OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

PHYSICS A 2823/03/TEST

Practical Test (Part B)

Wednesday **24 JANUARY 2001** Afternoon 1 hour 30 minutes

Additional materials:
Electronic calculator
Candidate's Plan (Part A of the Practical Test)
Candidates answer on the question paper.

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** questions.
- Write your answers in the spaces on the question paper.

INFORMATION FOR CANDIDATES

- In this part of the 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
- You are advised to spend the first few minutes reading through the whole paper before starting to answer any questions.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
Planning	**8**	
1	**14**	
2	**8**	
TOTAL	**30**	

This question paper consists of 8 printed pages.

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

1 The maximum current which is available from a power supply with a given e.m.f. is governed by the internal resistance of the supply. In this experiment you will determine the e.m.f. E and internal resistance r of a low voltage power supply.

(a) Connect the circuit shown in Fig. 1.1.

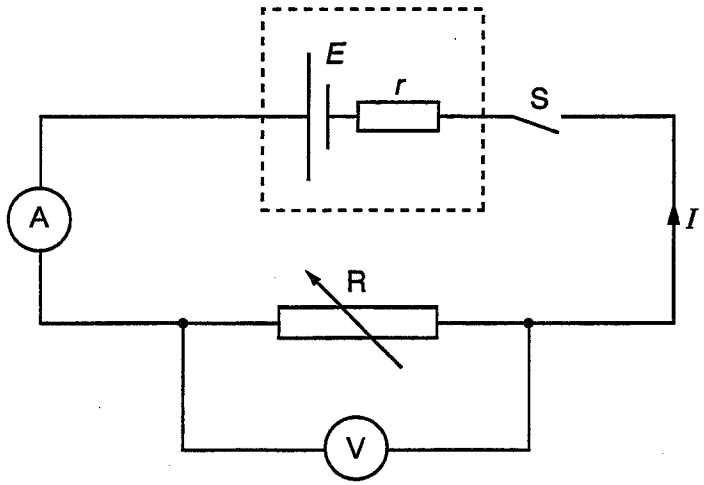

Fig. 1.1

(b) **(i)** Close switch S and adjust the variable resistor R to give maximum resistance.

(ii) Record values of the current I and the potential difference V across R.

(iii) Change the value of the resistance of R and repeat **(ii)** until you have six sets of readings for V and I.

(iv) Open switch S.

(c) Suggest why the results of your experiment may not be reliable if the switch remains closed for long periods during the experiment.

(d) V and I are related by the equation

$$V = -rI + E$$

(i) Plot a graph of V (y-axis) against I (x-axis).

(ii) Determine the gradient and the y-intercept of the graph.

(iii) Using your answers from **(ii)**, state the values of r and E.

You should include appropriate units in each case.

[14]

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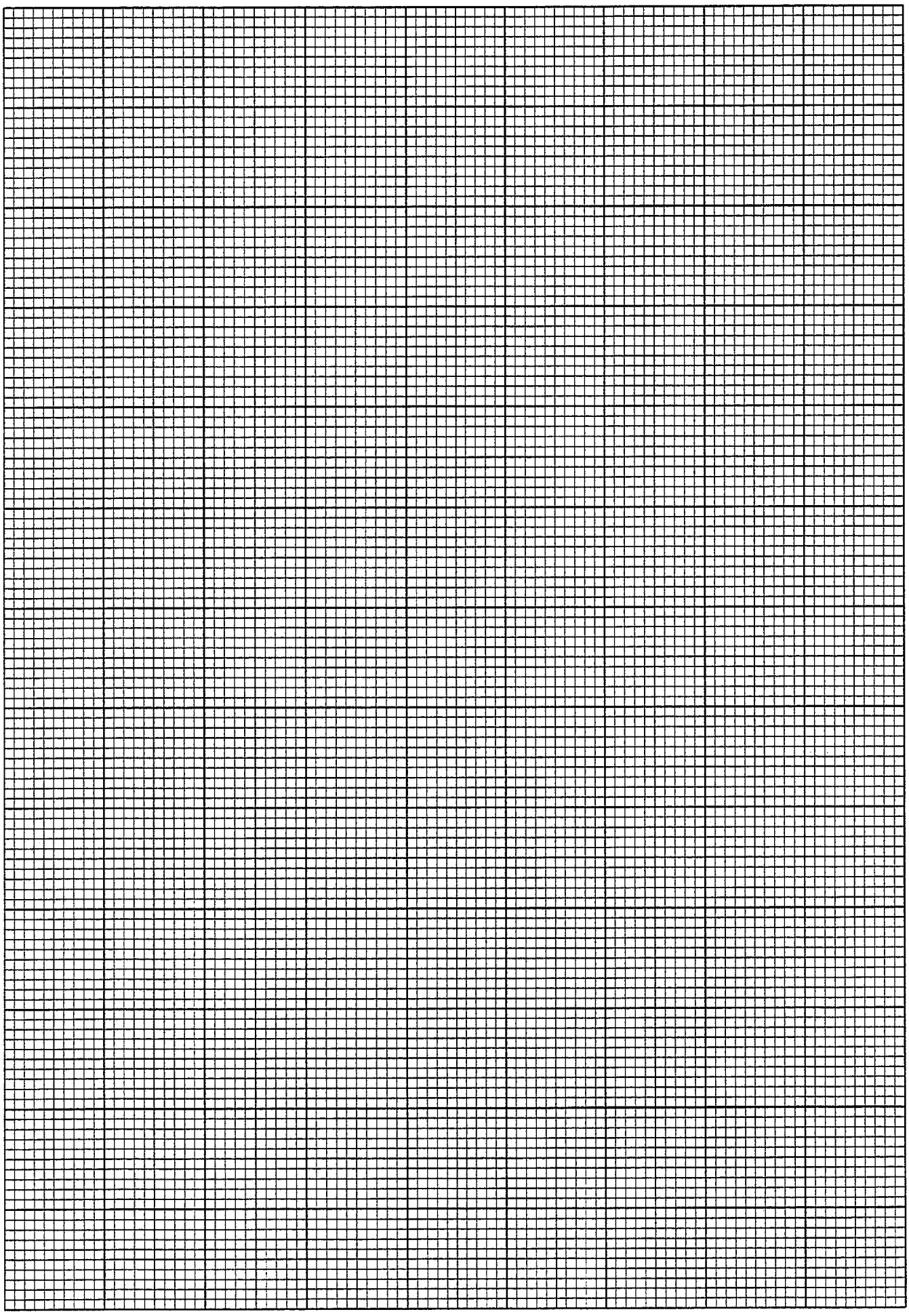
Measurements and Calculations

For Examiner's Use

M

R

A



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

2 When an object falls in a fluid it experiences a viscous drag force which opposes the motion of the object. Eventually the object reaches a constant (terminal) velocity. In this experiment you will investigate how the diameter d of a metal ball affects the terminal velocity v of the ball as it falls through a column of oil.

You are provided with two metal balls and a tube containing oil. The diameters of the balls are written on a card. The tube has three equally-spaced elastic bands wrapped around it as shown in Fig. 2.1.

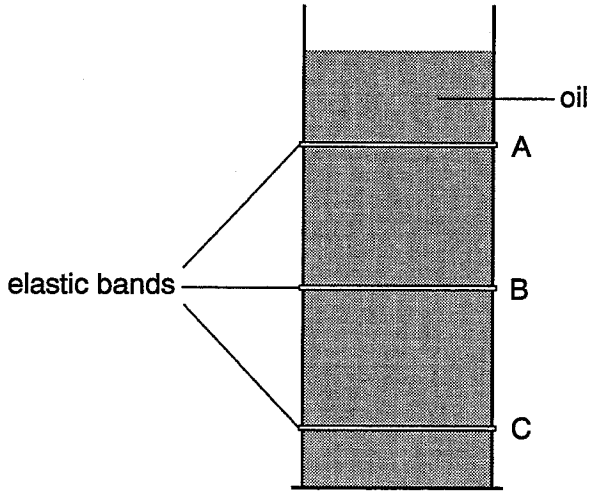

Fig. 2.1

(a) Release a ball gently from above the centre of the surface of the oil and observe the motion as the ball falls. A magnet may be used to retrieve the ball by placing the magnet on the **outside** of the tube near to the ball and gently raising the magnet until the ball reaches the top of the tube. Do not put the magnet into the oil.

(b) **(i)** Measure the time taken for each ball to move between band B and band C.

(ii) Estimate the percentage uncertainty in one of these times.

(iii) Calculate the terminal velocity of each ball as it moves between bands B and C.

(iv) Suggest how you would use the apparatus to ensure that the measured velocity is a terminal velocity.

(c) It is suggested that v is directly proportional to d^2. Do the results of your experiment support this suggestion? Explain your answer.

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

[8]

Evaluation