Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6408338408

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.

© UCLES 2016

1 A student is investigating the stretching of a spring.

The apparatus is shown in Fig. 1.1.

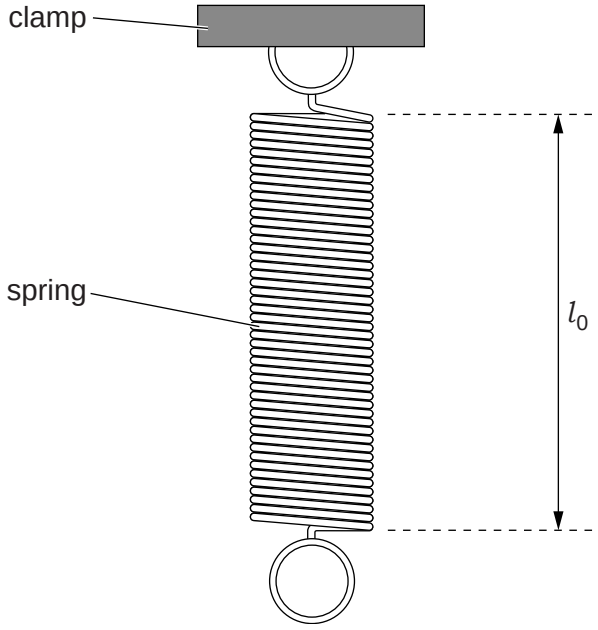


Fig. 1.1

(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		0
1.0	59	
2.0	64	
3.0	69	
4.0	74	
5.0	78	

[1]

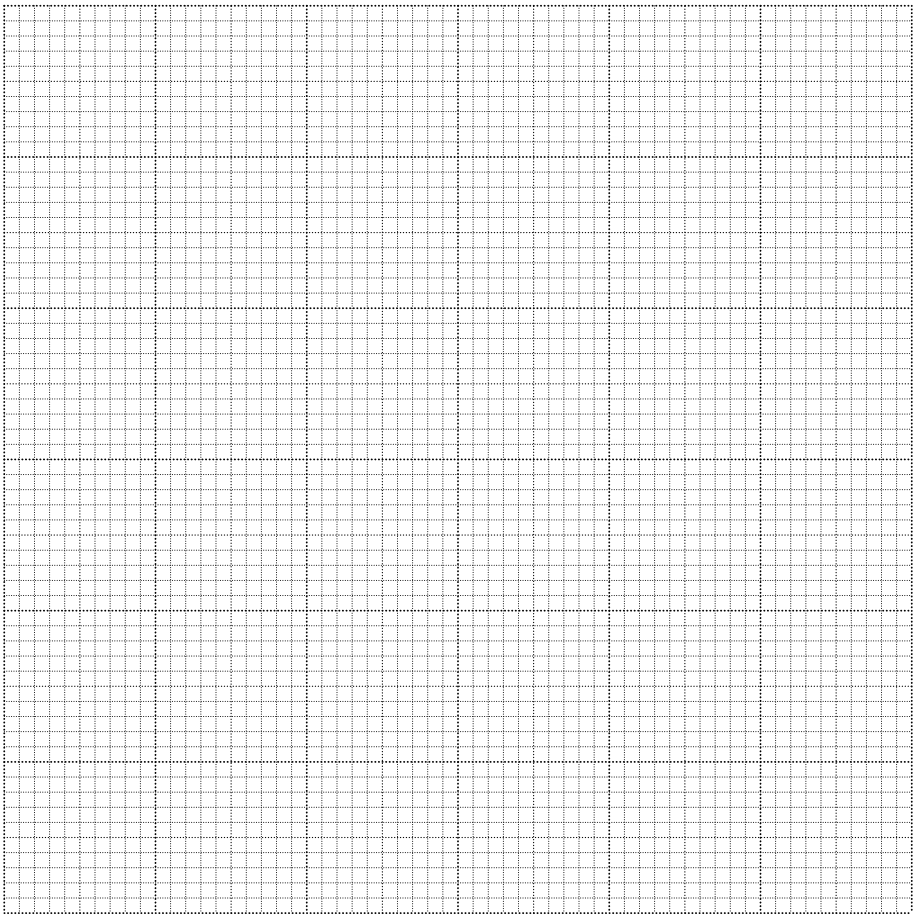
(ii) Explain briefly one precaution that you would take in order to obtain reliable readings.

.....

.....[1]

© UCLES 2016

(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.

e = ... [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 = ... [2]

[Total: 10]

2 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.

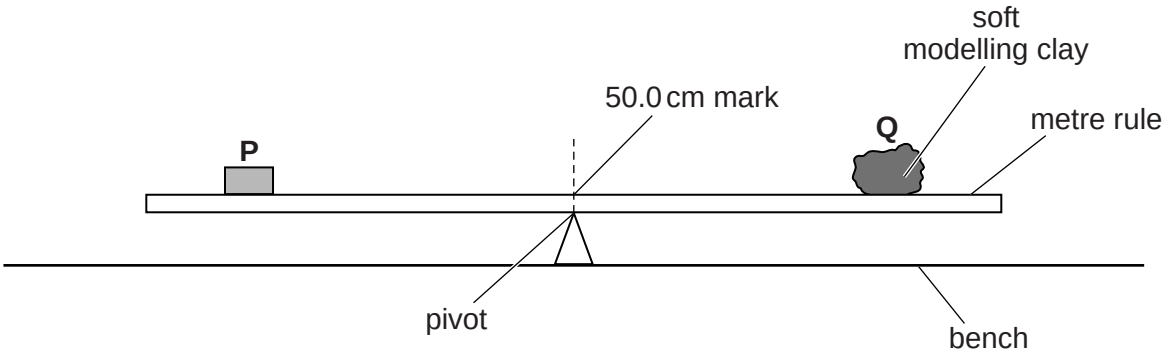


Fig. 2.1

P is a metal cube of weight $P = 1.0\,\text{N}$. **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. [1]

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

.....

.....[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.

.....

.....

.....[1]

© UCLES 2016

(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.

.....

.....

.....[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.

.....

.....[1]

[Total: 6]

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

The apparatus is shown in Fig. 3.1.

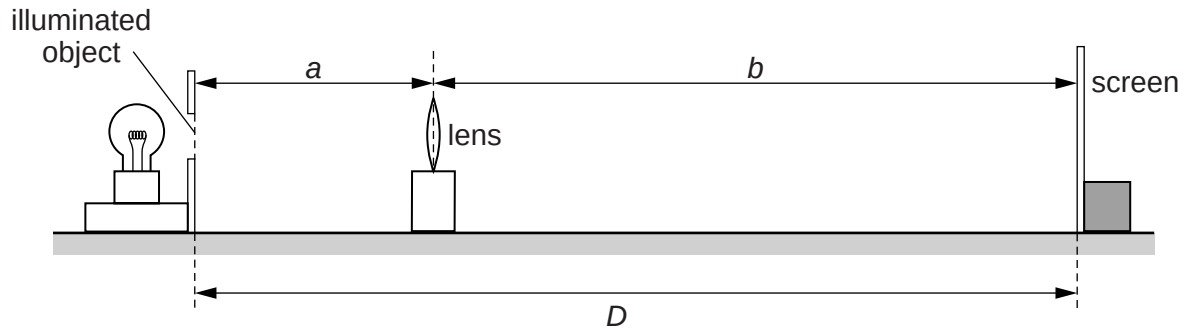


Fig. 3.1

The student places a screen at a distance D = 80.0 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 = ... [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 $m_2 = \frac{y}{x}$.

$m_2 =$ ..... [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.

statement .....

justification .....

.....

[2]

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

1. .....

.....

2. .....

.....

[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.

.....

.....[1]

[Total: 7]

© UCLES 2016

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.

© UCLES 2016

[7]

[Total: 7]

5 A student is investigating the cooling of water.

Some of the apparatus is shown in Fig. 5.1.

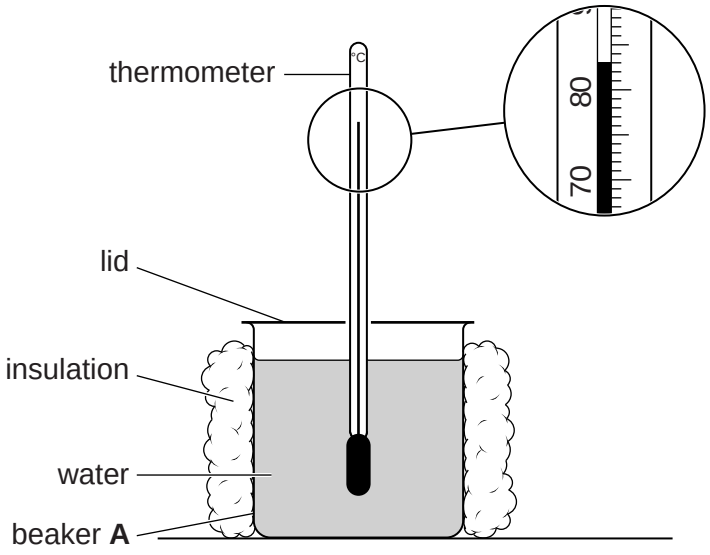


Fig. 5.1

(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. [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/	θ/	θ/	θ/
0		85	78
30	80	79	74
60	77	74	71
90	75	70	68
120	73	67	66
150	71	64	64

© UCLES 2016

(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.

.....

.....

.....[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. .....

.....

2. .....

.....

[2]

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

material .....

reason .....

.....

[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.

.....

.....

.....

.....[2]

[Total: 10]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.