UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

PHYSICS **0625/51**

Paper 5 Practical Test **October/November 2013**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces at the top of the page.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, 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.

For Examiner's Use	
1	
2	
3	
4	
Total	

This document consists of **9** printed pages and **3** blank pages.

1 In this experiment, you will investigate the stretching of a spring.

For Examiner's Use

Carry out the following instructions, referring to Fig. 1.1 and Fig. 1.2. Do **not** move the large load that is on the bench. At the start of the experiment, the spring should not be attached to the forcemeter.

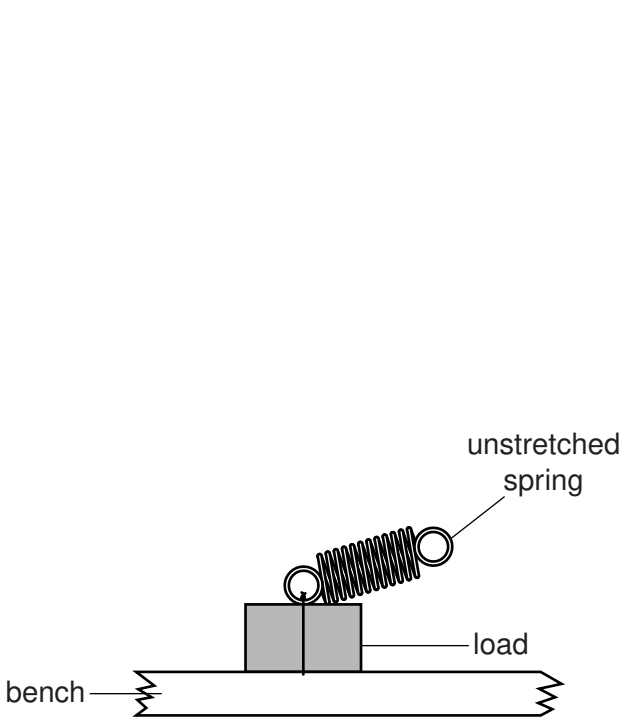


Fig. 1.1

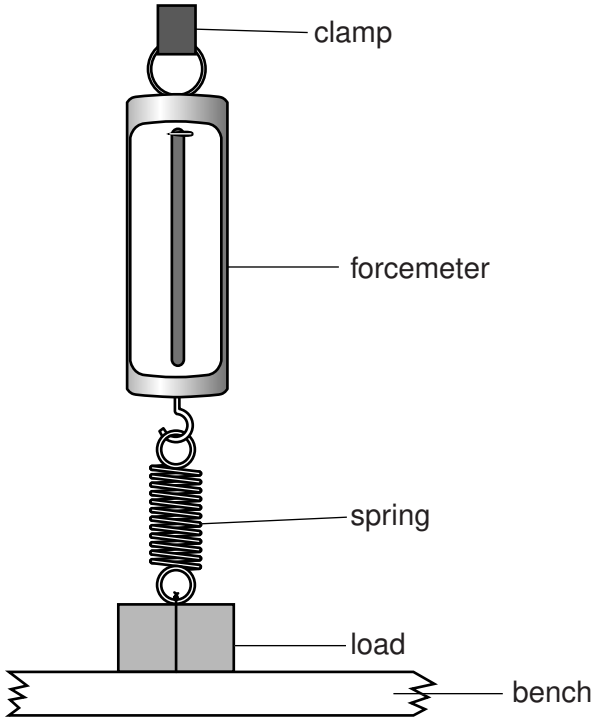


Fig. 1.2

(a) (i) Measure the **unstretched** length l_0 of the spring, in mm.

l_0 = ... mm

(ii) On **Fig. 1.1**, mark clearly the distance you have measured.

(iii) Attach the spring to the forcemeter, as shown in Fig. 1.2. The load must remain on the bench.

(iv) Gently raise the forcemeter until it reads 1.0 N. Clamp the forcemeter in this position.

Record the forcemeter reading *F* in Table 1.1. Measure, and record in the table, the new length l of the spring.

(v) Calculate the extension *e* of the spring using the equation $e = (l - l_0)$. Record the value of *e* in the table.

(vi) Repeat steps **(iv)** and **(v)** using forcemeter readings of 2.0 N, 3.0 N, 4.0 N and 5.0 N. Record all the readings and results in the table.

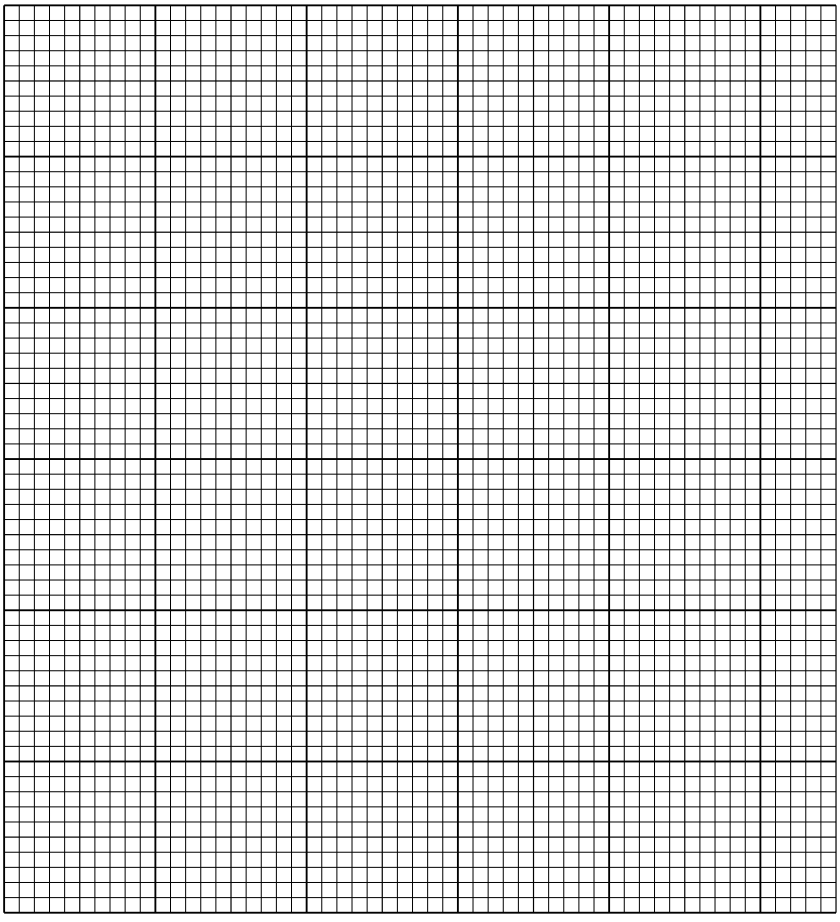
For Examiner's Use

Table 1.1

F/N	l/mm	e/mm

[4]

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



[4]

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

G = ... [2]

[Total: 10]

[Turn over

2 In this experiment, you will investigate the cooling of a thermometer bulb.

For Examiner's Use

Carry out the following instructions, referring to Figs. 2.1, 2.2 and 2.3.

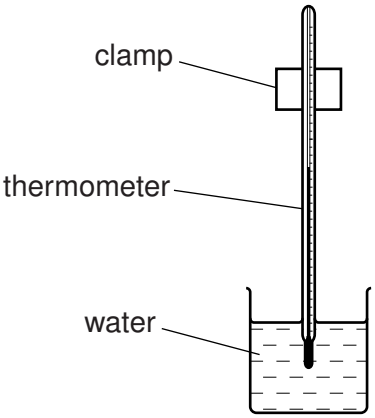


Fig. 2.1

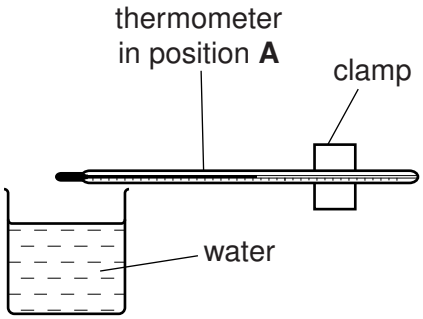


Fig. 2.2

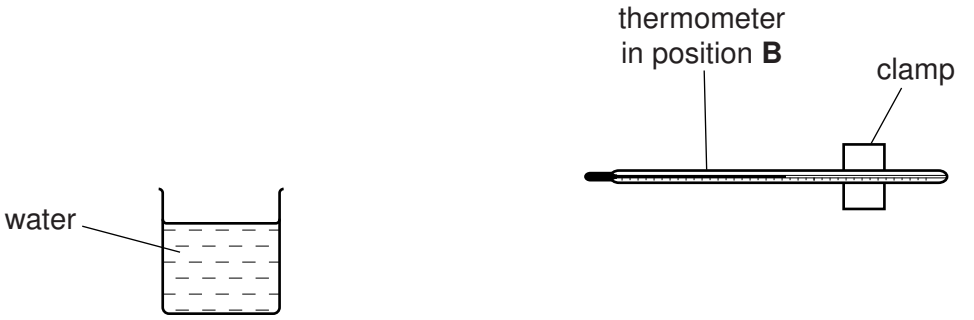


Fig. 2.3

Place the thermometer in the beaker of hot water, as shown in Fig. 2.1.

(a) (i) When the thermometer reading stops rising, record the temperature θ_H of the hot water.

θ_H = ...[1]

(ii) Quickly move the thermometer until the thermometer bulb is in position **A**, just above the beaker, as shown in Fig. 2.2. Immediately start the stopclock.

(iii) After 30 s, measure the temperature θ shown on the thermometer. Record the time t = 30 s and the temperature reading in Table 2.1.

(iv) Continue recording the time and temperature readings every 30 s until you have six sets of readings.

Table 2.1

For Examiner's Use

	Position **A**	Position **B**
t/	θ/	θ/

[5]

(b) Complete the column headings in the table.

(c) Replace the thermometer in the beaker of hot water. When the thermometer reading stops rising, record the temperature θ_H.

θ_H = ...[1]

(d) (i) Quickly move the thermometer at least 10 cm away from the beaker to position **B**, as shown in Fig. 2.3. Immediately start the stopclock.

(ii) After 30 s, measure the temperature θ shown on the thermometer. Record the temperature reading in Table 2.1.

(iii) Continue recording the temperature every 30 s until you have six readings.

(e) Describe briefly a precaution that you took in order to make the temperature readings reliable.

.....

.....[1]

(f) A scientist is using this experiment as part of research into convection currents of air above hot water.

Suggest two conditions that should be kept constant when this experiment is repeated.

1. .....

2. .....
[2]

[Total: 10]

3 In this experiment, you will investigate the power of lamps in a circuit.

Carry out the following instructions, referring to Fig. 3.1.

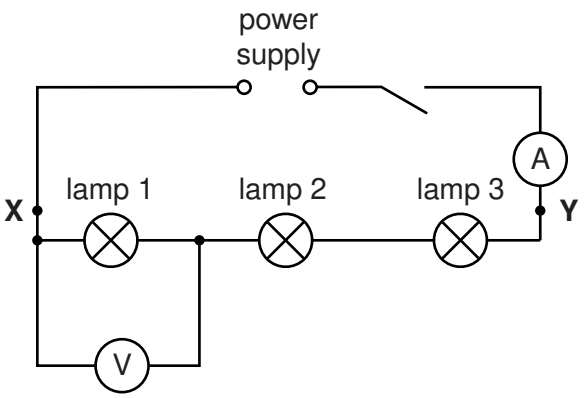


Fig. 3.1

(a) (i) 1. Switch on. Measure and record the potential difference V_1 across lamp 1 and the current I in the circuit. Switch off.

V_1 = ...

I = ...
[2]

2. Calculate the power P_1 of lamp 1 using the equation $P_1 = I V_1$.

P_1 = ...[1]

(ii) 1. Disconnect the voltmeter and reconnect it to measure the potential difference V_2 across lamp 2. Switch on to take the reading and then switch off.

V_2 = ...

2. Calculate the power P_2 of lamp 2 using the equation $P_2 = I V_2$.

P_2 = ...
[1]

(iii) 1. Disconnect the voltmeter and reconnect it to measure the potential difference V_3 across lamp 3. Switch on to take the reading and then switch off.

V_3 = ...

2. Calculate the power P_3 of lamp 3 using the equation $P_3 = I V_3$.

P_3 = ...
[1]

(iv) **1.** Disconnect the voltmeter. Reconnect the voltmeter to measure the potential difference V across all three lamps. Switch on to take the reading and then switch off.

V = ...

2. Calculate the total power P_T of the three lamps using the equation $P_T = I V$.

P_T = ...
[1]

(b) A student suggests that P_T should be equal to $P_1 + P_2 + P_3$.

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

statement .....

justification .....

.....
[1]

(c) **(i)** Draw a circuit diagram, similar to that in Fig. 3.1, to show

- a variable resistor in series with the power supply,
- the three lamps in parallel with each other between **X** and **Y**,
- the voltmeter connected to measure the potential difference across the lamps.

Use standard symbols. You are not asked to set up this circuit.

[2]

(ii) State the purpose of the variable resistor in this circuit.

.....

.....

.....[1]

[Total: 10]

4 In this experiment, you will determine the focal length of a converging lens.

For Examiner's Use

Carry out the following instructions, referring to Fig. 4.1.

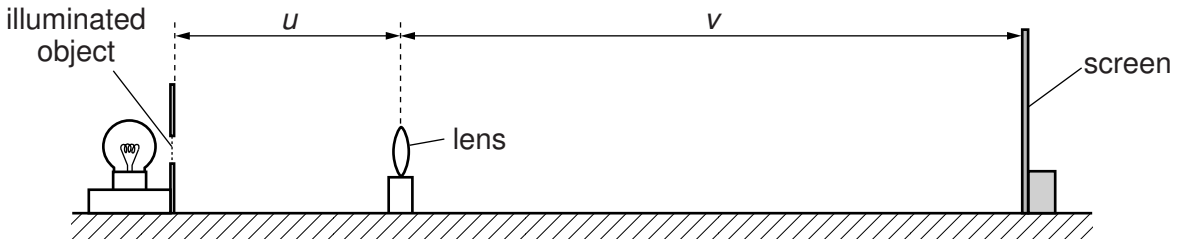


Fig. 4.1

(a) Place the lens a distance $u = 30.0$ cm from the illuminated object. Move the screen until a sharply focused image of the object is seen on the screen.

(i) Measure the distance v between the centre of the lens and the screen.

$v =$ .....[1]

(ii) Calculate uv.

$uv =$ .....

(iii) Calculate $(u + v)$.

$(u + v) =$ .....
[1]

(iv) Calculate the focal length f of the lens using the equation $f = \dfrac{uv}{(u + v)}$.

$f =$ .....[1]

(b) Repeat the steps in **(a)** using $u = 40.0\,\text{cm}$.

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$v =$ .....

$uv =$ .....

$u + v =$ .....

$f =$ .....
[2]

(c) (i) Check that $u = 40.0\,\text{cm}$. Carefully move the screen backwards and forwards to obtain the range of v values for which the image is well focused.

range of v values = ... to ..... [1]

(ii) From your results in parts **(a)** and **(b)**, calculate an average value f_{AV} for the focal length of the lens, giving your answer to a suitable number of significant figures for this experiment.

$f_{AV} =$ .....[2]

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

1. .....

.....

2. .....

.....
[2]

[Total: 10]

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