Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4841109280

PHYSICS **0625/63**

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 **14** printed pages and **2** blank pages.

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CAMBRIDGE International Examinations

[Turn over

1 Some students are investigating how the use of a lid affects the rate of cooling of water in a beaker.

They are using the apparatus shown in Fig. 1.1.

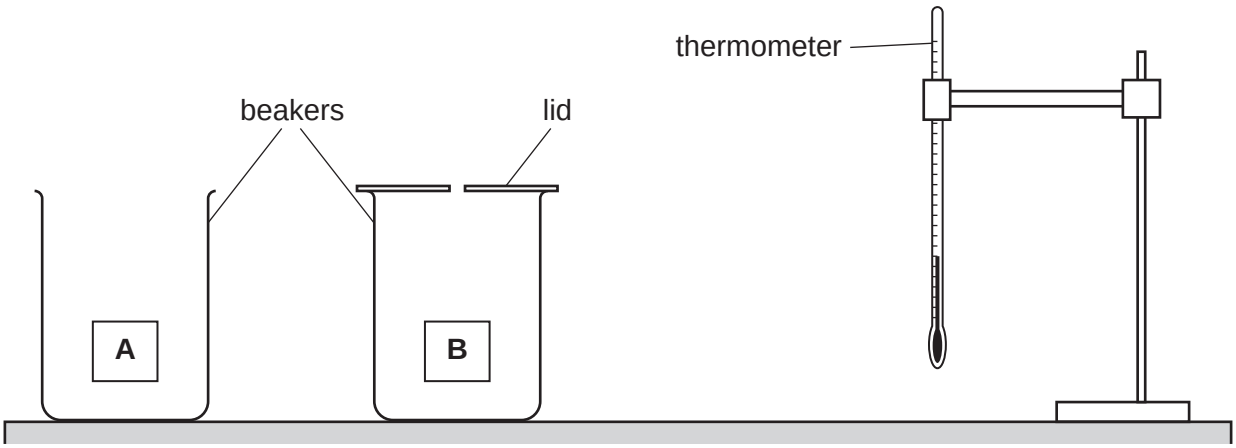


Fig. 1.1

- A student pours 100 cm^3 of hot water into beaker **A**.
- He records the temperature of the water in beaker **A** and immediately starts a stopclock.
- The student records the temperature θ of the water every 30 s. His readings are shown in Table 1.1.
- The student repeats the procedure for beaker **B** using 75 cm^3 of hot water.

(a) Complete the headings and the time column in Table 1.1. [2]

Table 1.1

	beaker **A** without a lid	beaker **B** with a lid
t/	θ/	θ/
	80.0	81.0
	77.0	79.0
	74.5	77.5
	72.5	76.0
	70.5	75.0
	69.0	74.0
	68.0	73.5

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(b) Describe **two** precautions which should be taken to ensure that the temperature readings are as accurate as possible in the experiment.

1 .....

.....

2 .....

.....
[2]

(c) **(i)** Write a conclusion, stating how the use of the lid affects the rate of cooling of the water. Justify your answer by reference to the results.

.....

.....

.....

.....[2]

(ii) Suggest **one** change to the apparatus or procedure to make the comparison a fairer test. Explain why the change makes the test fairer.

change .....

.....

explanation .....

.....

.....
[2]

(iii) The temperature of the water in each beaker decreases.

Describe **one** other similarity in the pattern of cooling in beakers **A** and **B**.

.....

.....[1]

(d)

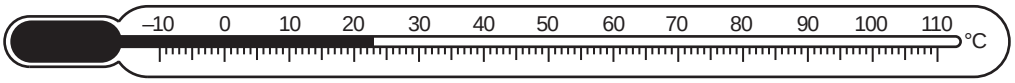


Fig. 1.2

(i) Record the room temperature θ_R, shown on the thermometer in Fig. 1.2.

θ_R = ... [1]

(ii) Another student is carrying out the same experiment in a room with a room temperature that is much higher than θ_R.

Suggest whether this might affect the cooling of the water in beaker **A** in her experiment. Briefly explain your answer.

suggestion .....

explanation .....

.....

.....
[1]

[Total: 11]

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2 A student is investigating a circuit containing resistors.

She is using the circuit shown in Fig. 2.1.

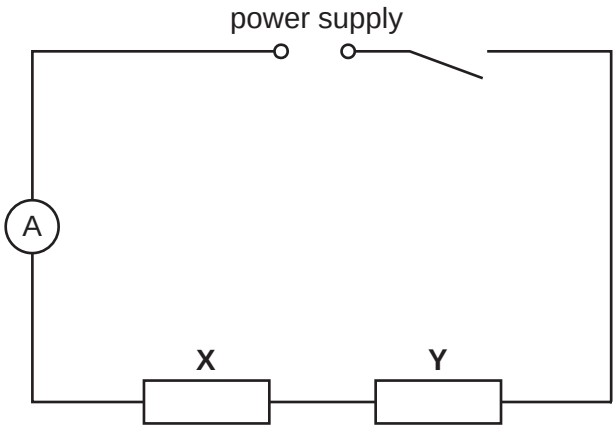


Fig. 2.1

(a) On Fig. 2.1, show a voltmeter connected so that it measures the potential difference across resistor **X**. [1]

(b) The student uses the ammeter to measure the current I_S in the circuit.

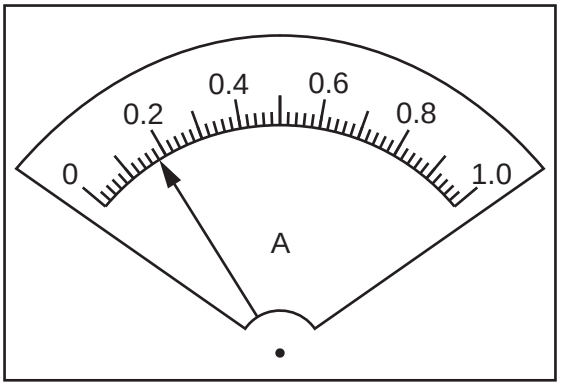


Fig. 2.2

Record the current I_S, as shown on the ammeter in Fig. 2.2.

I_S = ...[1]

(c) (i) The student uses the voltmeter to measure the potential difference V_X across resistor **X** and then reconnects it to measure the potential difference V_Y across resistor **Y**.

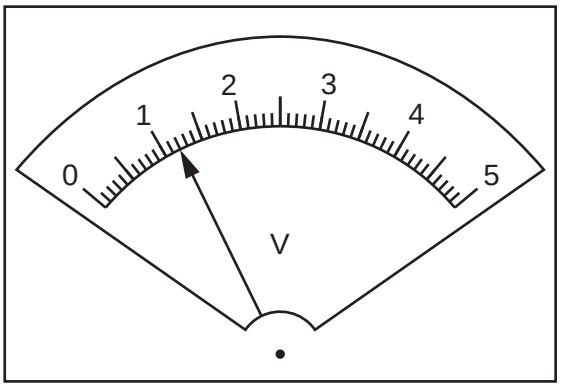


Fig. 2.3

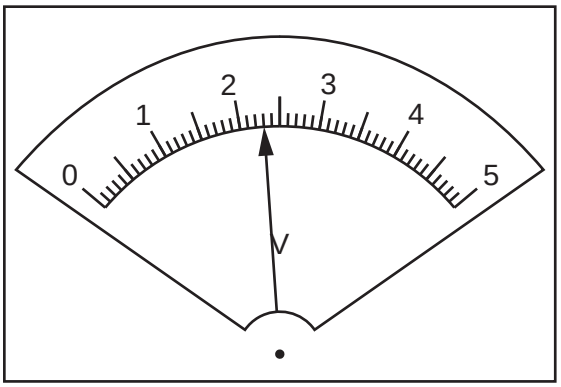


Fig. 2.4

- Record the value of the potential difference V_X across resistor **X**, shown in Fig. 2.3.

V_X = ...

- Record the value of the potential difference V_Y across resistor **Y**, shown in Fig. 2.4.

V_Y = ...
[1]

(ii) She then measures the potential difference V_S across the combination of both resistors.

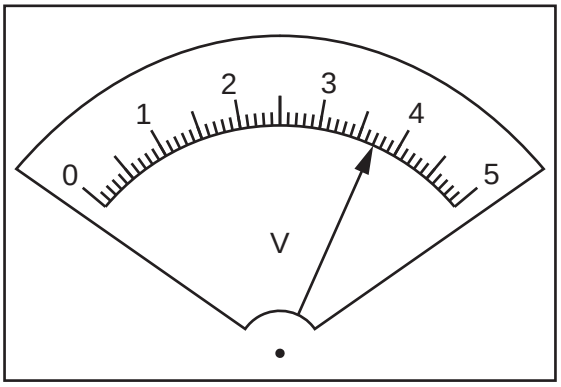


Fig. 2.5

Record the value of the potential difference V_S across the combination of both resistors, shown in Fig. 2.5.

V_S = ...[1]

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(iii) A student suggests that V_S should be equal to $(V_X + V_Y)$.

State whether the readings support this suggestion. Justify your statement with reference to the results.

statement .....

justification .....

.....

.....

[2]

(d) Calculate the resistance R_S of the combination of resistors, using the readings from **(b)** and **(c)(ii)** and the equation

$$R_S = \frac{V_S}{I_S}.$$

R_S = ...[2]

(e) **(i)** The circuit components are to be rearranged so that:

- resistors **X** and **Y** are in parallel
- the ammeter will measure the total current in the circuit
- the voltmeter will measure the potential difference across both resistors.

In the space below, draw a diagram of this circuit using standard electrical symbols.

[2]

(ii) The student sets up the circuit as described in **(e)(i)**.

She measures and records the total current I_P in the circuit and the potential difference V_P across the resistors.

I_P = 0.81 A

V_P = 3.6 V

The resistance of two resistors connected in parallel is less than the resistance of the same two resistors connected in series.

State whether the readings indicate that she has set up the circuit correctly.
Explain your answer.

suggestion .....

explanation .....

.....

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[1]

[Total: 11]

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3 Some students are determining the weight of a metre rule.
They use the apparatus shown in Fig. 3.1.

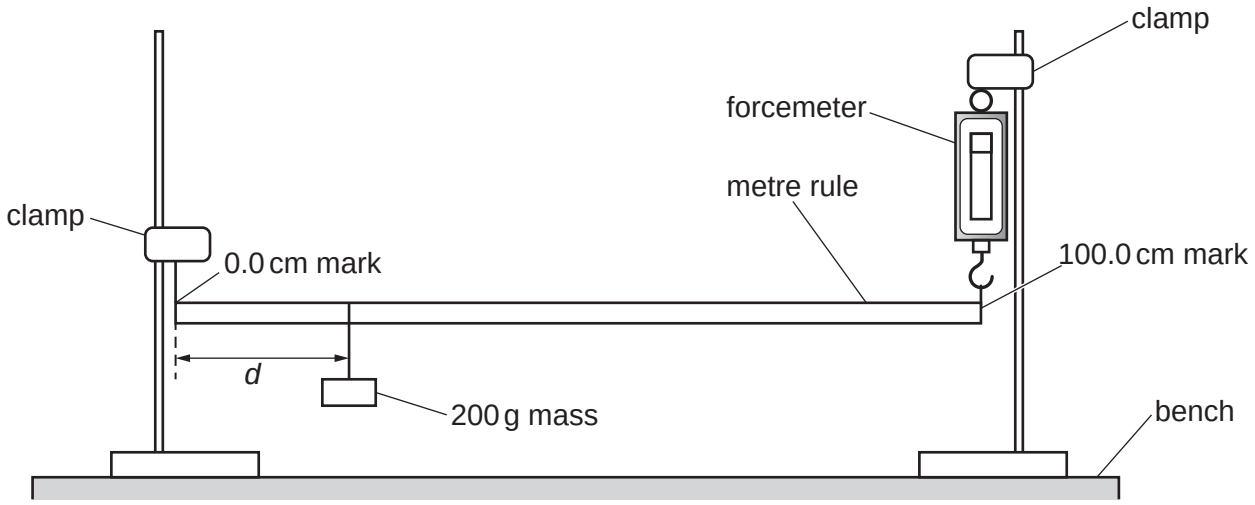


Fig. 3.1

(a) (i) The students suspend a 200 g mass at a distance *d* from the end of the rule.
They then adjust the height of the clamp holding the forcemeter so that the rule is horizontal.

Fig. 3.2 shows the forcemeter when the value of *d* is 10.0 cm.

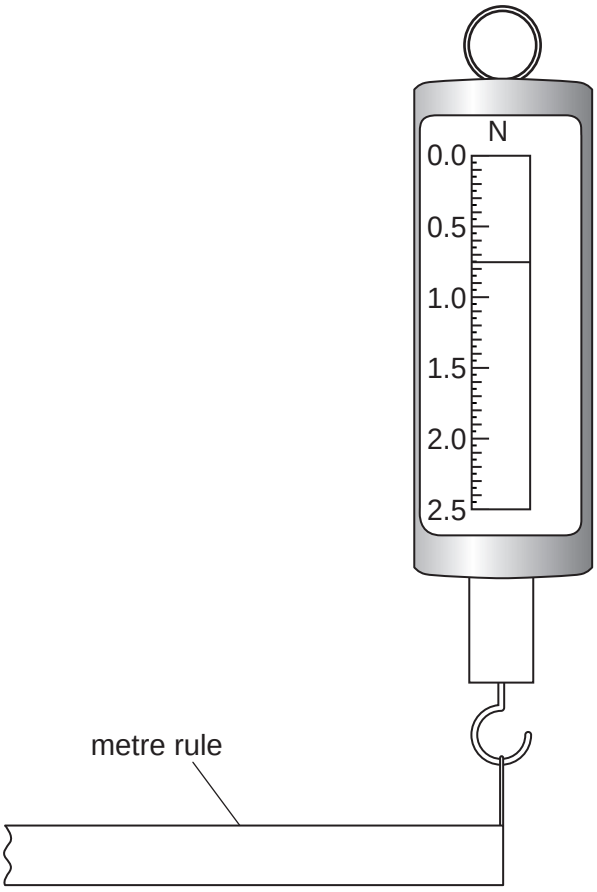


Fig. 3.2

In Table 3.1, record the forcemeter reading *F*, as shown in Fig. 3.2. [1]

Table 3.1

d / cm	*F* / N
10.0	
30.0	1.05
50.0	1.65
70.0	1.95
90.0	2.25

(ii) The students repeat the procedure for values of *d* = 30.0 cm, 50.0 cm, 70.0 cm and 90.0 cm. Their readings are shown in Table 3.1.

Explain how the students could make sure that the rule is horizontal before each reading. You may draw a diagram.

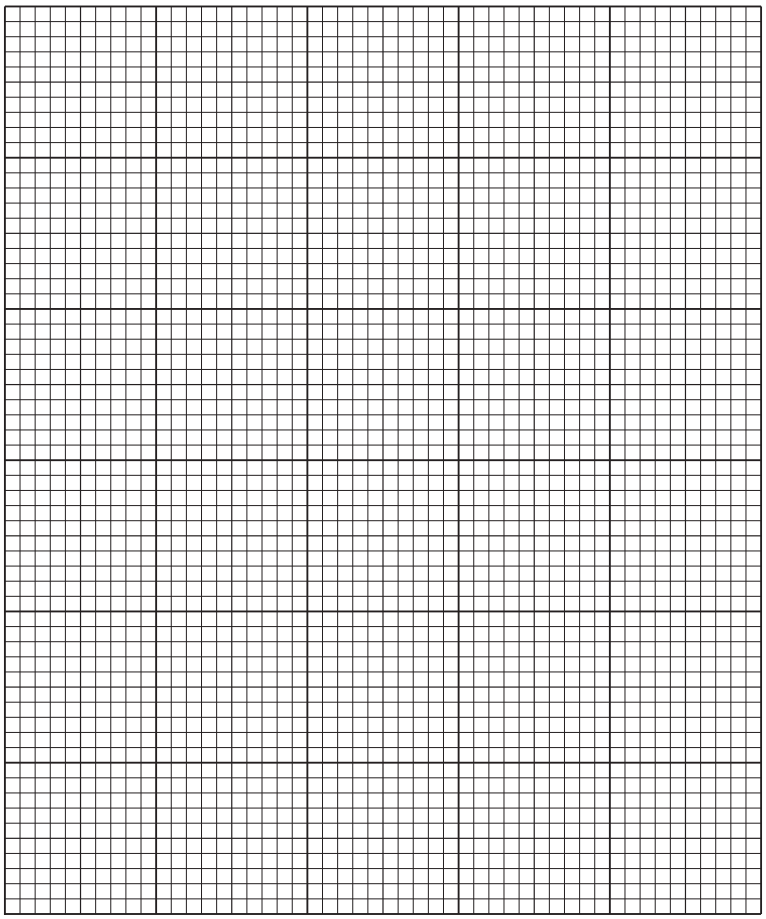
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.....[1]

(b) Plot a graph of F/N (y-axis) against d/cm (x-axis).
Start your axes from the origin (0, 0).

Draw a best-fit line.



[4]

(c) **(i)** From your graph, determine F_0, the value of F when d = 0.0 cm.

F_0 = ...[1]

(ii) Calculate the weight W_R of the metre rule, using the equation $W_R = 2 \times F_0$.
Give W_R to a suitable number of significant figures for this experiment.

W_R = ...[2]

(d) A student correctly plots your data points on another sheet of graph paper.

State and explain whether his best-fit line is likely to be the same as yours.
Justify your answer with reference to the plots.

statement .....

explanation .....

.....

.....
[1]

(e) Another student, carrying out the same experiment, is not sure if some of his values of *F* are correct.

Suggest **one** improvement to the procedure which would help him to obtain more reliable *F* values.

.....

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.....[1]

[Total: 11]

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4 A student has a box of converging lenses but does not know their focal lengths.

Plan an experiment which will enable her to determine an accurate value for the focal length f of one of the lenses, using the equation

$$f = \frac{uv}{(u + v)}$$

where u is the distance between an object and the lens and v is the distance between the lens and the focused image of the object.

The apparatus available includes:

a lens holder
a 12 V lamp in a holder, with a power supply
a card with a triangular hole covered with tracing paper.

Write a plan for the experiment.

You should:

- list any additional apparatus needed
- draw a diagram of how the apparatus will be arranged, clearly labelling u and v
- write a method for carrying out the experiment including how f will be determined
- state the precautions which should be taken to obtain a clear, focused image
- state the precautions which should be taken to ensure that measurements are accurate once a focused image has been obtained.

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[Total: 7]

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