axis).

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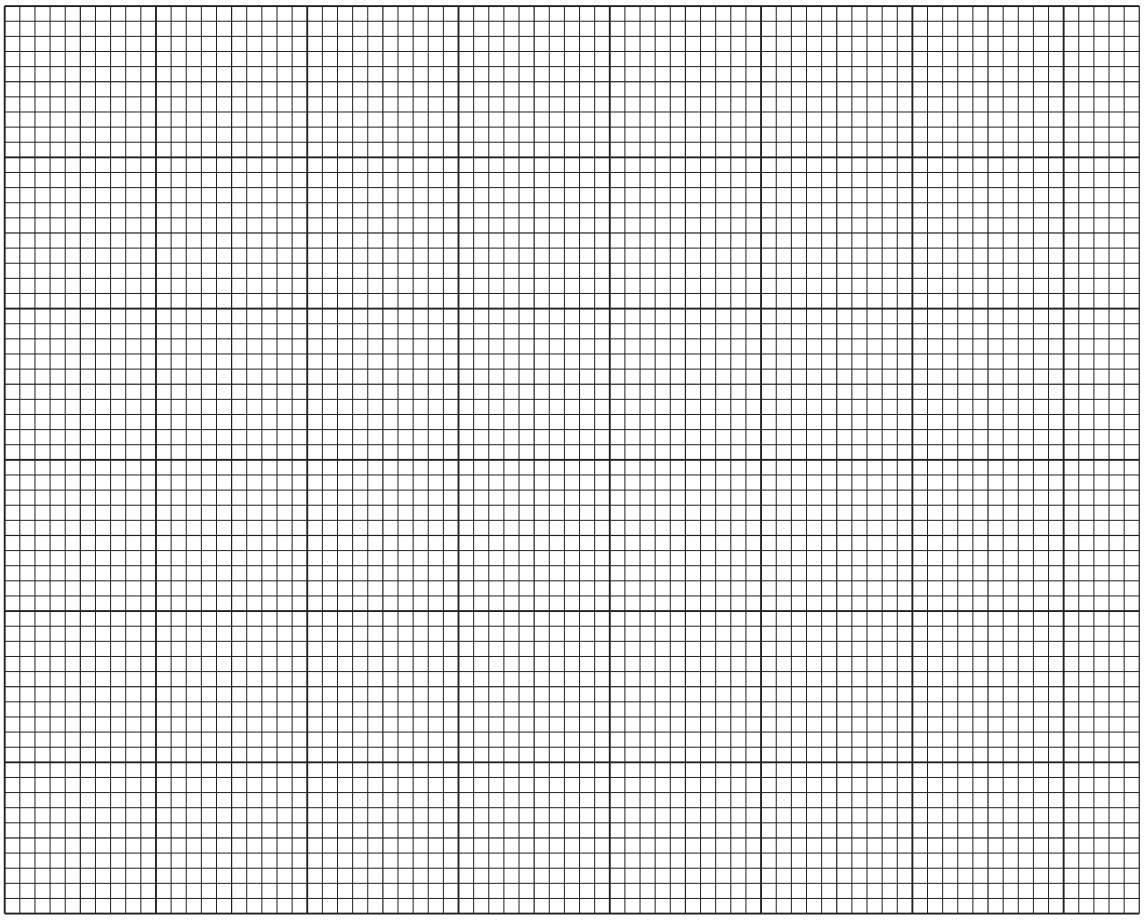

[5]

(d) As you read these words, this experiment is being carried out by candidates in many different countries, using identical apparatus.

Suggest two differences in the conditions in the various laboratories that might lead to different graphs.

1. .....

2. .....

[2]

[Total: 10]

3 In this experiment, you will investigate resistor combinations in circuits.

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Carry out the following instructions referring to Fig. 3.1.

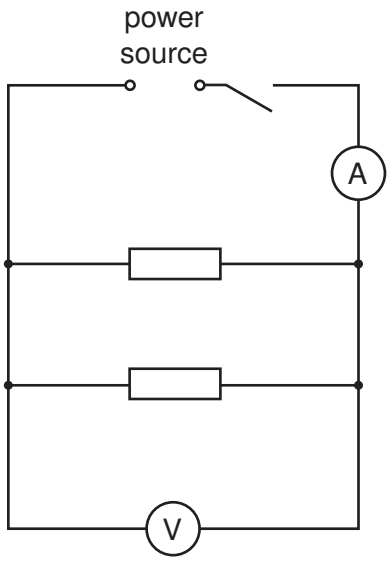

Fig. 3.1

(a) (i) Switch on. Measure and record the potential difference V_1 across the resistors and the current I_1 in the circuit. Switch off.

V_1 = ...

I_1 = ...

(ii) Calculate the total resistance R_P of the combination of the two resistors arranged in parallel, using the equation $R_P = \frac{V_1}{I_1}$.

R_P = ...

(iii) Calculate $4R_P$.

$4R_P$ = ...
[2]

(b) Rearrange the circuit so that the two resistors are connected in **series** and the voltmeter is connected to measure the potential difference across **both** resistors.

(i) Switch on. Measure and record the potential difference V_2 across the resistors and the current I_2 in the circuit. Switch off.

V_2 = ...

I_2 = ...

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(ii) Calculate the total resistance R_S of the combination of the two resistors arranged in series, using the equation $R_S = \frac{V_2}{I_2}$.

R_S = ...
[2]

(c) Theory suggests that $R_S = 4R_P$ if the two resistors have the same value.

State whether your results indicate that the two resistors have the same value. Justify your answer with reference to the results.

statement .....

justification .....

.....
[1]

(d) Using the circuit described in **(b)**, replace the two series resistors with the two lamps.

(i) Draw a circuit diagram of the new circuit using standard symbols.

[2]

(ii) Switch on. Measure and record the potential difference V_3 across the lamps and the current I_3 in the circuit. Switch off.

V_3 = ...

I_3 = ...

(iii) Calculate the total resistance L_S of the combination of the two lamps arranged in series using the equation $L_S = \frac{V_3}{I_3}$.

L_S = ...[1]

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(e) Rearrange the circuit to that shown in Fig. 3.1 but with the lamps in place of the resistors.

(i) Switch on. Measure and record the potential difference V_4 across the lamps and the current I_4 in the circuit. Switch off.

V_4 = ...

I_4 = ...

(ii) Calculate the total resistance L_P of the combination of the two lamps arranged in parallel using the equation $L_P = \frac{V_4}{I_4}$.

L_P = ...

(iii) Calculate $4L_P$.

$4L_P$ = ...
[1]

(f) A student suggests that using lamps instead of resistors changes the conditions of the experiment and that $4L_P$ will not be equal to L_s because of a heating effect.

From your own observations, state one piece of evidence that supports the student's suggestion that there is a heating effect. You should not do any further calculations.

.....

.....[1]

[Total: 10]

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4 In this experiment, you will determine the refractive index of the material of a transparent block.

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Carry out the following instructions, referring to Fig. 4.1.

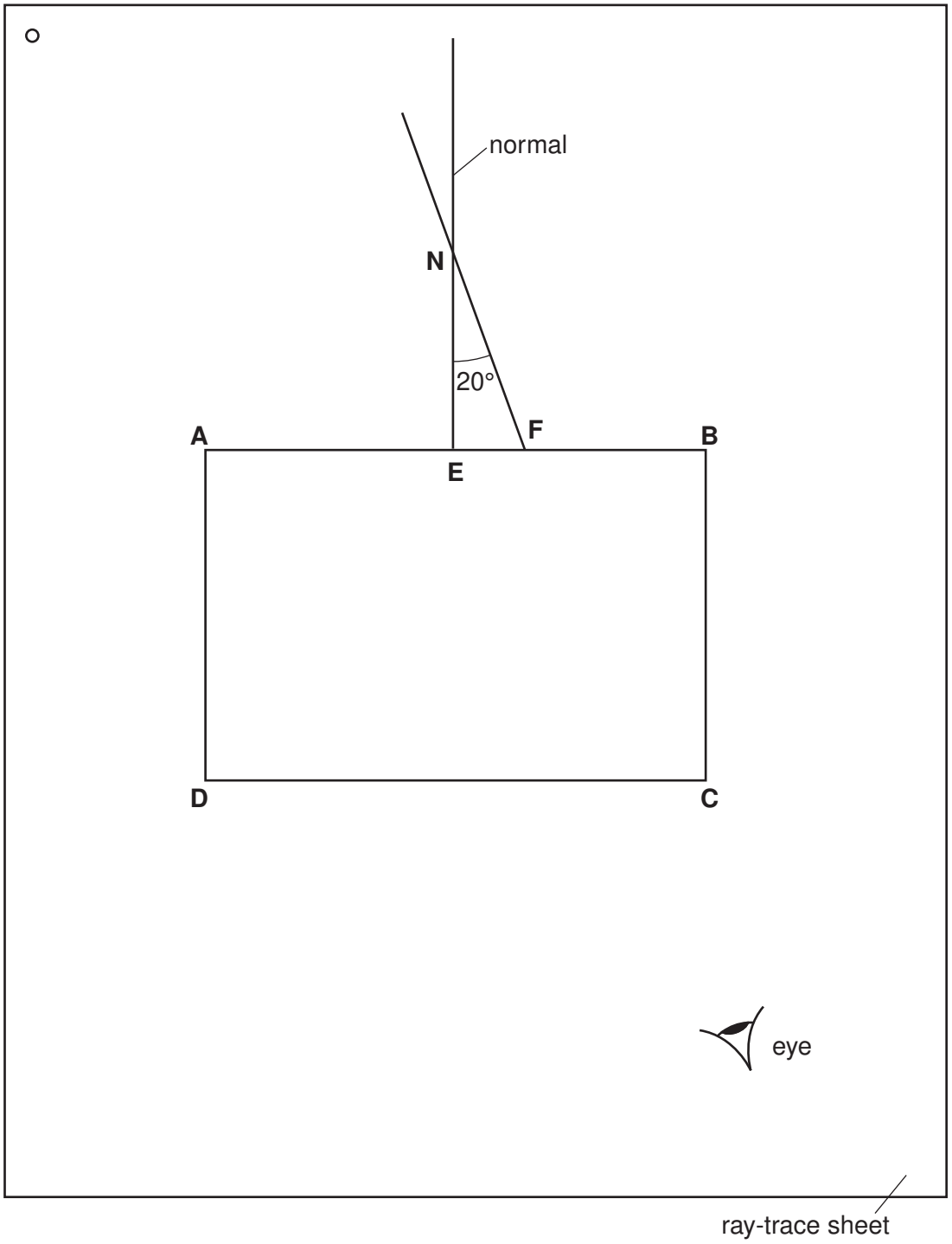

Fig. 4.1

(a) Place the transparent block, largest face down, on the ray-trace sheet supplied. The block should be approximately in the middle of the paper. Draw the outline of the block **ABCD**.

(b) Remove the block and draw a normal at the centre of side **AB**. Label the point **E** where the normal crosses **AB**. Mark a point **N** on the normal 4.0 cm from **E** and outside the block as shown in Fig. 4.1.

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(c) Draw a line **NF** to the right of the normal and at an angle of 20° to the normal as shown in Fig. 4.1. **F** is the point where the line meets **AB**. Measure and record the length *a* of the line **NF**.

a = ... [1]

(d) Extend the line **NF** beyond **N** and place the paper on the pin board.

(e) Place two pins P_1 and P_2 on the line through **F** and **N**, placing one pin close to **F.**

(f) Replace the block and observe the images of P_1 and P_2 through side **CD** of the block so that the images of P_1 and P_2 appear one behind the other.

Place two pins P_3 and P_4 between your eye and the block so that P_3 and P_4 and the images of P_1 and P_2, seen through the block, appear one behind the other.

Mark the positions of P_1, P_2, P_3 and P_4. Remove the block.

(g) Draw a line joining the positions of P_3 and P_4. Continue the line until it meets **CD**. Label this point **G**.

(h) Draw the line **GF** and continue it until it meets the normal. Label this point **H**.

(i) Measure and record the length *b* of the line **FH**.

b = ...[1]

(j) Calculate the refractive index *n* of the material of the block, using the equation $n = \frac{b}{a}$.

n = ...[2]

(k) Repeat steps **(c)** – **(j)** but with the line from **N** drawn at 25° to the left of the normal.

a = ...

b = ...

n = ...
[1]

Tie your ray trace into this Booklet between pages 10 and 11. [5]

[Total: 10]

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