Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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.

[Turn over

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.

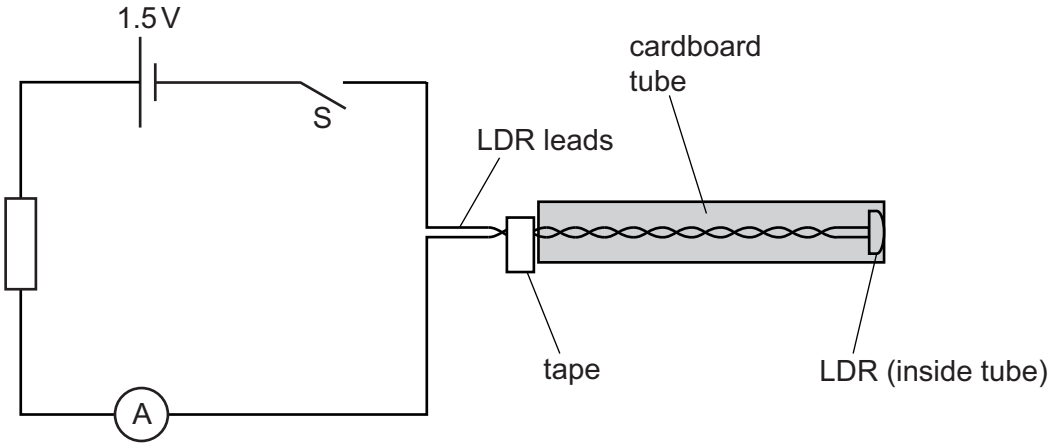


Fig. 1.1

- 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.

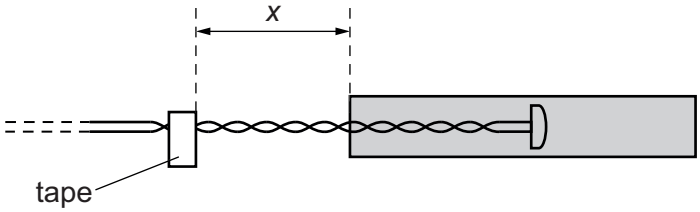


Fig. 1.2

- 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]

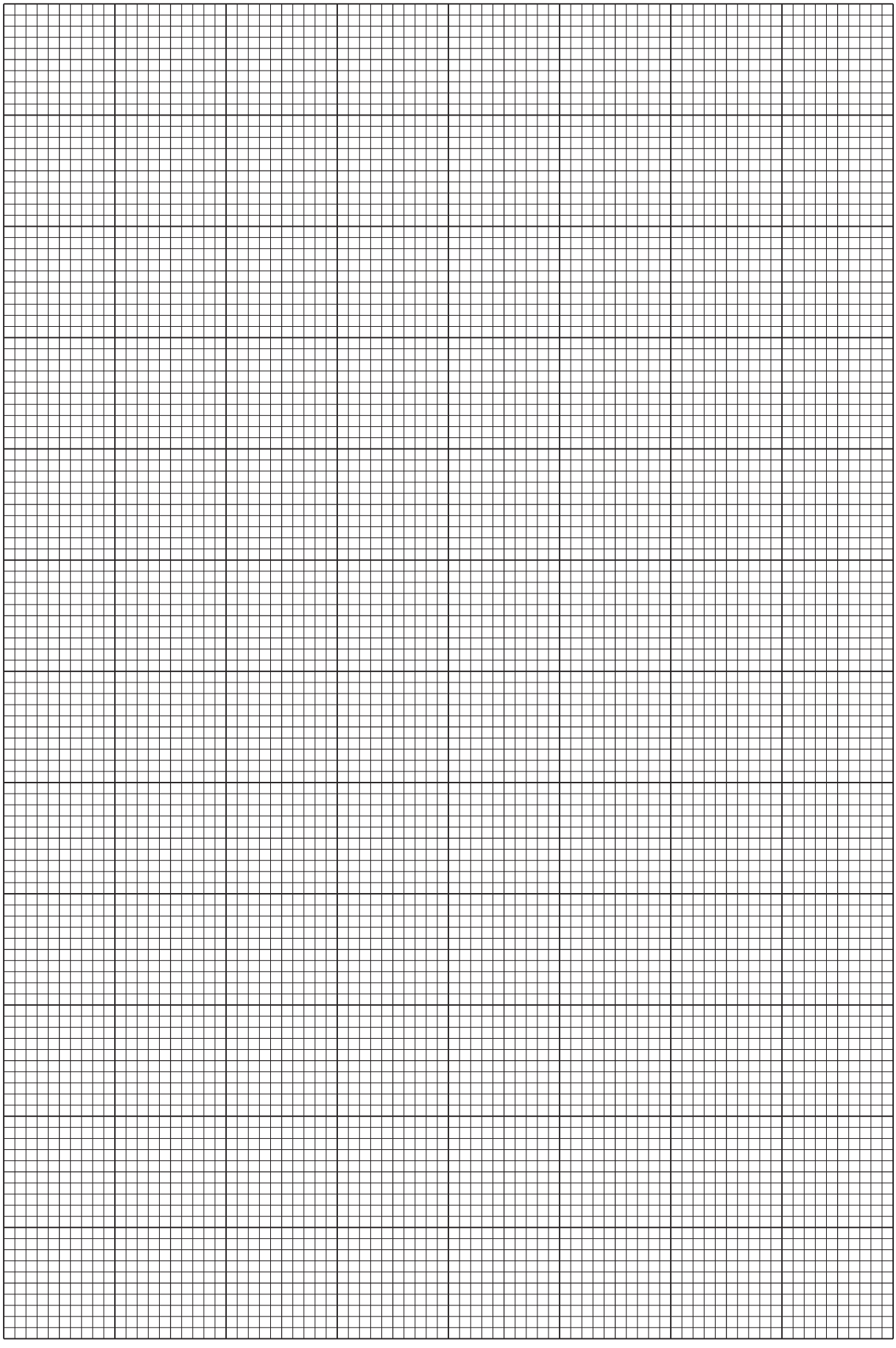
(c) (i) Plot a graph of $\sqrt{I}$ on the y-axis against x on the x-axis. [3]

(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.

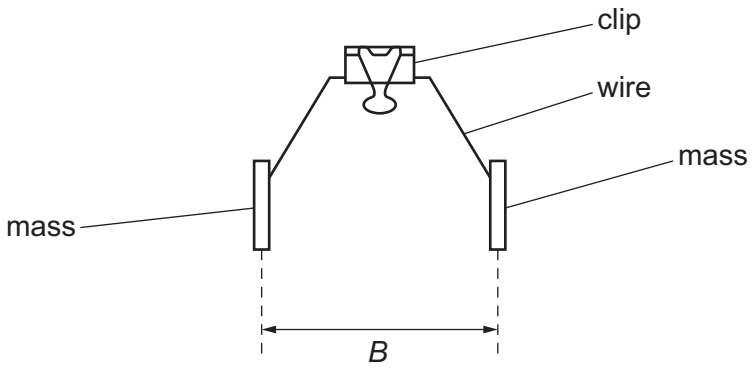


Fig. 2.1

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 = ... [1]

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

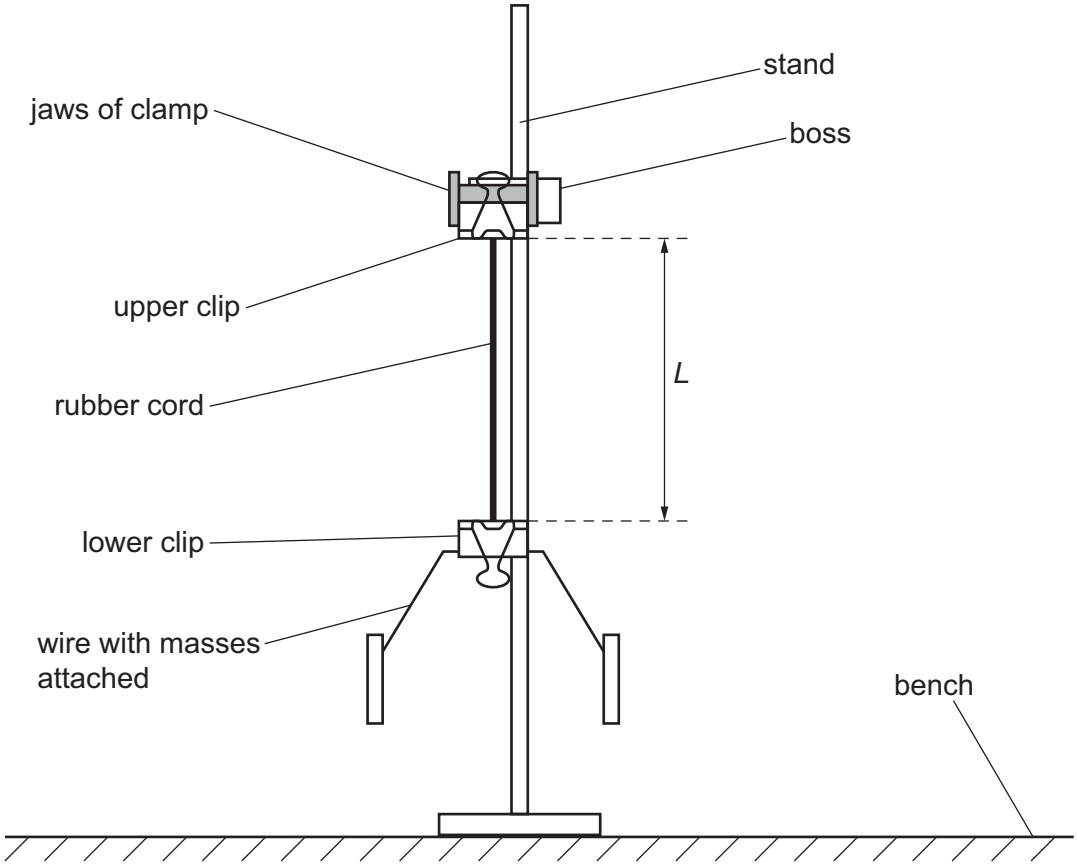


Fig. 2.2 (not to scale)

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

Measure and record *L*.

L = ... [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 = ... s [2]

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

d = ...

L = ...

T = ... 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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