THIS IS A LEGACY SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

PHYSICS A

2823/03/TEST

Practical Examination 1 (Part B – Practical Test)

CUP/T55538

Candidates answer on the question paper

OCR Supplied Materials:
None

Other Materials Required:
- Candidate's Plan (Part A of the Practical Examination)
- Electronic calculator
- Ruler (cm/mm)

Thursday 15 January 2009
Afternoon

Duration: 1 hour 30 minutes

2823/03/TEST

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- 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.
- This document consists of **12** pages. Any blank pages are indicated.

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

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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 depends on the resistance of the circuit.

(a) (i) Using the equipment provided, set up the circuit shown in Fig. 1.1. **F** is a protective resistor.

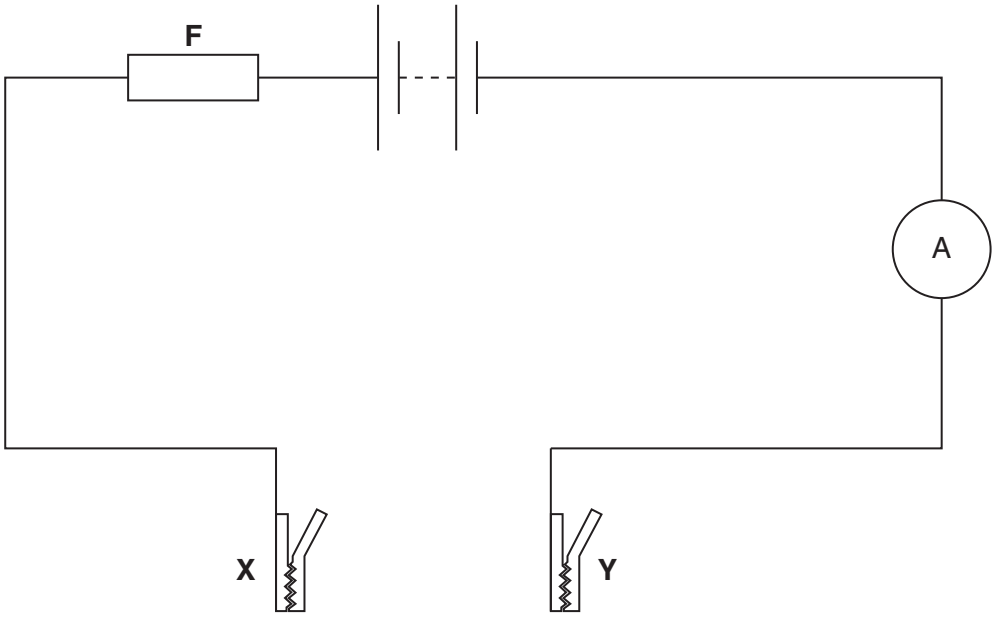


Fig. 1.1

(ii) The three remaining resistors each have the same resistance, 47 Ω.
Connect one of them between **X** and **Y**.

(b) (i) Measure and record the current I.

I = ... A

(ii) Calculate a value for the potential difference across **X** and **Y**. The following equation may be helpful:

potential difference = current × resistance

V = ... V

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

.....

.....

.....**[2]**

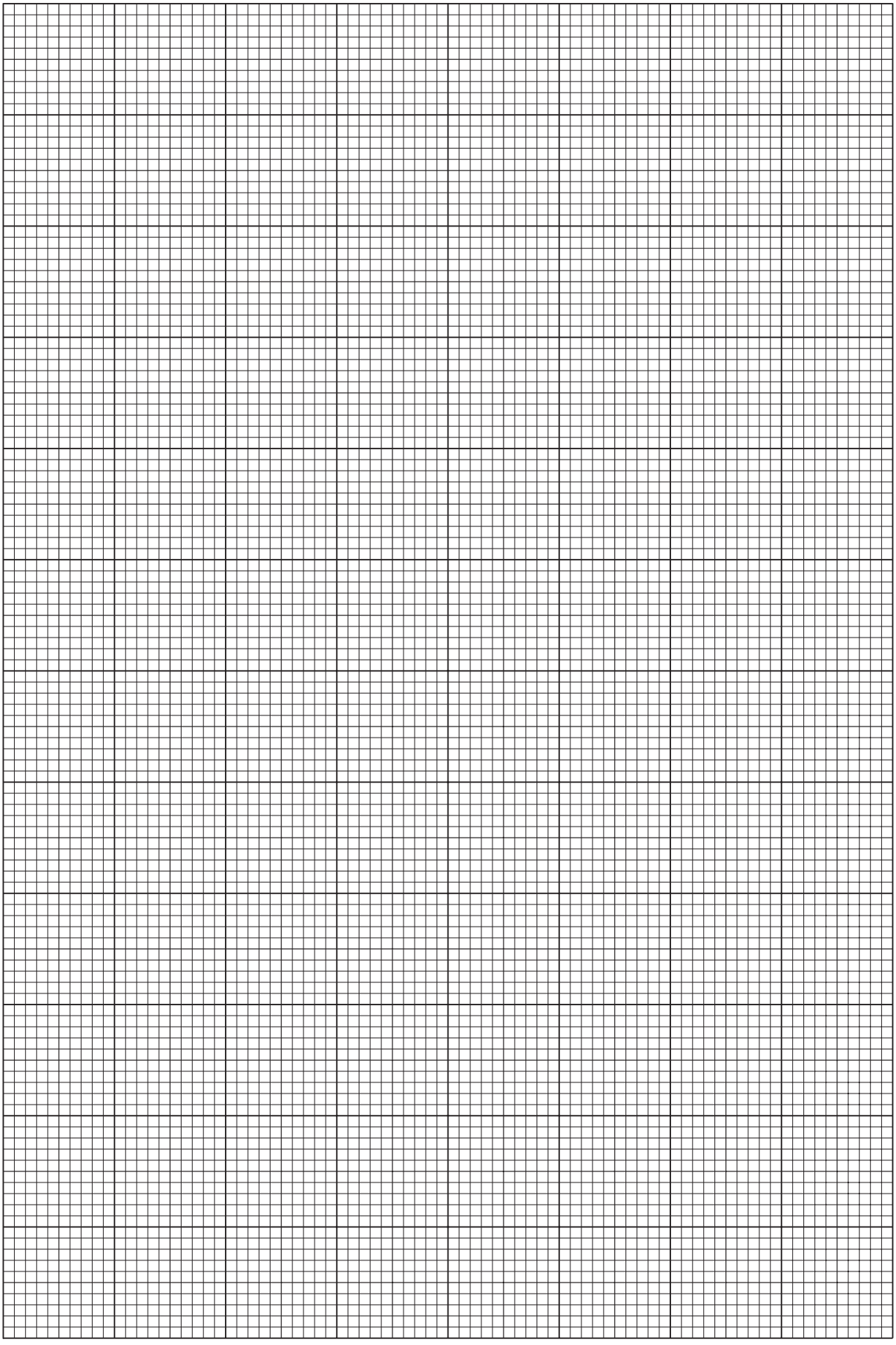
(d) The wires of the resistors may be twisted together to make series and parallel combinations of total resistance *R*. Use different **combinations** of these resistors between **X** and **Y** to repeat **(b)** until you have six different sets of readings for *R* and *I*. Include in your table of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

The following equations may be helpful for combinations of resistors:

series: $R = R_1 + R_2 + \ldots$ parallel: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$

[8]

(e) Plot a graph of *V* (*y*-axis) against *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) The relationship between V and I is

$$V = -FI + E$$

where E is the e.m.f. of the power supply and F is the resistance of resistor **F**.

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

F = ... unit ..... **[4]**

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

E = ... unit ..... **[3]**

(h) (i) The numerical value of F is expected to be 39 ±10 %. Determine whether the results of your experiment are within this range.

.....

.....

.....**[1]**

(ii) Discuss whether your graph indicates random errors in your experimental results.

.....

.....

.....**[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 extension of a spring system depends on a load submerged in water.

(a) Attach the mass holder to the springs as shown in Fig. 2.1. Measure and record the original length L_0 of the spring system loaded with the mass holder.

L_0 = ... cm

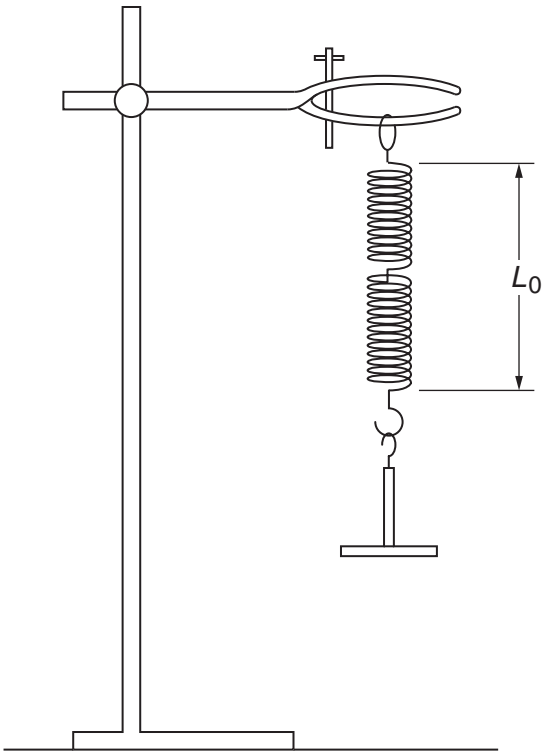


Fig. 2.1

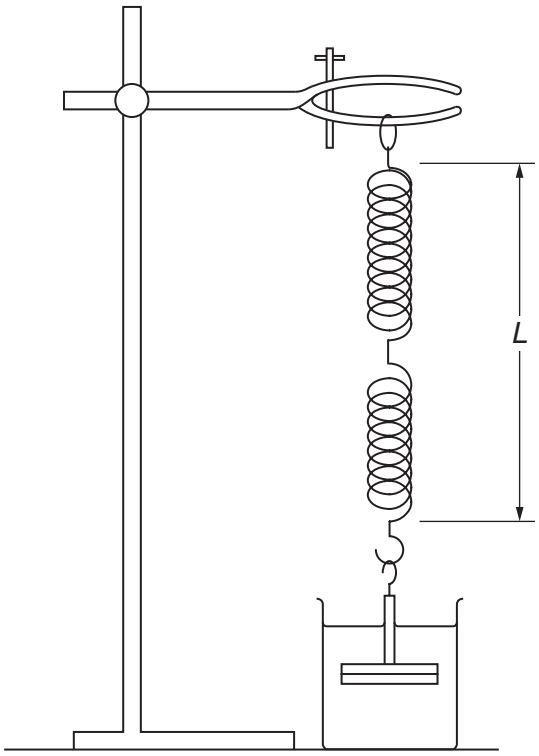


Fig. 2.2

(b) Add a 100 g mass to the mass holder.

(i) Adjust the clamp and boss so that the mass is submerged in the beaker of water. See Fig. 2.2.

(ii) Measure and record the new length L of the spring system.

L = ... cm

(iii) Determine the change in length e of the spring system where $e = L - L_0$.

e = ... cm **[1]**

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

percentage uncertainty = ...**[2]**

(d) Add another 100 g mass to the mass holder and repeat part **(b)(i), (ii) and (iii)**.

L = ... cm

e = ... cm **[1]**

(e) It is suggested that e is directly proportional to the **total mass added**. 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 *e* and the total mass added. 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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