

**ADVANCED SUBSIDIARY GCE UNIT**

**2823/03/TEST**

**PHYSICS A**

Practical Examination 1 (Part B – Practical Test)

**WEDNESDAY 17 JANUARY 2007**

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)



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**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- 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	
<b>TOTAL</b>	<b>60</b>	

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**2**  
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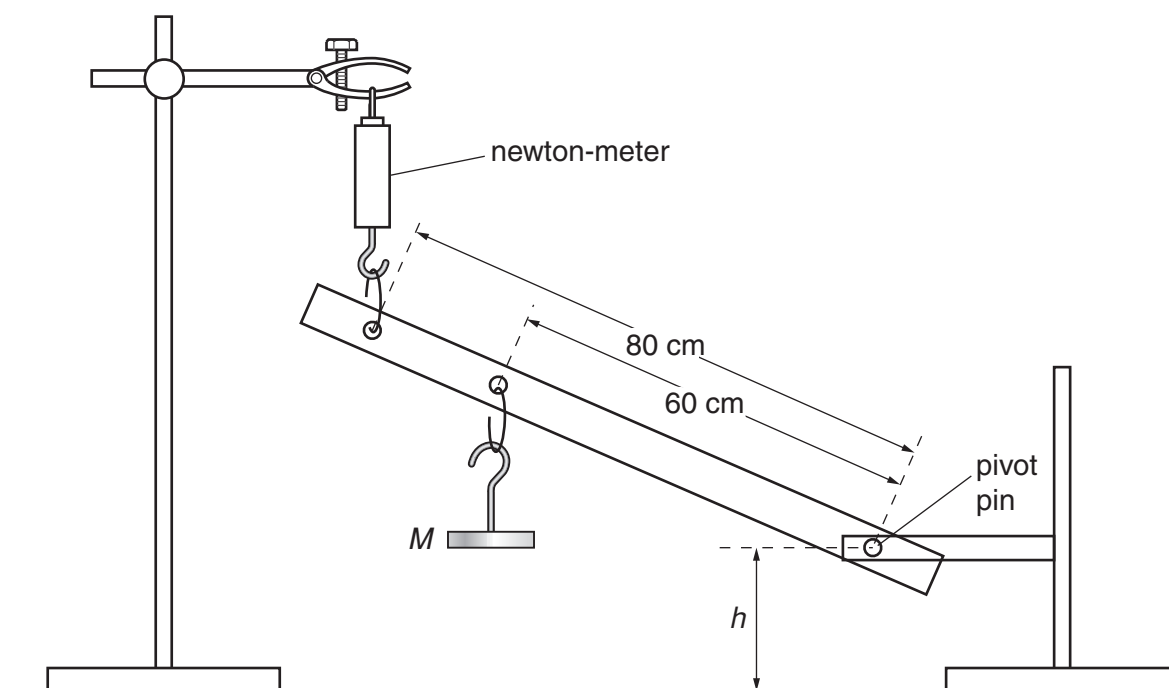
Answer **all** the questions.

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

- 1 In this question, you will investigate how the force required to support a metre rule at a constant angle to the horizontal depends on the mass  $M$ , attached to the metre rule.

Some apparatus is laid out on the bench in front of you.

- (a) Set up the apparatus as shown in Fig. 1.1.  
The initial value of  $M$  should be 0.100 kg.



**Fig. 1.1**

- (b) (i) Adjust the clamp on the right hand stand until  $h$  (the height of the pivot pin above the table) is 10.0 cm.  
(ii) Adjust the height of the newton-meter so that the bottom of the mass holder is 10.0 cm from the table. The newton-meter should be vertical.  
(iii) Record the newton-meter reading  $T$ .

$T = \dots\dots\dots$  N

- (c) Add 0.100 kg to the mass holder and repeat (b)(ii) and (b)(iii). Repeat this procedure until you have six sets of readings for  $M$  and  $T$ .

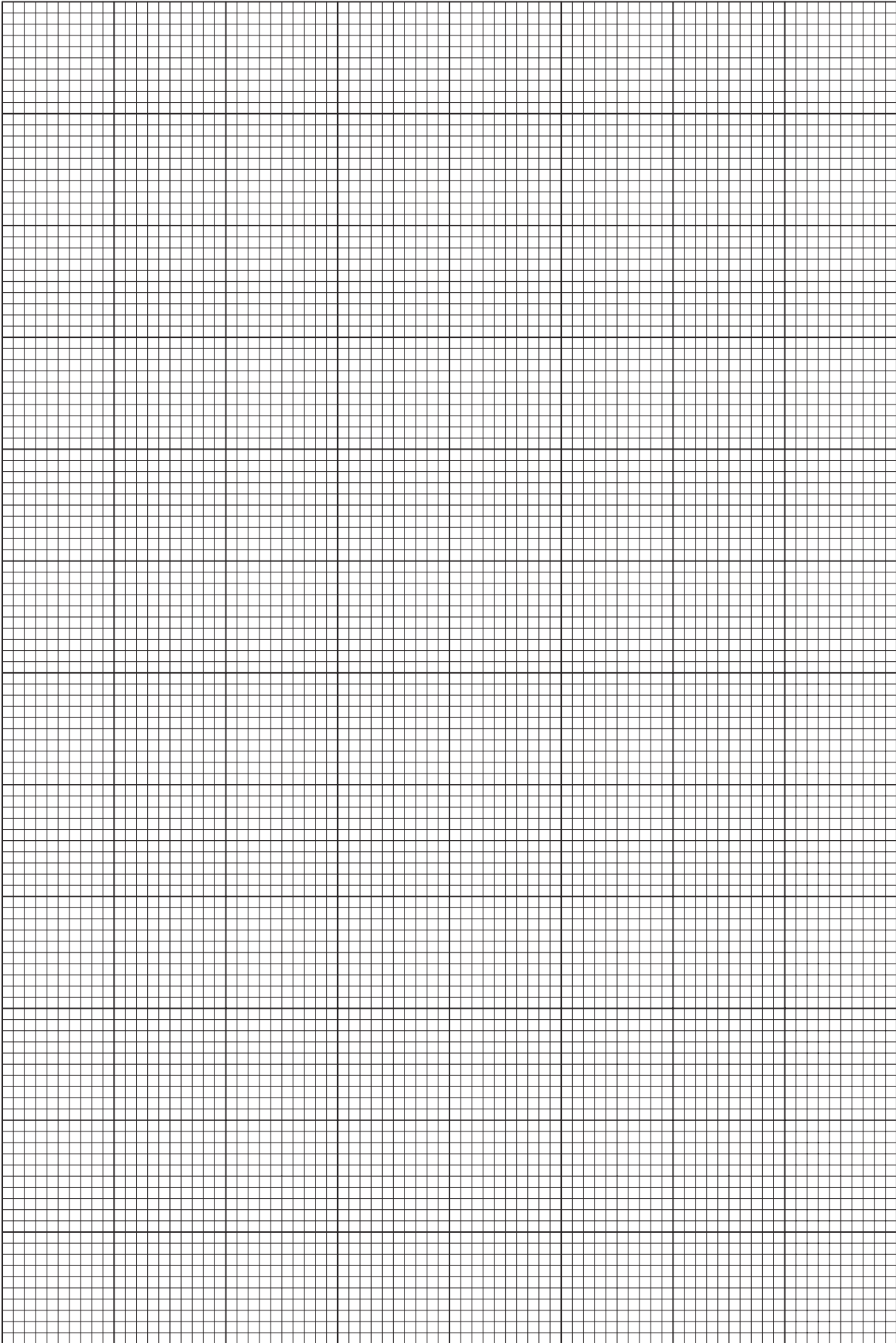
  
  

[8]

- (d) Plot a graph of  $T$  ( $y$ -axis) against  $M$  ( $x$ -axis). Draw the best straight line through the points. [6]

- (e) Determine a value for the gradient of your graph.

gradient = ..... [2]



Four empty square boxes stacked vertically, likely for marking or grading purposes.

- (f) Determine a value for the  $y$ -intercept of the line.

$y$ -intercept = .....[1]

- (g) It is suggested that the relationship between  $T$  and  $M$  is

$$T = \left(\frac{3g}{4}\right)M + \frac{gR}{2}$$

where  $R$  is the mass of the rule.

- (i) Use your answer from (e) to determine a value for  $g$ . Include an appropriate unit.

$g = \dots\dots\dots$  unit.....[5]

- (ii) Use your answers from (f) and (g)(i) to determine a value for  $R$ .

$R = \dots\dots\dots$  kg [3]

- (h) (i) From the card on the bench write down the true value of  $R$ , as measured on a top pan balance.

$R = \dots\dots\dots$  kg

Determine the percentage difference between the value of  $R$  from the experiment and the value measured by the top pan balance.

percentage difference =  $\dots\dots\dots$ % [1]

- (ii) Explain whether your results indicate

1 a random error

.....  
.....  
.....

2 a systematic error.

.....  
.....  
.....

[2]

[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 determine the resistance per unit length of a pencil lead.

(a) You are provided with two pencils. Using the rule provided measure and record the length,  $L$  of the **shorter** pencil as shown in Fig. 2.1.

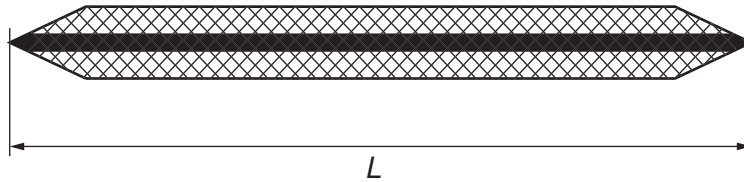


Fig. 2.1

$L = \dots\dots\dots$  cm

(b) (i) Set up the circuit shown in Fig. 2.2.

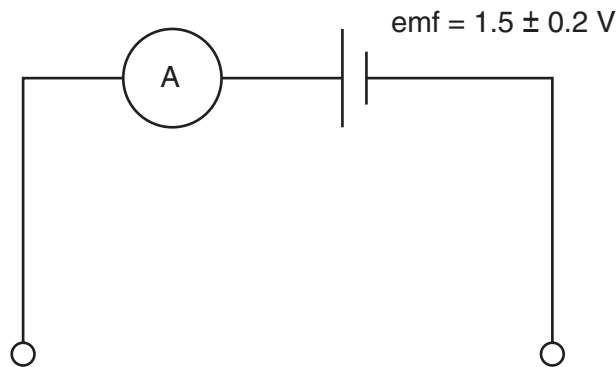


Fig. 2.2

(ii) Using the crocodile clips connect the **shorter** pencil to the circuit. Measure and record the current  $I$ .

$I = \dots\dots\dots$  mA [1]

Disconnect the pencil from the circuit.

(c) (i) Calculate the resistance  $R$  of the pencil lead.

$R = \dots\dots\dots$   $\Omega$

(ii) Calculate the resistance per unit length  $R/L$  of the pencil lead.

$R/L = \dots\dots\dots$   $\Omega \text{ cm}^{-1}$  [1]



- (d) (i) Calculate the percentage uncertainty in the value of e.m.f. of the battery shown in Fig. 2.2.

percentage uncertainty = ..... [1]

- (ii) Hence calculate the percentage uncertainty in the value of  $R$ .

percentage uncertainty = ..... [2]

- (e) Repeat parts (a), (b)(ii) and (c) using the **longer** pencil.

Record the new values of  $L$ ,  $I$ ,  $R$  and  $R/L$

$L =$  ..... cm

$I =$  ..... mA

$R =$  .....  $\Omega$

$R/L =$  .....  $\Omega \text{ cm}^{-1}$  [1]

- (f) It is suggested that  $R$  is directly proportional to  $L$ . Show whether or not the results of your experiment support this suggestion.

.....

..... [2]

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

Write an evaluation of the procedure that you have followed to determine the resistance per unit length of a pencil lead. 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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Dotted lines for writing

[6]

Quality of Written Communication [2]

[Total: 16]

**END OF QUESTION PAPER**

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