Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0337260198

PHYSICS **0625/61**

Paper 6 Alternative to Practical **October/November 2017**

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.

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

This document consists of **12** printed pages.

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1 A student is investigating resistance using the circuit shown in Fig. 1.1.

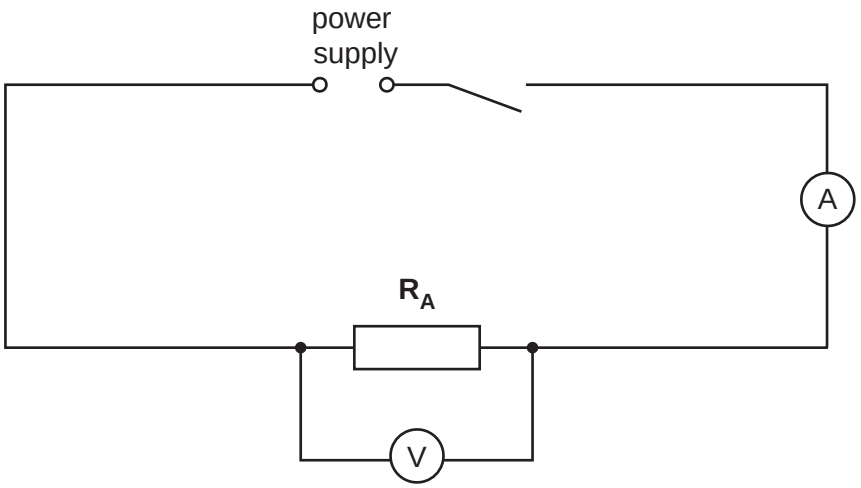


Fig. 1.1

(a) The student measures the potential difference V_1 across the resistor $\mathbf{R_A}$ and the current I_1 in the circuit. Figs. 1.2 and 1.3 show the voltmeter and ammeter scales.

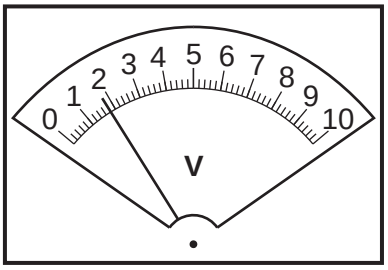


Fig. 1.2

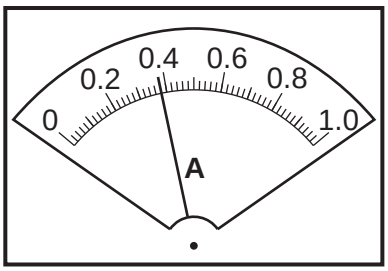


Fig. 1.3

(i) Write down the readings shown on the scales in Figs. 1.2 and 1.3.

V_1 = ...

I_1 = ...
[2]

(ii) Calculate the resistance R_1 of the resistor $\mathbf{R_A}$ using the equation $R_1 = \frac{V_1}{I_1}$.

R_1 = ... [1]

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(b) The student connects a resistor $\mathbf{R_B}$ in series with $\mathbf{R_A}$.

She measures the potential difference V_2 across the two resistors $\mathbf{R_A}$ and $\mathbf{R_B}$ combined and the current I_2 in the circuit.

V_2 = 1.8 V

I_2 = 0.19 A

Calculate the resistance R_2 of resistors $\mathbf{R_A}$ and $\mathbf{R_B}$ combined in series, using the equation $R_2 = \frac{V_2}{I_2}$.

R_2 = ...[1]

(c) The student connects a third resistor $\mathbf{R_C}$ in series with $\mathbf{R_A}$ and $\mathbf{R_B}$.

She measures the potential difference V_3 across the three resistors and the current I_3 in the circuit.

V_3 = 1.7 V

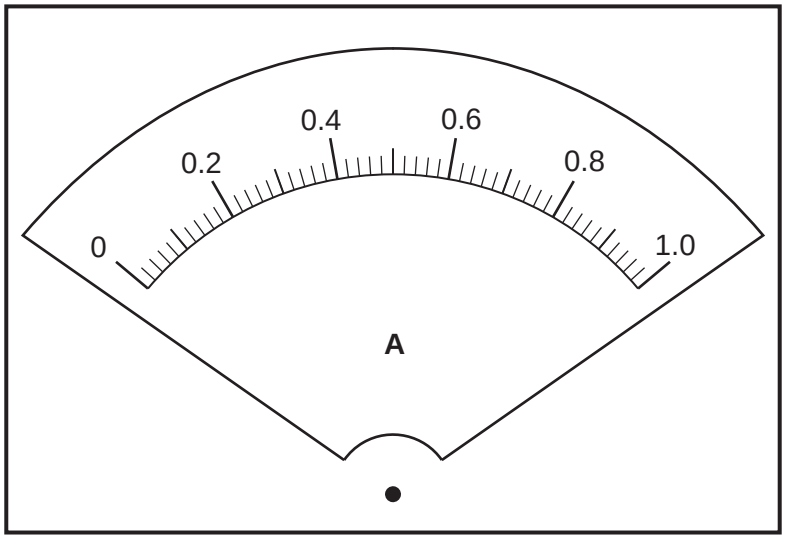
I_3 = 0.13 A

(i) Calculate the resistance R_3 of resistors $\mathbf{R_A}$, $\mathbf{R_B}$ and $\mathbf{R_C}$ combined in series, using the equation $R_3 = \frac{V_3}{I_3}$.

R_3 = ...

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(ii) On Fig. 1.4, draw a line for the needle on the ammeter to show the reading of 0.13A.



[1]

Fig. 1.4

(d) A student suggests that $R_3 = 3 \times R_1$.

State whether the results agree with this suggestion. Justify your answer by reference to the results.

statement .....

justification .....

.....

.....
[1]

(e) Another student suggests that the three resistors $\mathbf{R_A}$, $\mathbf{R_B}$ and $\mathbf{R_C}$ each have the same value of resistance.

Explain how you could use the circuit shown in Fig. 1.1 to check this suggestion.

.....

.....[1]

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(f) Complete the circuit diagram in Fig. 1.5 to show:

- the three resistors connected in parallel
- the voltmeter connected to measure the potential difference across the resistors
- a variable resistor connected to control the current in all three resistors.

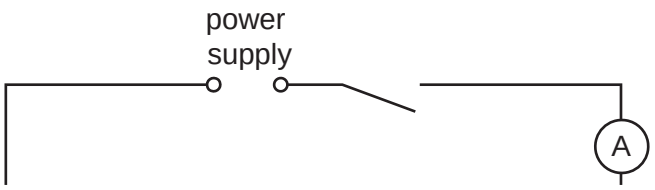


Fig. 1.5

[2]

(g) The circuit in Fig. 1.5 could be used to determine the combined resistance of three resistors connected in parallel.

Suggest a reason for connecting a variable resistor in the circuit.

.....

.....[1]

[Total: 10]

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[Turn over

2 A student is determining the focal length *f* of a lens.
Fig. 2.1 shows the apparatus used.

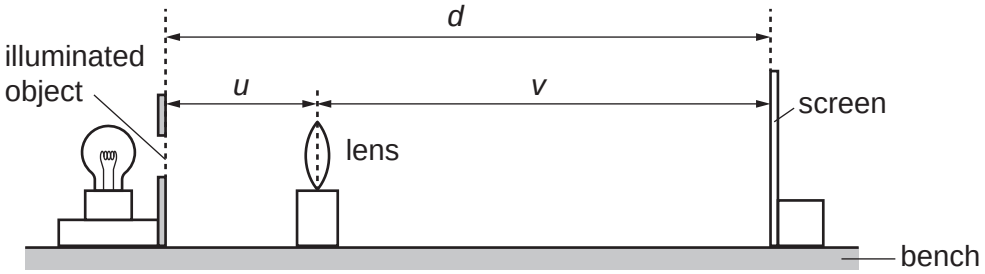


Fig. 2.1

(a) The student obtains a sharply-focused image on the screen.

(i) On Fig. 2.1, measure the distance *v* from the lens to the screen.

v = ...

(ii) On Fig. 2.1, measure the distance *d* from the illuminated object to the screen.

d = ...
[2]

(b) Fig. 2.1 is drawn 1/10th actual size.

(i) Calculate *V*, the actual distance from the lens to the screen. Record the value of *V* in the first row of Table 2.1.

(ii) Calculate *D*, the actual distance from the illuminated object to the screen. Record the value of *D* in the first row of the table.

(iii) Calculate *UV* and record the result in the table.

[2]

(c) The student repeated the procedure with the lens at a distance *U* = 30.0 cm from the illuminated object. All the readings are recorded in the table.

Table 2.1

U / cm	*V* / cm	*UV* / cm^2	*D* / cm
20.0			
30.0	29.5	885	59.5

State **one** difference that you would expect to observe between the image formed on the screen when *U* = 20.0 cm and when *U* = 30.0 cm.

.....

.....[1]

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(d) **(i)** Use the results in the first row of the table to calculate a value f_1 for the focal length of the lens. Use the equation $f_1 = \frac{UV}{D}$.

f_1 = ...

(ii) Use the results in the second row of the table to calculate a value f_2 for the focal length of the lens. Use the equation $f_2 = \frac{UV}{D}$.

f_2 = ...

(iii) Calculate the average value f_A for the focal length of the lens. Give your answer to a suitable number of significant figures for this experiment.

f_A = ...
[3]

(e) Suggest **two** reasons why it may be difficult to obtain reliable results in this experiment.

1. .....

.....

2. .....

.....
[2]

(f) A student states that a more reliable value for the focal length is obtained if more values of *U*, *V* and *D* are collected, enabling a graph to be drawn of *UV* against *D*.

(i) Suggest a suitable number of values for *U*.

.....

(ii) Suggest a suitable range of values for *U*.

.....
[2]

[Total: 12]

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[Turn over

3 A student is investigating whether the diameter of a pendulum bob affects the period of a pendulum. The period is the time taken for one complete oscillation of the pendulum. Fig. 3.1 shows a pendulum.

Fig. 3.2 shows one complete oscillation.

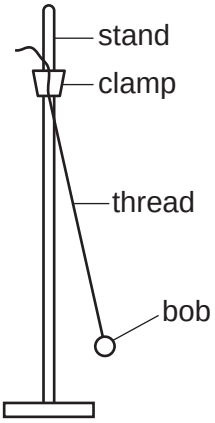


Fig. 3.1

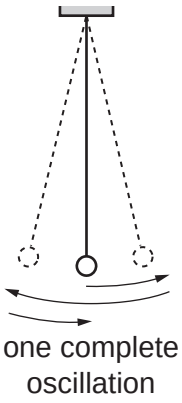


Fig. 3.2

The student has the following apparatus:

pendulum bobs made of polystyrene with diameters 1 cm, 2 cm, 3 cm, 4 cm and 5 cm
a supply of thread and a pair of scissors
clamp and stand.

Plan an experiment to investigate whether the diameter of a pendulum bob affects the period of a pendulum.

You should:

- list additional apparatus that you would require
- explain briefly how you would carry out the investigation
- state the key variables that you would control
- draw a table with column headings, to show how you would display your readings (You are **not** required to enter any readings in the table.)
- explain briefly how you would use your readings to reach a conclusion.

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.....[7]

[Total: 7]

4 A student is determining the weight of a load using a balancing method.

Fig. 4.1 shows the apparatus used.

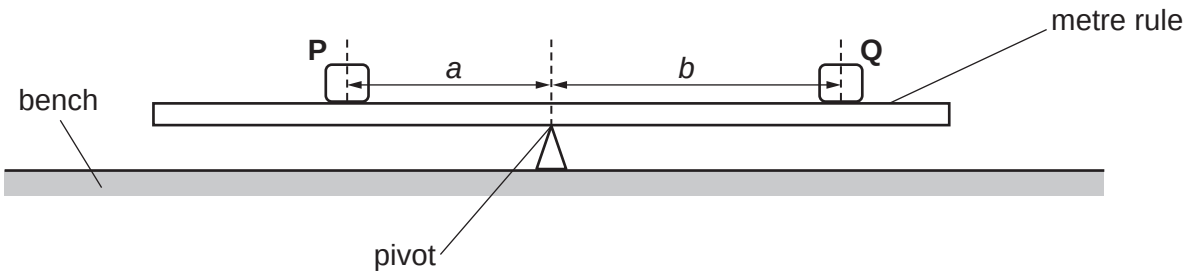


Fig. 4.1

The student places the metre rule on the pivot and adjusts its position so that the metre rule is as near as possible to being balanced.

He places a load **P** on the metre rule so that its centre is exactly at the 30.0 cm mark.

He records the distance *a* between **P** and the pivot.

a = 19.8 cm

He places a load **Q** of weight *Q* = 1.0 N on the metre rule and adjusts the position of **Q** so that the metre rule is as near as possible to being balanced.

He measures the distance *b* between the centre of load **Q** and the pivot.

He repeats the procedure, with the load **P** remaining at the 30.0 cm mark, using *Q* values of 2.0 N, 3.0 N, 4.0 N and 5.0 N. All the readings are recorded in Table 4.1.

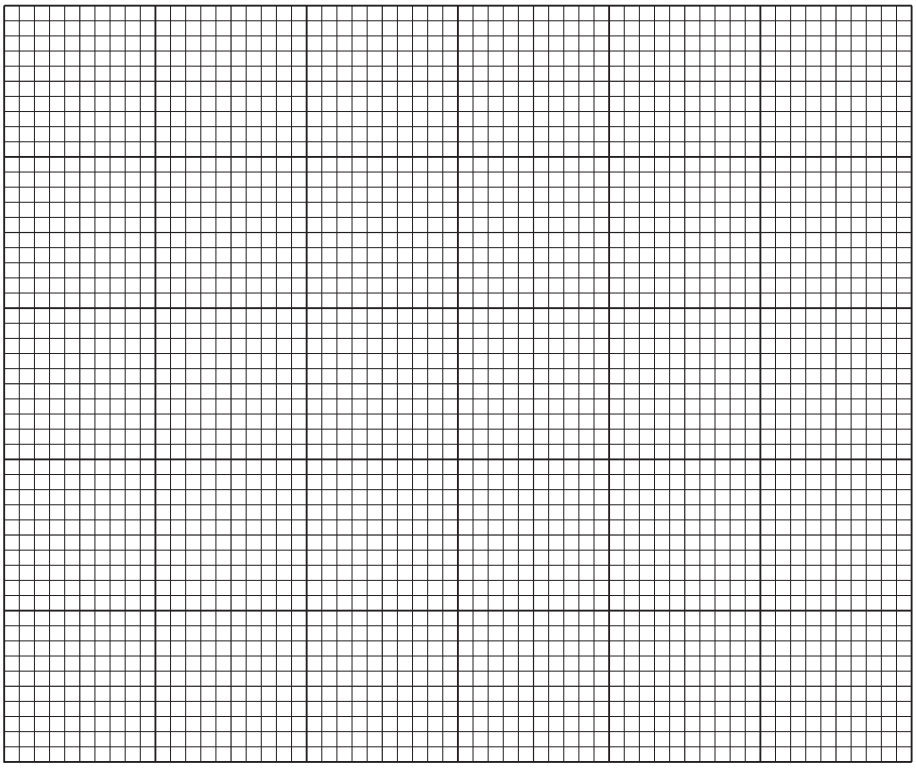
Table 4.1

Q / N	b / cm	$\frac{1}{Q} / \frac{1}{\text{N}}$
1.0	40.0	
2.0	19.5	
3.0	13.5	
4.0	10.5	
5.0	7.5	

(a) For each value of *Q*, calculate $\frac{1}{Q}$ and record the result in the table. [1]

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(b) Plot a graph of b/cm (y-axis) against $\frac{1}{Q}\Big/\frac{1}{N}$ (x-axis).



[4]

(c) **(i)** Determine the gradient G of the graph. Show clearly on the graph how you obtained the necessary information.

G = ...[2]

(ii) Calculate the weight P of load **P** using the equation $P = \frac{G}{a}$, where a = 19.8 cm.

P = ...[1]

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[Turn over

(d) The student measures the weight *P* of load **P** using a forcemeter. Fig. 4.2 shows the forcemeter.

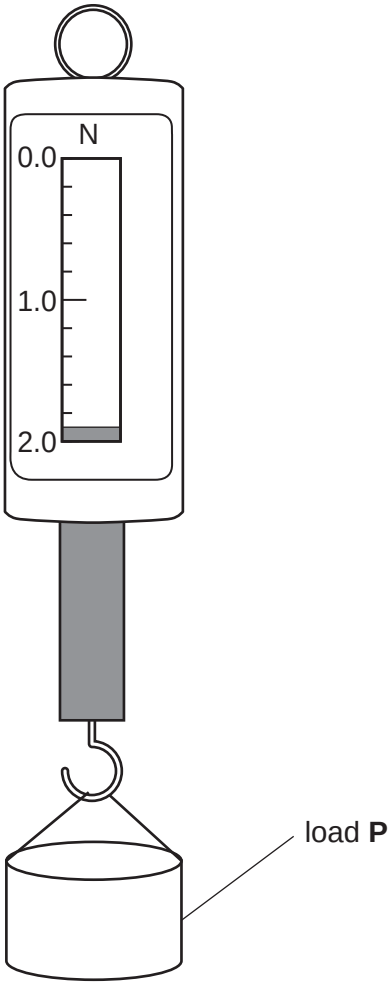


Fig. 4.2

Write down the reading *P* shown on the forcemeter.

P = ... N [1]

(e) The student has carried out the experiment with care and is expecting the two values of *P* in **(c)** and **(d)** to be the same.

Suggest **two** reasons why the values of *P* may be different.

1. .....

.....

2. .....

.....

[2]

[Total: 11]

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