



Cambridge International AS & A Level

 CANDIDATE
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PHYSICS

9702/35

Paper 3 Advanced Practical Skills 1

May/June 2026
2 hours

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You will be allowed to work with the apparatus for a maximum of 1 hour for each question.
- You should record all your observations in the spaces provided in the question paper as soon as these observations are made.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [].

For Examiner's Use

1	
2	
Total	

 This document has **12** pages. Any blank pages are indicated.





You may not need to use all of the materials provided.

- 1** In this experiment, you will investigate a balanced metre rule.

You have been provided with a metre rule and some masses.

- (a)** • Place some of the masses on the rule as shown in Figure 1.1.

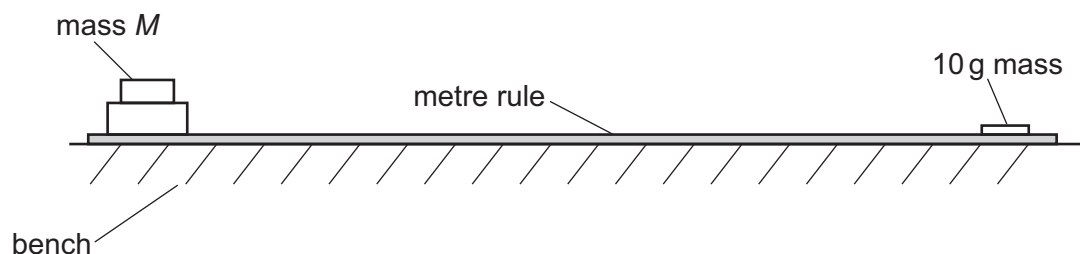


Figure 1.1

- Place one 10 g mass on the rule with its centre at the 95.0 cm mark. This mass must remain in place throughout the experiment.
- Place a total mass of 150 g on the rule with its centre at the 5.0 cm mark.
The value of n is given by $n = \frac{M}{10g}$ where M is the mass placed at the 5.0 cm mark.
For this value of M , the value of n is 15.
- Carefully place the rule and masses on the pivot as shown in Figure 1.2.

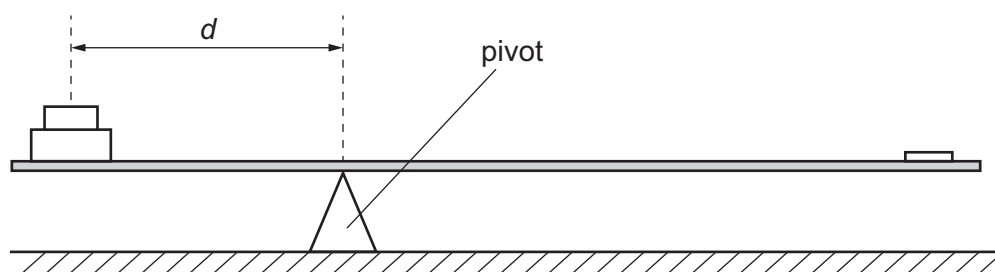


Figure 1.2

- Adjust the position of the rule on the pivot until the rule is balanced.
- The distance between the pivot and the 5.0 cm mark on the rule is d .

Record d .

$d =$ [1]





- (b) Change M by changing the total mass at the 5.0 cm mark. Adjust the position of the pivot until the rule is balanced. Calculate n using $n = \frac{M}{10g}$.

Repeat until you have six sets of values of M , n and d .

Record your results in a table. Include values of $\frac{1}{d}$ in your table.

[10]

- (c) (i) Plot a graph of $\frac{1}{d}$ on the y -axis against n on the x -axis.

[3]

- (ii) Draw the straight line of best fit.

[1]

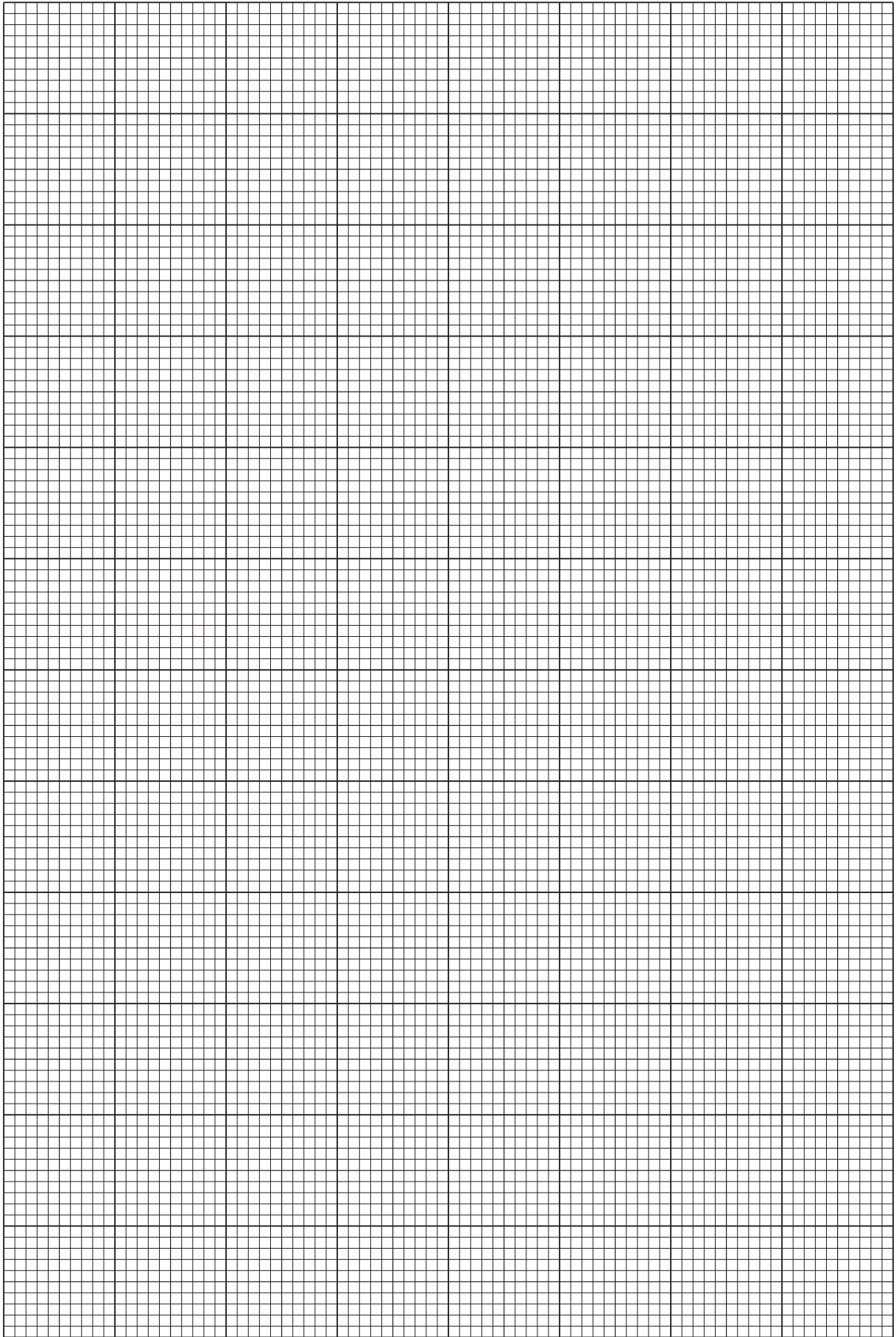
- (iii) Determine the gradient and y -intercept of this line.

gradient =

y -intercept =

[2]







(d) It is suggested that the quantities d and n are related by the equation

$$\frac{1}{d} = Pn + Q$$

where P and Q are constants.

Using your answers in **1(c)(iii)**, determine the values of P and Q .
Give appropriate units.

$$P = \dots\dots\dots$$

$$Q = \dots\dots\dots [2]$$

(e) Theory suggests that

$$\frac{Q}{P} = \frac{S + m}{m}$$

where $m = 10.0\text{g}$ and S is the mass of the rule.

Determine S .
Give an appropriate unit.

$$S = \dots\dots\dots [1]$$

[Total: 20]



You may not need to use all of the materials provided.

- 2 In this experiment, you will investigate the resistance of a parallel combination of resistance wires.

You have been provided with two metre rules with resistance wires attached.

- (a) (i) • A, B and C are crocodile clips.

Connect A to the soldered joint as shown in Figure 2.1.

- Connect B and C as shown in Figure 2.1.

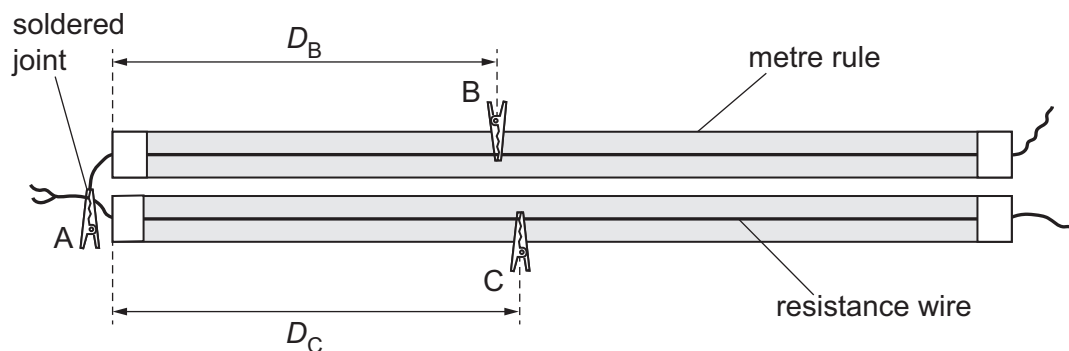


Figure 2.1

- Adjust the position of B so that the length L of wire between A and B is approximately 50 cm.
- Determine L .

$L =$

- Estimate the percentage uncertainty in your value of L . Show your working.

percentage uncertainty = %
[1]

- (ii) • Adjust the position of C so that the length of wire between A and C is also L .
- The distance from the end of the metre rule to B is D_B .
The distance from the end of the metre rule to C is D_C , as shown in Figure 2.1.

Measure and record D_B and D_C .

$D_B =$

$D_C =$

[1]



- (b) (i) • Connect the circuit as shown in Figure 2.2.

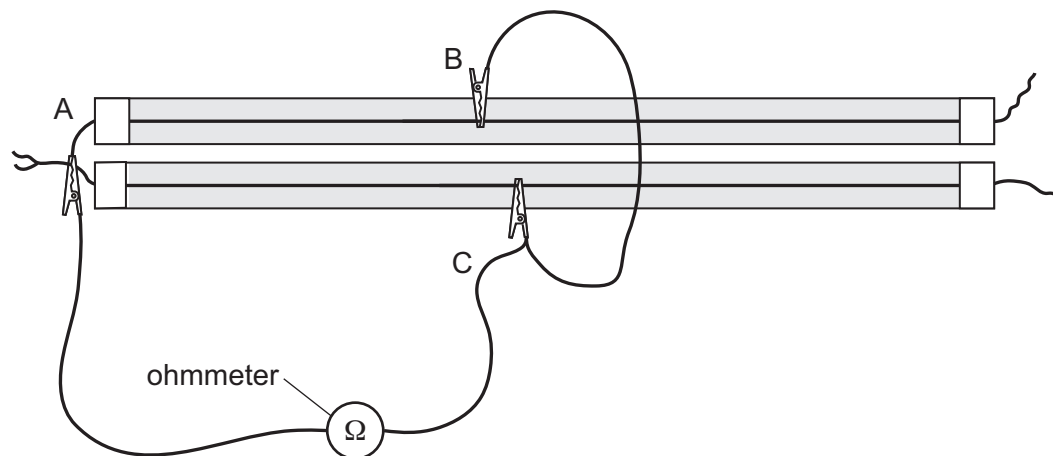


Figure 2.2

- The reading on the ohmmeter is R .

Record R .

$$R = \dots\dots\dots [1]$$

- (ii) • The value of x is 15.0 cm.

Calculate $(D_B - x)$ and $(D_C + x)$.

$$(D_B - x) = \dots\dots\dots$$

$$(D_C + x) = \dots\dots\dots$$

- Adjust the positions of B and C as shown in Figure 2.3.

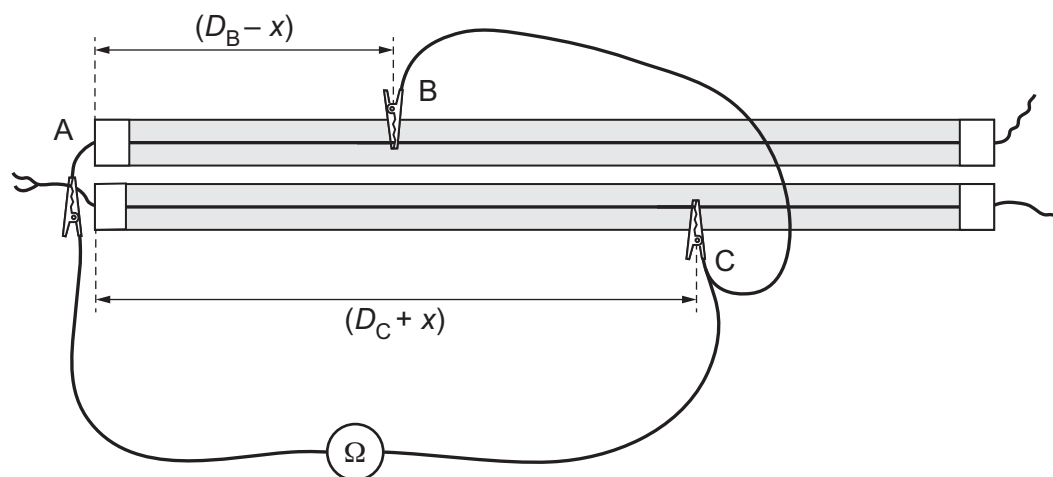


Figure 2.3

[1]





(iii) The ohmmeter reading is R_X .

Record R_X .

$$R_X = \dots\dots\dots [1]$$

(iv) Calculate $\frac{R_X}{R}$.

$$\frac{R_X}{R} = \dots\dots\dots [1]$$

(v) Justify the number of significant figures that you have given for your value of $\frac{R_X}{R}$.

.....

 [1]

(c) Using a value of x of 25.0 cm, repeat **2(b)(ii)**, **2(b)(iii)** and **2(b)(iv)**.

$$(D_B - x) = \dots\dots\dots$$

$$(D_C + x) = \dots\dots\dots$$

$$R_X = \dots\dots\dots$$

$$\frac{R_X}{R} = \dots\dots\dots [3]$$





(d) It is suggested that the relationship between R_x , R and x is

$$\frac{R_x}{R} = 1 - \frac{x^2}{k}$$

where k is a constant.

Using your data, calculate **two** values of k .

first value of k =

second value of k =

[1]

(e) It is suggested that the percentage uncertainty in the values of k is 15%.

Using this uncertainty, explain whether your results support the relationship in **2(d)**.

.....

 [1]





(f) (i) Describe **four** sources of uncertainty or limitations of the procedure for this experiment.

For any uncertainties in measurement that you describe, you should state the quantity being measured and a reason for the uncertainty.

1

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2

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3

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4

.....

[4]

(ii) Describe **four** improvements that could be made to this experiment. You may suggest the use of other apparatus or different procedures.

1

.....

2

.....

3

.....

4

.....

[4]

[Total: 20]





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