OCR
RECOGNISING ACHIEVEMENT

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 | | | | | |

Candidate Number | | | | |

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	
TOTAL	60	

This document consists of **11** printed pages and **1** blank page.

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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.

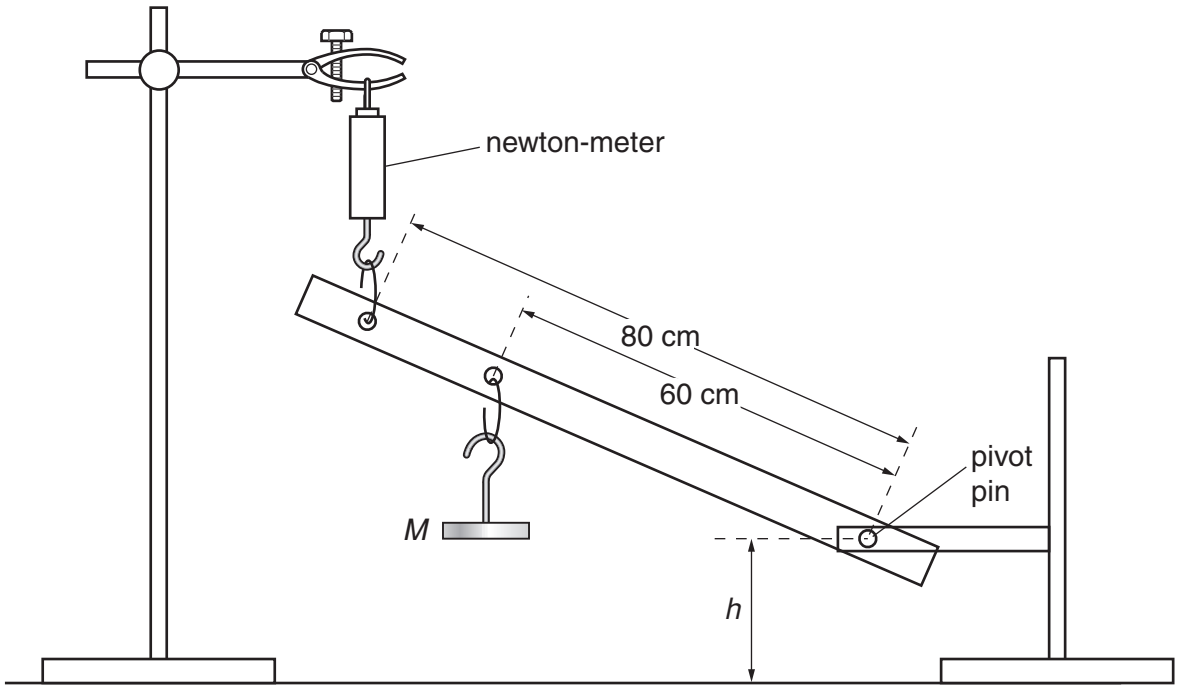


Fig. 1.1

(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 = ... N

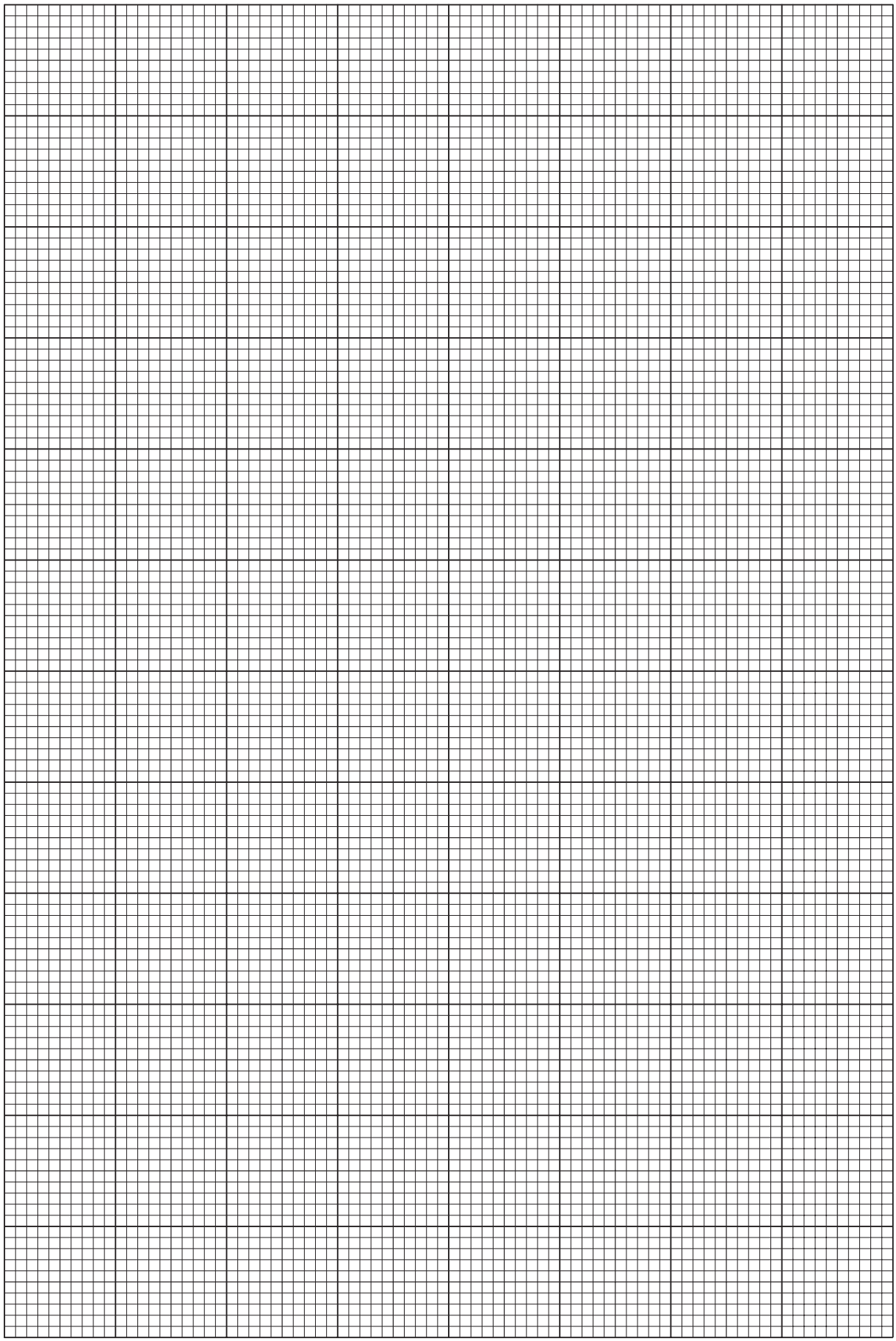
(c) Add 0.100 kg to the mass holder and repeat **(b)(ii)** and **(b)(iii)**. Repeat this procedure until you have six sets of readings for *M* and *T*.

[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]



(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 = ... unit.....[5]

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

R = ... 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 = ... kg

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

percentage difference = ...% [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.

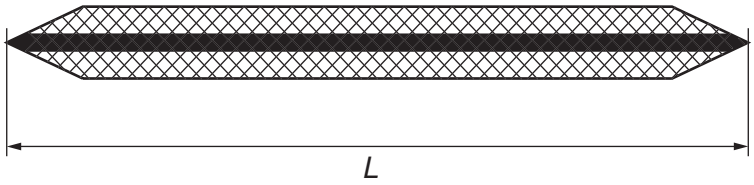


Fig. 2.1

L = ... cm

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

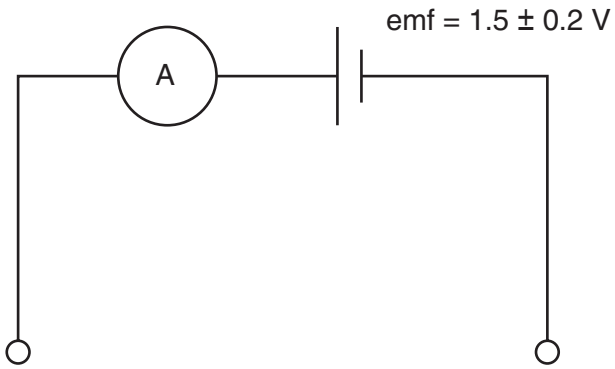


Fig. 2.2

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

I = ... mA [1]

Disconnect the pencil from the circuit.

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

R = ... Ω

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

R/*L* = ... Ω 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 = ... Ω

R/*L* = ... Ω 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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Quality of Written Communication [2]

[Total: 16]

END OF QUESTION PAPER

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