

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

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Candidate
Number

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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.

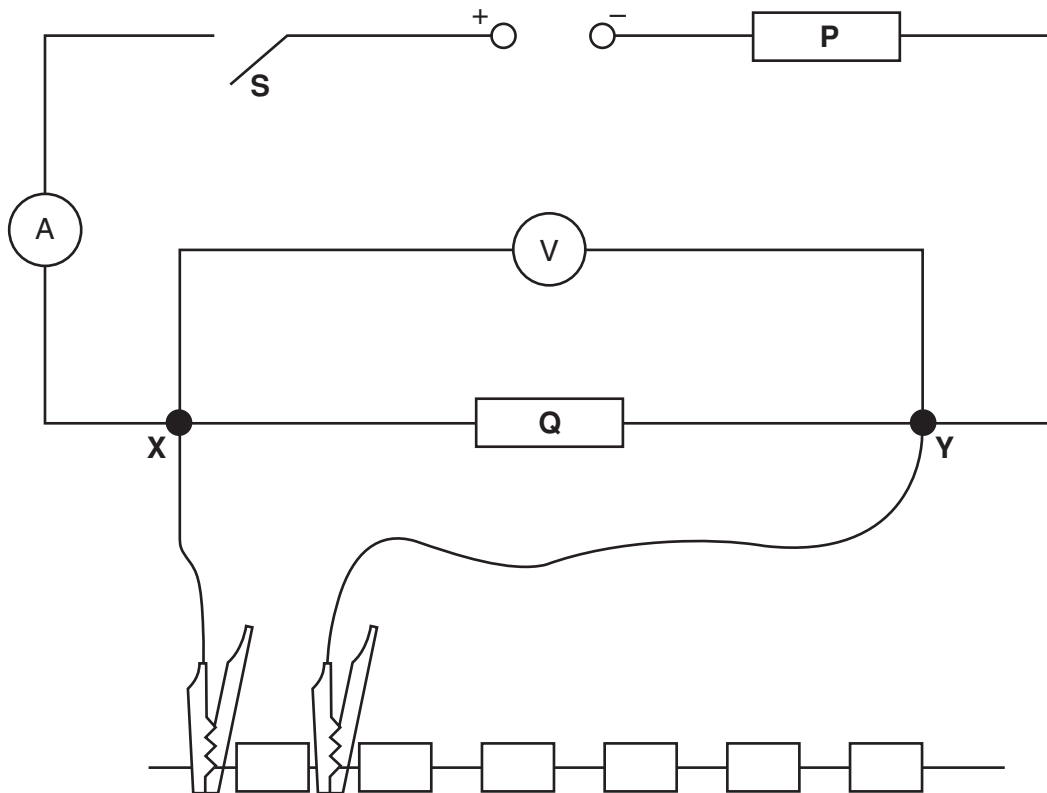


Fig. 1.1

(b) Close switch **S**.

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

$V = \dots\dots\dots$ V

$I = \dots\dots\dots$ A

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

$R = \dots\dots\dots$ Ω

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

$1/R = \dots\dots\dots$

$1/V = \dots\dots\dots$ [2]

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

.....

.....

..... [2]

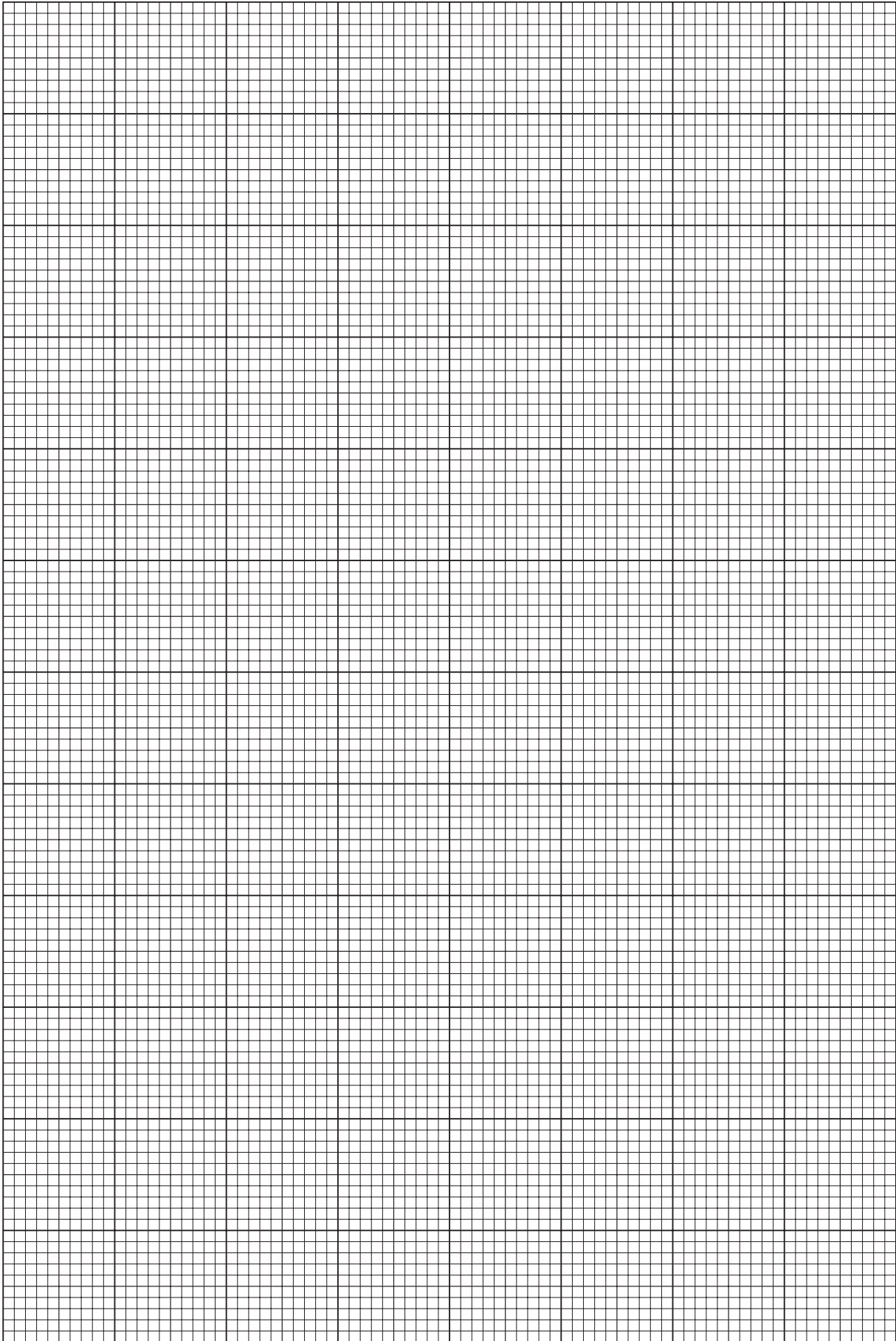
(d) Increase the number of resistors connected in parallel with **Q** and repeat (b) until you have six sets of readings for V and I . Include in your table of results values for R , $1/R$ and $1/V$.

[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 .

$E = \dots\dots\dots$ unit [3]

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

$P = \dots\dots\dots$ 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

$$E = \text{..... V}$$

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**, $d_A = \dots\dots\dots$ mm

internal diameter of tube **B**, $d_B = \dots\dots\dots$ 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.

$h_A = \dots\dots\dots$ mm [1]

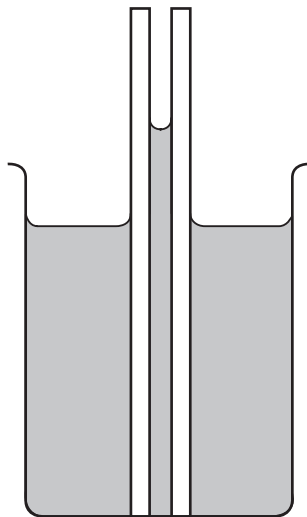


Fig. 2.1

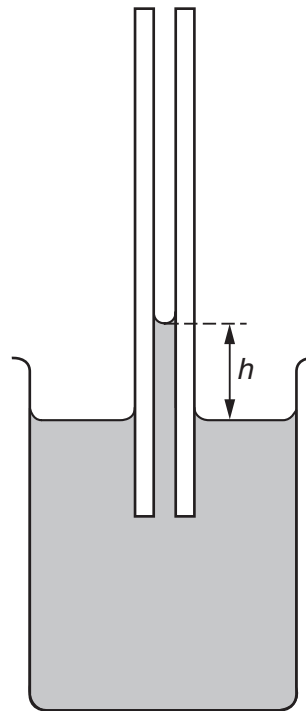


Fig. 2.2

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

percentage uncertainty = [2]

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

$h_B = \dots\dots\dots$ 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

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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