THIS IS A LEGACY SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE

PHYSICS A

2823/03/TEST

Practical Examination 1 (Part B – Practical Test)

CUP/T63771

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)

Wednesday 13 May 2009
Morning

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**	

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 depends on the position of a weight, *W*, attached to the metre rule.

The apparatus is laid out on the bench.

(a) Set up the apparatus as shown in Fig. 1.1.

Adjust the position of *W* so that the initial value of *x* is 0.100 m.

Adjust the position of the newton-meter so that the value of *d* is 0.800 m.

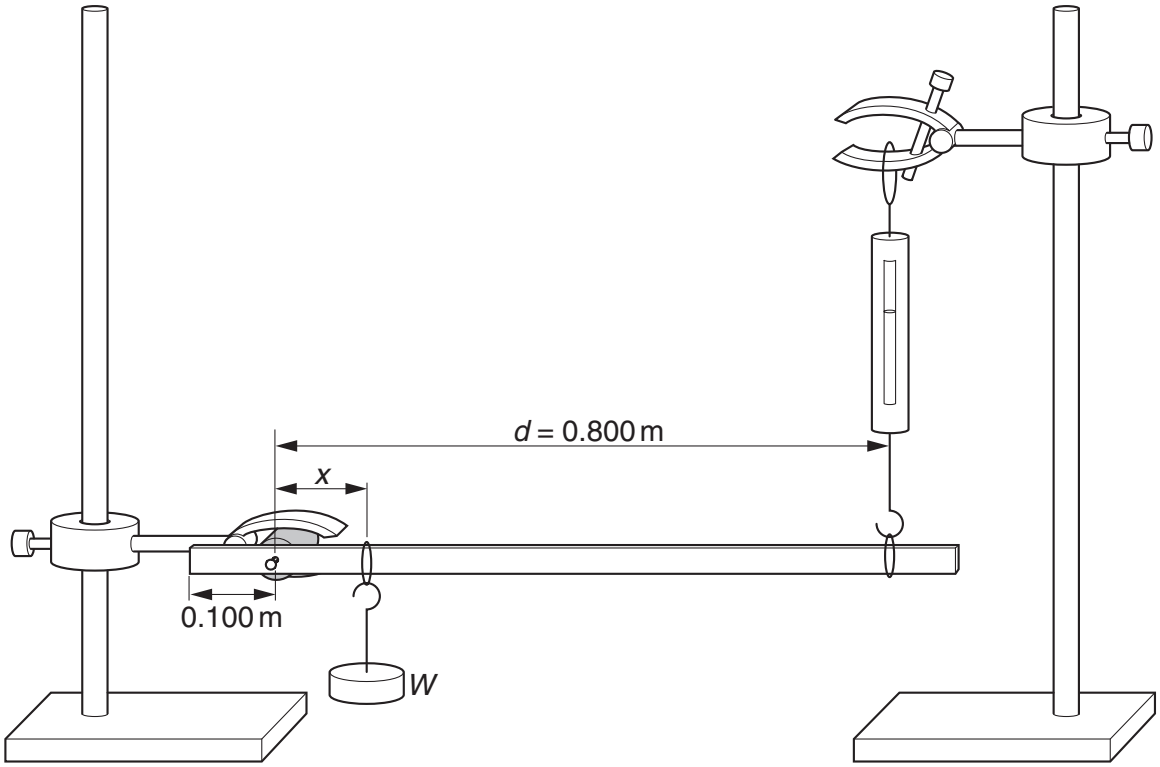


Fig. 1.1

(b) (i) Adjust the height of the newton-meter so that the metre rule is approximately horizontal – use the clamp screw for fine adjustment. The newton-meter should be approximately vertical keeping the value of *d* equal to 0.800 m.

(ii) Record the newton-meter reading *T* and determine a value for *Td*.

T = ... unit .....

Td = ... unit ..... **[2]**

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

.....

.....

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

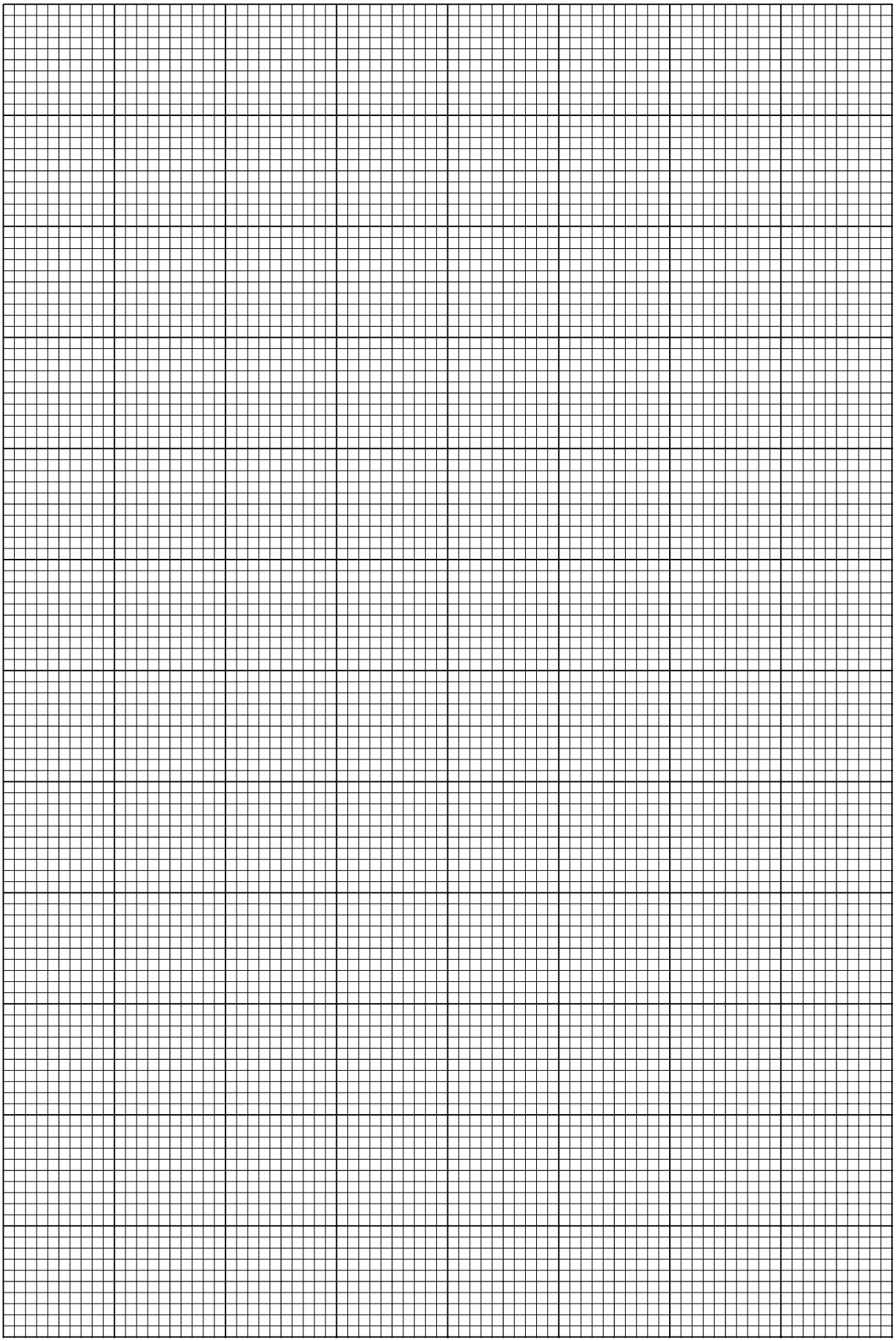
(d) Change the position of *W* and repeat **(b)**. Repeat this procedure until you have **seven** sets of readings for *x* and *T*. Include in your table of results values for *Td*.

[6]

(e) Plot a graph of *Td* (*y*-axis) against *x* (*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 Td and x is

$$Td = Wx + \frac{Rgd}{2}$$

where R is the mass of the metre rule and g is the gravitational field strength and has the value $9.81\,\text{N kg}^{-1}$.

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

W = ... unit ..... **[3]**

(ii) Use your answer from **(f)(ii)** 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.

.....

.....

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

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

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.....

..... **[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 time taken for a cylinder to roll a fixed distance is related to the vertical height it falls.

(a) Set up the apparatus as shown in Fig. 2.1. Measure a length of 1.000 m.

Adjust the slope so that *h*, measured 1.000 m from the bottom of the slope, is about 12 cm.

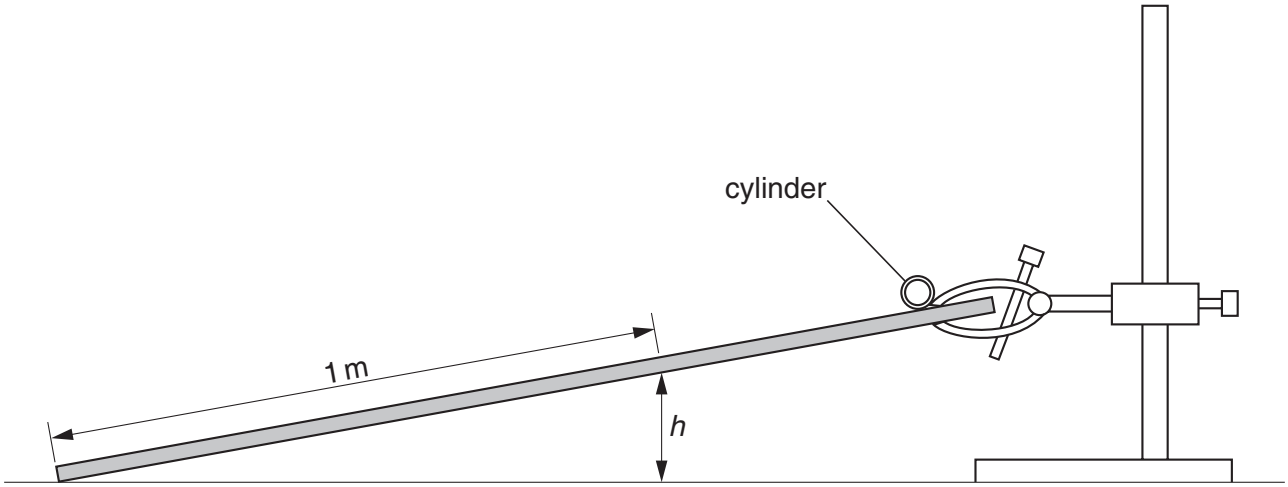

Fig. 2.1

(b) (i) Measure and record h.

h = ... cm

(ii) Measure and record the time t for the cylinder to roll a distance of 1.000 m from rest.

t = ... s **[1]**

(iii) Determine t^2.

t^2 = ... s^2 **[1]**

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

percentage uncertainty = ... **[3]**

(d) Adjust the slope so that h is about 6 cm and repeat part **(b)(i)**, **(ii)** and **(iii)**.

h = ... cm

t = ... s

t^2 = ... s^2 **[1]**

(e) It is suggested that $\frac{1}{t^2}$ is directly proportional to h. Show whether or not the results of your experiment support this suggestion.

.....

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

(f) Of the eight marks for 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 *t* and *h*. 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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.... **[6]**

Quality of Written Communication **[2]**

[Total: 16]

END OF QUESTION PAPER

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