Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | |
| CENTRE NUMBER | |
| CANDIDATE NUMBER | |

*0725775348*

**PHYSICS** **0625/52**

Paper 5 Practical Test **February/March 2018**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of the page.
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.
You are advised to spend about 20 minutes on each of questions 1 to 3, and about 15 minutes on question 4.
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.

| For Examiner's Use | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| Total | |

This 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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CAMBRIDGE International Examinations

**1** In this experiment, you will determine the mass of a metre rule by a balancing method.

Carry out the following instructions, referring to Fig. 1.1.

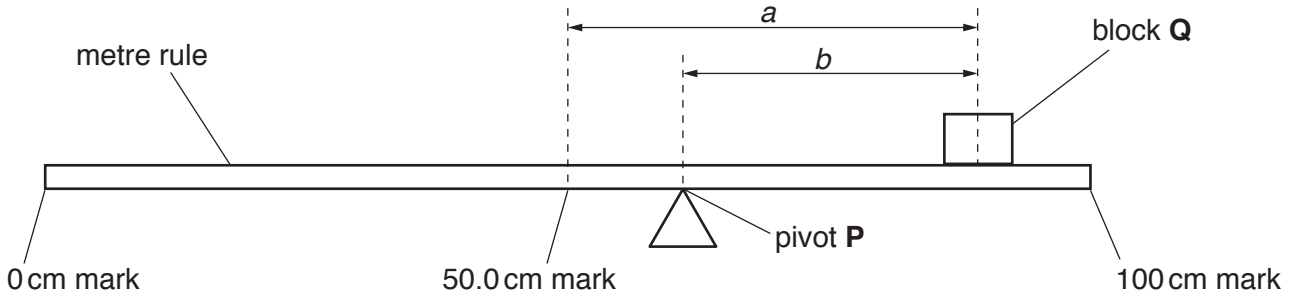



**Fig. 1.1**

**(a)** Place the metre rule on the pivot. Place block **Q** on the metre rule with its centre at the 95.0 cm mark. Keep **Q** at the 95.0 cm mark and adjust the position of the metre rule on the pivot until the metre rule is as near to being balanced as possible.

The distance *a* between the centre of **Q** and the 50.0 cm mark has been recorded in Table 1.1.

In the table, record the position of the pivot **P**.

Calculate the distance *b* between the centre of **Q** and the pivot **P**, using the formula

*b* = (position of **Q** – position of **P**).

Repeat the procedure for positions of **Q** at the 90.0 cm, 85.0 cm, 80.0 cm and 75.0 cm marks. Record your values for the position of **P** and your values for *b* in the table.

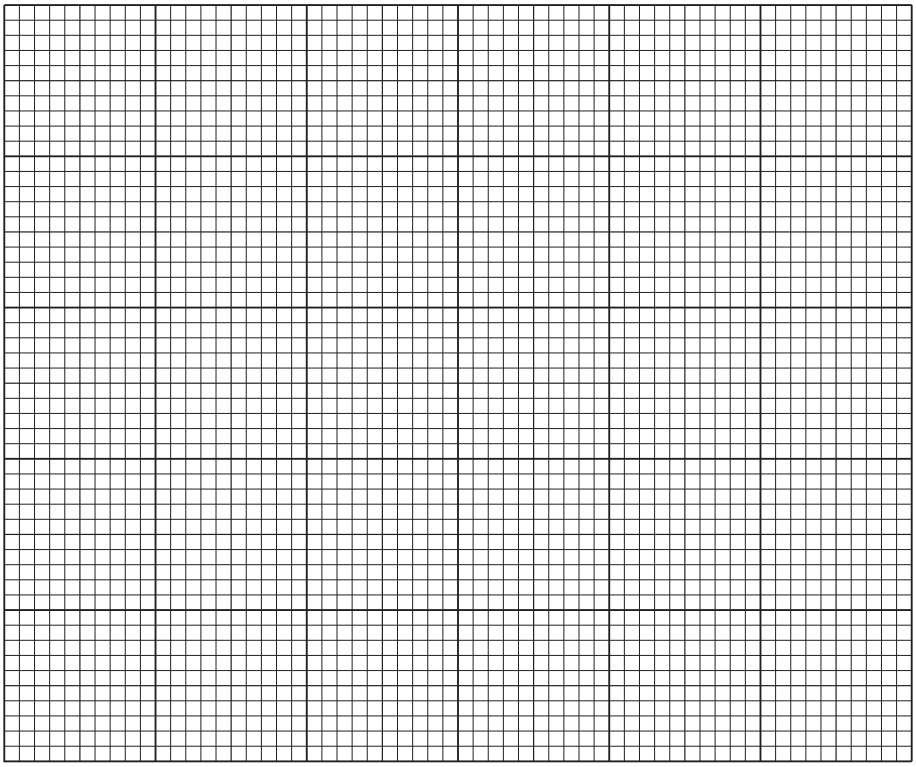
**Table 1.1**

| position of **Q** / cm | *a* / cm | position of **P** / cm | *b* / cm |
|---|---|---|---|
| 95.0 | 45.0 | | |
| 90.0 | 40.0 | | |
| 85.0 | 35.0 | | |
| 80.0 | 30.0 | | |
| 75.0 | 25.0 | | |

[2]

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**(b)** Plot a graph of $a$/cm ($y$-axis) against $b$/cm ($x$-axis). You do not need to start your axes at the origin (0,0).



[4]

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

$G$ = ..... [1]

**(ii)** Calculate the mass $M_R$ of the metre rule using the equation $M_R = \frac{M}{(G-1)}$,

where $M$ = 20 g. Record the value for $M_R$ to a suitable number of significant figures for this experiment.

$M_R$ = ..... [2]

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**(d)** Describe why it is difficult to place the block **Q** at the correct mark on the metre rule each time. Explain how you overcame this difficulty. You may draw a diagram to help your explanation.

.....

.....

..... [1]

**(e)** Two students carry out the experiment correctly but with different values for the mass of block **Q**. One student obtains values of *b* that are larger than those obtained by the other student.

State and explain whether the larger values of *b* are likely to produce a more accurate value for the mass of the metre rule.

.....

.....

..... [1]

[Total: 11]

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**2** In this experiment, you will investigate a circuit containing different lamps.

The circuit has been set up for you.

Carry out the following instructions, referring to Fig. 2.1.

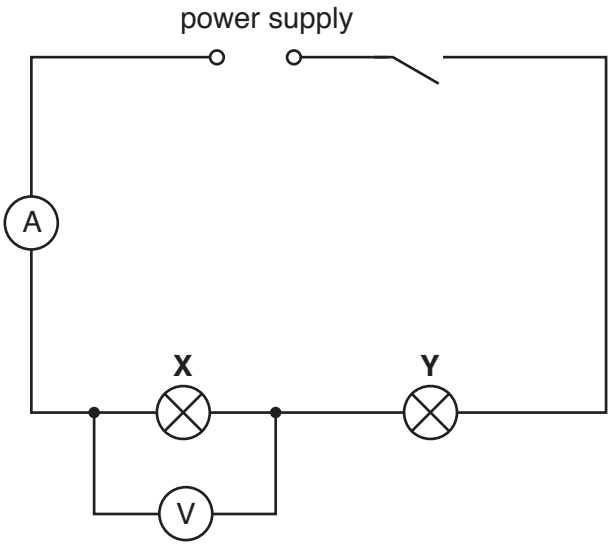



**Fig. 2.1**

**(a) (i)** Switch on. Record the current $I_S$ in the circuit.

$I_S$ = ..... [1]

**(ii)** Record the potential difference (p.d.) $V_X$ across lamp **X**.

$V_X$ = .....

Disconnect the voltmeter.

Connect the voltmeter to measure the p.d. $V_Y$ across lamp **Y**.
Record $V_Y$.

$V_Y$ = .....
[1]

**(iii)** Disconnect the voltmeter.

Connect the voltmeter to measure the p.d. $V_S$ across both lamps **X** and **Y** connected in series.
Record $V_S$.

$V_S$ = .....[1]

Switch off.

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

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

statement .....

justification .....

.....

.....

[2]

**(b)** Calculate the resistance $R_1$ of lamp **X**. Use your readings from **(a)(i)** and **(a)(ii)** and the equation $R_1 = \frac{V_X}{I_S}$. Record your answer to a suitable number of significant figures for your experiment.

$R_1$ = ..... [2]

**(c)** The circuit components are to be rearranged so that

- lamps **X** and **Y** are connected in parallel
- the ammeter measures the current in lamp **X** only
- the voltmeter measures the p.d. across the lamps.

Draw a circuit diagram of this arrangement.

[2]

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**(d) (i)** Set up the circuit as described in **(c)**.

Switch on. Measure and record the current $I_P$ in lamp **X** and the p.d. $V_P$ across the lamps.

$I_P$ = .....

$V_P$ = .....
[1]

Switch off.

**(ii)** Calculate the new resistance $R_2$ of lamp **X**. Use your readings from **(d)(i)** and the equation $R_2 = \frac{V_P}{I_P}$.

$R_2$ = ..... [1]

[Total: 11]

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**[Turn over**

**3** In this experiment, you will investigate how the volume of water affects the rate at which water in a beaker cools.

Carry out the following instructions, referring to Fig. 3.1.

**The thermometer must remain in the clamp throughout the experiment.**

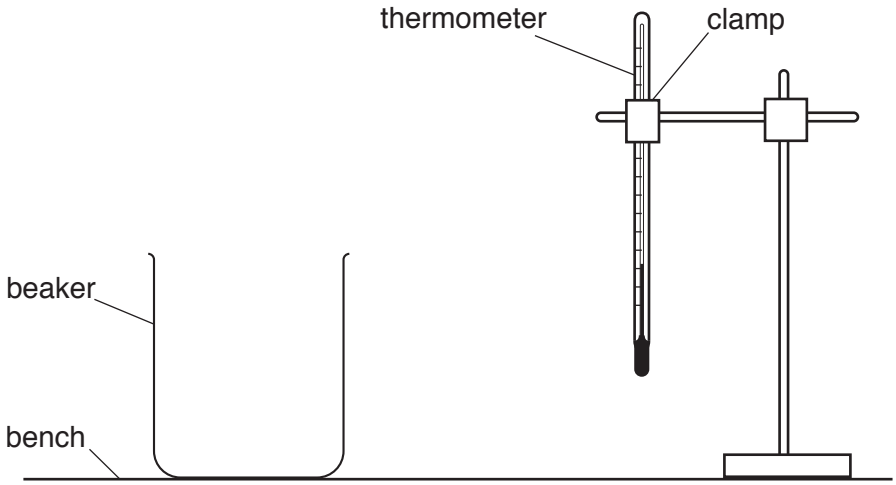



**Fig. 3.1**

**(a)** Pour 200 $cm^3$ of hot water into the beaker.
Place the thermometer in the water.

In the first row of Table 3.1, record the maximum temperature $\theta$ of the water and immediately start the stopclock.

Record, in the table, the temperature $\theta$ of the water at times $t$ = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s.

Remove the thermometer from the beaker and empty the beaker. [1]

**(b) (i)** Repeat **(a)**, using 100 $cm^3$ of hot water in the beaker. [1]

**(ii)** Complete the headings and the time column in the table. [2]

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**Table 3.1**

| | beaker with 200 $cm^3$ of hot water | beaker with 100 $cm^3$ of hot water |
|---|---|---|
| $t$/ | $\theta$/ | $\theta$/ |
| 0 | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**(c)** Write a conclusion stating how the volume of water in the beaker affects the rate of cooling of the water. Justify your answer by reference to your results.

.....

.....

.....

.....

..... [2]

**(d)** **(i)** Using your results for 100 $cm^3$ of water, calculate the average rate of cooling $x_1$ for the **first** 90 s of the experiment. Use your readings from the table and the equation

$$x_1 = \frac{\theta_0 - \theta_{90}}{t},$$

where $t = 90$ s and $\theta_0$ and $\theta_{90}$ are the temperatures at 0 s and 90 s.
Include the unit for the rate of cooling.

$x_1$ = ..... [1]

**(ii)** Using your results for 100 $cm^3$ of water, calculate the average rate of cooling $x_2$ in the **last** 90 s of the experiment. Use your readings from the table and the equation

$$x_2 = \frac{\theta_{90} - \theta_{180}}{t},$$

where $t = 90$ s and $\theta_{90}$ and $\theta_{180}$ are the temperatures at 90 s and 180 s.
Include the unit for the rate of cooling.

$x_2$ = ..... [1]

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**(e)** A student suggests that it is important that the experiments with the two volumes of water should have the same starting temperatures.

State whether your values for $x_1$ and $x_2$ support this suggestion. Justify your statement with reference to your results.

statement .....

justification .....

.....

.....
[1]

**(f)** Another student wants to investigate whether more thermal energy is lost from the water surface than from the sides of the beakers.

Describe an experiment that could be done to investigate this.

You are **not** required to carry out the experiment.

You may draw a diagram to help your description.

.....

.....

..... [2]

[Total: 11]

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**4** A student is investigating the factors that affect the size of the crater (hole) a ball makes when it is dropped into sand.

Plan an experiment which would enable you to investigate one factor which might affect the size of the crater. You are **not** required to carry out the experiment.

The apparatus available includes:

metal balls of different sizes
a tray of sand.

Write a plan for the experiment.

In your plan, you should:

- state which factor is being investigated,
- state the key variables that you would control,
- list any additional apparatus needed,
- explain briefly how you would carry out the experiment including what would be measured and how this would be done,
- state the precautions which should be taken to obtain reliable results,
- suggest a suitable graph which could be drawn from the results.

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

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[Total: 7]

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