OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

PHYSICS A

Practical Examination 1 (Part B – Practical Test) **2823/03/TEST**

Tuesday **17 JANUARY 2006** Afternoon 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				

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper.
- Pencils may be used for graphs and diagrams **only**.
- Read the instructions and questions carefully before starting your answers.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT** WRITE IN THE AREA **OUTSIDE** THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- 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 question paper consists of 11 printed pages and 1 blank page.

SP (KN) S96179/5

[Turn over

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 tension in the string supporting a metre rule depends on the position of a weight along the metre rule.

Fig. 1.1 shows the apparatus set up in front of you.

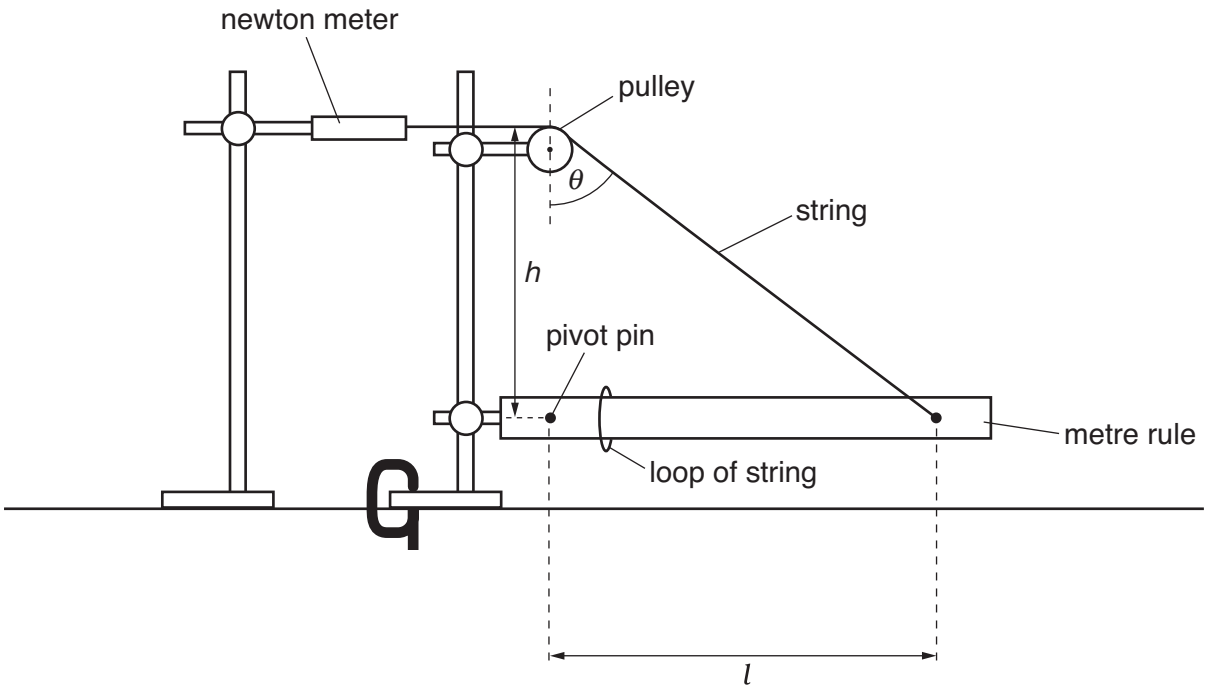


Fig. 1.1

(a) (i) Adjust the position of the left hand stand until the metre rule is horizontal.
Measure and record the distance, l, between the pin and the point where the string is attached to the ruler.

l = ... cm

(ii) Measure and record the distance, h, between the pin and the top of the pulley.

h = ... cm

(iii) Determine the angle θ.

θ = ... [2]

(b) Place the weight, *W*, so that it hangs on the rule. Position *W* so that it is 20.0 cm **from the pin**.

Adjust the position of the left hand stand until the metre rule is horizontal (see Fig. 1.2). Measure and record the newton meter reading, *T*.

T = ... N

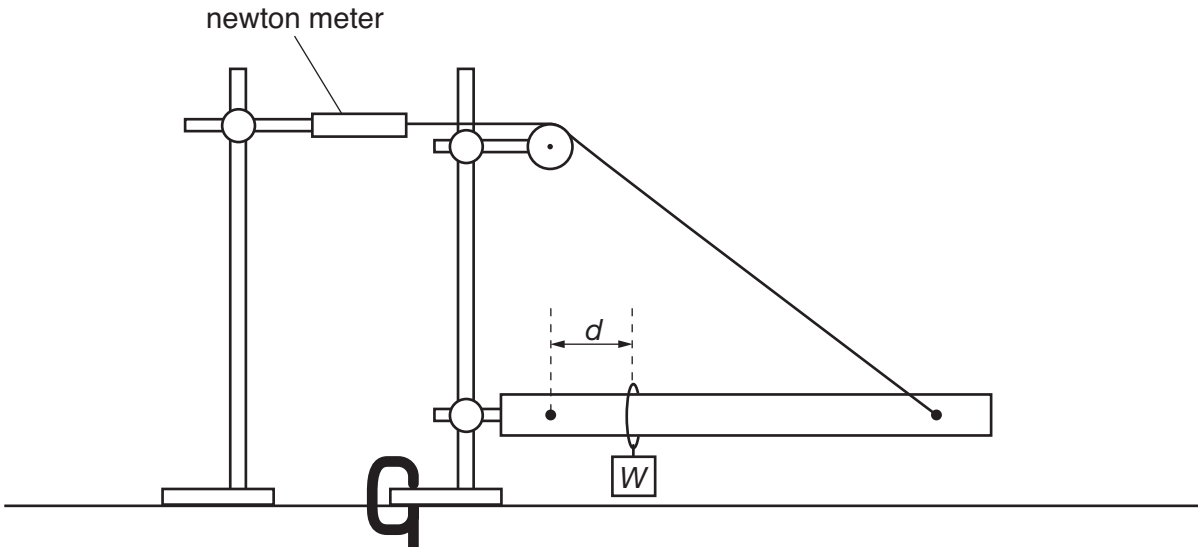


Fig. 1.2

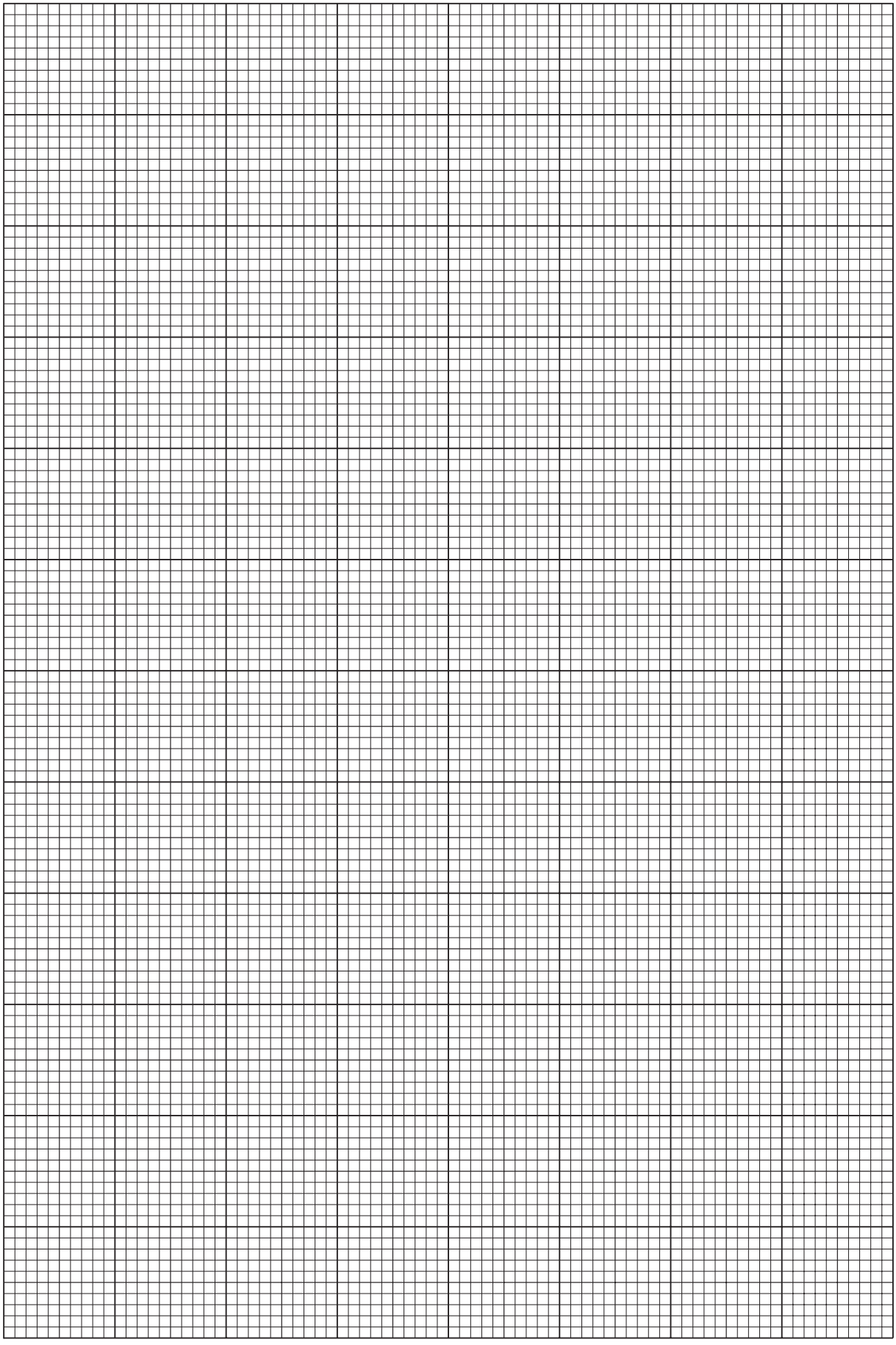
(c) Change the value of d so that d is in the range 20.0 cm $\leqslant d \leqslant$ 80.0 cm and repeat **(b)** until you have six sets of readings for d and T. Include all sets of results in a table.

[8]

(d) Plot a graph of T (y-axis) against d (x-axis) and 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 d is

$$T = \left(\frac{W}{l\cos\theta}\right)d + \frac{R}{2\cos\theta}$$

where R is the weight of the rule.

(i) Use your answers from **(a)** and **(e)** to determine a value for W. Include an appropriate unit.

W = ... unit ..... [5]

(ii) Use your answers from **(a)** and **(f)** to determine a value for R with an appropriate unit.

R = ... unit ..... [4]

[Total: 28]

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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 determine the mass of a steel ball.

(a) (i) You are provided with a tube containing some sand. Using the rule provided, measure and record the outer diameter, d, of the tube.

d = ... cm

(ii) Determine the outer cross-sectional area, A, of the tube.

A = ... cm^2 [1]

(b) Calculate the percentage uncertainty in your value of A.

percentage uncertainty = ... [3]

(c) Gently place the tube in the water as shown in Fig. 2.1. Be careful not to let any water enter the tube. Measure and record the height, h_0, of the unsubmerged part of the tube.

h_0 = ... cm

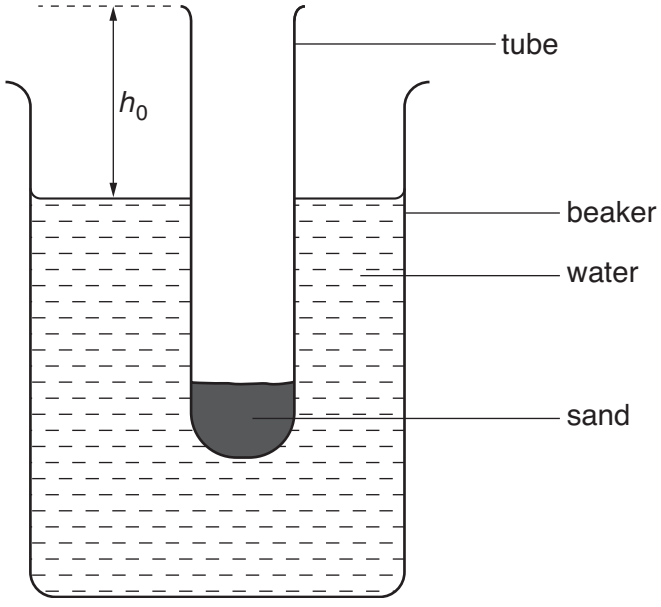

Fig. 2.1

(d) **(i)** Count the number, N, of steel balls.

N = ...

(ii) Gently add the steel balls to the tube. Again be careful not to let any water enter the tube.

(iii) Measure and record the new height, h_1, of the unsubmerged part of the tube.

h_1 = ... cm

(iv) Determine the change in unsubmerged height, Δh, of the tube.

Δh = ... cm [1]

(e) The mass of a steel ball may be calculated using the following equation

$$m = \frac{A \rho \Delta h}{N}$$

where ρ is the density of water and has the value of $1.00\,\text{g}\,\text{cm}^{-3}$.

Determine the mass of a steel ball in grams.

m = ... g [1]

Question 2 continued over the page

In this question, two marks are available for the quality of written communication.

(f) Write an evaluation of the procedure that you have followed to determine the mass of a steel ball. 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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