Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICS **0625/61**

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 **11** printed pages and **1** blank page.

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1 A student determines the weight of a metre rule using a balancing method.

Fig. 1.1. shows the apparatus.

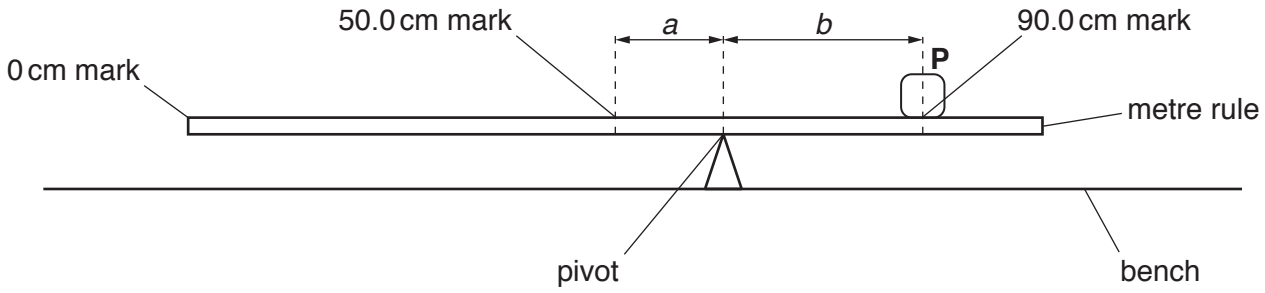

Fig. 1.1

(a) • The student places the metre rule on the pivot.

View solution

• He places the load **P**, labelled **1.5 N**, on the metre rule at the 90.0 cm mark.

• Keeping **P** at the 90.0 cm mark, he adjusts the position of the metre rule on the pivot so that the metre rule is as near as possible to being balanced.

• In Table 1.1, he records the distance *a* from the 50.0 cm mark to the pivot.

(i) Calculate, and record in Table 1.1, the distance *b* between the centre of load **P** and the pivot. [1]

(ii) Calculate $\frac{a}{b}$. Record its value in Table 1.1. [1]

(b) The student repeats the procedure using loads of 1.2 N, 1.0 N, 0.8 N and 0.5 N. The readings and results are shown in Table 1.1.

View solution

Table 1.1

Weight of load, **P** / N	*a* / cm	*b* / cm	$\frac{a}{b}$
1.5	23.1		
1.2	21.2	18.8	1.13
1.0	18.9	21.1	0.900
0.8	16.8	23.2	0.724
0.5	12.5	27.5	0.455

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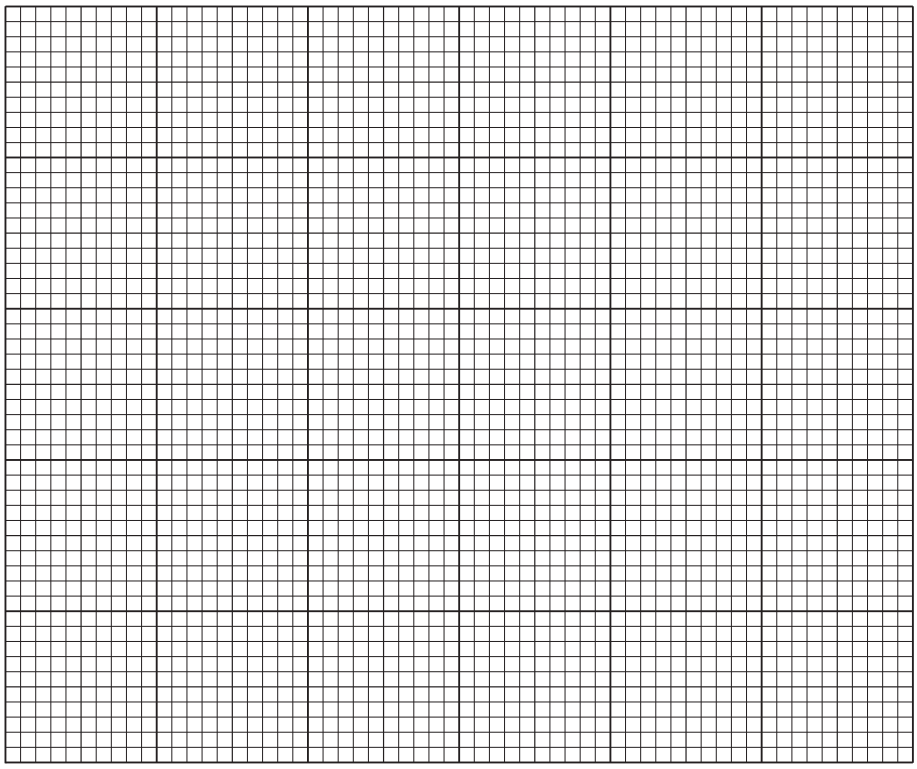
Plot a graph of weight of load **P** / N (y-axis) against $\frac{a}{b}$ (x-axis). You do **not** need to begin your axes at the origin, (0,0).



[4]

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

View solution

G = ... [2]

(d) The gradient G is numerically equal to the weight W of the metre rule. Write down the value of W to an appropriate number of significant figures for this experiment. Include the unit.

View solution

W = ... [2]

(e) The student has assumed that the centre of mass of the metre rule is at the 50.0 cm mark. Explain briefly how you would find as accurately as possible the position of the centre of mass of the metre rule. No extra apparatus or materials are available.

.....

.....

..... [1]

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(f) Briefly state the main difficulty that you would have when carrying out this type of balancing experiment.

.....

..... [1]

[Total: 12]

View solution

2 A student investigates the resistance of lamps.

She uses the circuit shown in Fig. 2.1.

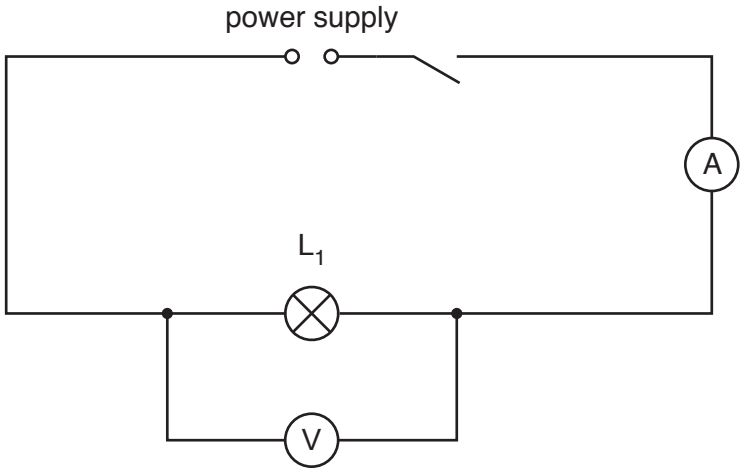

Fig. 2.1

(a) She records the potential difference V_1 across the lamp L_1 and the current I_1 in the circuit. The meters are shown in Fig. 2.2 and Fig. 2.3.

(i) Write down the meter readings.

View solution

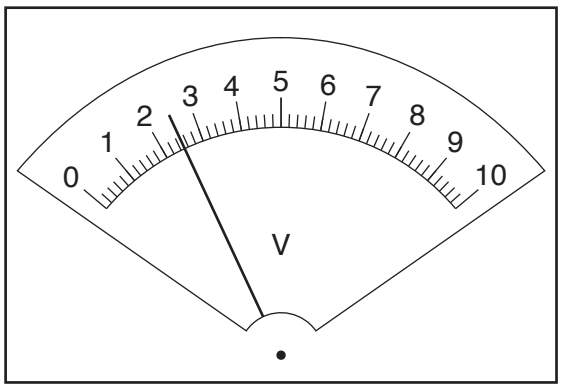

Fig. 2.2

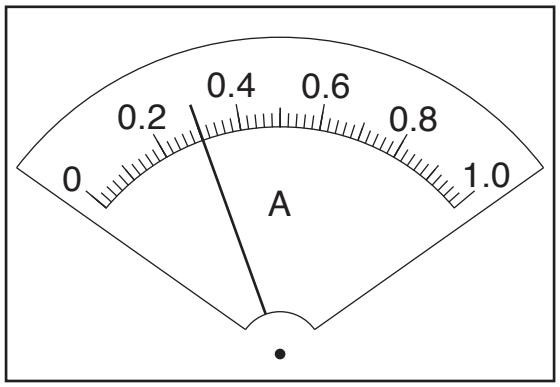

Fig. 2.3

V_1 = ...

I_1 = ...

[3]

(ii) Calculate the resistance R_1 of the lamp L_1 using the equation $R_1 = \frac{V_1}{I_1}$.

View solution

R_1 = ... [1]

(b) The student connects a lamp L_2 in series with lamp L_1.

She records the potential difference V_2 across lamps L_1 and L_2 and the current I_2 in the circuit.

V_2 = ... 2.4 V .....

I_2 = ... 0.21 A .....

Calculate the combined resistance R_2 of lamps L_1 and L_2 connected in series, using the equation $R_2 = \frac{V_2}{I_2}$.

View solution

R_2 = ...

[1]

(c) She connects a lamp L_3 in series with lamps L_1 and L_2.

She records the potential difference V_3 across the three lamps and the current I_3 in the circuit.

She calculates the combined resistance R_3.

View solution

V_3 = ... 2.4 V .....

I_3 = ... 0.17 A .....

R_3 = ... 14.1 Ω .....

A student suggests that the resistance R_3 of the three lamps connected in series should be given by the equation $R_3 = 3 \times R_1$. State whether the results agree with this suggestion. Justify your answer by reference to the results.

statement .....

justification .....

.....

.....

[2]

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(d) Complete the circuit diagram in Fig. 2.4 to show:

View solution

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

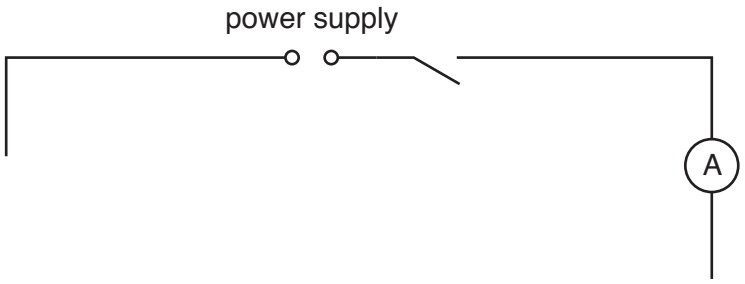

Fig. 2.4

[3]

[Total: 10]

3 A student investigates the cooling of water.

(a) The thermometer in Fig. 3.1 shows room temperature θ_R at the beginning of the experiment. Record θ_R.

View solution

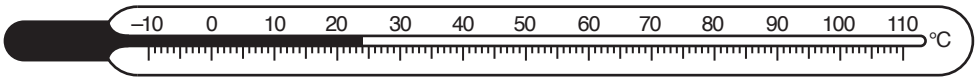

Fig. 3.1

θ_R = ... [1]

(b) • The student pours 200 cm^3 of hot water into a beaker. He places a thermometer in the water.

View solution

• He measures the temperature θ of the hot water in the beaker.

• He immediately starts the stopclock and continues recording the temperature of the water every 60 s. The temperature readings are shown in Table 3.1.

Table 3.1

t/	θ/
0	95
	89
	85
	81
	78

(i) Complete the time column in Table 3.1. [1]

(ii) Complete the column headings in Table 3.1. [1]

(c) • Calculate the decrease in temperature $\Delta\theta_1$ during the **first** 120 s.

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$\Delta\theta_1$ = ...

• Calculate the decrease in temperature $\Delta\theta_2$ during the **last** 120 s.

$\Delta\theta_2$ = ...
[1]

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(d) **(i)** Tick the box to show your conclusion from the results in **(c)**.

☐ The average rate of cooling is greater in the first 120 s than the average rate of cooling in the last 120 s.

☐ The average rate of cooling is less in the first 120 s than the average rate of cooling in the last 120 s.

☐ The average rate of cooling is the same in the first 120 s as the last 120 s.

View solution

[1]

(ii) Justify your conclusion in **(d)(i)** by reference to the results.

View solution

.....

.....

..... [2]

(e) Suggest **two** ways in which the student could reduce the rate of loss of thermal energy from the beaker in this type of experiment.

1 .....

2 .....

[2]

(f) Draw a diagram of a measuring cylinder being used to determine the volume of water. Show clearly the water level and draw, with a ruler, a straight line showing the line of sight required to obtain an accurate reading of the volume of water.

View solution

[2]

[Total: 11]

4 A student is investigating the time taken for metal balls to stop moving after being released on a curved track. Fig. 4.1 shows the shape of the track. The track is flexible, so the shape of the curve can be changed.

View solution

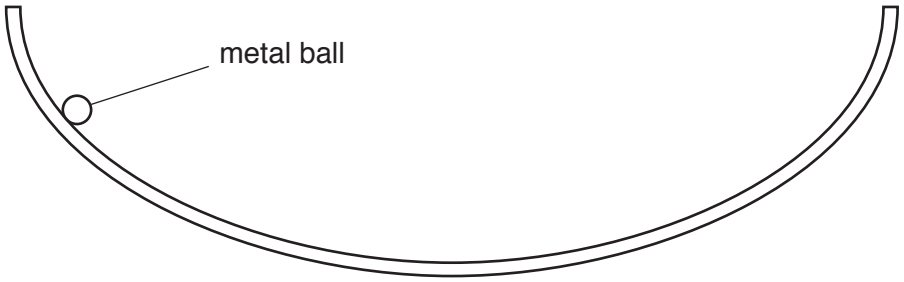

Fig. 4.1

The following apparatus is available:

a selection of metal balls of different masses
the flexible track
clamps to hold the track
a stopwatch
a tape measure
a metre rule

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

Plan an experiment to investigate a factor that affects the time taken for metal balls to stop moving after being released on a curved track.

In your plan, you should:

- state how you would expect the balls to move
- explain how you would carry out the investigation
- state which variables you would keep constant and which variable you would change
- 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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You may add to the diagram in Fig. 4.1 if it helps your explanation.

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[7]

[Total: 7]

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