Cambridge Assessment International Education

Cambridge IGCSE™

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2662337535

PHYSICS **0625/51**

Paper 5 Practical Test **May/June 2020**

1 hour 15 minutes

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 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	
3	
4	
Total	

This document has **12** pages. Blank pages are indicated.

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[Turn over

1 In this experiment, you will investigate the balancing of a metre rule.

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

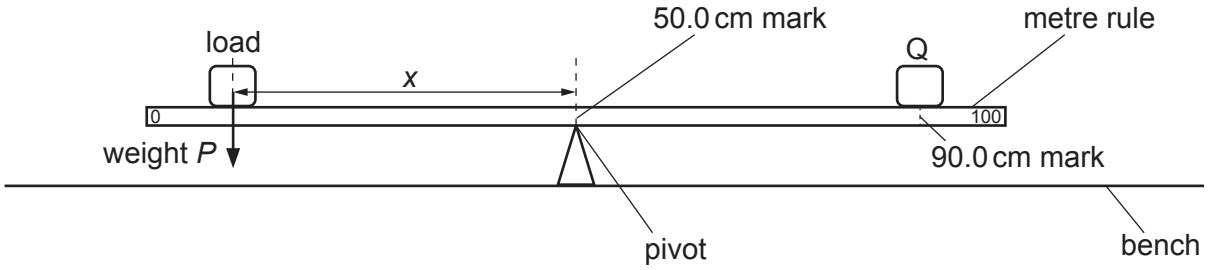


Fig. 1.1

(a)

- Place the metre rule on the pivot at the 50.0 cm mark.
- Place the object Q with its centre on the metre rule at the 90.0 cm mark.
- Place a load of weight P = 2.0 N on the metre rule.
- Adjust the position of the load so that the metre rule is as near as possible to being balanced and horizontal.

(i) Measure, and record in Table 1.1, the distance x from the centre of the load to the pivot.

Record also the weight of the load. [1]

(ii) Calculate, and record in Table 1.1, the value of $\frac{1}{x}$. [1]

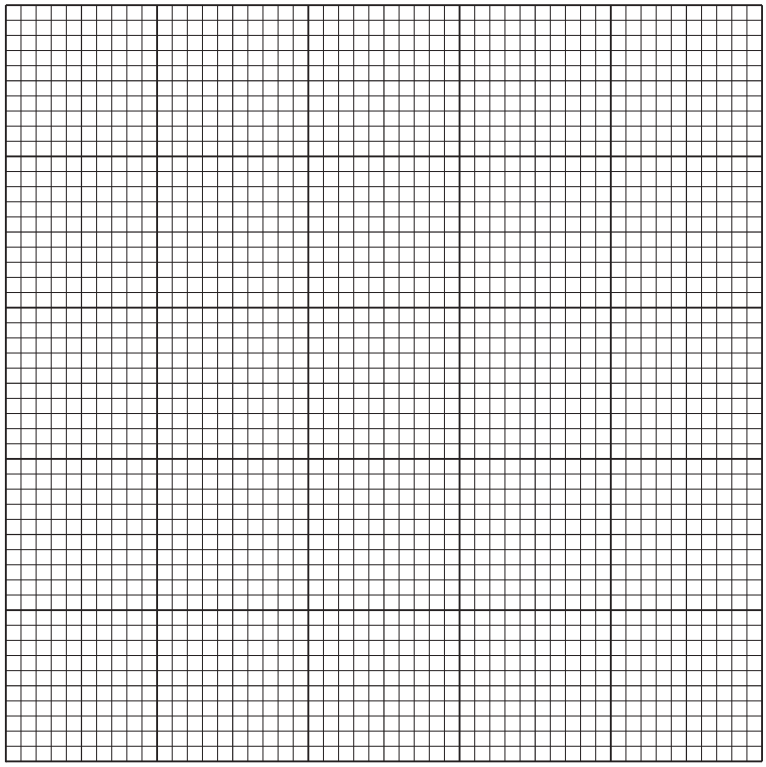
(iii) Repeat the steps above, using loads of weight P = 3.0 N, 4.0 N, 5.0 N and 6.0 N. Record all the values of P, x and $\frac{1}{x}$ in Table 1.1. [3]

Table 1.1

P/N	x/cm	$\frac{1}{x} \Big/ \frac{1}{\text{cm}}$

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(b) Plot a graph of P/N (y-axis) against $\frac{1}{x} \Big/ \frac{1}{\text{cm}}$ (x-axis). Start both axes at the origin (0,0).



[4]

(c) In this experiment, x_{max}, the maximum possible value for x is 50.0 cm. Calculate $\frac{1}{x_{max}}$.

$\frac{1}{x_{max}}$ = ... $\frac{1}{\text{cm}}$

Use the graph to determine the minimum value of P required to balance the metre rule in this experiment. Show clearly on the graph how you determined this value.

minimum value of P = ...

[2]

[Total: 11]

2 In this experiment, you will determine the resistances of filament lamps.

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

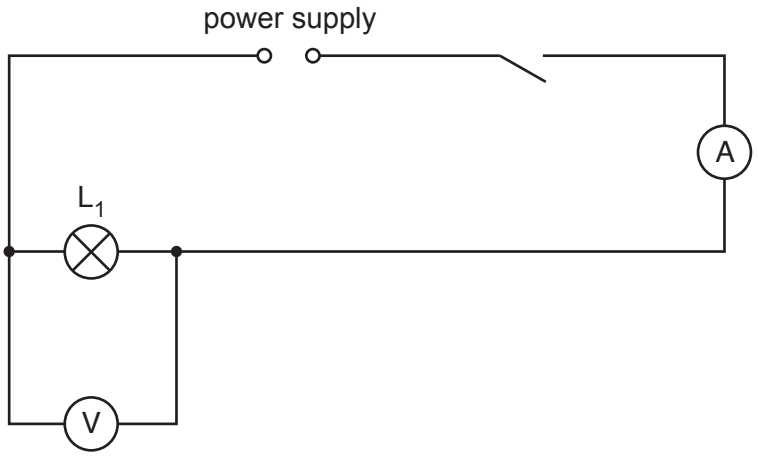


Fig. 2.1

(a) Switch on.

(i) Measure the current I_1 in the circuit.

I_1 = ... A [1]

(ii) Measure the potential difference V_1 across lamp L_1.

V_1 = ... V [1]

Switch off.

(iii) Calculate the resistance R_1 of the filament of lamp L_1. Use the equation $R_1 = \frac{V_1}{I_1}$. Include the unit.

R_1 = ... [2]

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(b) Disconnect the voltmeter. Connect lamp L_2 in series with lamp L_1. Connect the voltmeter across lamp L_2. Switch on.

Measure the current I_2 in the circuit.

I_2 = ... A

Measure the potential difference V_2 across lamp L_2.

V_2 = ... V

Switch off.

Calculate the resistance R_2 of the filament of lamp L_2. Use the equation $R_2 = \frac{V_2}{I_2}$.

R_2 = ...
[1]

(c) Disconnect the voltmeter. Connect lamp L_3 in series with lamps L_1 and L_2. Connect the voltmeter across lamp L_3. Switch on.

Measure the current I_3 in the circuit.

I_3 = ... A

Measure the potential difference V_3 across lamp L_3.

V_3 = ... V

Switch off.

Calculate the resistance R_3 of the filament of lamp L_3. Use the equation $R_3 = \frac{V_3}{I_3}$.

R_3 = ...
[1]

(d) Calculate $R_1 + R_2 + R_3$. Give your answer to a suitable number of significant figures for this experiment.

$R_1 + R_2 + R_3$ = ... [1]

(e) Some students make suggestions about the results of the experiment.

Suggestion **A**: $R_1 + R_2 + R_3$ should be equal to $3 \times R_1$.

Suggestion **B**: $R_1 + R_2 + R_3$ should be less than $3 \times R_1$.

Suggestion **C**: $R_1 + R_2 + R_3$ should be greater than $3 \times R_1$.

State which suggestion, **A**, **B** or **C**, agrees with your results. Justify your answer by reference to your results.

statement .....

justification .....

.....

[2]

(f) A student investigates whether the statement in **(e)** is always true for the same three lamps connected in series.
State a variable that he changes and how he changes the variable. You are **not** required to do this extra experiment.

variable to change .....

method of changing the variable .....

.....

.....

[2]

[Total: 11]

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3 In this experiment you will investigate the position of the image in a plane mirror.

Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 3.1 for guidance.

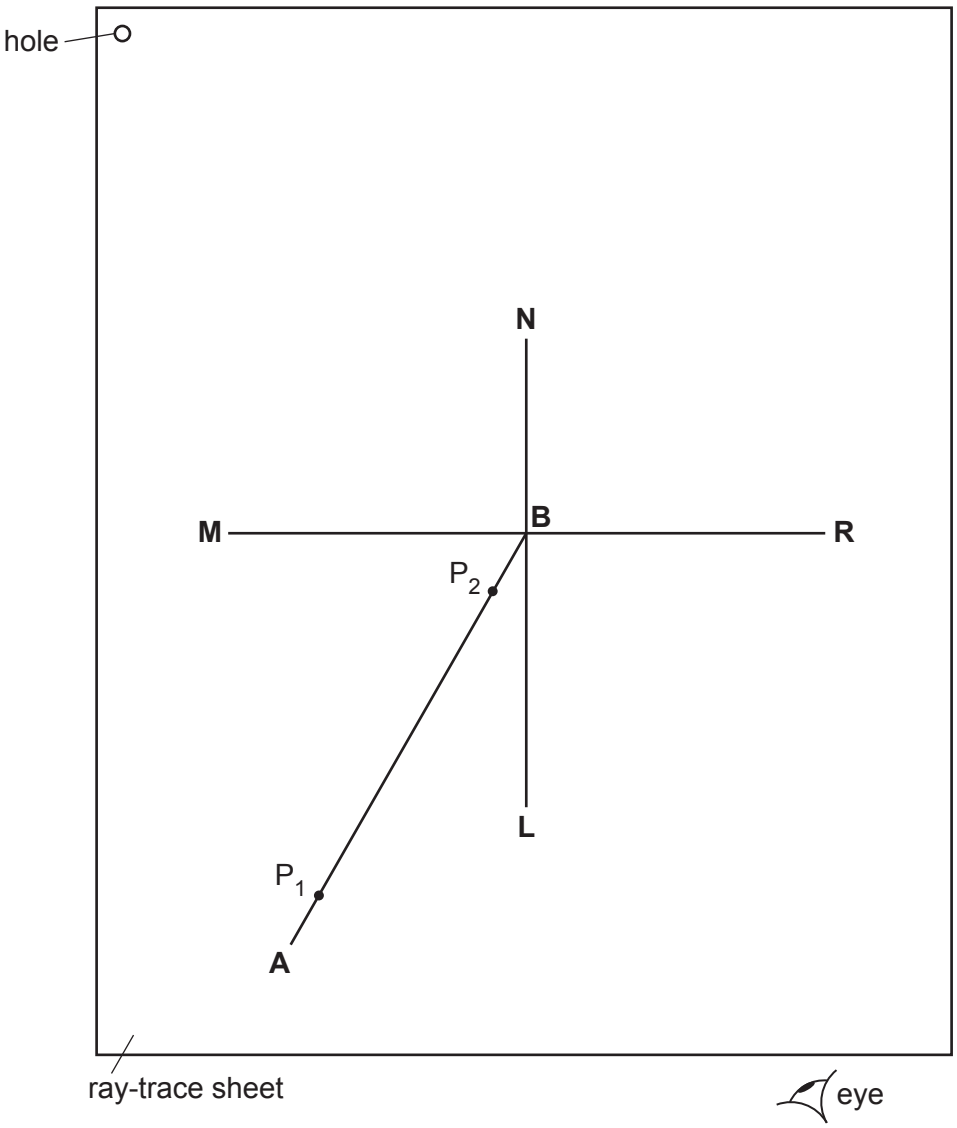


Fig. 3.1

(a) (i) Draw a line 10 cm long near the middle of the ray-trace sheet. Label the line **MR**. Draw a normal to this line that passes through the centre of **MR**. Label the normal **NL**. Label the point at which **NL** crosses **MR** with the letter **B**. [1]

(ii) Draw a line 7.0 cm long from **B** at an angle of incidence $i = 30°$ to the normal below **MR** and to the left of the normal. Label the end of this line **A**. [1]

(iii) Place a pin P_1 on line **AB** at a distance 6.0 cm from **B**.

Place a pin P_2 on line **AB** close to **MR**. [1]

(b) (i) Place the reflecting face of the mirror vertically on the line **MR**.

View the images of pins P_1 and P_2 from the direction indicated by the eye in Fig. 3.1.

Place two pins P_3 and P_4 some distance apart so that pin P_3 and the images of P_2 and P_1 all appear exactly behind pin P_4. Label the positions of P_3 and P_4.

Remove the pins and the mirror and draw the line joining the positions of P_3 and P_4. [1]

(ii) Continue the line until it extends at least 7.0 cm beyond **MR**. [1]

(c) Replace pin P_1 on line **AB** at a distance 6.0 cm from **B**.

Place pin P_2 1.0 cm to the right of its position in part **(a)**.

Repeat the steps in part **(b)**.

Label with the letter **Y** the point where the two lines cross beyond **MR**.

(i) Draw a line from P_1 to **MR** that meets **MR** at a right angle. Measure and record the length *a* of this line.

a = ... [1]

(ii) Draw a line from the point labelled **Y** to **MR** that meets **MR** at a right angle. Measure and record the length *b* of this line.

b = ... [1]

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(d) (i) Replace the mirror on **MR**. Place pin P_1 on the normal at a distance 6.0 cm from the front of the mirror.

View the image of P_1 in the mirror.

Place pin P_2 on the normal behind the mirror.

Adjust the position of P_2 along the normal so that the image of the bottom of the pin P_1 seen in the mirror and the top of pin P_2 seen over the mirror appear as one pin when viewed from all angles in front of the mirror.

Label the position of P_2.

[1]

(ii) Remove the pins and the mirror.

Measure the distance *x* along the normal between P_2 and the mirror.

x = ... [2]

(e) A student carries out this experiment with care.
Suggest a practical reason why the results may not be accurate.

.....

..... [1]

Tie your ray-trace sheet into this booklet between pages 8 and 9.

[Total: 11]

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4 A student investigates the effect of the colour of the surface of a metal container on the rate of loss of heat from the container. She knows that black surfaces are better radiators of thermal energy than white surfaces and wants to investigate the effect of other colours.

The following apparatus is available:

metal containers each with the outer surface painted a different colour
a thermometer
a stop-watch
a supply of hot water.

She can also use other apparatus and materials that are usually available in a school laboratory.

Plan an experiment to investigate the effect of the colour of the surface of a metal container on the rate of loss of heat from the container. You are **not** required to carry out this investigation.

You should:

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

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[Total: 7]

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