UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

PHYSICS **0625/61**

Paper 6 Alternative to Practical **October/November 2013**

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 a pencil for any diagrams or graphs.
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.

This document consists of **16** printed pages.

1 The IGCSE class is carrying out a moments experiment by balancing a metre rule on a pivot.

(a) A student has a small pivot and a metre rule.

Explain briefly how the student finds the position of the centre of mass of the metre rule.

.....

.....

.....[1]

(b) The student finds that the centre of mass is not in the middle of the rule but at the 50.2 cm mark.

Explain what the student could do to prevent this from affecting her results.

.....

.....[1]

(c) The student places the metre rule on a pivot so that it balances.

She places a load **P** on one side of the metre rule at a distance *x* from the pivot. She places another load **Q** on the metre rule and adjusts the position of the load **Q** so that the rule balances, as shown in Fig. 1.1.

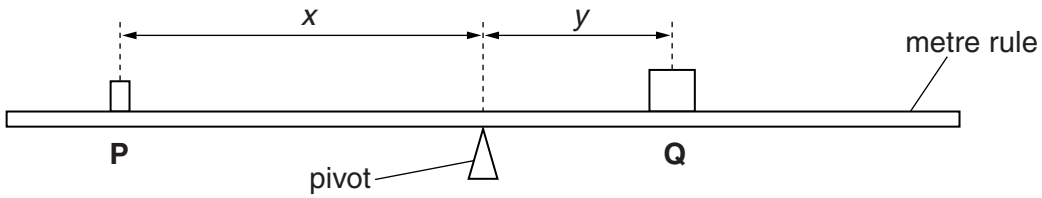


Fig. 1.1

The load **Q** is a distance *y* from the pivot.

The readings are shown in Table 1.1.

Table 1.1

weight of **P**/N	weight of **Q**/N	*x*/	*y*/
2.0	5.0	39.0	15.5

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

(ii) Calculate the clockwise moment and the anticlockwise moment using the equation

moment of a force = force × perpendicular distance to the pivot.

clockwise moment = ...

anticlockwise moment = ...
[1]

(d) In practice, it is difficult to adjust the loads to make the rule balance exactly.

Explain briefly how you would reduce the uncertainty in the position of **Q** required for exact balance.

.....

.....[1]

[Total: 5]

2 An IGCSE student is investigating the cooling of a thermometer bulb.

The apparatus used is shown in Figs. 2.1, 2.2 and 2.3.

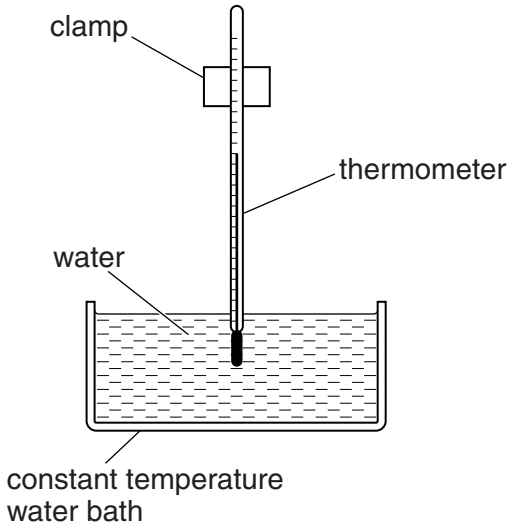


Fig. 2.1

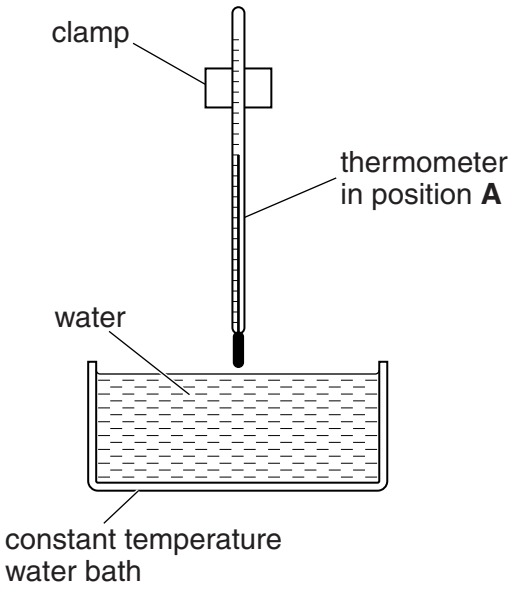


Fig. 2.2

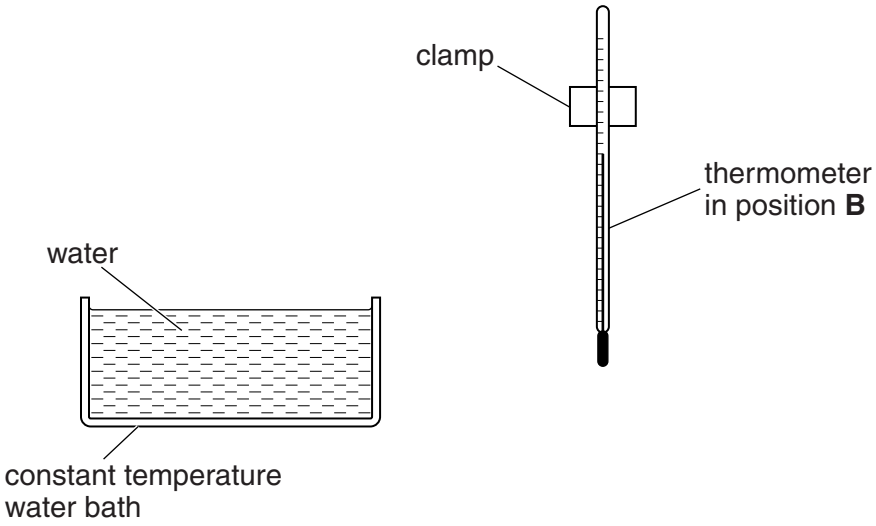


Fig. 2.3

(a) The student places the thermometer in the water bath, as shown in Fig. 2.1.

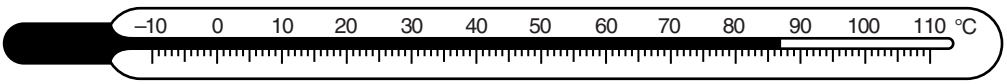


Fig. 2.4

Write down the temperature θ_H of the water bath, shown on the thermometer in Fig. 2.4.

θ_H = ... [1]

(b) The student moves the thermometer until the thermometer bulb is in position **A** the surface of the water, as shown in Fig. 2.2. She starts a stopclock. She records time and temperature readings every 30 s.

She replaces the thermometer in the water bath, still at temperature θ_H.

She then moves the thermometer to position **B**, as shown in Fig. 2.3. She records the time and temperature readings every 30 s.

All the readings are shown in Table 2.1.

Table 2.1

	position **A**	position **B**
t/	θ/	θ/
30	79	66
60	74	42
90	70	29
120	66	27
150	61	26
180	56	26

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

(ii) State in which position, **A** or **B**, the thermometer has the greater rate of cooling **in the first 30 s**.

position .....

(iii) Explain briefly how you reached this conclusion.

.....

.....

.....[1]

(iv) Calculate the temperature difference from 30 s to 180 s for each set of readings.

temperature difference for position **A** = ...

temperature difference for position **B** = ...
[1]

(v) Estimate room temperature θ_R.

θ_R = ... [1]

(c) Describe briefly a precaution you would take to make the temperature readings more accurate.

.....

.....[1]

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

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

1. .....

2. .....
[2]

[Total: 8]

Question 3 begins on page 8.

3 The IGCSE class is investigating the power of lamps in a circuit.

Fig. 3.1 shows the circuit used.

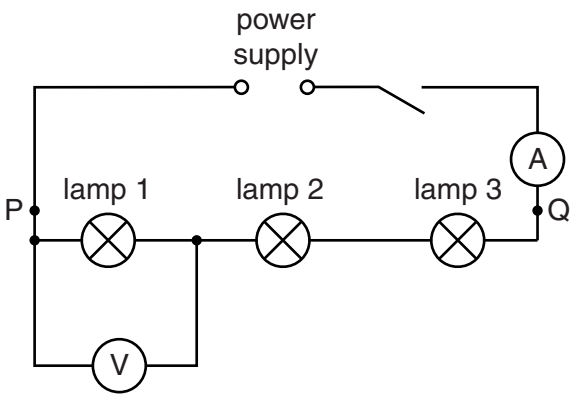


Fig. 3.1

(a) A student measures the potential difference V_1 across lamp 1 and the current I in the circuit. The meters are shown in Fig. 3.2.

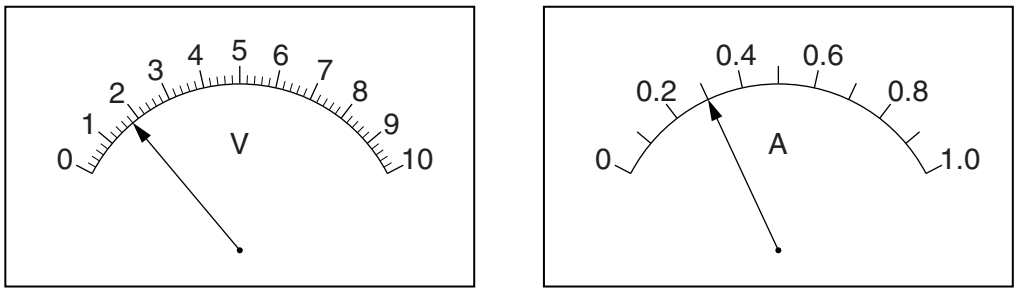


Fig. 3.2

(i) Write down the readings shown on the meters in Fig. 3.2.

V_1 = ...

I = ...

(ii) Calculate the power P_1 of lamp 1 using the equation $P_1 = IV_1$.

P_1 = ...

(iii) The student reconnects the voltmeter to measure the potential difference V_2 across lamp 2 and then V_3 across lamp 3.

Write down the readings shown on the meters in Figs. 3.3 and 3.4.

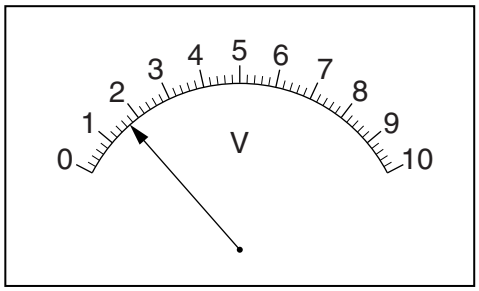


Fig. 3.3

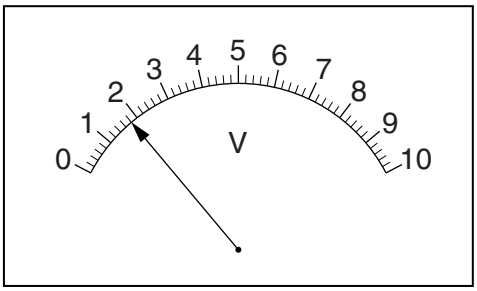


Fig. 3.4

V_2 = ... V_3 = ...

(iv) Calculate the power for each lamp using the equation $P = IV$.

P_2 = ...

P_3 = ... [3]

(v) Calculate the total power P_T for the three lamps using the equation $P_T = P_1 + P_2 + P_3$.

P_T = ... [1]

(b) The student connects the voltmeter across the three lamps and records the potential difference. He calculates the power P.

P = 1.61 W .....

Another student suggests that P_T should be equal to P.

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

statement .....

justification .....

.....

[2]

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

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

Use standard symbols.

[2]

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

.....

.....[1]

[Total: 9]

Question 4 begins on page 12.

4 The IGCSE class is determining the focal length of a converging lens.

Fig. 4.1 shows the apparatus used to produce an image on the screen.

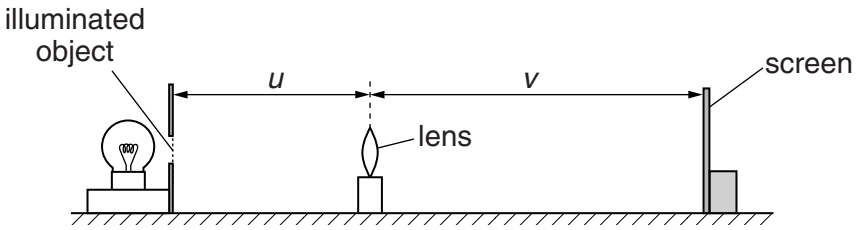


Fig. 4.1

(a) (i) On Fig. 4.1, measure the distance *u* between the illuminated object and the centre of the lens.

u = ...

(ii) On Fig. 4.1, measure the distance *v* between the centre of the lens and the screen.

v = ...
[2]

(b) (i) Calculate *uv*.

uv = ...

(ii) Calculate *u* + *v*.

u + *v* = ...
[1]

(iii) Calculate *x* using the equation $x = \frac{uv}{(u+v)}$.

x = ... [1]

(c) Fig. 4.1 is drawn 1/10th of actual size. The focal length *f* of the lens is given by the equation *f* = 10*x*.

Calculate a value for the focal length *f* of the lens, giving your answer to a suitable number of significant figures for this experiment.

f = ... [2]

(d) A student carrying out this experiment changes the position of the lens and then ... the screen to produce a well-focused image.

She records the distance v between the centre of the lens and the screen as $v = 18.2$ cm. She finds it difficult to decide the exact point at which the image is sharpest.

Suggest a range of v values for which the image may appear well-focused.

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

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

1. .....

.....

2. .....

.....

[2]

[Total: 9]

5 The IGCSE class is investigating the stretching of a spring.

Fig. 5.1 shows the apparatus.

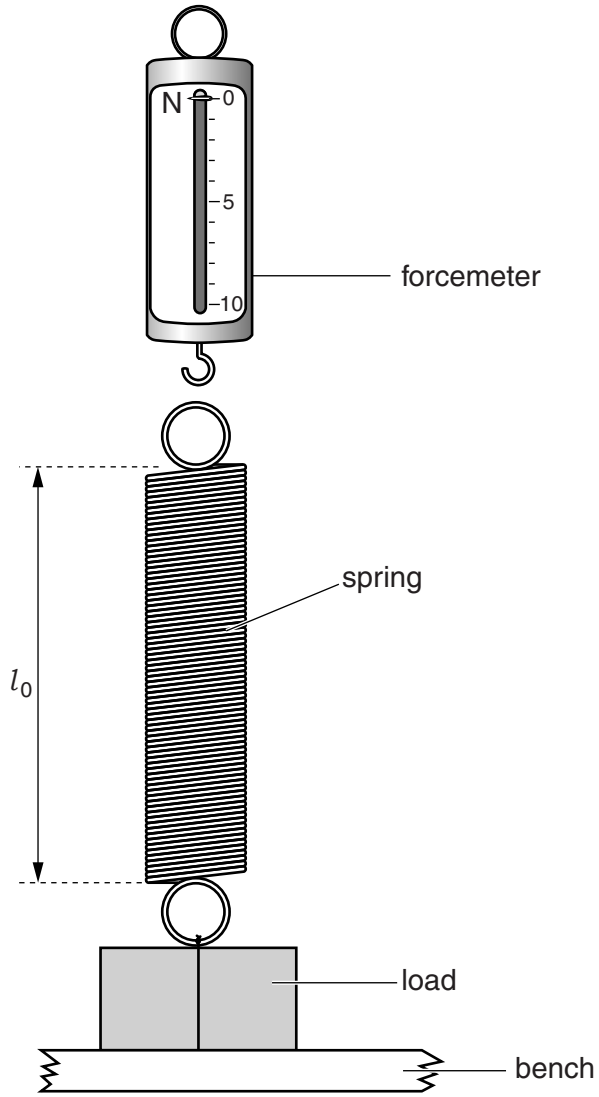


Fig. 5.1

(a) On Fig. 5.1, measure the unstretched length l_0 of the spring, in mm.

l_0 = ... mm [1]

(b) A student hangs the spring on the forcemeter with the load attached to the bottom of the spring, as shown in Fig. 5.1. The load remains on the bench.

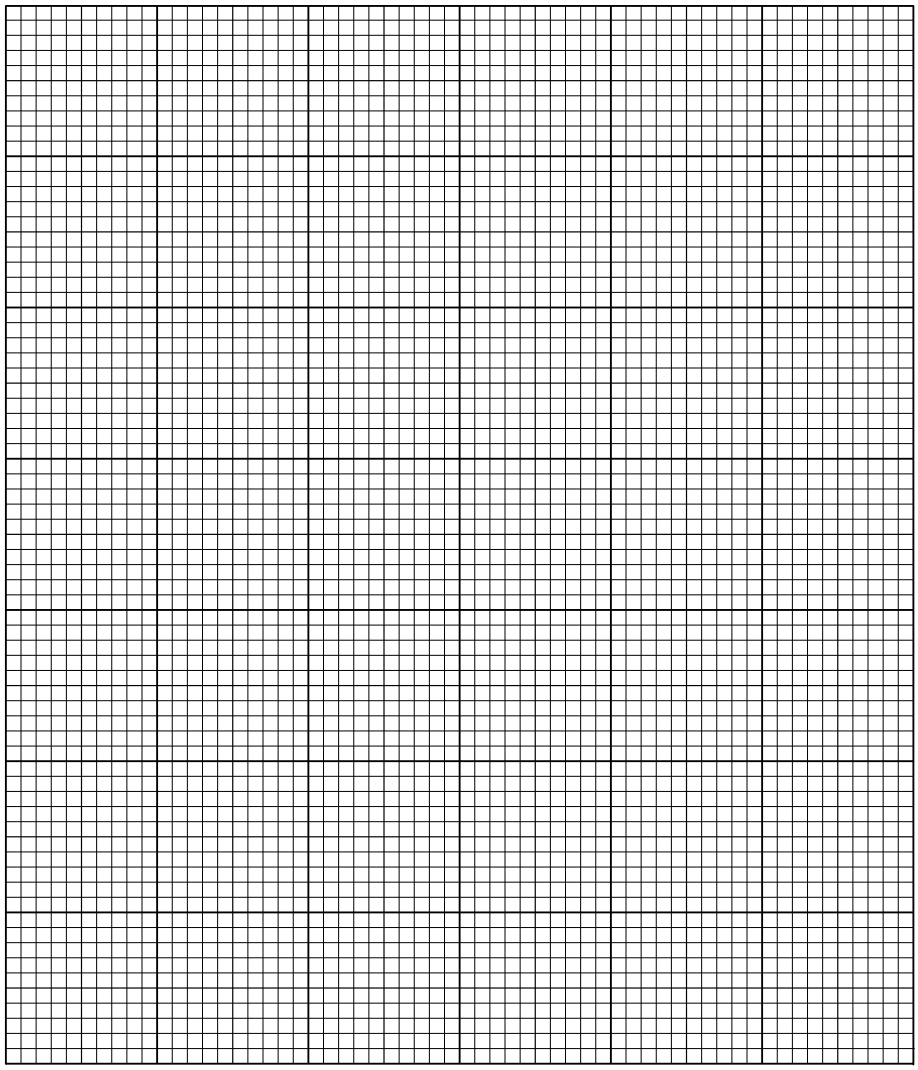
He gently raises the forcemeter until it reads 1.0 N. He measures the new length l of the spring. He repeats the procedure using a range of forcemeter readings. The readings are recorded in Table 5.1.

Table 5.1

F/N	l/mm	e/mm
1.0	67	
2.0	77	
3.0	91	
4.0	105	
5.0	115	

(i) Calculate the extension e of the spring, for each set of readings, using the equation $e = (l - l_0)$. Record the values of e in Table 5.1. [1]

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



[5]

(iii) Determine the gradient G of the graph. Show clearly on the graph how you ob… the necessary information.

G = ... [2]

[Total: 9]