Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICS **0625/61**

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.

DC (NF/SW) 107598/3

CAMBRIDGE International Examinations

1 A student is determining the weight of a metre rule using a balancing method.

The apparatus is shown in Fig. 1.1.

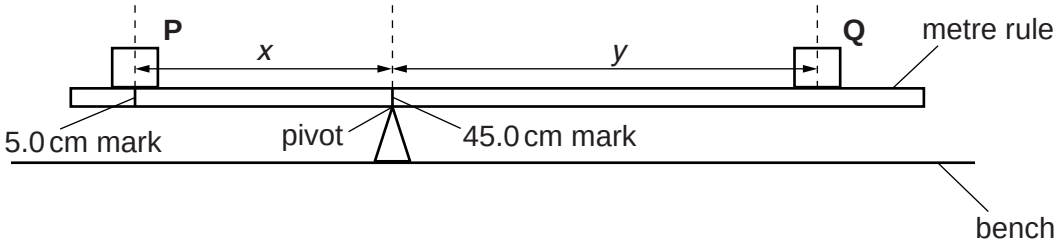


Fig. 1.1 (not to scale)

(a)
- The student places the load **P** on the metre rule at the 5.0 cm mark.
- She places the metre rule on the pivot at the 45.0 cm mark.
- She places load **Q** on the rule and adjusts its position so that the metre rule is as near as possible to being balanced.
- She measures the distance x between the centre of load **P** and the pivot and the distance y from the centre of load **Q** to the pivot.
- She repeats the procedure, placing the load **P** at the 10.0 cm mark, at the 15.0 cm mark, at the 20.0 cm mark and at the 25.0 cm mark. The readings are shown in Table 1.1.

Table 1.1

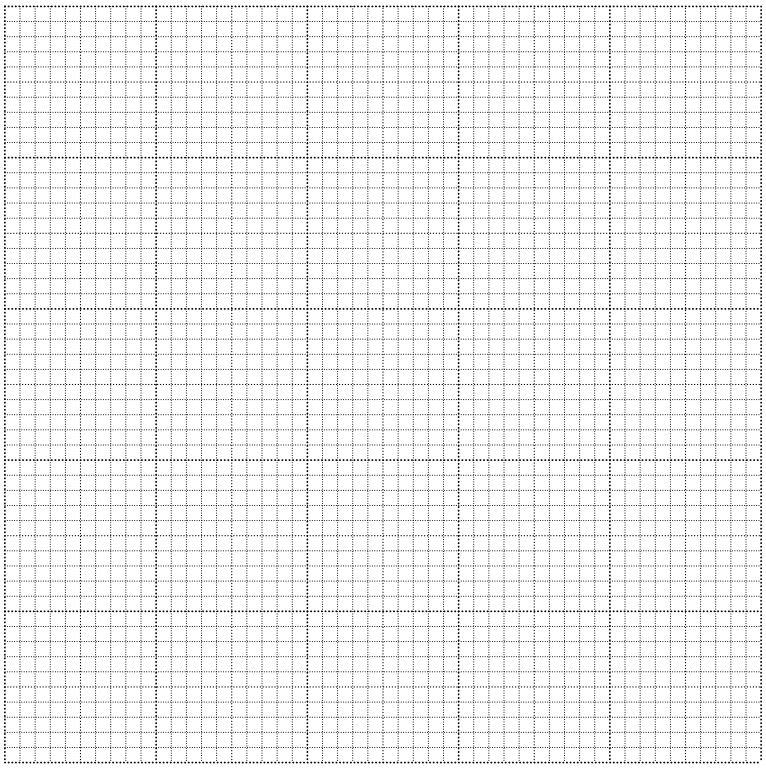
x /	y /	A /	B /
40.0	42.5		
35.0	36.0		
30.0	30.0		
25.0	24.0		
20.0	17.5		

(i)
- For each value of x, calculate $A = Px$, where P = 1.00 N. Record the values in the table. P is the weight of load **P**.
- For each value of y, calculate $B = Qy$, where Q = 0.80 N. Record the values in the table. Q is the weight of load **Q**.

[1]

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

(b) Plot a graph of A / N cm (y-axis) against B / N cm (x-axis). Start both axes at the origin (0,0).



[4]

(c) Using the graph, determine the vertical intercept Y (the value of A when B = 0 N cm). Show clearly on the graph how you obtained this value.

Y = ... [1]

(d) Calculate the weight W of the metre rule using the equation $W = \frac{Y}{z}$, where z = 5.0 cm.

W = ... [1]

(e) Suggest one practical reason why it is difficult to obtain exact results with this experiment.

.....

..... [1]

(f) The student uses an accurate electronic balance to obtain a second value for the weight of the metre rule.

weight obtained on the balance = ... 1.24 N .....

State and explain whether the two values for the weight agree within the limits of experimental accuracy.

statement .....

justification .....

.....

[1]

[Total: 10]

2 A student is heating water in a beaker using an electrical heater.

(a) He measures the potential difference V across the heater and the current I in the heater.

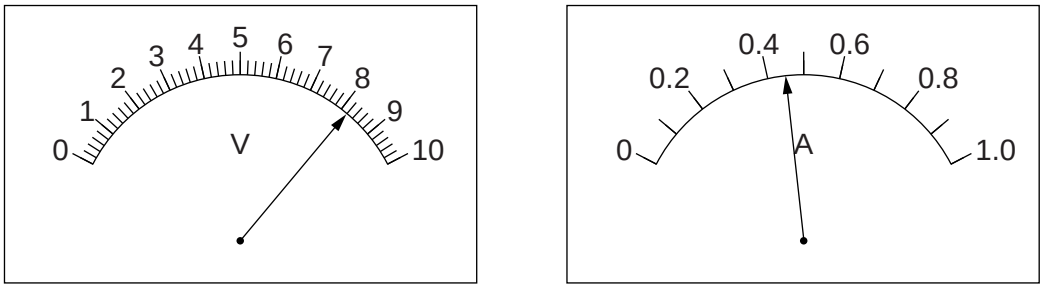


Fig. 2.1

Write down the readings shown on the meters in Fig. 2.1.

V = ...

I = ...

[3]

(b) He measures the temperature of the water before heating.

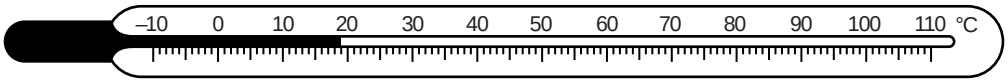
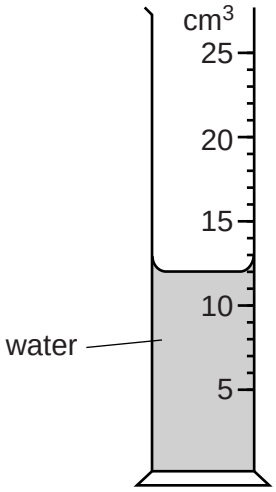


Fig. 2.2

Write down the temperature reading θ shown in Fig. 2.2.

θ = ... [1]

(c) On Fig. 2.3, draw a line and an eye to show clearly the line of sight required to read the volume of water in the measuring cylinder.



[1]

Fig. 2.3

[Total: 5]

3 A student is investigating the resistance of a lamp filament.

The circuit is shown in Fig. 3.1.

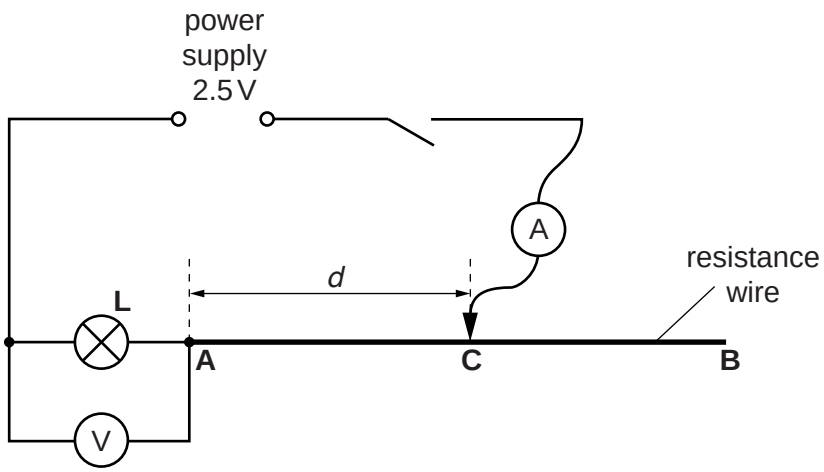


Fig. 3.1

(a) The student places a sliding contact **C** on the resistance wire at a distance d = 0.200 m from point **A**. He measures the current I in the circuit and the p.d. V across the lamp **L**.

He repeats the procedure using values for d of 0.400 m, 0.600 m and 0.800 m. The readings are shown in Table 3.1.

(i) Calculate the resistance R of the lamp filament for each set of readings. Use the equation $R = \frac{V}{I}$. [2]

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

Table 3.1

d /	V /	I /	R /	appearance of lamp filament
0.200	1.6	1.00		very bright
0.400	1.3	0.86		bright
0.600	1.0	0.74		dim
0.800	0.8	0.66		does not glow

(b) The student notices that the lamp does not glow when he takes the final set of readings. He thinks that the filament has broken.

State whether the student is correct and give a reason for your answer.

statement .....

reason .....

.....
[1]

(c) A student suggests that the resistance *R* of the lamp filament should be constant.

Suggest, referring to the observations, a reason why the resistance *R* may not be constant in this experiment.

.....

.....

.....

..... [2]

(d) **(i)** Name an electrical component that could be used, instead of the resistance wire **AB** and sliding contact, to vary the current I.

..... [1]

(ii) Draw a diagram of the circuit including this component instead of the resistance wire and sliding contact.

[2]

[Total: 9]

4 A student is investigating the effect of insulation on the rate of cooling of hot water in a 250 cm^3 container.

The student can choose from the following apparatus:

thermometer
250 cm^3 glass beaker
250 cm^3 plastic beaker
250 cm^3 copper can
250 cm^3 measuring cylinder
three different insulating materials
clamp, boss and stand
stopwatch.

Plan an experiment to investigate the effectiveness of the three insulating materials.

You should

- explain briefly how you would carry out the investigation,
- 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,
- explain how you would use your readings to reach a conclusion.

A diagram is not required but you may draw a diagram if it helps your explanation.

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.... [7]

[Total: 7]

5 A student determines the focal length of a lens.

The apparatus is shown in Fig. 5.1.

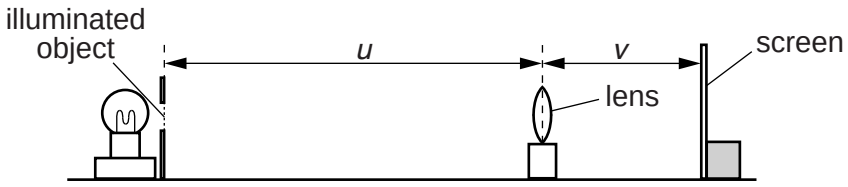

Fig. 5.1

(a) The student places the lens at a distance *u* from the illuminated object. He moves the screen until a sharply focused image of the object is seen on the screen.

On Fig. 5.1,

- measure the distance *u* from the illuminated object to the centre of the lens,

u = ... mm

- measure the distance *v* from the screen to the centre of the lens.

v = ... mm
[1]

(b) Fig. 5.1 is drawn 1/10th actual size.

(i) • Calculate the actual distance *U* from the illuminated object to the centre of the lens.

U = ... mm

- Calculate the actual distance *V* from the screen to the centre of the lens.

V = ... mm
[1]

(ii) Calculate a value f_1 for the focal length of the lens using the equation $f_1 = \frac{UV}{(U + V)}$.

f_1 = ... mm
[2]

(c) A second student repeats the experiment three times using a different lens. His values for the focal length of his lens are shown in Table 5.1.

Table 5.1

	1	2	3
focal length/mm	132	141	135

Calculate the average value f_2 for the focal length of this student's lens.

f_2 = ... mm [1]

(d) A third student, using the same method, finds that the focal length f of her lens is 200 mm.

She reads in a book that when $u = 2f$, the distances u and v, as shown in Fig. 5.1, are equal.

- Calculate $2f$ for this student's lens.

$2f$ = ... mm

The student sets up the apparatus as shown in Fig. 5.2. She adjusts both x and y to be 400 mm.

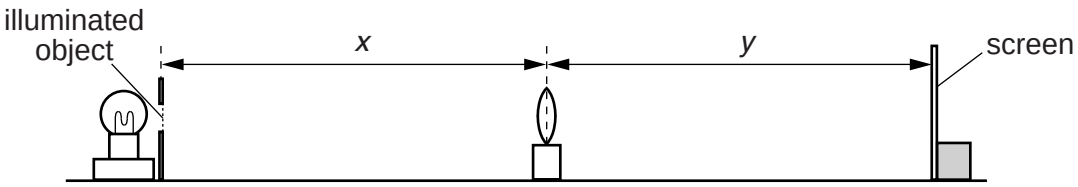

Fig. 5.2

She observes that the image is blurred. The student slowly increases the distance y, and obtains a sharply focused image when $y = 406$ mm.

Discuss whether the student's results confirm the statement in the book.

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.....

.....
[2]

(e) Suggest two precautions that you would take in this investigation in order to obtain reliable results.

1. .....

.....

2. .....

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[2]

[Total: 9]