



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

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**PHYSICS**

**0625/62**

Paper 6 Alternative to Practical

**October/November 2018**

**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.

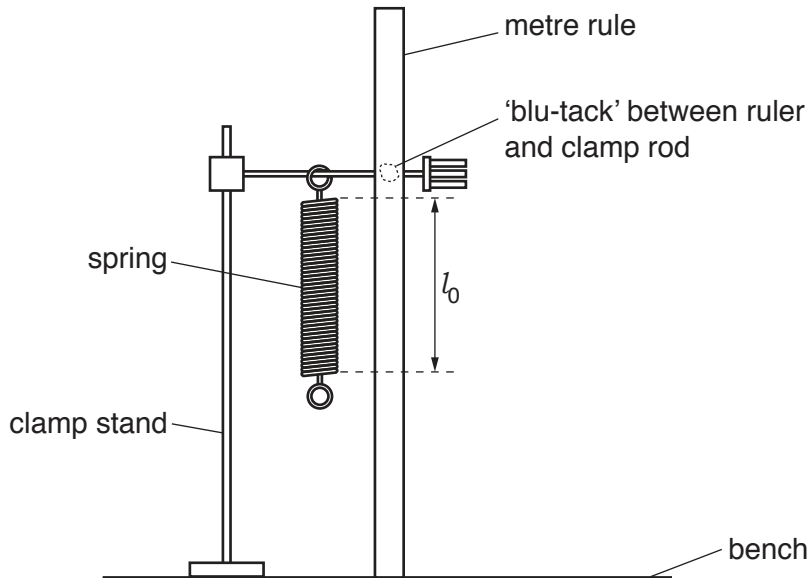
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is approved 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.

- 1 A student is determining the spring constant  $k$  of a spring.

Fig. 1.1 shows the apparatus used.



**Fig. 1.1**

- (a) On Fig. 1.1, measure the unstretched length  $l_0$  of the coiled part of the spring, in mm.

Record this value of length  $l$  in Table 1.1 for  $L = 0.00\text{ N}$ .

[1]

- (b) On Fig. 1.1, show how a set-square could be used to take readings in order to determine the length  $l_0$  of the coiled part of the spring.

[1]

- (c) The student places a  $0.20\text{ N}$  load on the spring. He records the new length  $l$  of the spring in Table 1.1.

He repeats the procedure using loads of  $0.40\text{ N}$ ,  $0.60\text{ N}$ ,  $0.80\text{ N}$  and  $1.00\text{ N}$ . All the readings are recorded in Table 1.1.

- (i) Calculate the extension  $e$  of the spring for each value of load  $L$ , using the equation

$$e = (l - l_0).$$

Record the values of  $e$  in Table 1.1.

[1]

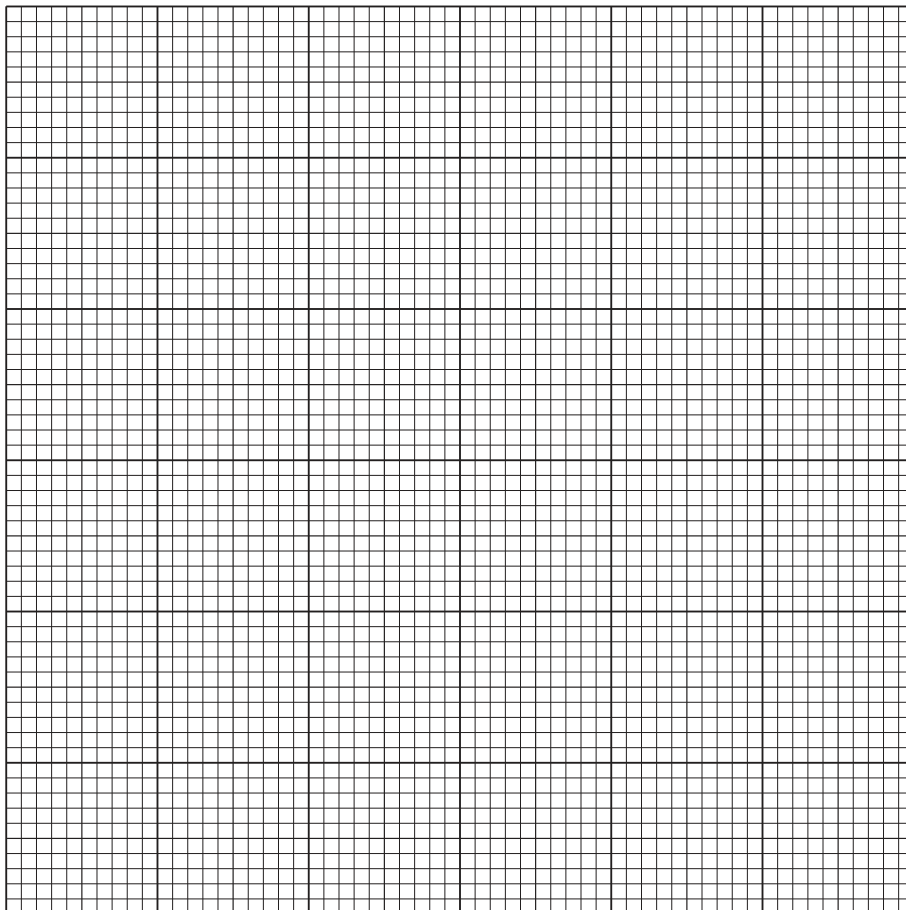
- (ii) Complete the column headings in Table 1.1.

Table 1.1

$L/l$	$l/l$	$e/l$
0.00		0
0.20	31	
0.40	40	
0.60	46	
0.80	55	
1.00	63	

[1]

(d) Plot a graph of  $L/N$  ( $y$ -axis) against  $e/\text{mm}$  ( $x$ -axis).



[4]

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

$G = \dots\dots\dots$  [2]

- (f) The gradient  $G$  is numerically equal to the spring constant  $k$ .

Write down a value for  $k$  to a suitable number of significant figures for this experiment.

$k = \dots\dots\dots$  N/mm [1]

[Total: 11]

2 A student is investigating the power of two lamps.

The circuit is shown in Fig. 2.1.

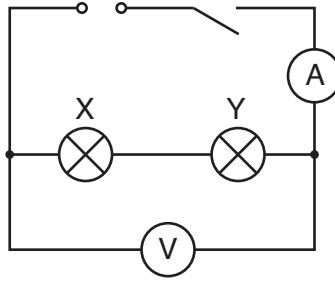


Fig. 2.1

(a) (i) Record the potential difference (p.d.)  $V_T$  across the lamps and the current  $I_T$  in the circuit, as shown in Fig. 2.2 and Fig. 2.3.

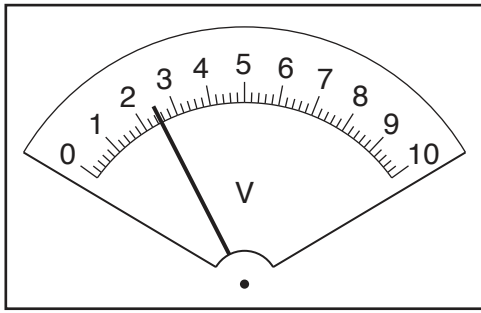


Fig. 2.2

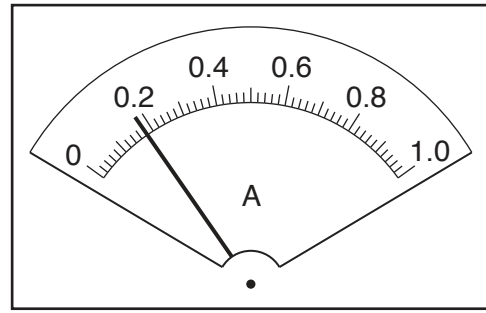


Fig. 2.3

$V_T =$  .....

$I_T =$  .....

[2]

(ii) Calculate the power  $P_T$  produced by the lamp filaments, using the equation  $P_T = V_T I_T$ .

$P_T =$  ..... [1]

- (b) The student connects the voltmeter across lamp X only. She records the p.d.  $V_X$  across lamp X and the current  $I_X$  in the circuit.

$$V_X = \dots\dots\dots 1.3 \dots\dots\dots \text{V}$$

$$I_X = \dots\dots\dots 0.18 \dots\dots\dots \text{A}$$

She repeats the procedure with the voltmeter connected across lamp Y only.

$$V_Y = \dots\dots\dots 1.2 \dots\dots\dots \text{V}$$

$$I_Y = \dots\dots\dots 0.18 \dots\dots\dots \text{A}$$

- (i) Calculate the power  $P_X$  produced by the lamp filament X using the equation  $P_X = V_X I_X$ , and calculate the power  $P_Y$  produced by the lamp filament Y using the equation  $P_Y = V_Y I_Y$ .

$$P_X = \dots\dots\dots$$

$$P_Y = \dots\dots\dots$$

[1]

- (ii) State and explain briefly whether the two values for power  $P_X$  and  $P_Y$  are the same within the limits of experimental accuracy.

statement .....

explanation .....

.....

[2]

- (c) The student repeats the experiment using two other lamps. She notices that one lamp is dimly lit, but the other lamp does not light at all.

The p.d.  $V_T$  across the lamps is the same as in (b), but the current  $I_T$  in the circuit is approximately half of the original value.

The student concludes that the filament of one of the lamps is broken.

State whether you agree with the student and give a reason for your answer.

statement .....

reason .....

.....

[2]

(d) Draw a circuit diagram to show the circuit in Fig. 2.1 rearranged so that:

- the lamps are connected in parallel
- a variable resistor is connected to control the total current in the circuit
- the ammeter will measure the total current in the circuit
- the voltmeter will measure the p.d. across the lamps.

[3]

[Total: 11]

3 A student is determining the refractive index  $n$  of the material of a transparent block.

Fig. 3.1 shows the outline **ABCD** of the block.

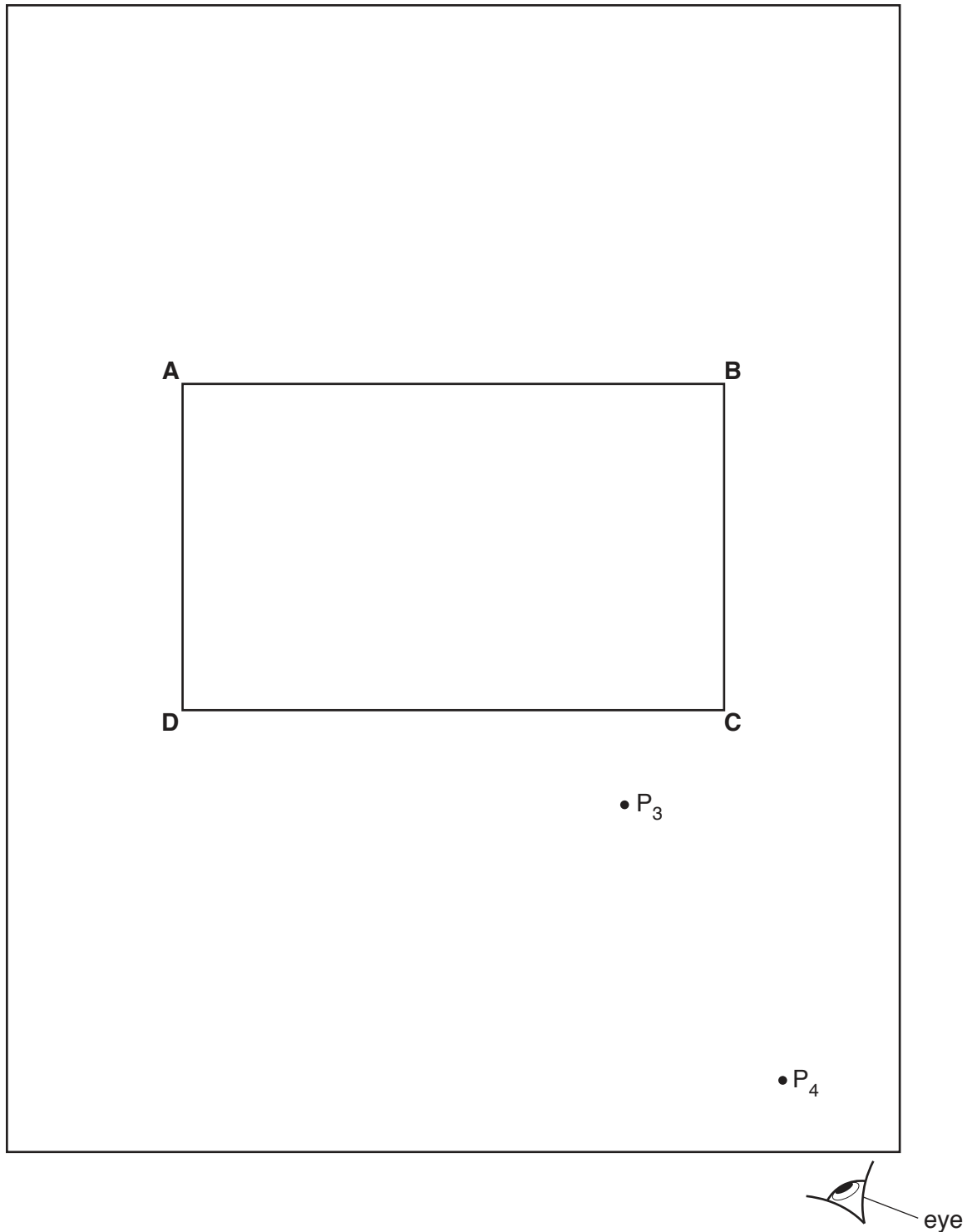


Fig. 3.1

- (a) (i)
- On Fig. 3.1, draw a normal **NL** at the centre of side **AB**.
  - Continue the normal so that it passes through side **CD** of the block.

[1]



- (ii) • Label the point **F** where **NL** crosses **AB**.
- Label the point **G** where **NL** crosses **CD**.
- Draw a line **EF** at an angle  $i = 30^\circ$  to the left of the normal and above side **AB**. [1]

(iii) Mark the positions of two pins  $P_1$  and  $P_2$  on line **EF** placed at a suitable distance apart for this type of ray-tracing experiment. [1]

(b) The student observes the images of  $P_1$  and  $P_2$  through side **CD** of the block.

He places two pins  $P_3$  and  $P_4$  between his eye and the block so that  $P_3$ ,  $P_4$  and the images of  $P_1$  and  $P_2$  seen through the block, all appear exactly one behind the other.

The positions of  $P_3$  and  $P_4$  are marked on Fig. 3.1.

- Draw a line passing through  $P_3$  and  $P_4$ . Continue the line until it meets the normal **NL**.
- Label the point **J** where the line meets the normal.
- Label the point **H** where the line meets side **CD**. Draw the line **FH**. [1]

(c) (i) Measure and record the length  $a$  of the line **FH**.

$a = \dots\dots\dots$  [1]

(ii) Measure and record the length  $b$  of the line **HJ**.

$b = \dots\dots\dots$  [1]

(iii) Calculate the refractive index  $n$  using the equation  $n = \frac{a}{b}$ .

$n = \dots\dots\dots$  [2]

(d) A student states that repeating the experiment improves the reliability of the value obtained for  $n$ .

Suggest additional values for the angle of incidence  $i$  that you would use when repeating the experiment to improve the reliability.

.....  
 .....  
 ..... [2]

(e) State **one** precaution that you would take in this experiment to obtain accurate results.

.....  
 ..... [1]

[Total: 11]

[Turn over

- 4 A student is investigating whether the type of container affects the time taken for water to be heated from room temperature to boiling point.

The following apparatus is available:

- 250 cm<sup>3</sup> copper can
- 250 cm<sup>3</sup> aluminium can
- 250 cm<sup>3</sup> glass beaker
- Bunsen burner
- measuring cylinder
- thermometer
- tripod and gauze
- stopwatch

Other apparatus normally available in the school laboratory is also available.

Plan an experiment to investigate whether the type of container affects the time taken for water to be heated from room temperature to boiling point.

You should:

- 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 briefly how you would use your readings to reach a conclusion.

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