Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4000005171 8

PHYSICS **0625/61**

Paper 6 Alternative to Practical **May/June 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 **12** printed pages.

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1 The class is investigating the stretching of a spring.

Fig. 1.1 shows the apparatus.

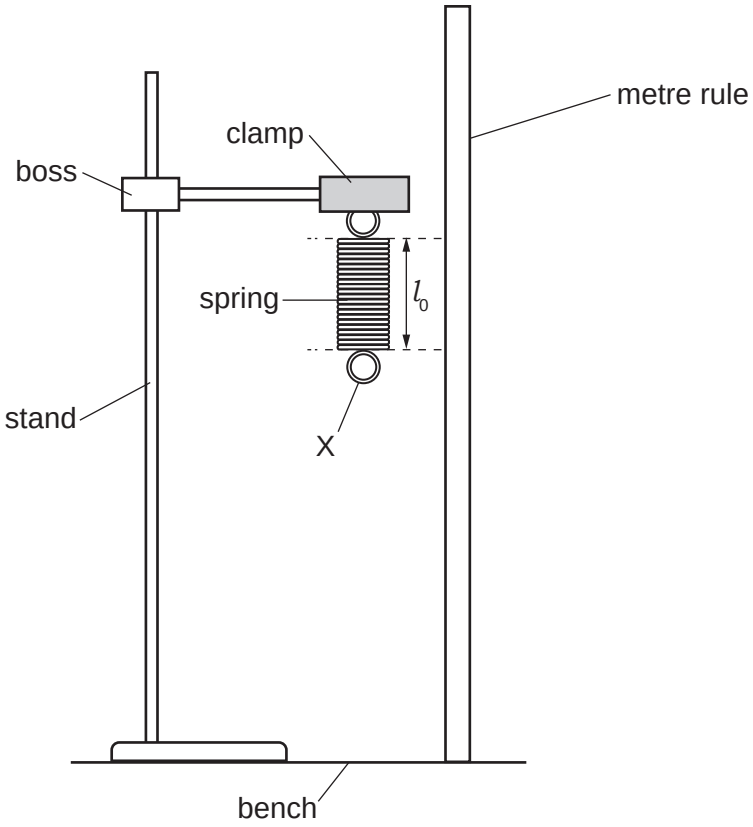


Fig. 1.1

(a) **(i)** On Fig. 1.1, measure the length l_0.
Record l_0 in Table 1.1 at load L = 0.0 N. [1]

(ii) Explain why l_0 is **not** measured to point X on the spring.

.....

.....[1]

(b) A student hangs a 1.0 N load on the spring. He records the new length l of the spring.

He repeats the procedure using loads of 2.0 N, 3.0 N, 4.0 N and 5.0 N. The readings are shown in Table 1.1.

Table 1.1

L/N	0.0	1.0	2.0	3.0	4.0	5.0
l/mm		17	20	21	23	25

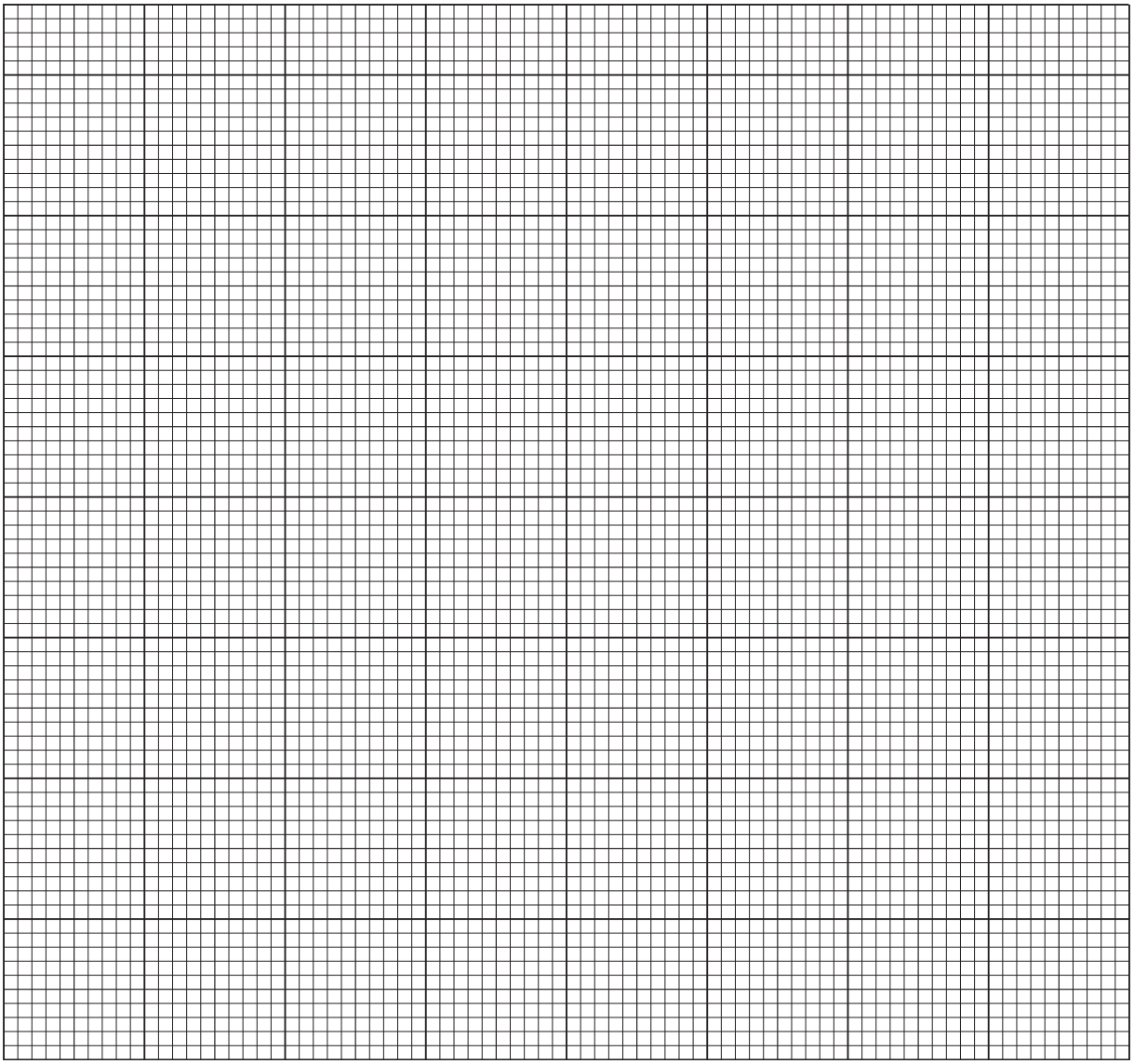
Describe **one** precaution that you would take in order to obtain reliable readings.

.....

.....[1]

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(c) Plot a graph of l / mm (y-axis) against L / N (x-axis).



[4]

(d) A student suggests that the length l of the spring is directly proportional to the load L.

State whether your readings support this suggestion. Justify your answer by reference to the graph line.

.....

.....[1]

(e) Use the results to predict the load L that would give a length l twice the value of l_0.
Show clearly how you obtained your answer.

load L = ...[2]

[Total: 10]

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[Turn over

2 The class is investigating the refraction of light passing through a transparent block. A student is using optics pins to trace the paths of rays of light.

Fig. 2.1 shows the student's ray-trace sheet.

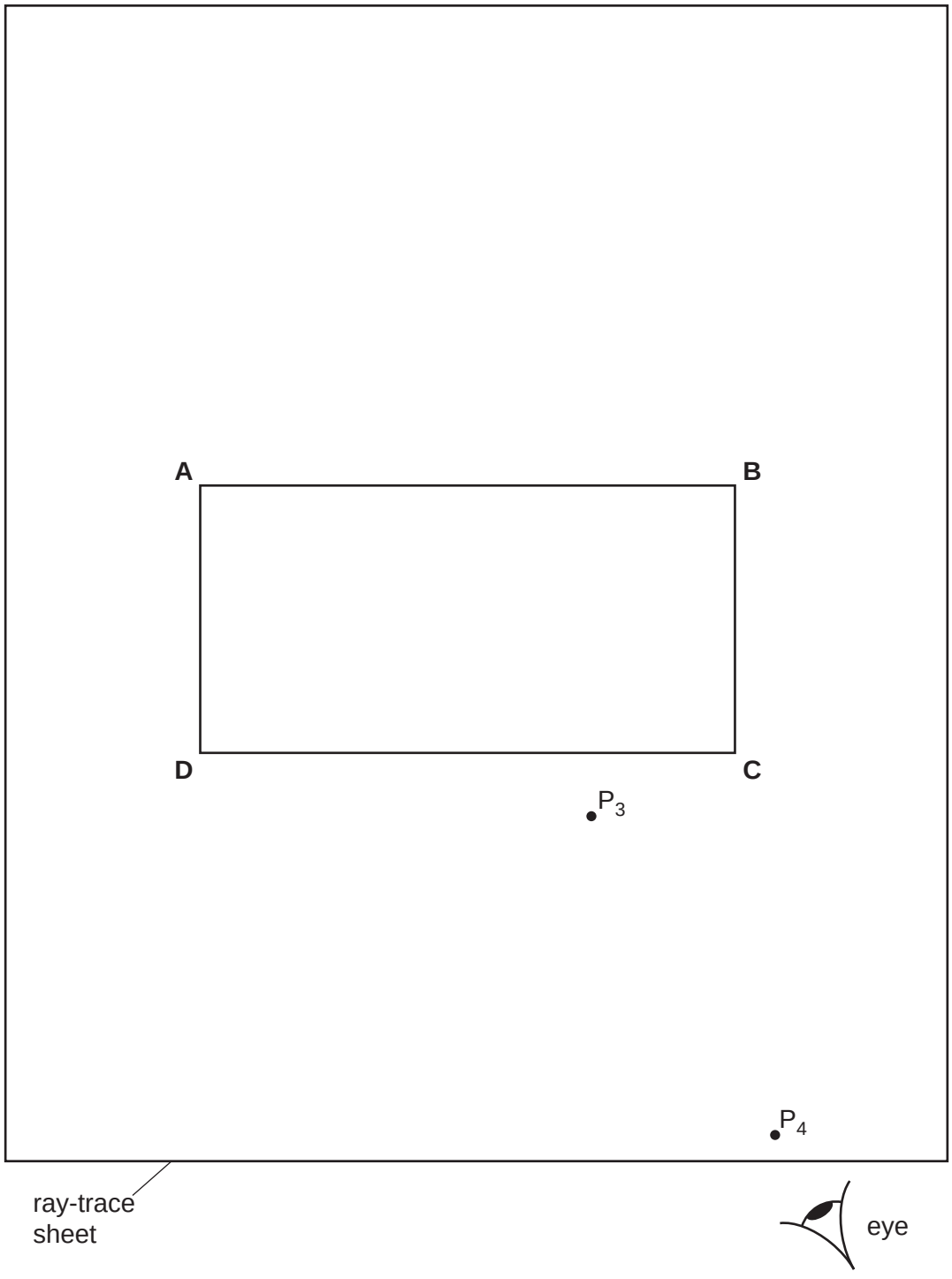


Fig. 2.1

(a)
- On Fig. 2.1, draw a normal at the centre of side **AB**. Label this line **NL**. Label the point **E** where the normal crosses **AB**. Label the point **M** where the normal crosses **CD**.
- Draw a line above **AB** to the left of the normal and at an angle of incidence $i = 30°$ to the normal. Label this line **FE**.
- Label the positions of two pins P_1 and P_2 placed a suitable distance apart on **FE** for accurate ray tracing. [2]

(b) The student observes the images of P_1 and P_2 through side **CD** of the block so that the images of P_1 and P_2 appear one behind the other. He places two pins P_3 and P_4 between his eye and the block so that P_3 and P_4, and the images of P_1 and P_2 seen through the block, appear one behind the other. The positions of P_3 and P_4 are marked on Fig. 2.1.

Draw a line joining the positions of P_3 and P_4. Continue the line until it meets the normal. Label this point **K**. [1]

(c)
- Measure and record the angle α between the line joining the positions of P_3 and P_4 and the line **KM**.

$\alpha =$ .....

- Measure and record the length x between points **M** and **K**.

$x =$ .....

[2]

(d) The student repeats the procedure with the angle of incidence $i = 50°$.
His readings for α and x are shown.

$\alpha =$ 52° .....

$x =$ 19 mm .....

A student suggests that the angle α should always be equal to the angle of incidence i.

State whether the results support this suggestion. Justify your answer by reference to the values of α for $i = 30°$ and $i = 50°$.

statement .....

justification .....

[2]

(e) Suggest **one** precaution that you would take with this experiment to obtain reliable results.

.....

.....

.....[1]

[Total: 8]

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3 The class is investigating the cooling of water.

Fig. 3.1 shows the apparatus.

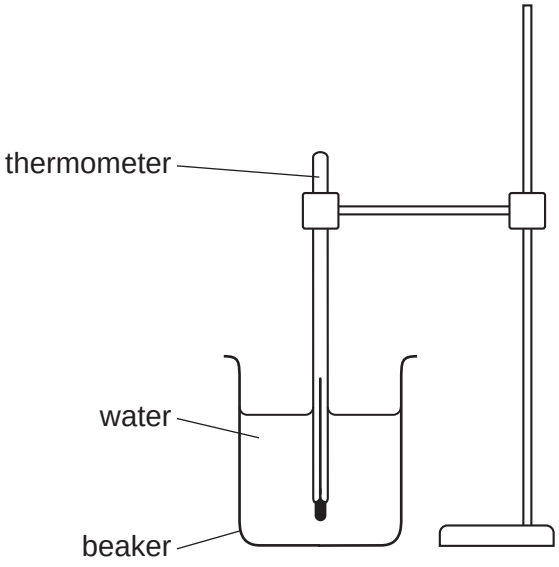


Fig. 3.1

(a) The thermometer in Fig. 3.2 shows the room temperature θ_R at the beginning of the experiment.

Record θ_R.

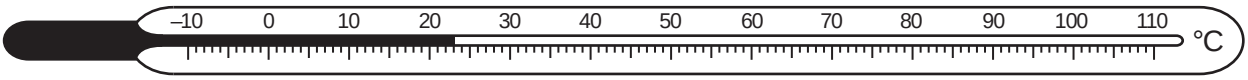


Fig. 3.2

θ_R = ...[1]

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(b) • A student pours 200 cm^3 of hot water into the beaker.

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

• She immediately starts a stopclock.

• After 180 s, she measures the temperature θ of the hot water.

• After 360 s, she measures the temperature θ of the hot water again.

The readings are shown in Table 3.1.

Table 3.1

t / s	θ / °C
0	85
180	74
360	66

(i) • Calculate the temperature fall $\Delta\theta_1$ during the first 180 s.

$\Delta\theta_1$ = ...

• Calculate the temperature fall $\Delta\theta_2$ during the next 180 s.

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

(ii) Suggest why $\Delta\theta_1$ is different from $\Delta\theta_2$.

.....

.....[1]

(c) Another student plans to investigate the factors affecting the difference between the values of $\Delta\theta_1$ and $\Delta\theta_2$.

Suggest **two** changes that he could make to the procedure to obtain a larger value of this difference.

1. .....

2. .....

[2]

(d) The volume of water used in this experiment is measured using a measuring cylinder. Fig. 3.3 shows a measuring cylinder.

A, **B**, **C** and **D** are four possible lines of sight that could be used to read the volume of the water.

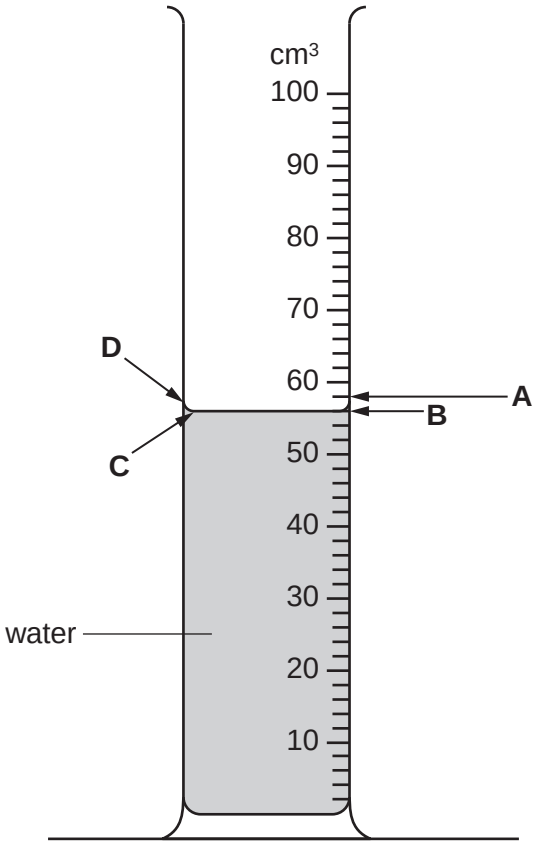


Fig. 3.3

Give **two** reasons why **B** should be used to obtain the most accurate reading.

1. .....

.....

2. .....

.....

[2]

[Total: 7]

4 The class is investigating the motion of a pendulum.

Fig. 4.1 shows the apparatus.

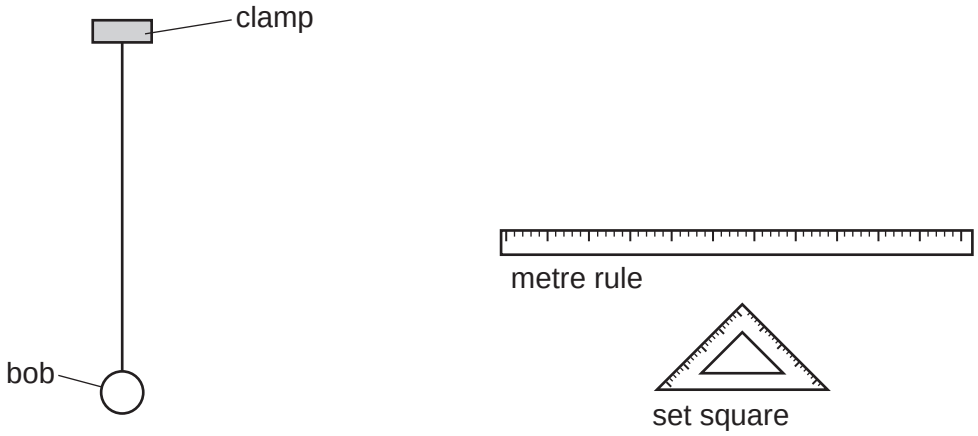


Fig. 4.1

(a) (i) On Fig. 4.1, show clearly the length l of the pendulum. [1]

(ii) Use Fig. 4.2 to explain how you would measure the length l accurately. You may draw on the diagram.

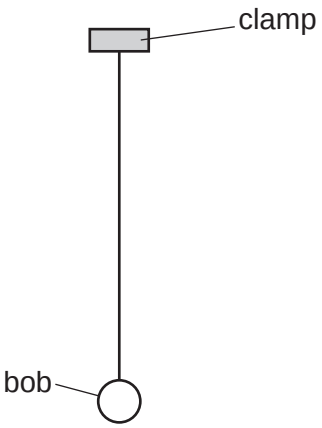


Fig. 4.2

.....

.....

.....

.....

.....[2]

(b) A student determines the period T of the pendulum. The period is the time taken for one complete oscillation. The student measures the time t for 20 oscillations.

Fig. 4.3 shows the time t.



Fig. 4.3

(i) Calculate the period T of the pendulum.

T = ...[1]

(ii) Explain how measuring the time for 20 oscillations rather than one oscillation helps the student to obtain a more reliable value for the period.

.....

.....

.....[2]

(c) The student wants to determine a value for the acceleration of free fall from his results. He needs the value of T^2 to do this.

Calculate T^2.

Give your answer to a suitable number of significant figures and include the unit.

T^2 = ... [2]

[Total: 8]

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5 A student is investigating whether the resistance of a wire depends on the material from which the wire is made.

Resistance R is given by the equation $R = \frac{V}{I}$.

The following apparatus is available to the student:

ammeter
voltmeter
micrometer screw gauge
power supply (0–3 V)
variable resistor
switch
connecting leads
wires of different materials.

Plan an experiment to investigate whether the resistance of a wire depends on the material from which it is made.

You should:

- draw a diagram of the circuit you would use to determine the resistance of each wire
- explain briefly how you would carry out the investigation, including the measurements you would take
- state the key variables that you would control
- draw a suitable table, with column headings, to show how you would display your readings (you are **not** required to enter any readings in the table).

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.....[7]

[Total: 7]

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