

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Ordinary Level

| CANDIDATE NAME | | | | | |
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| CENTRE NUMBER | | | CANDIDATE NUMBER | | |



PHYSICS 5054/03

Paper 3 Practical Test May/June 2008

2 hours

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 on all the work you hand in.

Write in dark blue or black pen.

You may use a soft 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.

For each of the questions in Section A, you will be allowed to work with the apparatus for a maximum of 20 minutes. For the question in Section B, you will be allowed to work with the apparatus for a maximum of 1 hour.

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, 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 **8** printed pages and **4** blank pages.



Section A

Answer all questions in this section.

For Examiner's Use

| 1 | | | experiment you will make measurements on 5 coins in order to determine the density aterial from which the coins are made. |
|---|--------------|--------|---|
| | Υοι | ı have | e been provided with 5 coins and a 30 cm rule. |
| | (a) | (i) | Determine the mean thickness <i>t</i> of a coin. |
| | | | |
| | | | t = |
| | | (ii) | Determine the mean diameter <i>d</i> of the coins. |
| | | | |
| | | | d = |
| | | (iii) | Explain how you ensured that your answers to (i) and (ii) were as accurate as possible. |
| | | | |
| | | | |
| | | | |
| | | | |
| | <i>(</i> 1.) | 0.1 | |
| | (b) | Cal | culate the density of the material from which the coins are made using |
| | | | density = $\frac{4m}{\pi d^2 t}$ |
| | | | |
| | | whe | ere <i>m</i> is the mass of 1 coin, which is given on the card. |
| | | | |
| | | | |
| | | | density =[1] |
| | (c) | Exp | lain why your answer in (b) is only approximate. |
| | (-) | | and they your another in (a) to only approximate. |
| | | | |
| | | | |

3

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Please turn over for question 2.

5054/03/M/J/08 **[Turn over**

2 In this experiment you will investigate the mixing of hot water with water at room temperature.

For Examiner's Use

You have been provided with an empty 100 cm³ beaker labelled A, a 250 cm³ beaker containing water at room temperature, a supply of hot water, a 100 cm³ measuring cylinder, a plastic stirrer, a thermometer and a stand, boss and clamp to hold the thermometer.

(a) (i) Measure the temperature θ_1 of the water at room temperature.

$$\theta_1 = \dots$$

- (ii) Pour 50 cm³ of the water at room temperature into the measuring cylinder.
- Pour hot water into beaker A until the water level reaches the 50 cm³ mark.
- Place the thermometer in the hot water as shown in Fig. 2.1. (iv)

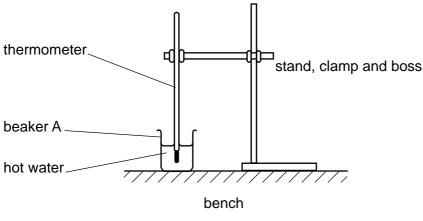


Fig. 2.1

Stir the water. Record the maximum temperature θ_2 shown on the thermometer before the temperature starts to fall.

$$\theta_2$$
 =

(v) Immediately pour the 50 cm³ of water from the measuring cylinder into beaker A. Stir the mixture. The reading on the thermometer will fall quickly at first and then at a slower rate. As soon as it starts to fall at the slower rate, record the temperature θ_3 of the mixture.

$$\theta_3$$
 =[3]

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| (b) | The The T | e mass of 50cm^3 of water is 50g . Firmal energy is transferred from the hot water to the water at room temperature. Examount of the thermal energy transferred is given by the equation hermal energy = mass × specific heat capacity × change in temperature. Examount of the thermal energy = mass × specific heat capacity × change in temperature. Examount of the thermal energy = mass × specific heat capacity × change in temperature. |
|-----|-----------------|---|
| | Cal | culate |
| | (i) | the thermal energy transferred from the hot water, |
| | | |
| | | energy transferred = |
| | (ii) | the thermal energy transferred to the water that was initially at room temperature. |
| | | |
| | | energy transferred = |
| | | [1] |
| (c) | Ехр | lain why your answers in (b) are different. |
| | | |
| | | |
| | | [1] |
| | | [Total: 5] |

3 In this experiment you will determine the focal length of a converging lens.

For Examiner's Use

You have been provided with a converging lens in a holder, an illuminated cross-wire object, a screen and a metre rule.

(a) Place the illuminated cross-wire object at one end of the metre rule and the screen at the other end. Place the lens between the object and the screen. The arrangement is shown in Fig. 3.1.

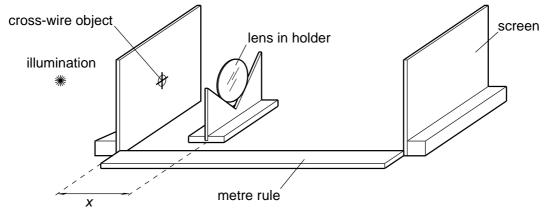


Fig. 3.1

Adjust the position of the lens until a magnified, focussed image of the object is formed on the screen. Measure the distance *x* between the object and the lens.

$$x = \dots [1]$$

(b) (i) State, using your observations, whether the image is upright or inverted.

.....

(ii) Describe the observations that you made.

[1]

(c) Keeping the object and the screen in the same position, move the lens until a diminished, focussed image of the object is formed on the screen. Measure the distance *y* between the object and the lens.

(d) Calculate the focal length *f* of the lens using;

$$f = \frac{D^2 - d^2}{4D}$$

where *D* is the distance between the object and the screen and d = y - x.

$$f = \dots [2]$$

[Total: 5]

7

Section B

For Examiner's Use

4 In this experiment, you will investigate how the resistance of a light emitting diode depends on the current in the diode.

You have been provided with the apparatus shown in Fig. 4.1, together with three resistors whose values are marked on them.

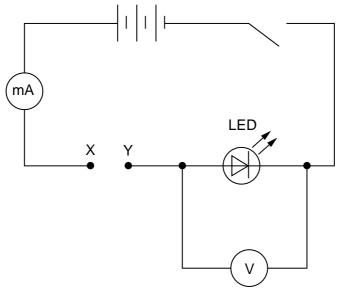


Fig. 4.1

- (a) (i) Connect a resistor of resistance $R = 270 \Omega$ in the gap between points X and Y.
 - (ii) Complete the circuit by closing the switch. Measure the current I in the circuit and the potential difference V across the light emitting diode (LED). Open the switch.

| V = | 1 |
|-----|---|

(b) Calculate the resistance $R_{\rm LED}$ of the LED by using

$$R_{\text{LED}} = \frac{V}{I}$$

$$R_{\text{LED}} = \dots [2]$$

| | | | | oeat (a) (ii) an | |
|----------------------|--------------------------------------|----------------------------------|------------------------|-------------------------------|-------|
| | | | tor, | the 330 Ω re | (i) |
| | | | tor, | the 470 Ω re | (ii) |
| nnected | $170~\Omega$ resistors, cor | e 270 Ω, 330 Ω a | | different seri between X a | (iii) |
| nd (b) in | ults from (a) (ii) an | elow. Include you | sults in the table | Record your your table. | |
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| [4] | | | | | |
| / m 1 on | ne <i>y</i> -axis against <i>I</i> / | graph of R_{LED}/Ω | e next page plot a | ng the grid or | Usir |
| | | i your piolled poil | pezi iii iiile iiiloni | x-axis. Diaw i | |
| | | | | | D |
| / ma on [4] | ent. | | esistance of the LE | scribe how the | Des |
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| [4] [1] | | O depends on the | esistance of the LE | | |
| [4] [1] A. | | D depends on the | esistance of the LE | | |

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