Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

9430622255

PHYSICS **0625/53**

Paper 5 Practical Test **May/June 2017**

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.
You are advised to spend about 20 minutes on each of questions 1 to 3, and 15 minutes on question 4.
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 **12** printed pages.

DC (KN/SG) 125972/7

CAMBRIDGE International Examinations

[Turn over

1 In this experiment, you will investigate the resistance of a power supply. The circuit has been set up for you.

Carry out the following instructions, referring to Fig. 1.1.

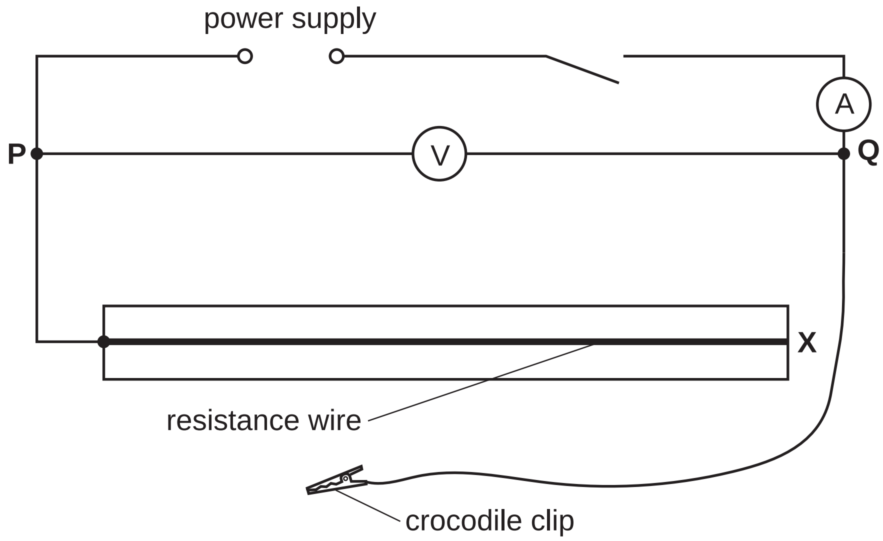

Fig. 1.1

(a)
- Connect the crocodile clip near end **X** of the resistance wire.
- Switch on.
- Adjust the position of the crocodile clip until the potential difference *V* across terminals **P** and **Q** is 2.0 V.
- Record, in Table 1.1, the value of the current *I* shown on the ammeter.
- Move the crocodile clip and record values of *I* for *V* = 1.8 V, 1.6 V, 1.4 V and 1.2 V.
- Switch off.

Table 1.1

I / A	*V* / V
	2.0
	1.8
	1.6
	1.4
	1.2

[2]

(b) Plot a graph of *V* / V (*y*-axis) against *I* / A (*x*-axis).

[4]

(c) **(i)** Determine the gradient *M* of the graph.

Show clearly on the graph how you obtained the necessary information.

M = ... [1]

(ii) The gradient *M* is numerically equal to the resistance *R* of the power supply.

Write down the resistance *R* to a suitable number of significant figures for this experiment.

R = ... [2]

(d) Suggest **one** practical reason why the crocodile clip should not be connected to very short lengths of resistance wire in order to obtain smaller potential differences.

....

....

....[1]

(e) In this type of experiment, it is possible to change the potential difference by using a variable resistor rather than using different lengths of a resistance wire.

In the space, draw the standard circuit symbol for a variable resistor.

[1]

[Total: 11]

2 In this experiment, you will determine the density of water by two methods.

Method 1

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

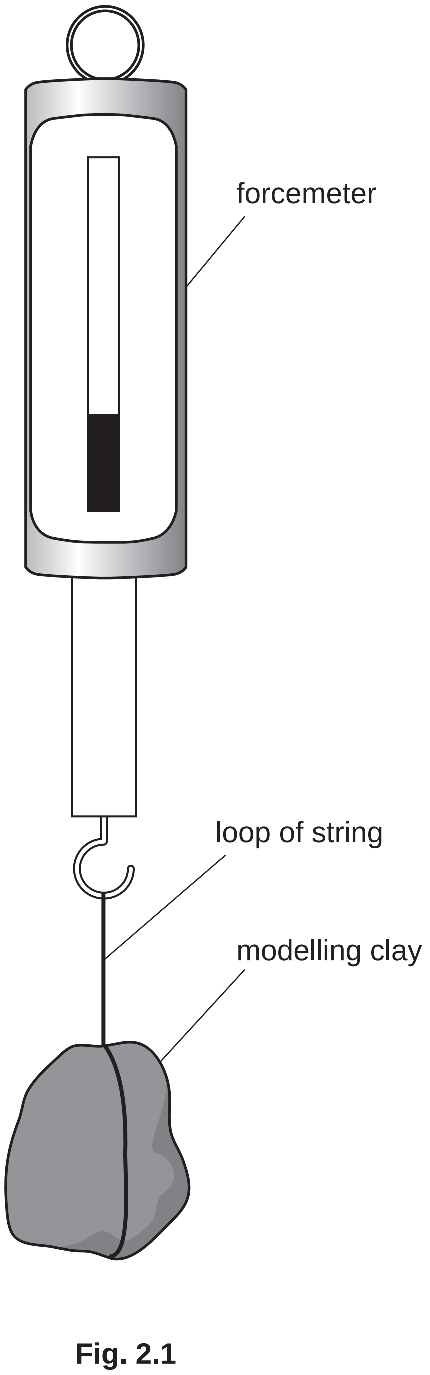

Fig. 2.1

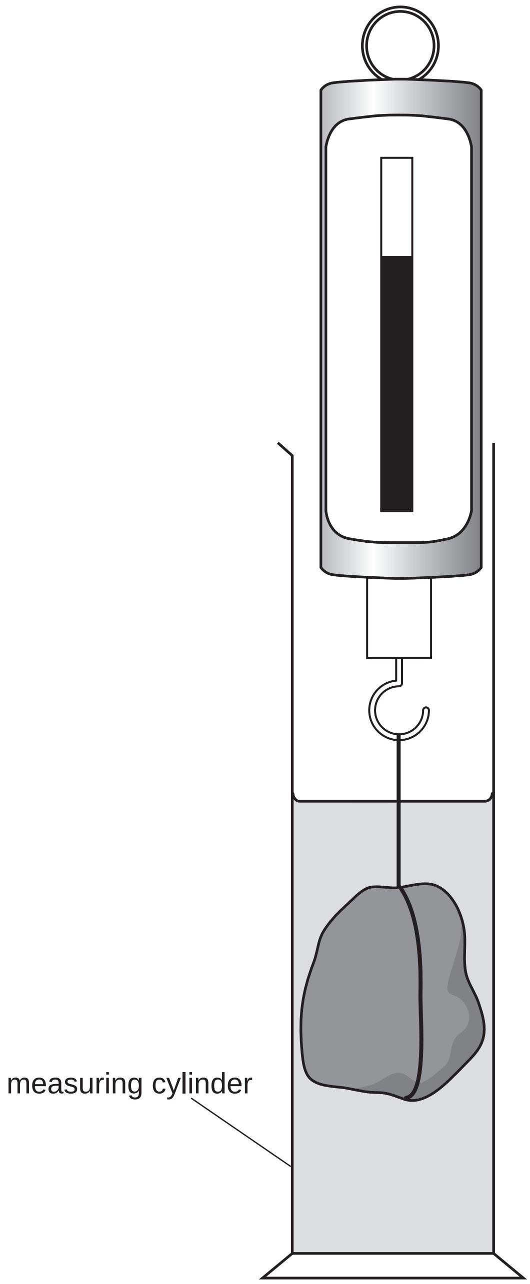

Fig. 2.2

(a) Measure the weight W_1 of the piece of modelling clay, as shown in Fig. 2.1.

W_1 = ... N [1]

(b) **(i)** Pour approximately 150 cm^3 of water into the measuring cylinder.

Record the volume V_1 of the water in the measuring cylinder.

V_1 = ... cm^3 [1]

(ii) Describe briefly how a measuring cylinder is read to obtain an accurate value for the volume of water. You may draw a diagram.

....

....

....[2]

(c) Lower the piece of modelling clay into the water as shown in Fig. 2.2.

- Record the new reading W_2 of the forcemeter.

W_2 = ... N

- Record the new reading V_2 of the measuring cylinder, with the piece of modelling clay in the water.

V_2 = ... cm^3

- Remove the modelling clay from the measuring cylinder.
- **Do not empty the measuring cylinder**. [1]

(d) Calculate a value ρ_1 for the density of water, using your readings from **(a)**, **(b)** and **(c)** and the equation

$$\rho_1 = \frac{(W_1 - W_2)}{(V_2 - V_1)} \times k$$

where k = 100 g/N.

ρ_1 = ...[2]

Method 2

(e) • Measure the mass m_1 of the measuring cylinder, still containing the volume V_1 of water. Use the balance provided.

m_1 = ...

• Empty the measuring cylinder.

• Measure the mass m_2 of the empty measuring cylinder.

m_2 = ...
[1]

(f) Calculate a second value ρ_2 for the density of water, using your readings from **(b)** and **(e)** and the equation

$$\rho_2 = \frac{(m_1 - m_2)}{V_1}.$$

ρ_2 = ... [1]

(g) Suggest a possible source of inaccuracy in either **Method 1** or **Method 2**, even when they are carried out carefully.

Explain how an improvement might be made to reduce this inaccuracy.

suggestion ....

....

explanation of improvement ....

....

....
[2]

[Total: 11]

3 In this experiment, you will investigate the refraction of light by a transparent block. You will determine a quantity known as the refractive index of the material of the block.

Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 3.1 for guidance.

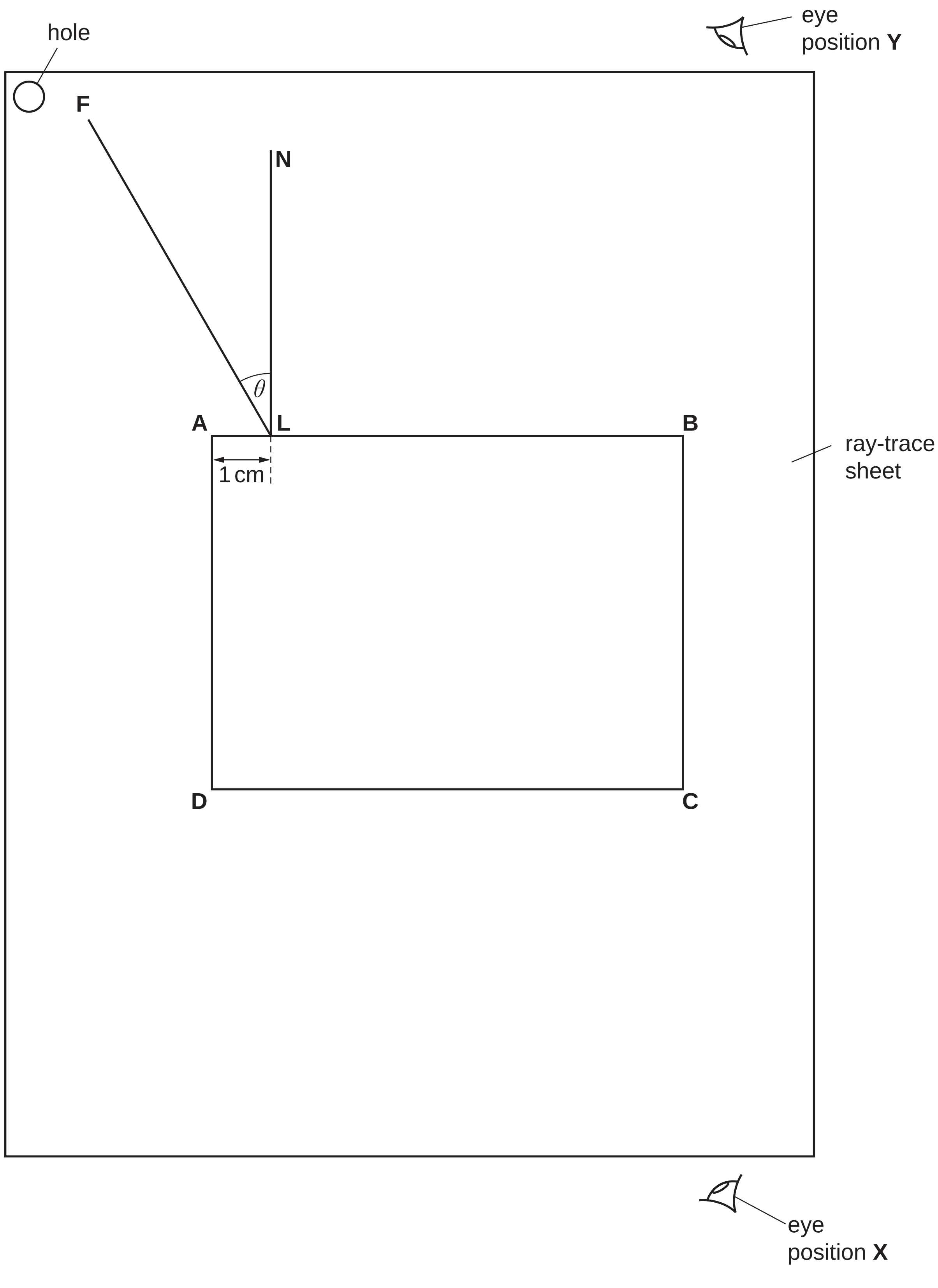

Fig. 3.1

(a)
- Place the block approximately in the centre of the ray-trace sheet. Carefully draw round the block and label the corners **ABCD**, as indicated in Fig. 3.1.
- Remove the block from the ray-trace sheet.
- Draw a normal to line **AB** at a point **L**, 1 cm from **A**. Label the other end of the normal with the letter **N**.
- Draw a line **FL**, 8 cm long and at an angle $\theta = 30°$, as indicated by Fig. 3.1.

[1]

(b)
- Replace the block in exactly the same position as in **(a)**.
- Place two pins P_1 and P_2 on line **FL**, a suitable distance apart for accurate ray tracing.
- Label the positions of P_1 and P_2.
- View the images of P_1 and P_2 through the block, from the direction indicated by the eye in position **X** in Fig. 3.1. Place two pins P_3 and P_4, a suitable distance apart, so that pins P_3 and P_4, and the images of P_1 and P_2, all appear exactly one behind the other.
- Label the positions of P_3 and P_4.
- Remove the block and pins from the ray-trace sheet.

[1]

(c) **(i)**
- Draw a line joining P_3 and P_4. Extend this line until it meets **CD**.
- Label the point at which this line meets **CD** with the letter **G**.
- Draw a line through **G**, at 90° to **CD**. Extend this line until it crosses **AB**.
- Label the point at which this line crosses **AB** with the letter **H**.
- Extend line **FL** until it meets **GH**.
- Label the point at which it meets **GH** with the letter **K**.
- Join points **L** and **G** with a straight line.

[1]

(ii)
- Measure the length *a* of line **LG**.

a = ... cm

- Measure the length *b* of line **LK**.

b = ... cm

- Calculate a value *n* for the refractive index, using the equation $n = \frac{a}{b}$.

n = ...

[3]

(d) • Replace the block in exactly the same position as in **(a)**.

• Replace the two pins P_1 and P_2 on line **FL**.

• Place the mirror against side **CD**, with the reflecting surface towards the block.

• View the images of P_1 and P_2 from the direction indicated by the eye in position **Y** in Fig. 3.1. Place two pins P_5 and P_6, a suitable distance apart, so that pins P_5 and P_6, and the images of P_1 and P_2, all appear exactly one behind the other.

• Label the positions of P_5 and P_6.

• Remove the block and pins from the ray-trace sheet.

[1]

(e) **(i)** • Draw a line joining P_5 and P_6. Extend this line until it meets **GH**.

• Label the point at which this line meets **GH** with the letter **M**.

• Label the other end of the line with the letter **R**.

• Measure the angle α, where α is the smaller angle between lines **RM** and **GH**.

α = ... [1]

(ii) A student suggests that angle α and angle θ, measured in part **(a)**, should be equal.

State whether your results support this suggestion. Justify your answer with reference to your results.

statement ....

justification ....

....

[2]

(f) Suggest why different students, all carrying out this experiment carefully, may not obtain identical results.

....

....[1]

[Total: 11]

Tie your ray-trace sheet into this Question Paper between pages 8 and 9.

4 Plan an experiment to investigate how increasing the number of layers of insulation affects the rate of cooling of hot water in a beaker.

You are **not** required to carry out the experiment.

Write a plan for the experiment, including:

- the apparatus needed
- what you would measure
- the variables you would keep the same to ensure the comparison is a fair test
- instructions for carrying out the experiment
- how you would present your results
- how you would use your readings to reach a conclusion.

You may draw a diagram if it helps to explain your plan.

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