UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICS **0625/51**

Paper 5 Practical Test **May/June 2011**

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.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

2

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1   In this experiment you are to determine the position of the centre of mass of a triangular card.

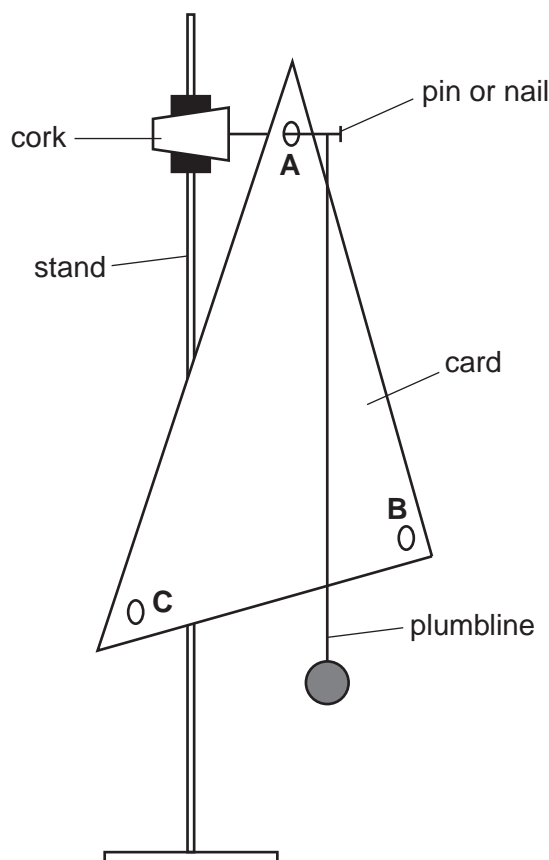Carry out the following instructions referring to Fig. 1.1.

Fig. 1.1

You are provided with a small mass attached to a length of thread. This is referred to as the plumbline.

(a) Measure and record the lengths of the three sides of the triangular sheet of card.

length 1 = ...

length 2 = ...

length 3 = ... [1]

(b) **(i)** Hang the card on the nail through hole **A**.

(ii) Hang the plumbline from the nail so that it is close to the card but not touching it.

(iii) When the card and plumbline are still, make a small mark at the edge of the card where the plumbline crosses the edge.

(iv) Remove the card and draw a line from the mark to hole **A**.

(c) Repeat the steps in **(b)** using hole **B**.

(d) Repeat the steps in **(b)** using hole **C**.

4

(e) Place your card in the space below and draw around its outline.

5

On your diagram on page 4,

(i) show the positions of each of the holes **A**, **B** and **C** with a small, neat circle. Label each circle with the appropriate letter (**A**, **B** or **C**),

(ii) show the positions of each of the marks you made in **(b)(iii)** with a small neat cross (✕),

(iii) draw the lines between the positions of the holes **A**, **B** and **C** and the corresponding marks, as on your sheet of card. [5]

(f) If the experiment is completely accurate, the centre of mass of the card is at the position where the three lines meet.

On your diagram judge the best position for the centre of mass.

Draw a line from this position to the right-angled corner of the card and measure the distance *a* between the centre of mass and the right-angled corner of the card.

a = ... [3]

(g) In this experiment it is important that the card is able to swing freely. For this reason the plumbline should not touch the card, but be a small distance from the card. This could cause an inaccuracy in marking the card at the correct position (part **(b)(iii)**).

Describe how you minimised the possible inaccuracy. You may draw a diagram.

....

.... [1]

[Total: 10]

6

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

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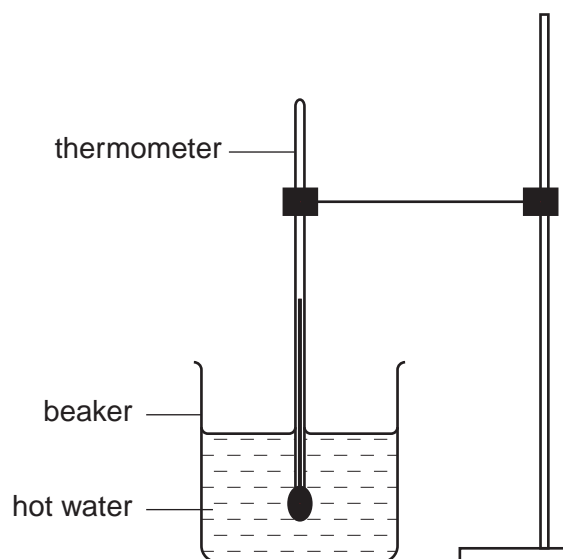

Fig. 2.1

(a) (i)   Place the thermometer into the water as shown in Fig. 2.1.

(ii)   When the temperature shown on the thermometer stops rising, record the temperature θ in Table 2.1 at time $t = 0\,$s and immediately start the stopclock.

(iii)   Record in the table the temperature of the water at 30 s intervals from $t = 30\,$s until you have a total of seven values up to $t = 180\,$s.

Table 2.1

$t\,/$	$\theta\,/$
0	

(b)   Complete the column headings in the table.   [3]

7

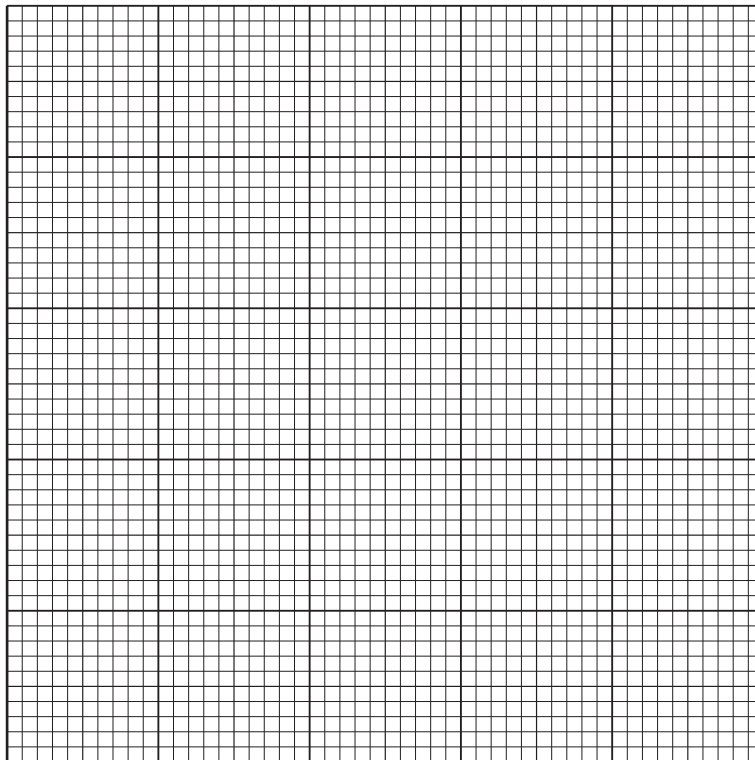**(c) (i)** Calculate the temperature fall T_1 during the first 30 s of cooling.

$T_1 = $ ....

(ii) Calculate the temperature fall T_2 during the final 30 s of cooling.

$T_2 = $ ....
[1]

(d) Plot the graph of temperature (*y*-axis) against time (*x*-axis).

[4]

(e) (i) State how the rate of cooling in the first 30 s differs from the rate of cooling in the final 30 s.

....

....

(ii) Explain how the graph line shows this difference.

....

....
[2]

[Total: 10]

3 In this experiment you will measure the currents in lamps in a circuit.

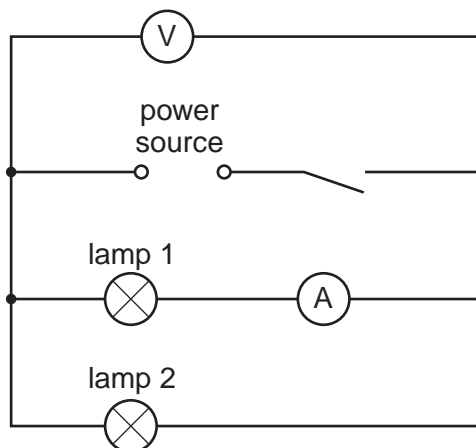Carry out the following instructions referring to Fig. 3.1.

Fig. 3.1

(a) The circuit shown in Fig. 3.1 is set up for you.

Switch on.

Record in Table 3.1 the potential difference *V* across the lamps and the current *I* in lamp 1.

Switch off. [1]

(b) Rearrange the circuit so that the ammeter is connected in series with lamp 2.

Switch on, and record in the table the potential difference *V* across the lamps and the current *I* in lamp 2.

Switch off. [1]

Table 3.1

	V/	*I*/	*R*/
lamp 1			
lamp 2			

(c) (i) Calculate the resistance *R* of each lamp, using the equation $R = \dfrac{V}{I}$ and enter the results in the table.

(ii) Add together the two values of R to calculate R_S, the sum of the resistances.

R_S = ...

(iii) Complete the column headings in the table.

[3]

(d) Rearrange the circuit so that the lamps and the ammeter are all in series. Do not change the position of the voltmeter.

(i) Record the readings on the voltmeter and the ammeter.

voltmeter reading = ...

ammeter reading = ...

(ii) Use the voltmeter and ammeter readings to calculate R_T the combined resistance of the two lamps in series.

R_T = ... [2]

(e) A student suggests that the values of R_S and R_T should be equal.

State whether your results support this suggestion and justify your statement by reference to the calculated values.

statement ....

justification ....

.... [2]

(f) State, without reference to the values of resistance that you have calculated, one piece of evidence that you have observed during the experiment that shows that the temperature of the lamp filaments changes.

....

.... [1]

[Total: 10]

4   In this experiment you will investigate the reflection of light by a plane mirror.

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

Fig. 4.1

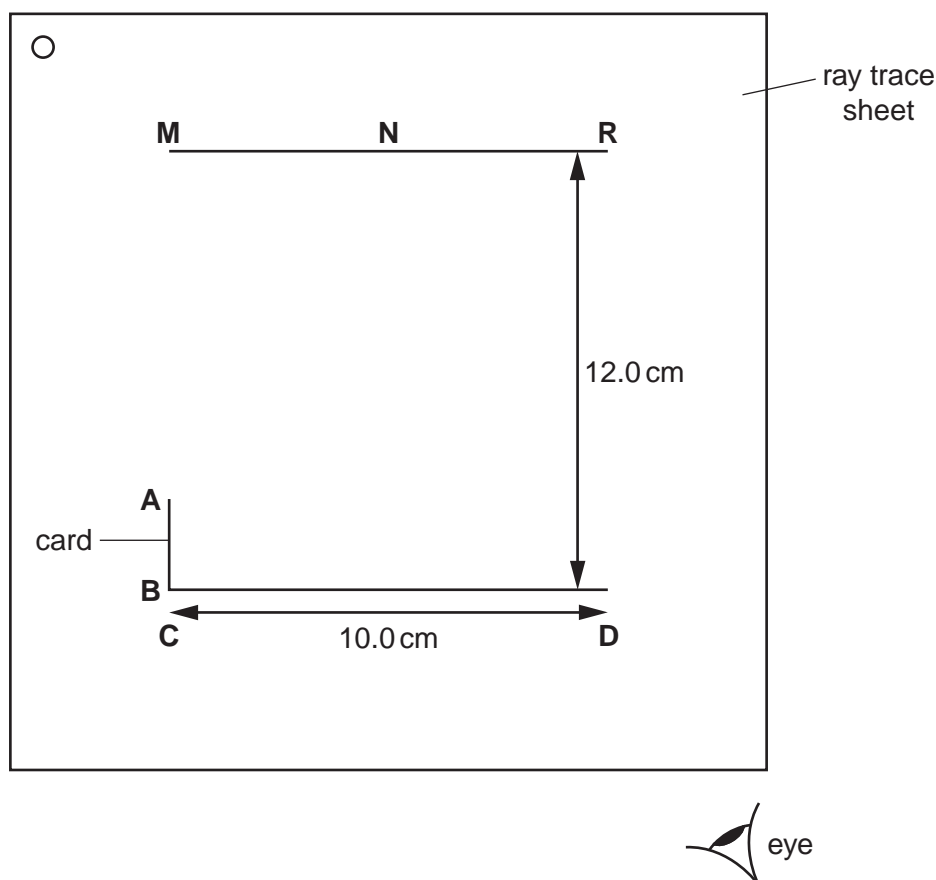**(a)** Draw a line 10 cm long near the top of the ray trace sheet. Label the line **MR**. Draw a normal to this line at its centre. Label the normal **NL**.

(b) Draw a line 10 cm long that is parallel to line **MR** and 12 cm below it. Label this line **CD**.

(c) Place the mirror, with its reflecting face vertical, on the line **MR**.

(d) Place the card so that it stands vertically with end **B** at **C** and such that the card is at right angles to line **CD** (see Fig. 4.1). Draw a line along the edge of the card and label the line **AB**.

(e) Remove the card and the mirror. Draw a line from the edge **A** of the card to the point **N**. Replace the card and the mirror.

(f) Place a pin P_1 on line **AN**. Label the position of P_1.

(g) View the image of the edge **A** of the card in the mirror from the direction indicated by the eye in Fig. 4.1. Place two pins P_2 and P_3 some distance apart so that pins P_3, P_2 and the reflections of P_1 and the edge **A** of the card, all appear exactly one behind the other. Label the positions of P_2 and P_3.

(h) Remove the pins and the mirror and draw in the line joining the positions of P_2 and P_3. Continue the line until it meets the normal.

(i) Measure and record in Table 4.1 the angle of incidence *i* between the line **AN** and the normal. Measure, and record in the table, the angle of reflection *r* between the normal and the line passing through P_2 and P_3.

Table 4.1

edge	*i*/°	*r*/°
A		
B		

[3]

(j) Repeat the steps **(e)** – **(i)** but using edge **B** of the card instead of edge **A**.

(k) In spite of carrying out this experiment with care, it is possible that the values of the angle of reflection *r* will not be exactly the same as the values obtained from theory. Suggest two possible causes of this inaccuracy.

1. ....

....

2. ....

.... [2]

Tie in your ray trace sheet between pages 10 and 11. [5]

[Total: 10]

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