OCR
RECOGNISING ACHIEVEMENT

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

PHYSICS A

Practical Examination 1 (Part B – Practical Test)

WEDNESDAY 16 JANUARY 2008 Afternoon

Time: 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials: Candidate's Plan
(Part A of the Practical Examination)
Electronic calculator
Ruler (cm/mm)

CUP/T33401

Candidate Forename | Candidate Surname

Centre Number | Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your 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 codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

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.

[Turn over

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 current in a circuit containing a diode depends on the resistance of the circuit.

(a) (i) In Fig. 1.1 the voltmeter measures the potential difference *V* across the part of the circuit between the crocodile clips **X** and **Y**. Using the equipment provided, set up the circuit shown in Fig. 1.1. **P** is a protective resistor.

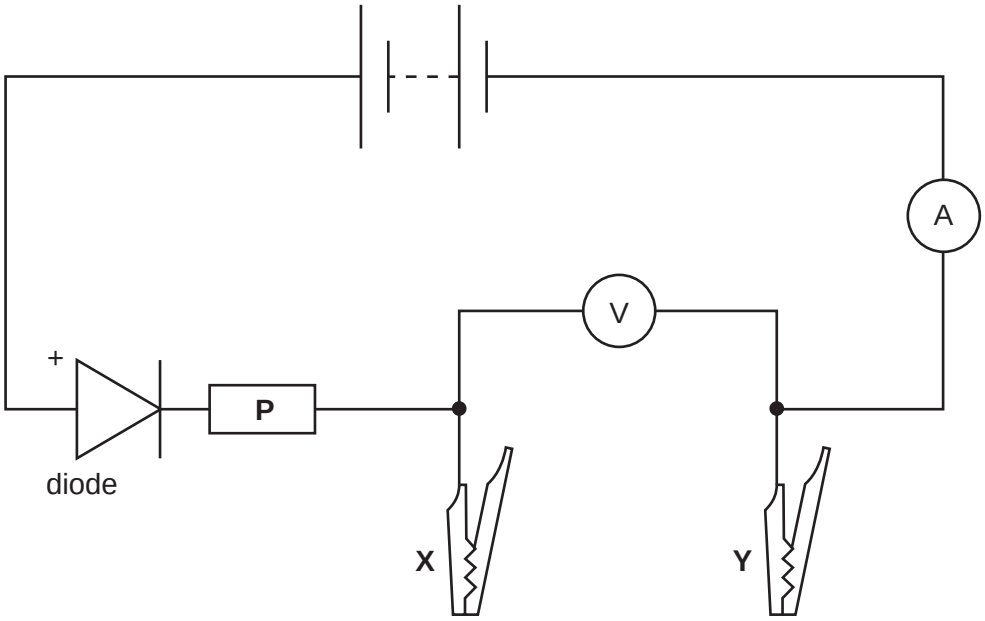


Fig. 1.1

(ii) The three remaining resistors have equal resistance.
Connect one of them between crocodile clips **X** and **Y**.

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

V = ... V

I = ... A

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

R = ... Ω

(iii) Calculate a value for $1/I$.

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

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

.....

.....

.....[2]

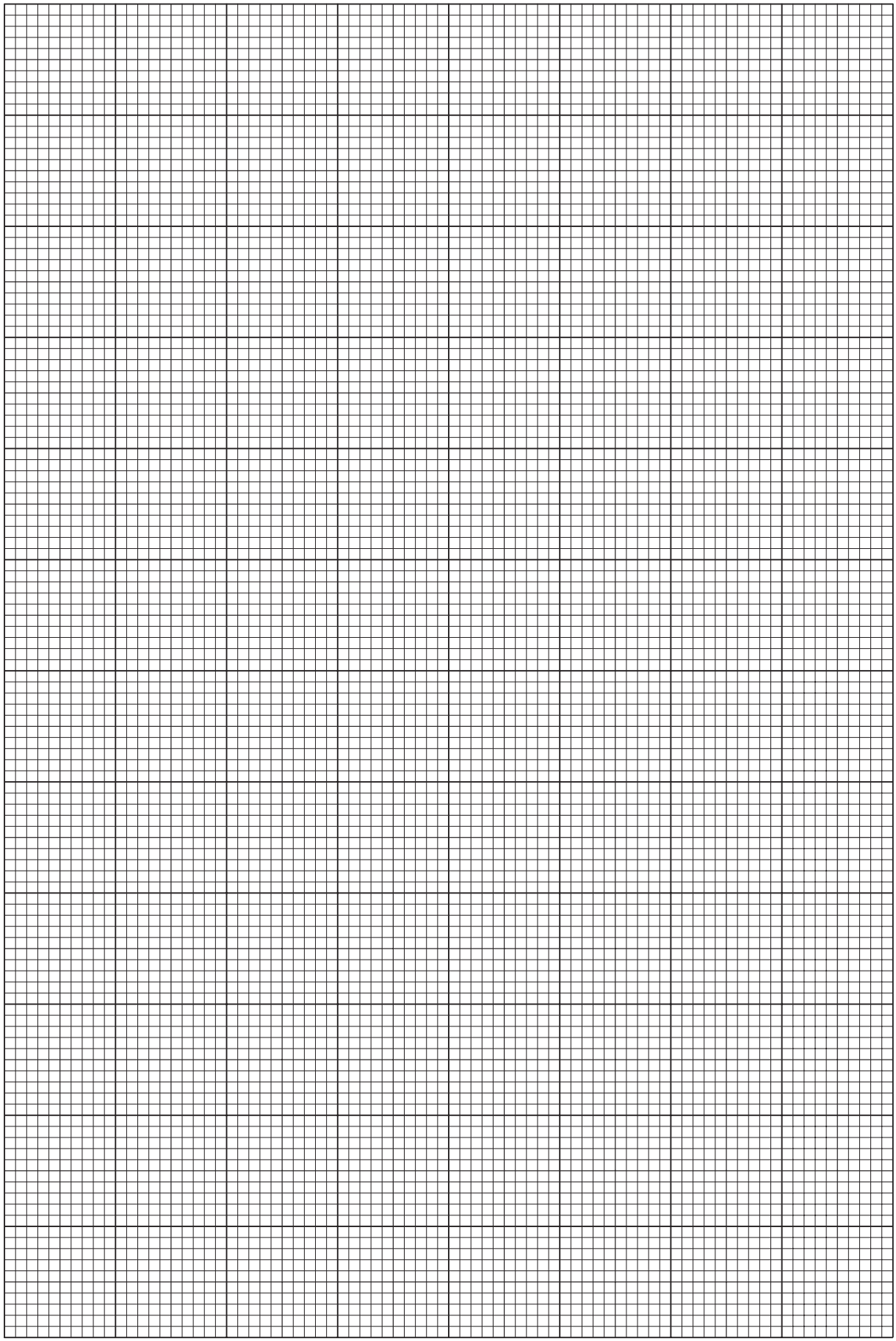
(d) Use different **combinations** of the resistors between **X** and **Y** to repeat **(b)** until you have six different sets of readings for V and I. The wires of the resistors may be twisted together to make series and parallel combinations. Include in your table of results values for R and $1/I$.

[6]

(e) Plot a graph of R (y-axis) against $1/I$ (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) Disconnect your circuit. Use the voltmeter to determine the e.m.f. of the power supply.

e.m.f. = ... V [1]

(h) The relationship between R and $1/I$ is

$$R = (E - V_D)\frac{1}{I} - P$$

where E is the e.m.f. of the power supply and V_D is the potential difference across the diode and P is the resistance of resistor **P**.

(i) Use your answer from **(f)(i)** and **(g)** to determine a value for V_D.

V_D = ... unit ..... [4]

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

P = ... Ω [3]

(iii) The value of P is expected to be $220\,\Omega \pm 10\%$. Determine whether the results of your experiment are within this range.

.....

.....

.....[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 (f).

2 In this experiment you will investigate how the force of **attraction** between two bar magnets depends on the separation of the bar magnets.

(a) Suspend one of the bar magnets from the newton-meter. Record its weight.

weight of bar magnet = ... N

(b) (i) Take the second bar magnet and using the blu-tack fix it to the bench below the first bar magnet. Adjust the clamp and boss so that the two magnets are as close together as possible without touching each other. See Fig. 2.1. Rough adjustment can be achieved by using the boss and fine adjustment can be achieved by using the clamp screw.

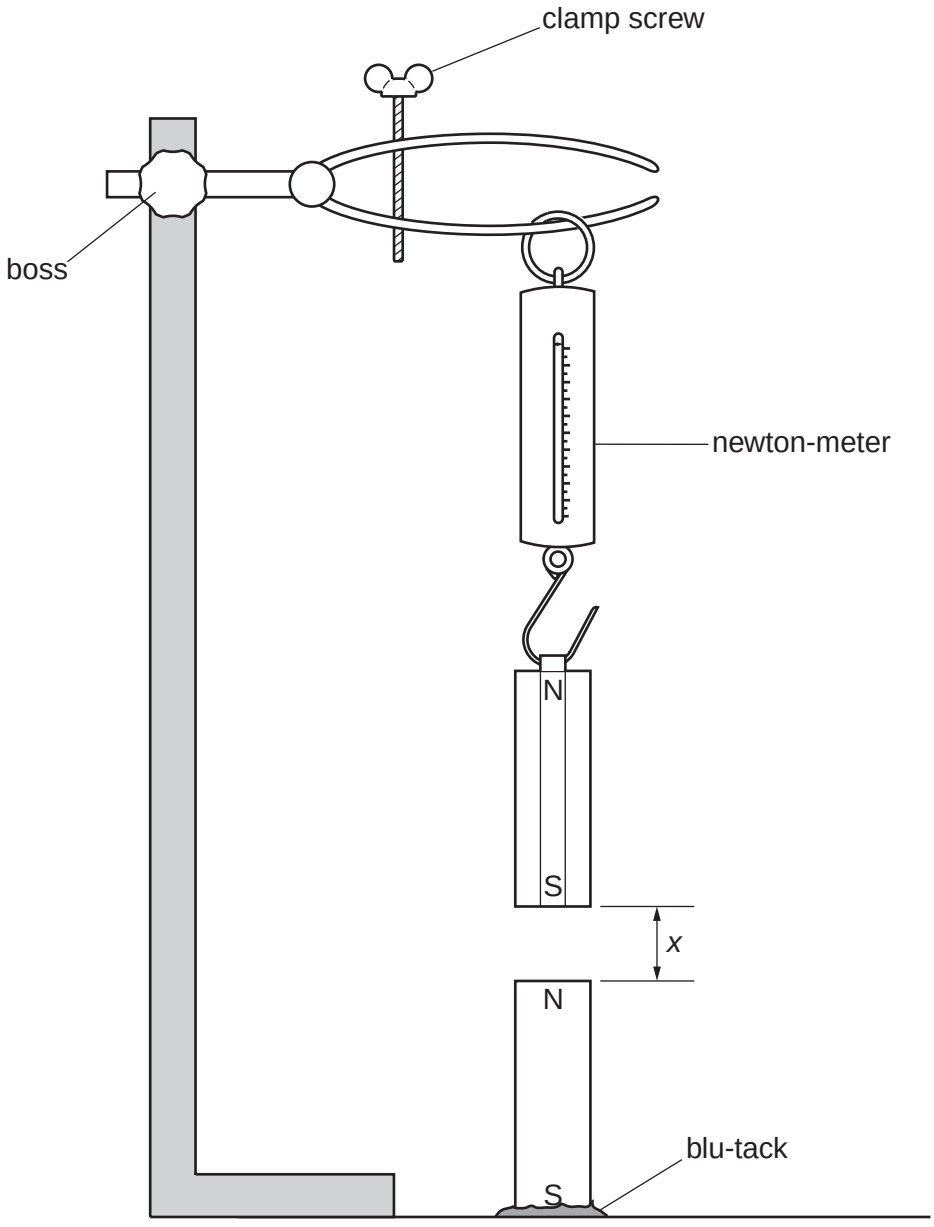


Fig. 2.1

(ii) Record the new reading on the newton-meter R and the separation x. Hence determine the force of attraction F between the two magnets and a value for x^2.

R = ... N

x = ... cm

F = ... N

x^2 = ... cm^2 [1]

(c) Calculate the percentage uncertainty in the value of x^2.

percentage uncertainty = ...[3]

(d) Increase the separation x (by at least 1 cm) and repeat part **(b)(ii)**.

R = ... N

x = ... cm

F = ... N

x^2 = ... cm^2 [1]

(e) It is suggested that the force F of attraction is related to the separation x by the equation

$$F = \frac{k}{x^2}$$

where k is a constant.

Show whether or not the results of your experiment support this suggestion.

.....

.....[2]

(f) In this question two marks are available for the quality of written communication.

Write an evaluation of the procedure that you have followed to investigate the relationship between *F* and *x*. 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]

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