Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICS **0625/62**

Paper 6 Alternative to Practical **May/June 2016**

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.

The apparatus is shown in Fig. 1.1.

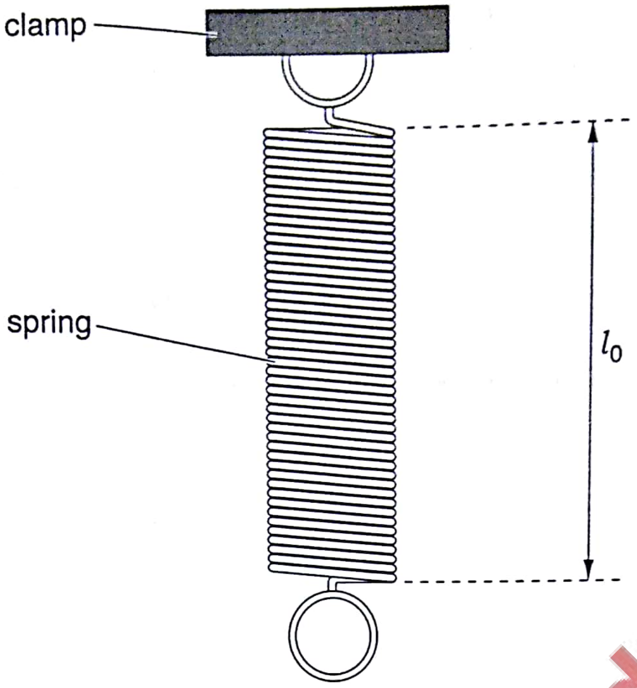


Fig. 1.1

(a) On Fig. 1.1, measure the unstretched length l_0 of the spring. Record l_0 in the first row of Table 1.1. [1]

(b) The student hangs a load L of 1.0 N on the spring and measures the new length l of the spring. She repeats the measurements using loads of 2.0 N, 3.0 N, 4.0 N and 5.0 N. The readings are shown in Table 1.1.

(i) For each set of readings, calculate the extension e of the spring using the equation $e = (l - l_0)$. Record the values of e in the table.

Table 1.1

L/N	l/mm	e/mm
0.0	55	0
1.0	59	4
2.0	64	9
3.0	69	14
4.0	74	19
5.0	78	23

→ 59 - 55 = 4
64 - 55 = 9
69 - 55 = 14
74 - 55 = 19
78 - 55 = 23

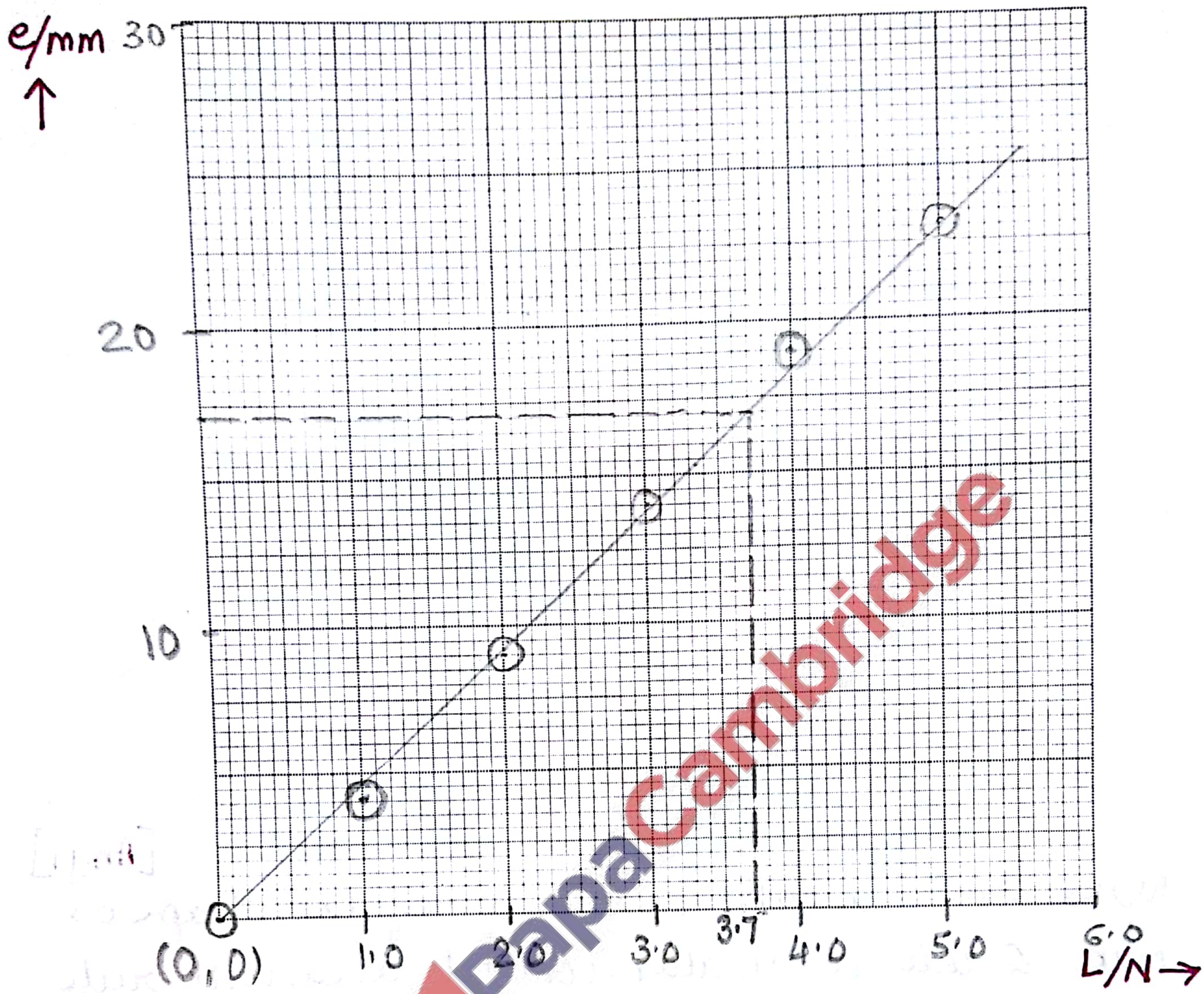
[1]

[Any 1]

(ii) Explain briefly one precaution that you would take in order to obtain reliable readings.

View the scale at right angles OR use a straight edge / set square / pointer between the bottom of spring / and scale. [1]

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



[4]

(d) The student removes the load from the spring and hangs an unknown load **X** on the spring. She measures the length l of the spring.

l = ...72 mm..........

(i) Calculate the extension e of the spring.

72mm - 55mm = 17mm

e = ...17mm.......... [1]

(ii) Use the graph to determine the weight W of the load **X**. Show clearly on the graph how you obtained the necessary information.

W = ...3·7N.......... [2]

[Total: 10]

A student is using a balancing method to determine the weight of a piece of soft modelling clay. The apparatus is shown in Fig. 2.1.

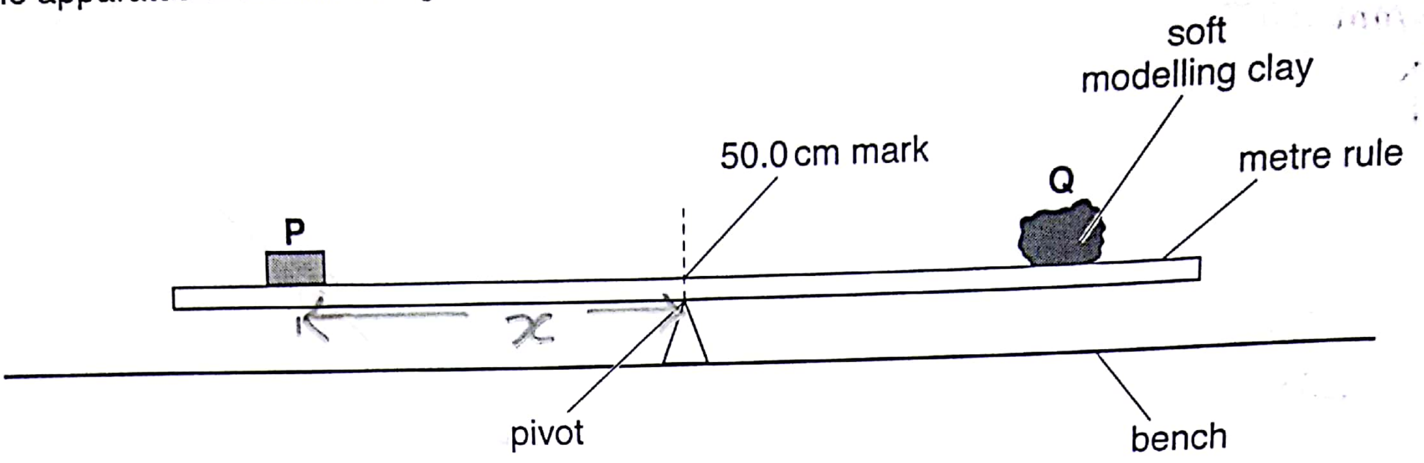


Fig. 2.1

P is a metal cube of weight $P = 1.0\,N$. **Q** is the piece of soft modelling clay.

The student places the cube **P** so that its weight acts at a distance *x* from the pivot.

He adjusts the position of **Q** to balance the rule and measures the distance *y* from the centre of **Q** to the pivot. He calculates the weight *W* of **Q** using the equation $W = \frac{Px}{y}$.

(a) **On Fig. 2.1**, mark clearly the distance *x*. DONE [1]

(b) Suggest a change to **Q** that would make it easier to find the value of *y* accurately. [Any 1]

Make Q into a cube or into a regular shape or make Q into a smaller contact area with rule [1]

(c) It is difficult to achieve an exact balance of the metre rule in this type of experiment. This can make the result unreliable.

Explain how you would reduce the effect of this problem to improve the reliability of the experiment.

Move P or Q in one way until it just tips, then back over until it tips back and take the middle reading OR Repeat the experiment and take [1] average [Any 1]

(d) The metal cube **P** is larger than the width of the metre rule.

Explain briefly how you would determine the reading of the metre rule scale at the position of the centre of mass of **P**. You may draw a diagram.

Diagram = optional.

[Any1] Find the readings of the centre of mass of the cube and mark side of the rule in desired position

OR Take readings on both sides of the cube & find mean [2]

(e) Before starting the experiment, the student determines the position of the centre of mass of the metre rule.

Explain briefly how you would do this.

Place the rule on the pivot without P and Q and record the reading at the balance point [1]

[Total: 6]

3 A student is investigating the magnification of images produced by a lens.

The apparatus is shown in Fig. 3.1.

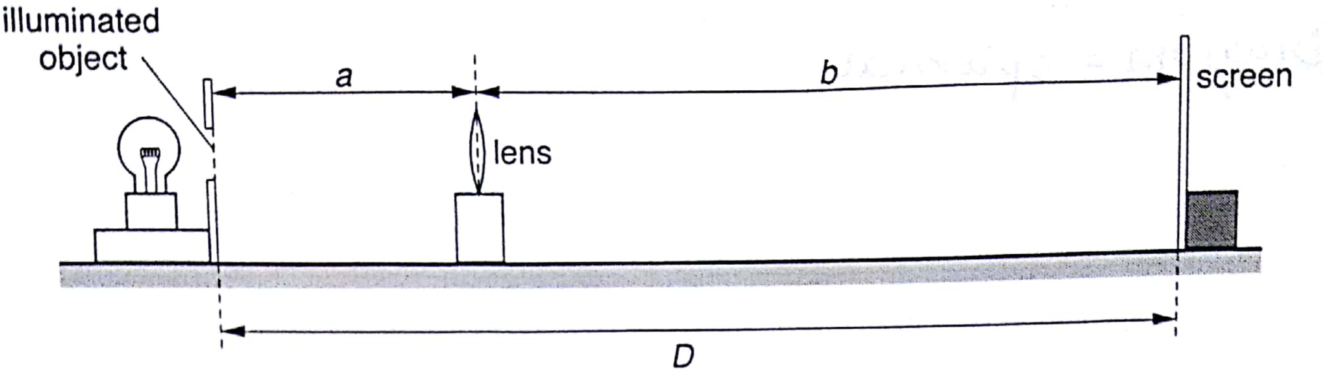


Fig. 3.1

The student places a screen at a distance $D = 80.0\,\text{cm}$ from an illuminated object. The screen and the illuminated object remain in the same positions throughout the experiment.

(a) She places the lens close to the illuminated object. She moves the lens until she sees a sharply focused, **enlarged** image of the object on the screen.

She measures the distance a from the illuminated object to the centre of the lens.

a = 20.3 cm

She measures the distance b from the centre of the lens to the screen.

b = 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$M_1 = \frac{59.7}{20.3} = 2.940$

m_1 = 2.94 [1]

(b) The student then moves the lens towards the screen until a **smaller**, sharply focused image of the object is seen on the screen.

She measures the distance x from the illuminated object to the centre of the lens.

x = 60.2 cm

She measures the distance y from the centre of the lens to the screen.

y = 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$$m_2 = \frac{y}{x} = \frac{19.8}{60.2} = 0.3289$$

m_2 = 0.329 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

$$m_1 \times m_2 = 2.940 \times 0.329 = 0.96726$$

statement Yes. Must match the result.

justification The difference is within the limits of experimental accuracy [2]

(d) State two precautions that you would take in this experiment to obtain reliable results. Any 2

1. Use a darkened room | brighter lamp | no other light
2. Mark position of centre of lens on holder.
3. Clamp the meter rule in position on the bench
4. Move lens slowly to and fro when focussing
5. Repeat with different D.
6. Ensure object and centre of lens are same height from bench

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

Bcoz the image appears well focused over a range of lens positions [1]

[Total: 7]

4 A student is investigating how the resistance of a wire depends on the length of the wire. The student aims to plot a graph.

The following apparatus is available to the student:

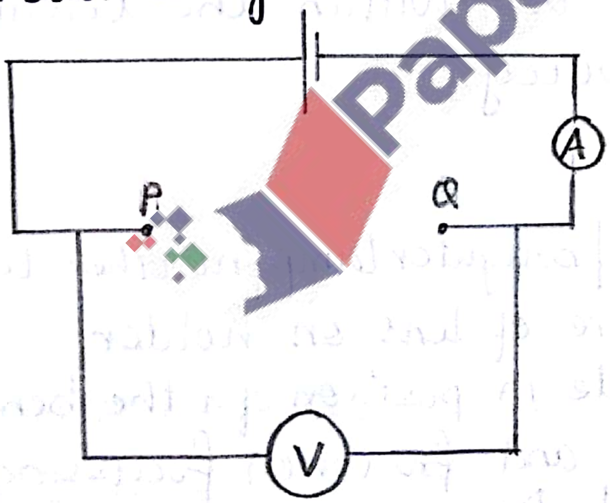
ammeter
voltmeter
power supply
variable resistor
switch
connecting leads
resistance wires of different lengths
metre rule.

Plan an experiment to investigate how the resistance of a wire depends on the length of the wire.

You should

- draw a diagram of the circuit you could use to determine the resistance of each wire
- explain briefly how you would carry out the investigation
- suggest suitable lengths of wire
- 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.

Circuit diagram:



l/m	V/V	I/A	R/Ω

Connect the apparatus as shown in the circuit diagram. Between points P and Q connect resistance wires of different lengths one at a time. Each time note the reading shown by the voltmeter and ammeter in the table shown alongside. Record for atleast 5 resistance wires. Range of lengths must be between 2cm and 5cm. Also take the largest length of the resistive wire atleast twice the smallest length.

Control variables:-

To ensure a fair experiment, other factors that affect the resistance of wire must be kept constant, namely the material of the wire, the diameter (radius/thickness) of the wire and the temperature of the wire.

[7]

[Total: 7]

5 A student is investigating the cooling of water.

Some of the apparatus is shown in Fig. 5.1.

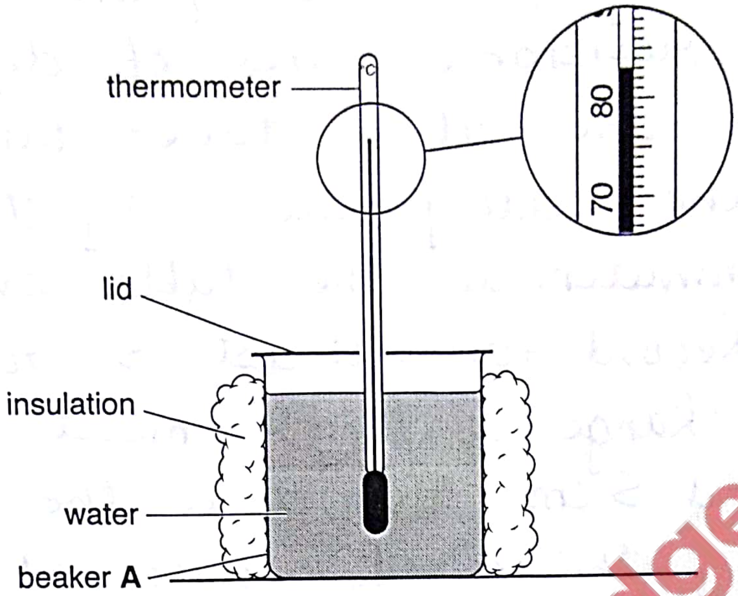


Fig. 5.1

(a) The student pours 200 cm^3 of hot water into a 250 cm^3 insulated beaker labelled **A**. He covers the top of the beaker with a lid.

The student takes a temperature reading every 30 s as the water cools. The readings are shown in Table 5.1.

(i) Complete the column headings in the table. DONE [1]

(ii) The starting temperature θ of the hot water in beaker **A** is shown on Fig. 5.1.

Record this temperature in the table at time t = 0 s. [1]

Table 5.1

	beaker **A** insulation and lid	beaker **B** insulation, no lid	beaker **C** lid, no insulation
t/s	θ/ °C	θ/ °C	θ/ °C
0	83	85	78
30	80	79	74
60	77	74	71
90	75	70	68
120	73	67	66
150	71	64	64

(b) The student repeats the procedure using a 250 cm^3 beaker labelled **B**. This beaker is insulated but has no lid.

He repeats the procedure again using a 250 cm^3 beaker labelled **C**. This beaker has a lid but no insulation.

All the readings are shown in Table 5.1.

(i) Tick the statement that best describes the results of the investigation.

[✓] Removing the lid speeds up the rate of cooling significantly more than removing the insulation.

[ ] Removing the insulation speeds up the rate of cooling significantly more than removing the lid.

[ ] There is no significant difference between removing the lid and removing the insulation. [1]

(ii) Justify your answer by reference to the readings.

Because at time = 30 s; the temp drop for Beaker C is more than Beaker A. This is seen for time from 0 s to 120 s. [1]

(c) State two of the conditions that should be kept the same in this experiment in order for the comparison to be fair.

1. Room temperature
2. Starting temperature of water
3. Density of packing or type of insulation
4. Identicle lids [Any 2] [2]

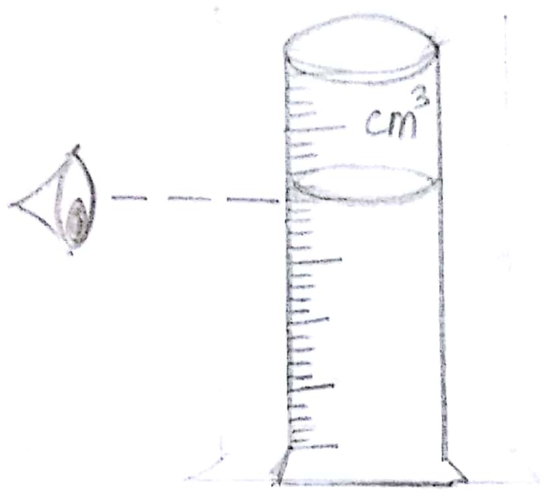
(d) Suggest a suitable material for the lid. Give a reason for your choice of material.

material Card [Any 1]

reason Card is a good insulator or Card is a poor conductor. [2]

(e) Describe briefly how a measuring cylinder is read in order to obtain a reliable value for the volume of water. You may draw a diagram.

Diagram = optional



View the measuring cylinder at right angles (perpendicular) to the cylinder. Take readings for the bottom of miniscus. [2]

[Total: 10]