



Cambridge International AS & A Level

CANDIDATE
NAME
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NUMBER

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PHYSICS

9702/32

Paper 3 Advanced Practical Skills 2

May/June 2025

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 or correction fluid.
- 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 light-dependent resistor (LDR).

(a) • Connect the circuit shown in Fig. 1.1.

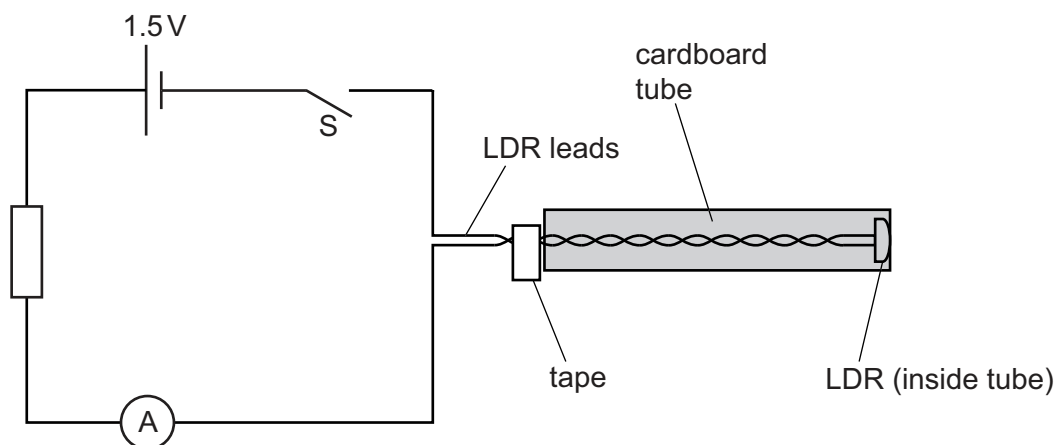


Fig. 1.1

- Ensure that the switch S is open.
- Slide the LDR leads into the tube until the front of the LDR is just level with the open end of the tube, as shown in Fig. 1.1.
- With the LDR in this position, attach a piece of adhesive tape to the leads as a marker at the other end of the tube, as shown in Fig. 1.1.
- Slide the tube until the LDR is approximately half-way along it, as shown in Fig. 1.2.

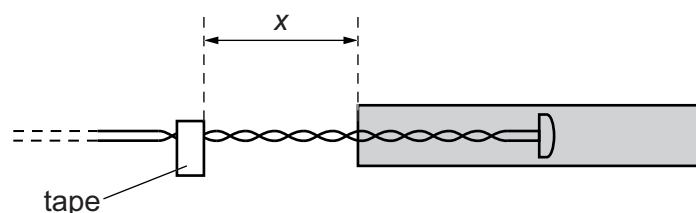


Fig. 1.2





- The distance between the tape and the tube is x .

Measure and record x .

$x =$

- Close S and record the ammeter reading I .

$I =$

- Open S.

[2]





- (b) Change x by moving the LDR to a new position inside the tube, with x in the range 4 cm to 18 cm. Record x and I .

Repeat until you have six sets of values of x and I .

Record your results in a table. Include values of \sqrt{I} in your table.

[10]

- (c) (i) Plot a graph of \sqrt{I} on the y -axis against x on the x -axis.

[3]

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

[1]

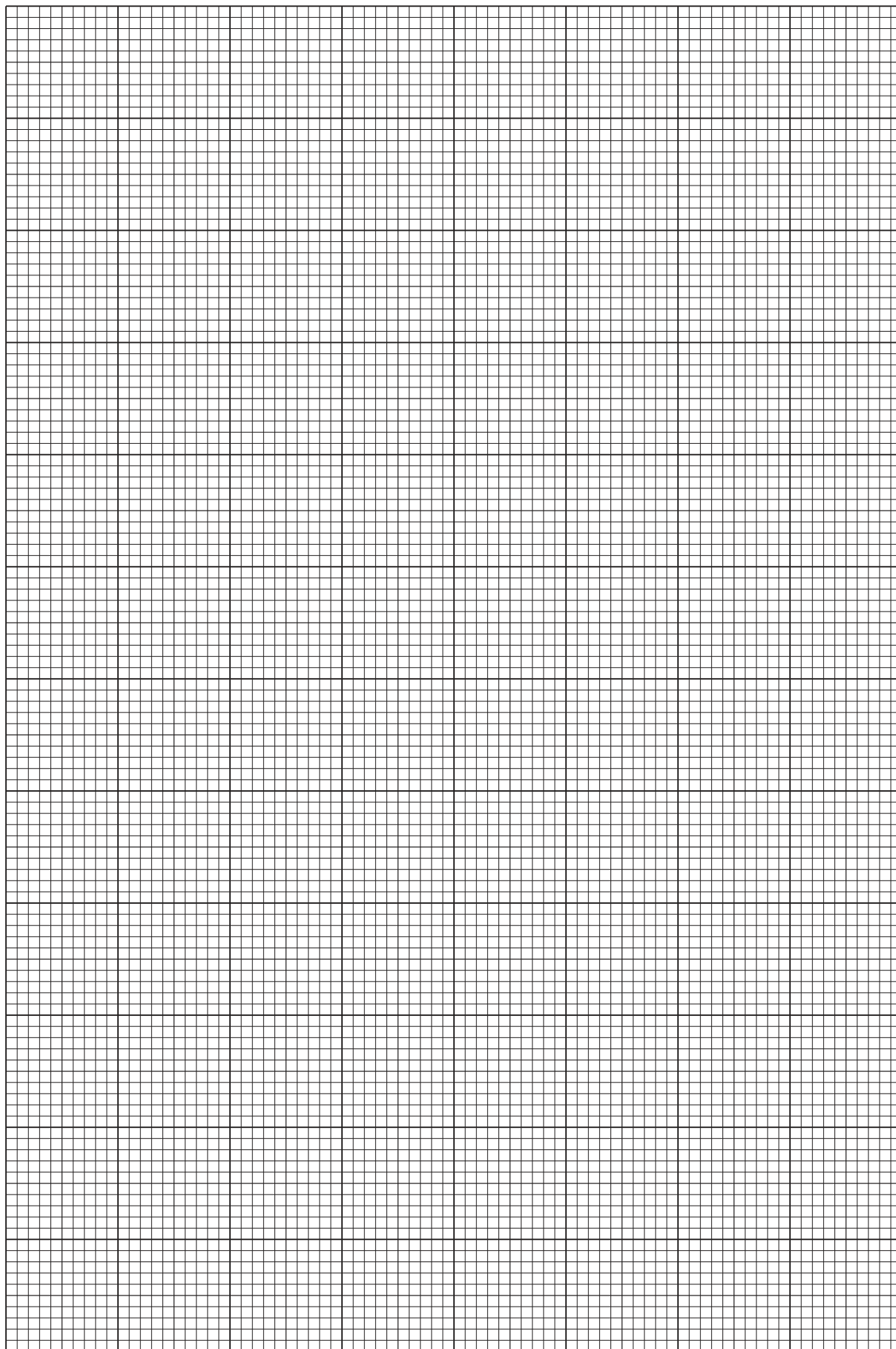
- (iii) Determine the gradient and y -intercept of this line.

gradient =

y -intercept =

[2]







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

$$\sqrt{I} = ax + b$$

where a and b are constants.

Using your answers in (c)(iii), determine the values of a and b .
Give appropriate units.

$a =$

$b =$

[2]

[Total: 20]



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

2 In this experiment, you will investigate the elastic properties of rubber cord.

- (a) (i) You are provided with a wire with a clip and two slotted masses attached, as shown in Fig. 2.1.

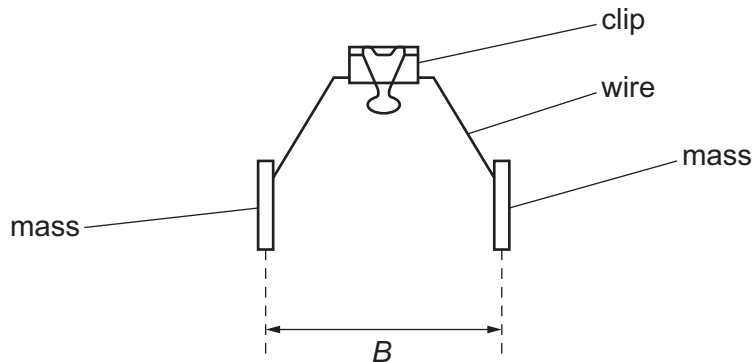


Fig. 2.1

The distance between the centres of the two slotted masses is B , as shown in Fig. 2.1.

Measure and record B .

$B =$ [1]

- (ii) Estimate the percentage uncertainty in your value of B . Show your working.

percentage uncertainty =% [1]





- (b) (i) • You are provided with two lengths of rubber cord. Select the **longer** cord.
- The diameter of the cord is d .

Measure and record d .

$d = \dots\dots\dots$ [1]

- (ii) • Suspend the clip, wire and masses using the **longer** cord secured in the two clips, as shown in Fig. 2.2.

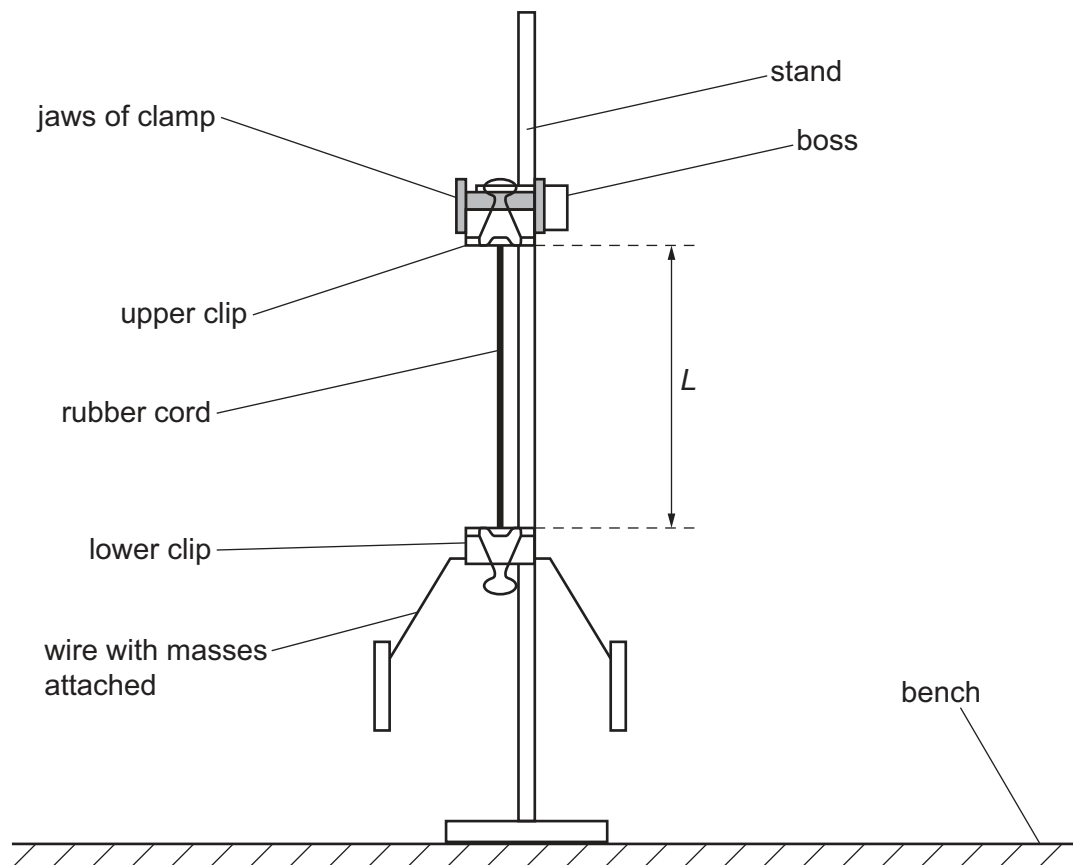


Fig. 2.2 (not to scale)

- The length of cord between the two clips is L , as shown in Fig. 2.2.

Measure and record L .

$L = \dots\dots\dots$ [1]





- (iii) • Keeping the cord vertical, rotate the lower clip through approximately 180° and release the clip. The clip will rotate with a small number of oscillations.
- Take measurements to determine the period T of these oscillations.

$T = \dots\dots\dots$ s [2]

(c) Using the **shorter** length of rubber cord, repeat (b).

$d = \dots\dots\dots$

$L = \dots\dots\dots$

$T = \dots\dots\dots$ s
[3]





(d) It is suggested that the relationship between T , B , L and d is

$$T^2 = \frac{B^2 L}{k d^4}$$

where k is a constant.

(i) Using your data, calculate **two** values of k .

first value of k =

second value of k = [1]

(ii) Justify the number of significant figures that you have given for your values of k .

.....

 [1]

(e) It is suggested that the percentage uncertainty in the values of k is 20%.

Using this uncertainty, explain whether your results support the relationship in (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
.....
- 2
.....
- 3
.....
- 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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