OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE UNIT   **2823/03/TEST**

PHYSICS A

Practical Examination 1 (Part B – Practical Test)

WEDNESDAY 16 MAY 2007   Afternoon

Time: 1 hour 30 minutes

Additional materials: Candidate's Plan
(Part A of the Practical Examination)
Electronic calculator
Ruler (cm/mm)

Candidate Name	

Centre Number					

Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- In this Practical Test, you will be assessed on the Experimental and Investigative Skills:
  Skill I: Implementing
  Skill A: Analysing evidence and drawing conclusions
  Skill E: Evaluating evidence and procedures.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- You will be awarded marks for the quality of written communication where this is indicated in the question.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
Planning	16	
1	28	
2	16	
TOTAL	60	

This document consists of **12** printed pages.

Answer **all** the questions.

It is recommended that you spend about 1 hour on this question.

1   In this question, you will investigate how the potential difference across part of a circuit depends on the resistance of the circuit.

(a) **P** and **Q** are resistors and A is an ammeter which measures the current I from the power supply. The voltmeter measures the potential difference V across **Q** when it is in parallel with a resistor from the chain of resistors. Using the equipment provided, set up the circuit shown in Fig. 1.1.
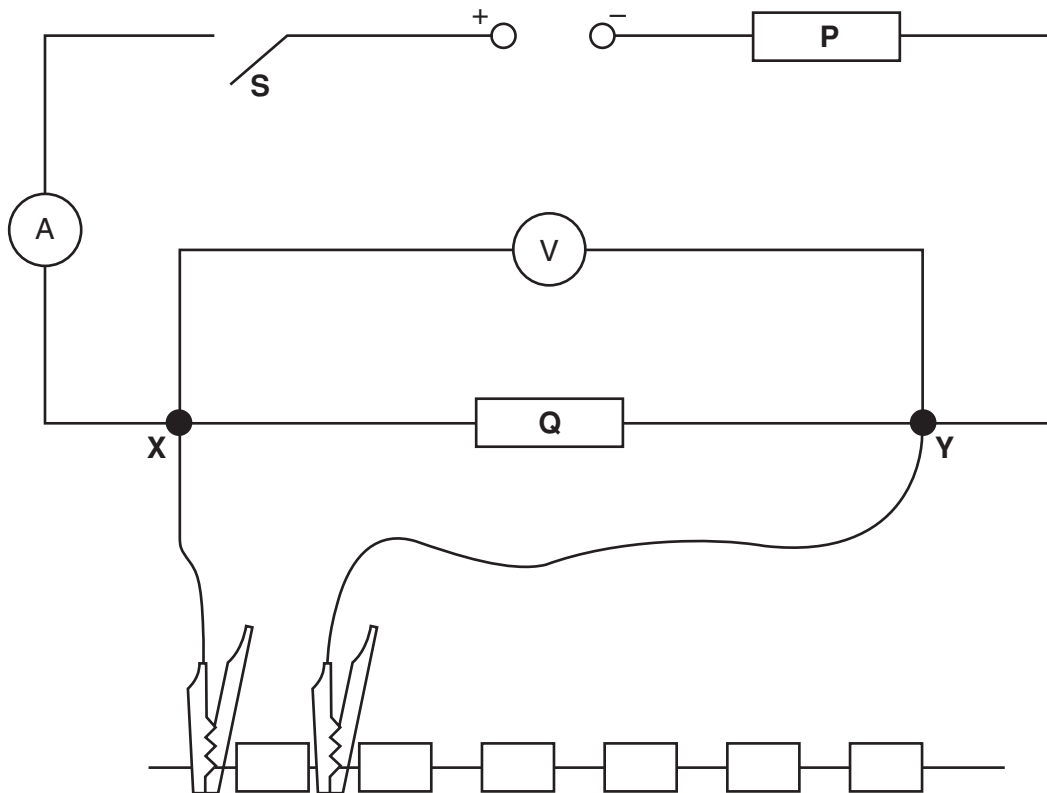
Fig. 1.1

(b) Close switch **S**.

   (i) Measure and record the potential difference, V and the current, I.

   $V =$ V

   $I =$ ....A

   (ii) Calculate a value for the total resistance, R between **X** and **Y**.

   $R =$ ....Ω

   (iii) Calculate values of $1/R$ and $1/V$.

   $1/R =$ ....

   $1/V =$ .... [2]

(c) Justify the number of significant figures that you have used for $1/R$.

   ....

   ....

   .... [2]

[Turn over

(d) Increase the number of resistors connected in parallel with **Q** and repeat **(b)** until you have six sets of readings for V and I. Include in your table of results values for R, $1/R$ and $1/V$.

[6]

(e) Plot a graph of $1/V$ (y-axis) against $1/R$ (x-axis). Draw the best straight line through the points. [6]

(f) (i) Determine a value for the gradient of your graph.

gradient = ... [2]
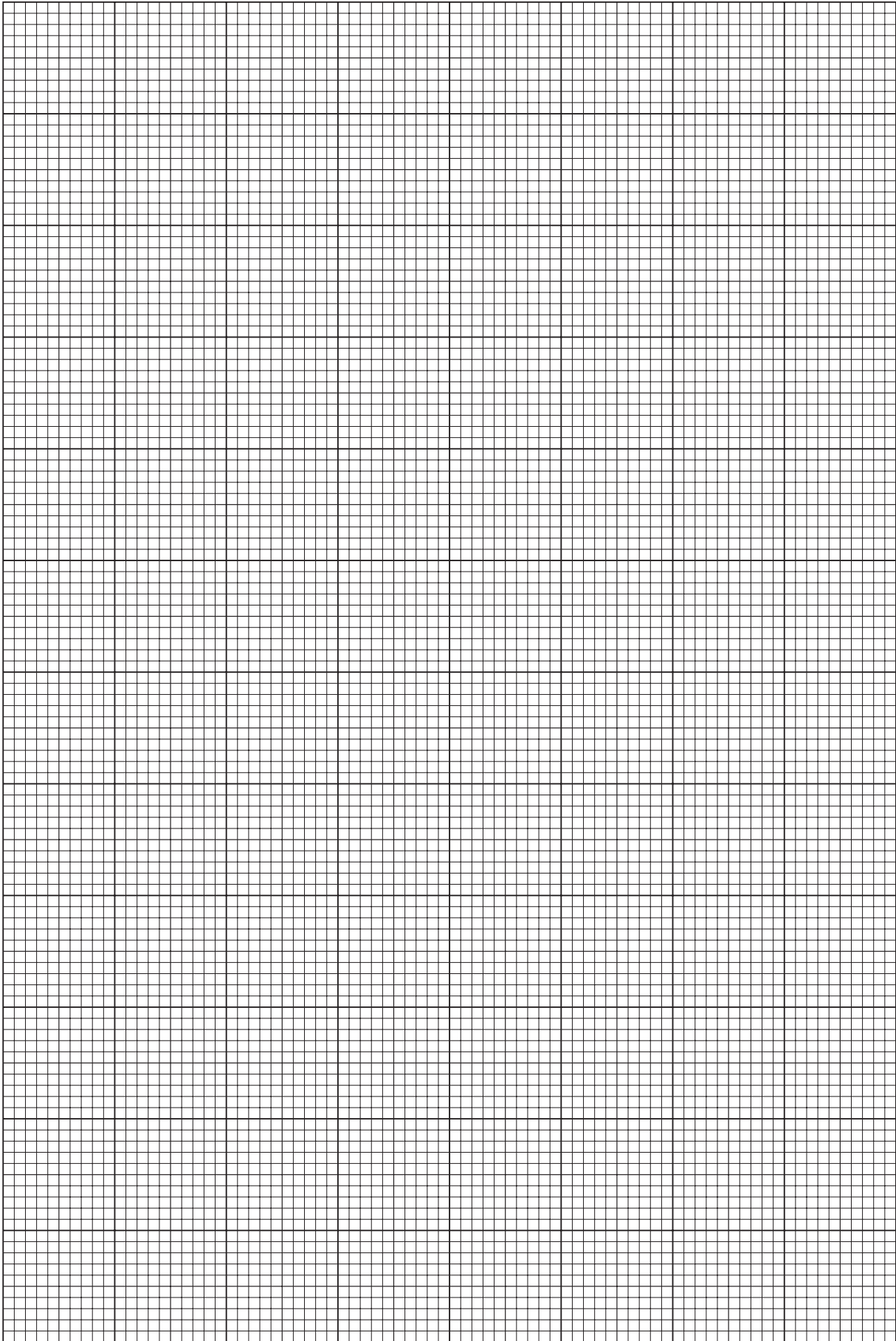
(ii) Determine a value for the *y*-intercept of the line.

y-intercept = ... [1] ☐

(g) The relationship between 1/*V* and 1/*R* is

$$\frac{1}{V} = \left(\frac{P}{E}\right)\frac{1}{R} + \frac{1}{E}$$

where *E* is the emf of the power supply.

(i) Use your answer from **(f)(ii)** to determine a value for *E.*

☐
☐

E = ... unit .... [3] ☐

(ii) Use your answers from **(f)(i)** and **(g)(i)** to determine a value for *P*. Include an appropriate unit.

☐
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☐

P = ... unit .... [4] ☐

 (h) Explain whether the results of your experiment indicate a random error.

 ....

 ....

 .... [1]

 (i) Write down the value of *E* given on the card

E = ... V

 Determine the percentage difference between the value of *E* from the experiment and the value of *E* given on the card.

percentage difference = ... % [1]

[Total: 28]

It is recommended that you spend about 30 minutes on this question.

Approximately half of this time should be spent on the evaluation exercise in part (g).

2   In this experiment you will investigate the rise of water in a capillary tube.

(a) You are provided with two capillary tubes **A** and **B**.

From the card on the bench write down the internal diameters of each tube.

internal diameter of tube **A**, d_A = ... mm

internal diameter of tube **B**, d_B = ... mm

(b) (i)   Take tube **A** and place it in the beaker of water so that the tube **gently** touches the bottom. See Fig. 2.1.

(ii)   Then raise the tube and measure and record the rise of water h_A. See Fig. 2.2.

h_A = ... mm [1]
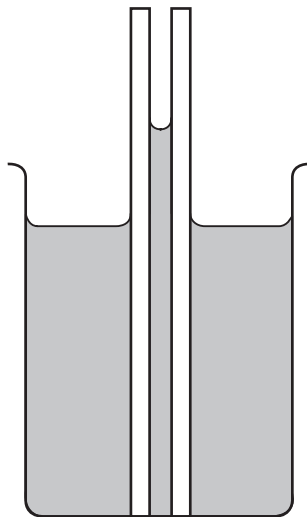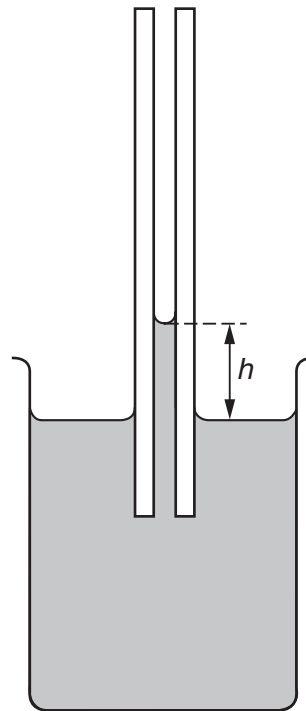
Fig. 2.1   **Fig. 2.2**

(c) Calculate the percentage uncertainty in the value of h_A.

percentage uncertainty = ... [2]

(d) Repeat part **(b)** using tube **B**.

h_B = ... mm [1]

(e) It is suggested that the rise of the water h is inversely proportional to the internal diameter d. Show whether or not the results of your experiment support this suggestion.

....

.... [2]

(f) Suggest how you would measure the internal diameter of the capillary tubes in the laboratory.

....

....

....

.... [2]

Question 2 continued over the page

[Turn over

Of the eight marks for this question two marks are available for the quality of written communication.

(g) Write an evaluation of the procedure that you have followed to investigate the relationship between *h* and *d*. You should include some of the limitations of the procedure and suggest ways in which the experiment may be improved, giving reasons for your suggestions.

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Quality of Written Communication [2]

[Total: 16]

END OF QUESTION PAPER

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