Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME		
CENTRE NUMBER		CANDIDATE NUMBER

PHYSICS **0625/52**

Paper 5 Practical Test **February/March 2015**

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 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.

For Examiner's Use	
1	
2	
3	
4	
Total	

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 **11** printed pages and **1** blank page.

DC (NH/CGW) 94505/4

1 In this experiment, you will investigate the link between the brightness of a filament lamp and its resistance.

The circuit has been set up for you. Carry out the following instructions, referring to Fig. 1.1.

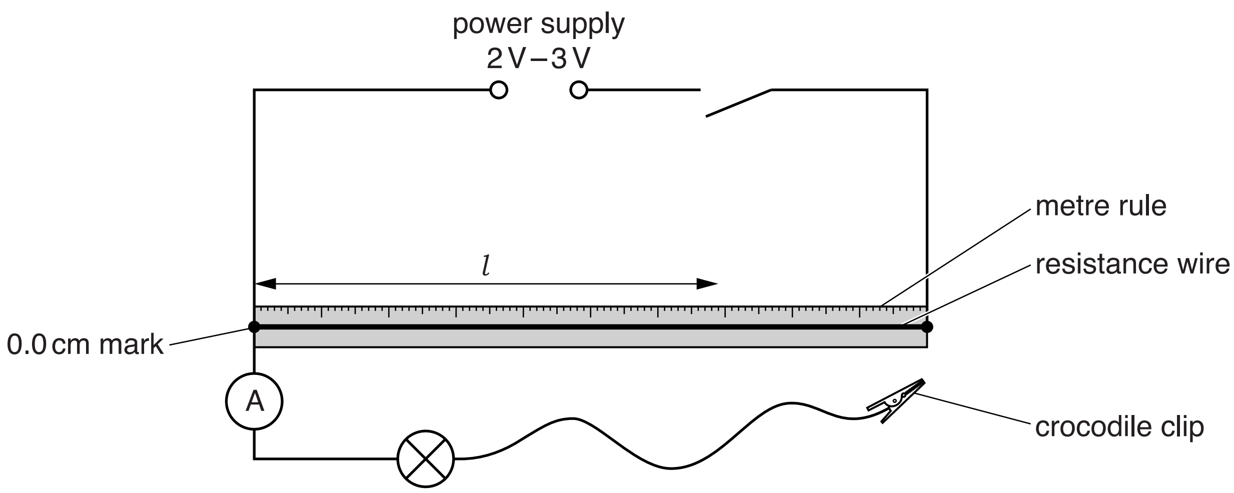

Fig. 1.1

(a) **(i)** On Fig. 1.1, use standard symbols to show a voltmeter connected to measure the potential difference across the lamp. [1]

(ii) Connect the voltmeter in this position.

(b) **(i)** Connect the crocodile clip to a length l of the resistance wire, where $l = 100$ cm.

(ii) Switch on. In Table 1.1, record the potential difference V and the current I for the lamp. Switch off.

Table 1.1

l/cm	V/V	I/A	R/Ω
100			
70			
30			

(iii) Repeat steps **(b)(i)** and **(b)(ii)** for values of $l = 70$ cm and 30 cm.

[2]

(c) Calculate, and record in the table, the resistance R of the lamp for each value of l, using the equation $R = \frac{V}{I}$. [2]

(d) From your results and your observations of the lamp filament, state the link, if any, between the brightness of the lamp and its resistance. Explain clearly how your results support your statement.

statement ....

explanation ....

....

....

....
[2]

(e) A student wishes to see if another lamp shows the same link between brightness and resistance. However, his lamp only glows dimly when a potential difference of 3V is applied across it.

The student decides that a method using a resistance wire is not suitable.

Suggest an alternative circuit and apparatus which would allow him to vary the brightness of his lamp and to measure the potential difference and current for his lamp. You may draw a circuit diagram.

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....

....

....[3]

[Total: 10]

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

Carry out the following instructions, referring to Fig. 2.1.

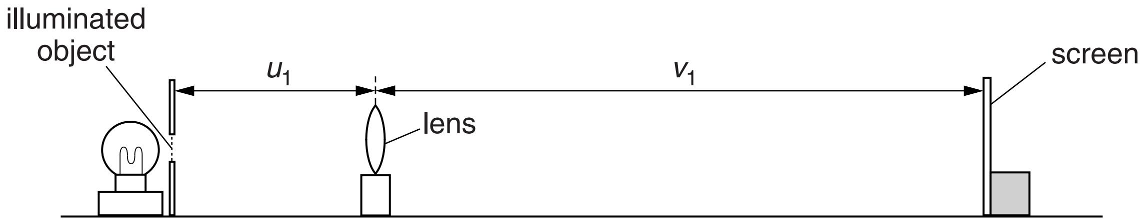

Fig. 2.1

(a) **(i)** Place the lens at a distance u_1 = 25.0 cm from the illuminated object.

(ii) Move the screen until a sharp image of the object appears on the screen.

Do not move the screen from this position for the remainder of the experiment.

(iii) Record the distance v_1 between the lens and the screen.

v_1 = ... [2]

(b) Calculate a value f_1 for the focal length of the lens, using the values from **(a)** and the equation $f_1 = \dfrac{u_1 v_1}{(u_1 + v_1)}$.

f_1 = ... [2]

(c) **(i)** Keeping the illuminated object and screen in the same positions, move the lens towards the screen until a second sharp image is seen on the screen.

(ii) Record the new distance u_2 between the illuminated object and the lens, and the new distance v_2 between the lens and the screen.

u_2 = ...

v_2 = ...
[1]

(d) Calculate another value f_2 for the focal length of the lens, using your results from **(c)(ii)** and the equation $f_2 = \dfrac{u_2 v_2}{(u_2 + v_2)}$.

f_2 = ... [1]

(e) A student suggests that u_2 and v_1 should be equal.

State whether your findings support this suggestion. Justify your statement by reference to your results.

statement ....

justification ....

....

....
[2]

(f) Describe two precautions you took in order to obtain reliable results in this experiment.

1. ....

....

2. ....

....
[2]

[Total: 10]

3 In this experiment, you will determine the mass of a metre rule by a balancing method.

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

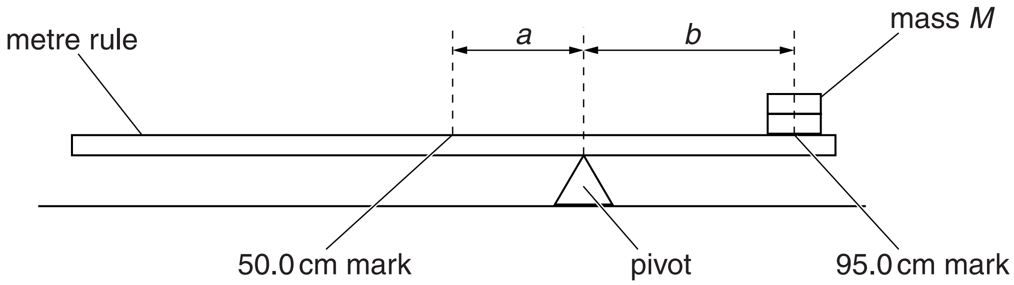

Fig. 3.1

(a) **(i)** Place the metre rule on the pivot. Place a mass $M = 20$ g with its centre at the 95.0 cm mark. Keeping the mass at the 95.0 cm mark, adjust the position of the metre rule on the pivot until the metre rule is as near to being balanced as possible.

Record, in Table 3.1, the position of the pivot.

(ii) Record in the table

- the distance *a* between the 50.0 cm mark and the pivot,
- the distance *b* between the 95.0 cm mark and the pivot.

Table 3.1

M/g	position of pivot/cm	a/cm	b/cm	S
20				
40				
60				
80				
100				

(iii) Repeat steps **(a)(i)** and **(a)(ii)** for values of M = 40 g, 60 g, 80 g and 100 g.

[2]

(b) For each value of *M*, calculate and record in the table the value *S*, where $S = \frac{a}{b}$. [1]

(c) Plot a graph of S (y-axis) against M/g (x-axis).

[4]

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

G = ...[1]

(ii) The mass M_R of the metre rule is numerically equal to $\frac{1}{G}$.

Write down a value for M_R to a suitable number of significant figures for this experiment.

M_R = ...g [1]

(e) Determination of M_R by this method relies on the centre of mass of the rule being at the 50.0 cm mark.

Suggest how you could use the apparatus to test whether this is the case. You may draw a diagram. You are not asked to carry out the experiment.

....

....

....[1]

[Total: 10]

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4 In this experiment, you will investigate how the insulation around a container affects the rate at which water cools.

Two test-tubes, labelled **A** and **B**, have been set up for you. Test-tube **A** has one layer of insulation. Test-tube **B** has three layers of insulation.

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

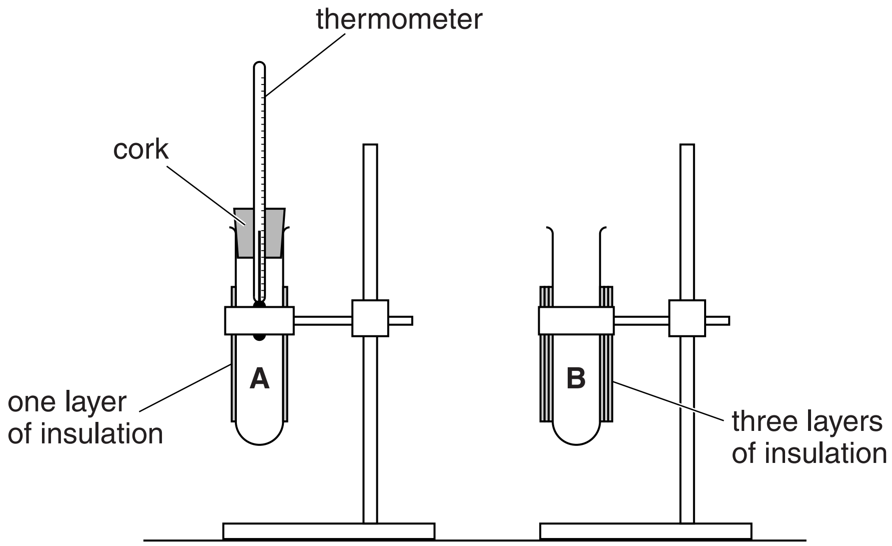

Fig. 4.1

(a) (i) Remove the cork and thermometer from test-tube **A**. Pour hot water into the test-tube, up to the level of the top of the insulation.

(ii) Carefully replace the cork and thermometer. The water level will rise.

(iii) Measure the temperature θ of the hot water and start the stopclock. Record this temperature in the first row of Table 4.1.

(iv) Record in the table the temperature θ of the water at times t = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s.

(v) Complete the column headings in the table.

Table 4.1

	test-tube **A** (1 layer)	test-tube **B** (3 layers)
t/	θ/	θ/

[4]

(b) **(i)** Pour hot water into test-tube **B**, up to the level of the top of the insulation.

Remove the cork and thermometer from test-tube **A**. Place the cork and thermometer in test-tube **B**.

(ii) Repeat steps **(a)(iii)** and **(a)(iv)**.

(c) From your results, state how increasing the number of layers of insulation affects the rate at which water cools. Justify your answer by referring to your results.

statement ....

....

justification ....

....

....

....

[2]

(d) State two ways in which the temperature readings in this experiment were made as reliable as possible.

1. ....

....

2. ....

....

[2]

(e) Suggest two improvements to the apparatus or procedures which will ensure that the investigation into the effect of insulation on the rate of cooling is more reliable.

1. ....

....

2. ....

.... [2]

[Total: 10]