Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/63**

Paper 6 Alternative to Practical **October/November 2019**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **13** printed pages and **3** blank pages.

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1 A student investigates how the resistance of a filament lamp changes with the potential difference (p.d.) across it.
He uses the circuit shown in Fig. 1.1.

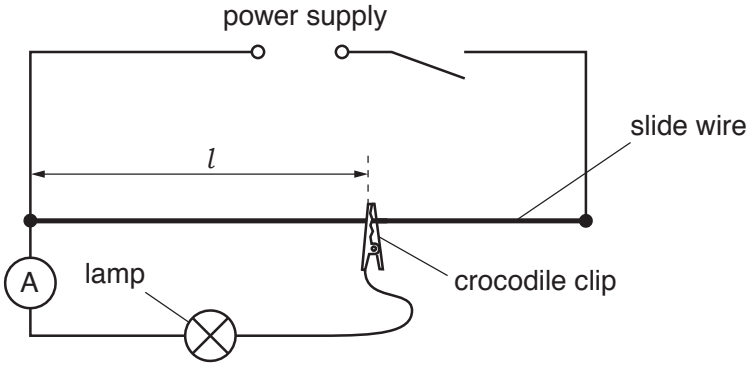


Fig. 1.1

(a) On Fig. 1.1, draw the symbol for a voltmeter connected to measure the potential difference across the lamp. [1]

View solution

(b) The student connects the crocodile clip to a length $l = 20.0\,\text{cm}$ of the slide wire.
He measures the potential difference V and the current I for the lamp.

View solution

(i) Record the voltmeter and ammeter readings shown in Fig. 1.2 for a value of $l = 20.0\,\text{cm}$.

$V =$ .....

$I =$ .....
[1]

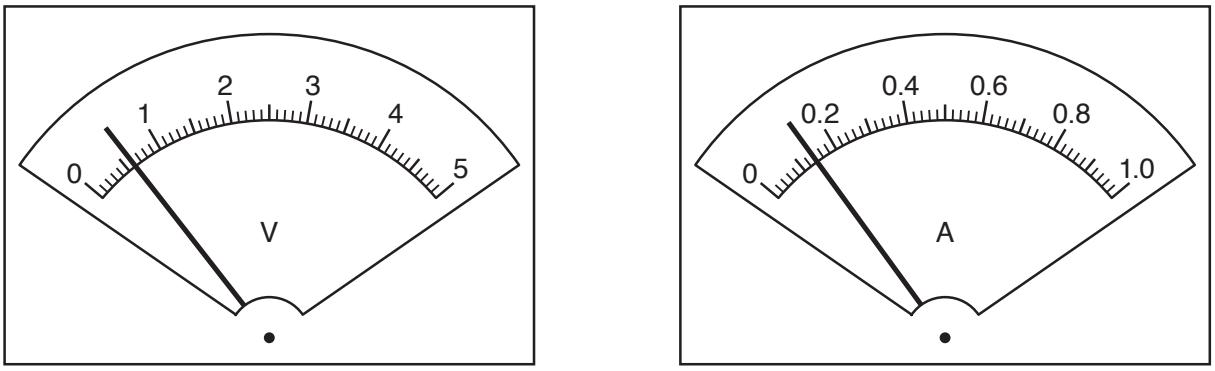


Fig. 1.2

(ii) Calculate, and record in Table 1.1, the resistance R of the lamp at $l = 20.0\,\text{cm}$.
Use your readings from **(b)(i)** and the equation $R = \frac{V}{I}$. [1]

View solution

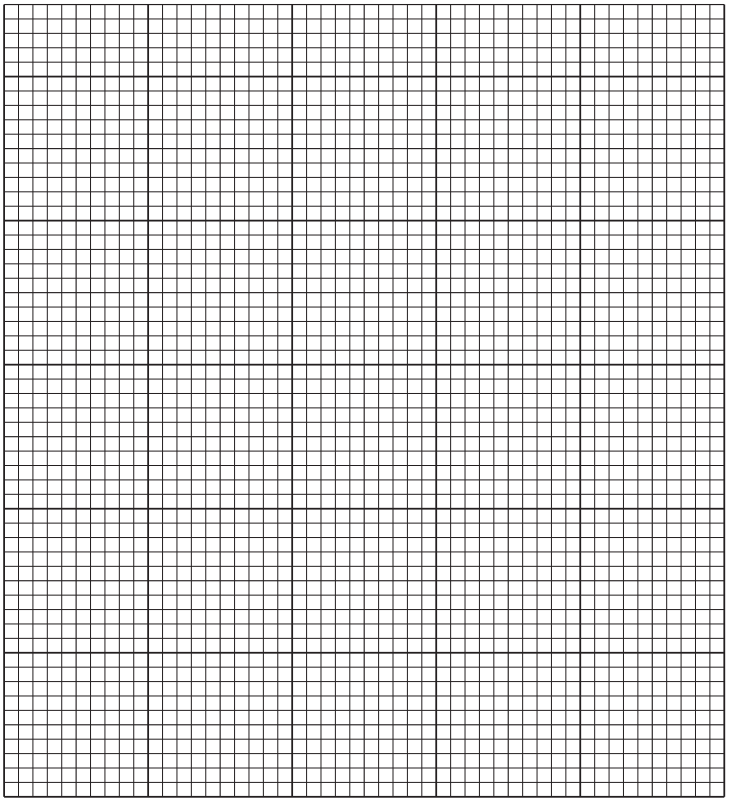
Table 1.1

l / cm	R / Ω
20.0	
40.0	7.5
60.0	10
80.0	12
100.0	13

View solution

(c) The student connects the crocodile clip to other lengths l of the slide wire.
He measures the potential difference V and the current I for the lamp and calculates the resistance each time. His results are shown in Table 1.1.

Plot a graph of R / Ω (y-axis) against l / cm (x-axis).



[4]

(d) The student notices that the lamp is very dim when $l = 20.0\,\text{cm}$ but becomes very bright when $l = 100.0\,\text{cm}$.

View solution

State what the shape of the graph tells you about how the resistance of the lamp changes with the temperature of the filament.
Justify your statement using your results from the graph.

statement .....

justification .....

.....

[2]

(e) In this type of experiment, it is possible to change the current in the lamp by using a variable resistor instead of a slide wire.

View solution

On Fig. 1.3, complete the circuit diagram to show a variable resistor used for this purpose.

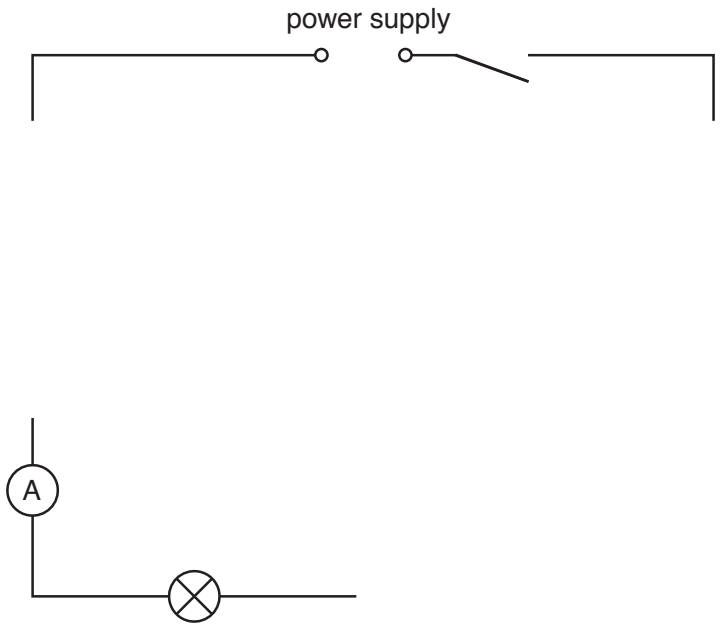


Fig. 1.3

[2]

[Total: 11]

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2 Some students determine the focal length of a converging lens by two different methods.

They use the apparatus shown in Fig. 2.1.

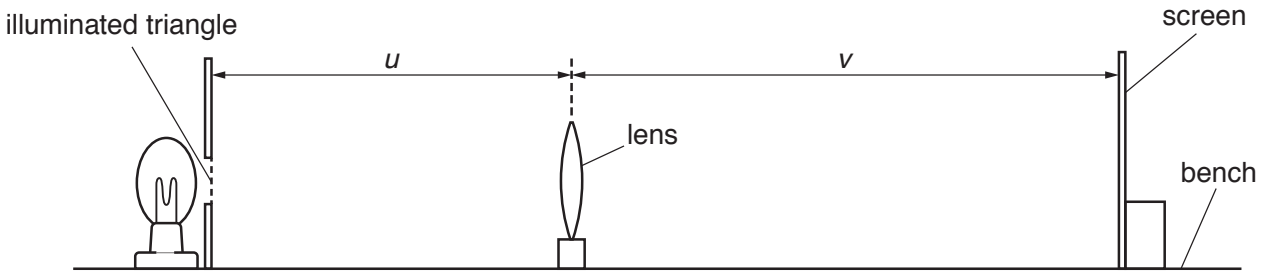

Fig. 2.1

(a) A student sets the distance *U* between the illuminated triangle and the lens.
She moves the screen until a sharp image of the triangle is seen on the screen.

View solution

Method 1

(i) On Fig. 2.1, measure the distance *u* between the illuminated triangle and the lens.

u = ...

On Fig. 2.1, measure the distance *v* between the lens and the screen.

v = ...
[1]

View solution

(ii) Fig. 2.1 is drawn to 1/5th scale.

Calculate the actual distance *U* between the illuminated triangle and the lens in the experiment.

U = ...

Calculate the actual distance *V* between the lens and the screen in the experiment.

V = ...
[1]

View solution

(iii) Calculate a value f_1 for the focal length of the lens, using the equation $f_1 = \frac{UV}{(U + V)}$.

f_1 = ... [1]

(iv) Briefly describe a technique to obtain an image on the screen that is as sharp as possible in this experiment.

View solution

.....

.....

..... [1]

Method 2

View solution

(b) (i) On Fig. 2.2, measure h_O, the height of the illuminated triangle.

h_O = ...

On Fig. 2.3, measure h_I, the height of the image on the screen.

h_I = ...
[1]

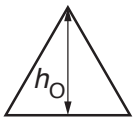

Fig. 2.2

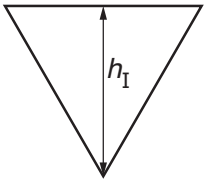

Fig. 2.3

(ii) Calculate a value for the magnification M, using the equation $M = \frac{h_I}{h_O}$.

View solution

M = ... [1]

(iii) Calculate a second value f_2 for the focal length of the lens, using the equation $f_2 = \frac{V}{(M+1)}$ and the value of V from **(a)(ii)**.

View solution

f_2 = ... [1]

(c) A student suggests that f_1 and f_2 should be equal.
State whether the results support this suggestion. Justify your statement with reference to the results.

View solution

statement .....

justification .....

.....
[2]

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(d) State **one** precaution that could be taken to ensure that the measurements in the experiment are taken as reliably as possible.

View solution

.....

..... [1]

(e) Suggest which of **Method 1** or **Method 2** is likely to give the more accurate value for the focal length.
Explain the reason for your choice.

View solution

suggestion .....

explanation .....

.....

.....
[1]

[Total: 11]

3 The class is investigating the behaviour of a spring, and then using the spring to determine the weight of an object.

The apparatus is shown in Fig. 3.1.

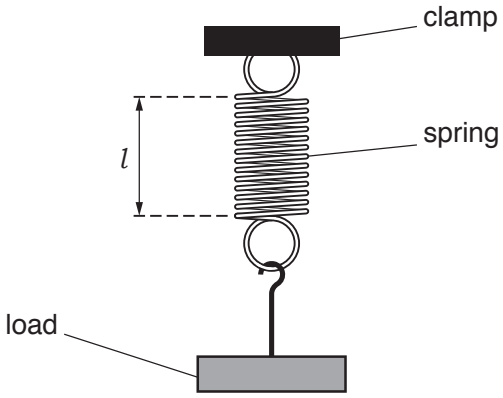

Fig. 3.1

View solution

(a) The stretched length l of the spring, indicated in Fig. 3.1, is to be measured.

Describe **two** precautions that could be taken when measuring the length of the stationary spring, to ensure an accurate reading. You may draw a diagram.

1 .....

.....

2 .....

.....

[2]

(b)

- A student measures the length l_0 of the spring without any load.

View solution

l_0 = ...2.1..... cm

- Various loads *L* are hung on the spring.
  The stretched length l of the spring for each load is recorded in Table 3.1.

Table 3.1

L/N	l/cm	*e*/cm
1.0	6.3	
2.0	10.5	
3.0	14.7	

- Calculate, and record in Table 3.1, the extension *e* of the spring for each load *L*.
  Use the equation $e = (l - l_0)$.

[1]

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(c) The loads are removed and an object **X** is suspended from the spring.

View solution

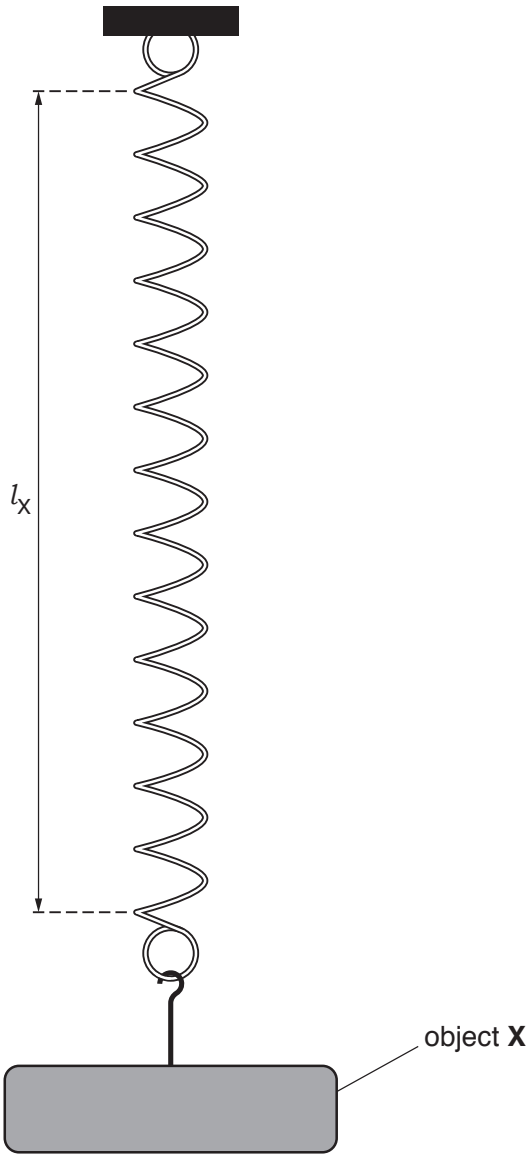

Fig. 3.2

(i) Measure the stretched length l_X of the spring on Fig. 3.2.

l_X = ... cm [1]

View solution

(ii) Estimate the weight W_X of object **X**.
Explain how you obtained your answer.

.....

.....

.....

W_X = ... N
[2]

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(d) A student measures the weight of a different load using a similar method. He gives the weight as 4.532 N.
Explain why this is not a suitable number of significant figures for this experiment.

View solution

.....

.....

..... [1]

(e) **(i)** Another student suggests that *e* is directly proportional to *L*.
State whether the results support her suggestion.
Use values from the results in Table 3.1 to justify your statement.

View solution

statement .....

justification .....

.....

.....
[2]

(ii) The student wishes to plot a graph of *L* against *e* to test if the two quantities are directly proportional.
State how her graph line could show that *e* is directly proportional to *L*.

View solution

.....

.....

..... [2]

[Total: 11]

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4 A student is investigating ways of slowing the rate of cooling of hot liquids in a container.
The student knows that a lid will reduce the rate of cooling. He wants to find out if the thickness of the lid makes any difference to the rate of cooling.

View solution

Plan an experiment which will enable him to compare the effects of lids of different thicknesses.

In your plan, you should:

- list the apparatus needed
- explain briefly how you would carry out the investigation, including the measurements to be taken
- state any key variables that would need to be kept the same
- draw a suitable table or tables, with column headings, to show how the readings would be displayed (you are **not** required to enter any readings in the table)
- explain how you would use your readings to reach a conclusion.

You may draw a diagram if it helps to explain your plan.

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