UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

* 4 1 2 6 3 9 8 7 2 7 *

PHYSICS **0625/05**

Paper 5 Practical Test **May/June 2009**

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 are to make two sets of measurements as accurately as you can in order to determine the density of glass.

Carry out the following instructions referring to Fig. 1.1.

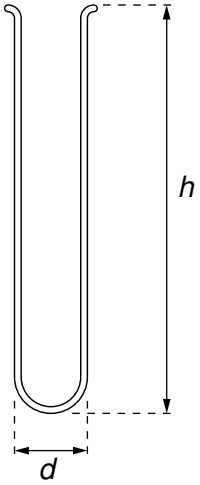

Fig. 1.1

Method 1

(a) (i) Use the two blocks of wood and the rule to measure the external diameter *d* of the test-tube in cm.

d = ... cm

(ii) 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 external diameter of the test-tube.

(iii) Measure the height *h* of the test-tube in cm.

h = ... cm

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(iv) Calculate the external volume V_e of the test-tube using the equation

$$V_e = \frac{\pi d^2 h}{4}.$$

V_e = ...
[3]

(b) Use the balance provided to measure the mass m_1 of the test-tube.

m_1 = ... [1]

(c) **(i)** Completely fill the test-tube with water. Pour the water into the measuring cylinder and record the volume V_i of the water.

V_i = ...

(ii) Calculate the density ρ of the glass using the equation

$$\rho = \frac{m_1}{(V_e - V_i)}.$$

ρ = ...
[1]

Method 2

(d) (i) Pour water into the measuring cylinder up to about the 175 cm^3 mark. Record this volume V_1.

V_1 = ...

(ii) Carefully lower the test-tube, open end uppermost, into the measuring cylinder so that it floats. Record the new volume reading V_2 from the measuring cylinder.

V_2 = ...

(iii) Calculate the difference in volumes $(V_2 - V_1)$.

$(V_2 - V_1)$ = ...

(iv) Calculate the mass m_2 of the test-tube using the equation

$$m_2 = k(V_2 - V_1) \qquad \text{where } k = 1.0\,g/cm^3.$$

m_2 = ...
[3]

(e) (i) Use the wooden rod to push the test-tube, open end uppermost, down to the bottom of the measuring cylinder so that the test-tube is full of water and below the surface. Remove the wooden rod. Record the new volume reading V_3 from the measuring cylinder.

V_3 = ...

(ii) Calculate the density ρ of the glass using the equation

$$\rho = \frac{m_2}{(V_3 - V_1)}.$$

ρ = ...
[2]

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2 In this experiment, you are to investigate the cooling of thermometer bulbs under different conditions.

Carry out the following instructions referring to Fig. 2.1.

You are provided with two thermometers, **A** and **B**. Thermometer **B** has cotton wool wrapped around the bulb. Do **not** remove this cotton wool.

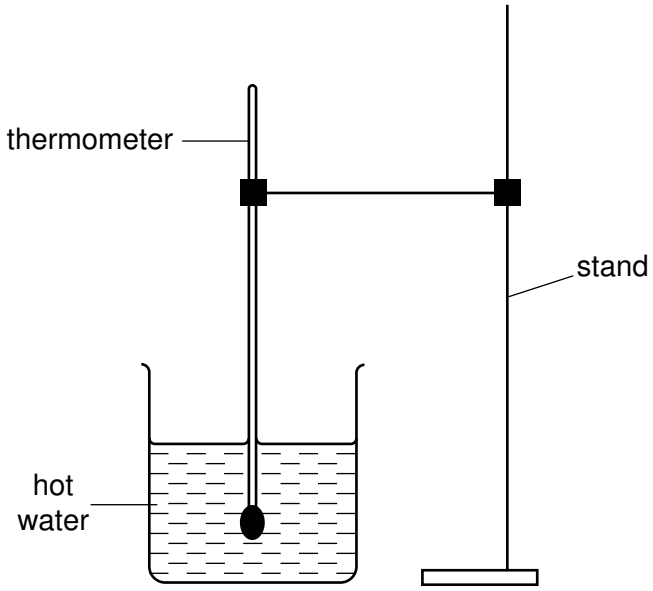

Fig. 2.1

(a) (i) Place thermometer **A** in the beaker of hot water. Measure θ, the temperature of the water. Record θ in Table 2.1 at time $t = 0$ s.

(ii) Remove the thermometer from the water, starting the stopclock as you do so. Record in Table 2.1 the temperature θ of the thermometer bulb at 30 s intervals until you have a total of seven values.

Table 2.1

	Thermometer **A**	Thermometer **B**
t /	θ /	θ /

(iii) Repeat steps **(i)** and **(ii)** using thermometer **B**.

(iv) Complete Table 2.1 by inserting the appropriate unit in each of the time and temperature column headings. [6]

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(b) State which thermometer cooled more quickly. Justify your answer by reference to your readings.

Statement .....

Justification .....

.....

..... [2]

(c) To make a fair comparison between the rates of cooling of the two thermometer bulbs under different conditions (in this experiment one thermometer bulb is covered with cotton wool) it is important to control other experimental conditions. Suggest two conditions that should be controlled in this experiment.

1 .....

.....

2 .....

..... [2]

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3 In this experiment, you will investigate the resistance of a wire.

Carry out the following instructions referring to Fig. 3.1, which shows the circuit that has been set up for you.

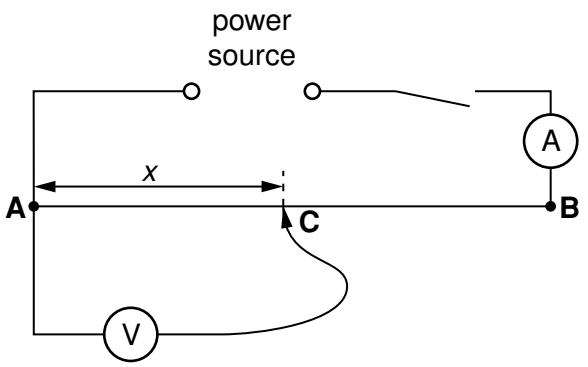

Fig. 3.1

You are provided with a length of resistance wire **AB**.

(a) Place the sliding contact **C** on the resistance wire **AB** at a distance x from **A**, where $x = 0.100\,\text{m}$.

(b) Record the value of x in Table 3.1.

(c) Switch on. Using the voltmeter, measure the p.d. V across the wire between **A** and **C**. Record the value of V in Table 3.1.

(d) Using the ammeter, measure the current I in the wire. Record the value of I.

$I =$ ..... [1]

(e) Take the sliding contact away from the wire **AB** and switch off.

(f) Calculate the resistance R of the section **AC** of the wire using the equation $R = \frac{V}{I}$.

(g) Record R in the table.

Table 3.1

x/m	V/V	R/Ω

[3]

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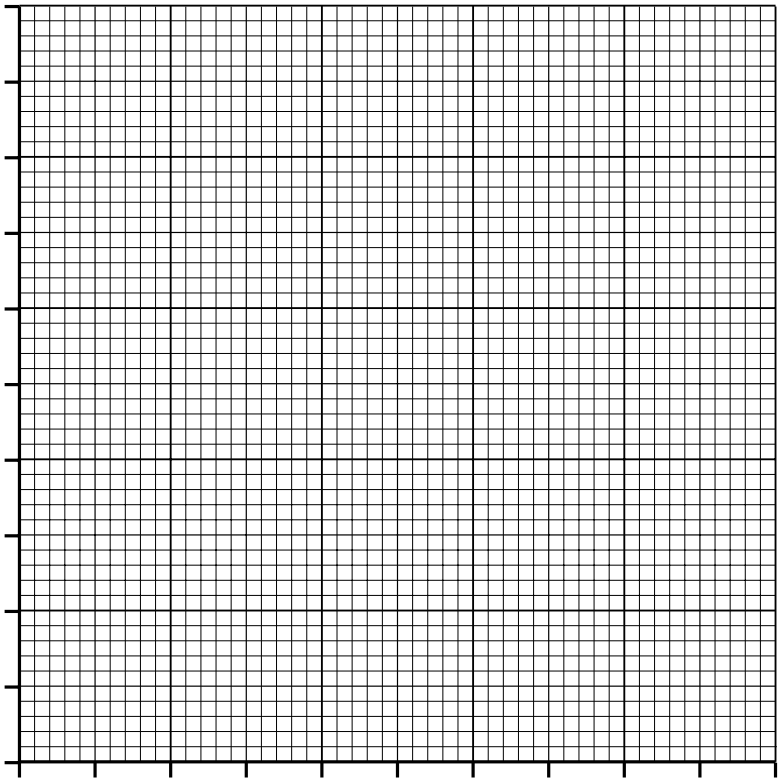
(h) Repeat steps **(a)** to **(g)** with the sliding contact at distances of $x = 0.300\,\text{m}$, $0.500\,\text{m}$, $0.700\,\text{m}$ and $0.900\,\text{m}$ from **A**.

(i) Plot a graph of R/Ω (y-axis) against x/m (x-axis). [3]



(j) Within the limits of experimental accuracy, what do you conclude about the variation of resistance with distance along the wire? Justify your conclusion by reference to your graph.

Statement .....

Justification .....

..... [1]

(k) Using your graph, determine a value for the resistance R when the length $x = 0.750\,\text{m}$. Show clearly on your graph how you obtained the necessary information.

$R =$ ..... [2]

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4 In this experiment, you are to determine the focal length of a converging lens.

Carry out the following instructions referring to Fig. 4.1.

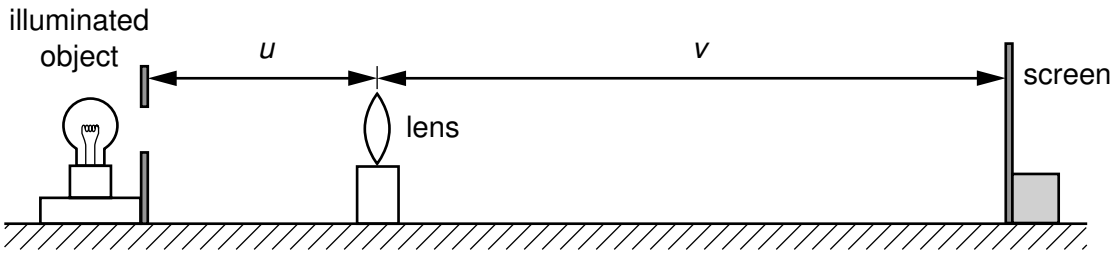

Fig. 4.1

(a) Place the lens so that its centre is a distance $u = 25.0$ cm from the illuminated object.

(b) Record in Table 4.1 the distance u in cm from the centre of the lens to the illuminated object, as shown in Fig. 4.1.

(c) Place the screen close to the lens. Move the screen away from the lens until a focused image of the object is seen on the screen.

(d) Measure and record in Table 4.1 the distance v in cm from the centre of the lens to the screen.

Table 4.1

u / cm	v / cm	f / cm

[5]

(e) Calculate and record in the table the focal length f of the lens using the equation

$$f = \frac{uv}{(u + v)}.$$

(f) Place the lens so that its centre is 45.0 cm from the illuminated object.

(g) Repeat steps **(b)** to **(e)**.

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(h) Calculate the average value of the focal length.

Average value of the focal length = ...
[3]

(i) State and briefly explain one precaution you took in order to obtain reliable measurements.

Statement .....

Explanation .....

..... [2]

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