Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

2477129868

PHYSICS **0625/52**

Paper 5 Practical Test **February/March 2023**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

For Examiner's Use	
1	
2	
3	
4	
Total	

This document has **16** pages. Any blank pages are indicated.

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1 In this experiment, you will determine the diameter of a marble by two methods and calculate the density of the material from which the marble is made.

Method 1

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

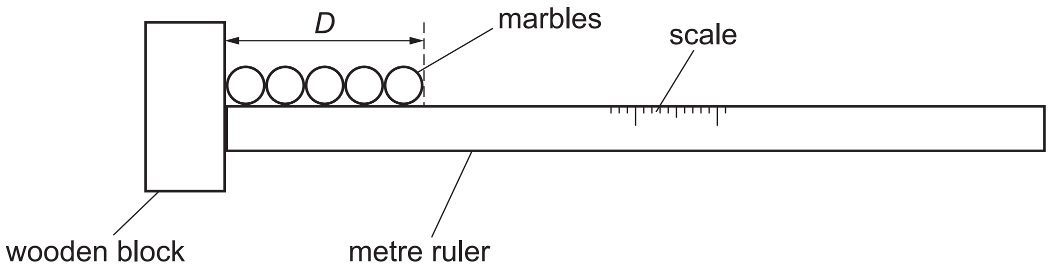

Fig. 1.1 (Apparatus viewed from above)

(a) **(i)** Place the metre ruler on the bench with its scale facing upwards. Arrange one of the wooden blocks and the five marbles as shown in Fig. 1.1.
Measure the length *D* for the five marbles.

D = ... cm

Using your value of *D*, calculate the average diameter d_1 of **one** marble.

d_1 = ... cm
[2]

(ii) Suggest why it is more accurate, when using a ruler, to measure *D* for **five** marbles rather than measure the diameter of a single marble.

....

....

.... [1]

Method 2

(b) Describe how the two wooden blocks and one of the marbles can be used to determine an accurate value for the diameter of a marble.
Draw a diagram to show your suggested arrangement.
Describe clearly how you ensure that your value for the diameter of a marble is as accurate as possible.

....

....

....

Use your arrangement to measure the diameter d_2 of the marble.

d_2 = ... cm [2]

(c) **(i)** Use the top-pan balance as shown in Fig. 1.2 to measure the mass m of one of the marbles.

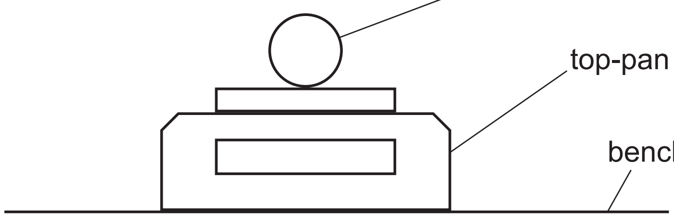

Fig. 1.2

m = ... g [1]

(ii) Pour approximately 25 cm^3 of water into the measuring cylinder.

Record the reading V_1 of the water level in the measuring cylinder.

V_1 = ... cm^3

Carefully place the 5 marbles into the water in the measuring cylinder as shown in Fig. 1.3.

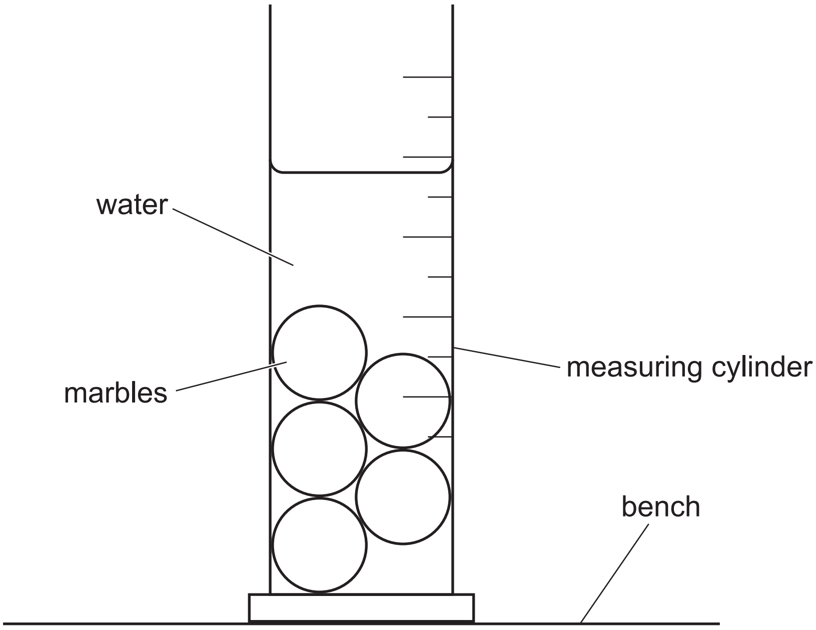

Fig. 1.3

Record the new reading V_2 of the water level in the measuring cylinder.

V_2 = ... cm^3

Calculate a value for the average volume V of **one** marble. Use the equation

$$V = \frac{V_2 - V_1}{5}.$$

V = ... cm^3
[1]

(iii) Draw, on Fig. 1.3, an arrow showing the correct line of sight for reading the water level in the measuring cylinder. [1]

(iv) Calculate a value for the density ρ of the material from which the marble is made. Use your values of m from **(c)(i)**, V from **(c)(ii)** and the equation

$$\rho = \frac{m}{V}.$$

ρ = ... g/cm^3 [1]

(d) Describe **one** possible source of inaccuracy in the method described in **(c)** and suggest **one** improvement to reduce its effect.

source of inaccuracy ....

....

improvement ....

....
[2]

[Total: 11]

2 In this experiment, you will investigate the cooling of hot water from different initial temperatures.

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

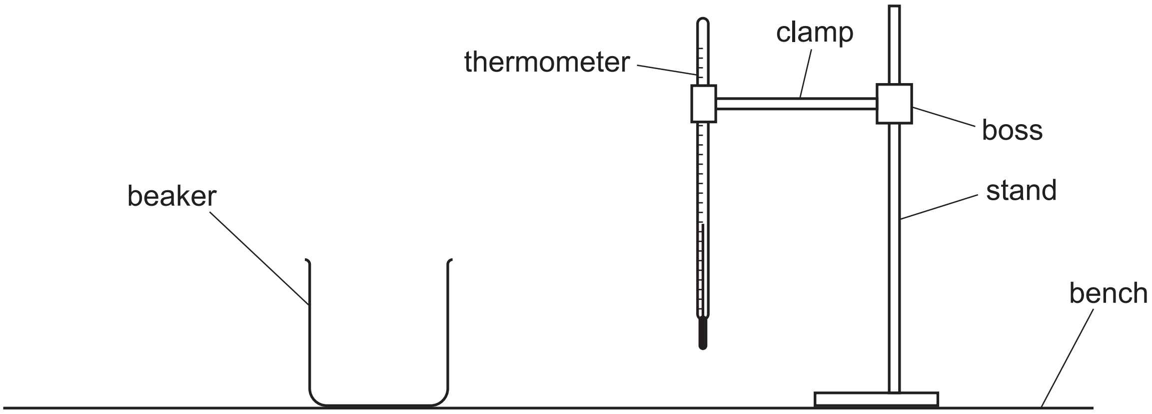

Fig. 2.1

(a) Experiment A
Pour 100 cm^3 of hot water into the beaker.
Place the thermometer in the water in the beaker.

In the first row of Table 2.1, record the temperature θ_A of the water at time t = 0 s and immediately start the stop-watch.

Record, in Table 2.1, the temperature θ_A of the water at times t = 30 s, t = 60 s, t = 90 s, t = 120 s, t = 150 s and t = 180 s. [1]

Empty the beaker.

(b) Experiment B
Pour 100 cm^3 of hot water into the beaker.
Place the thermometer in the water in the beaker.

Wait until the temperature θ_B of the water has reached the same value as the temperature θ_A at t = 90 s in **Experiment A**.

In the first row of Table 2.1, record this temperature θ_B of the water at time t = 0 s and immediately start the stop-watch.

Record, in Table 2.1, the temperature θ_B of the water at times t = 30 s, t = 60 s, t = 90 s, t = 120 s, t = 150 s and t = 180 s.

Table 2.1

t / s	θ_A / °C	θ_B / °C
0		
30		
60		
90		
120		
150		
180		

[3]

(c) Write a conclusion stating how the temperature at t = 0 s affects the rate of cooling of the water.
Justify your answer by reference to values from your results.

....

....

....

.... [2]

(d) **(i)** Calculate the average cooling rate x_1 during the second half of **Experiment A**.
Use your readings from Table 2.1 and the equation

$$x_1 = \frac{\theta_{A90} - \theta_{A180}}{T}$$

where T = 90 s and θ_{A90} and θ_{A180} are the temperatures at t = 90 s and t = 180 s in **Experiment A**.
Include the unit for the cooling rate.

x_1 = ... [2]

(ii) Calculate the average cooling rate x_2 during the first half of **Experiment B**.
Use the readings from Table 2.1 and the equation

$$x_2 = \frac{\theta_{B0} - \theta_{B90}}{T}$$

where T = 90 s and θ_{B0} and θ_{B90} are the temperatures at t = 0 s and t = 90 s in **Experiment B**.

x_2 = ... [1]

(iii) A student suggests that x_1 and x_2 should be the same.
State whether your results support this suggestion.
Justify your statement by reference to your results.

statement ....

justification ....

....

.... [1]

(e) State **one** variable which must be controlled so that the comparison of x_1 and x_2 is valid.

....

.... [1]

[Total: 11]

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3 In this experiment, you will determine the resistance per unit length of a resistance wire. The circuit has been set up for you.

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

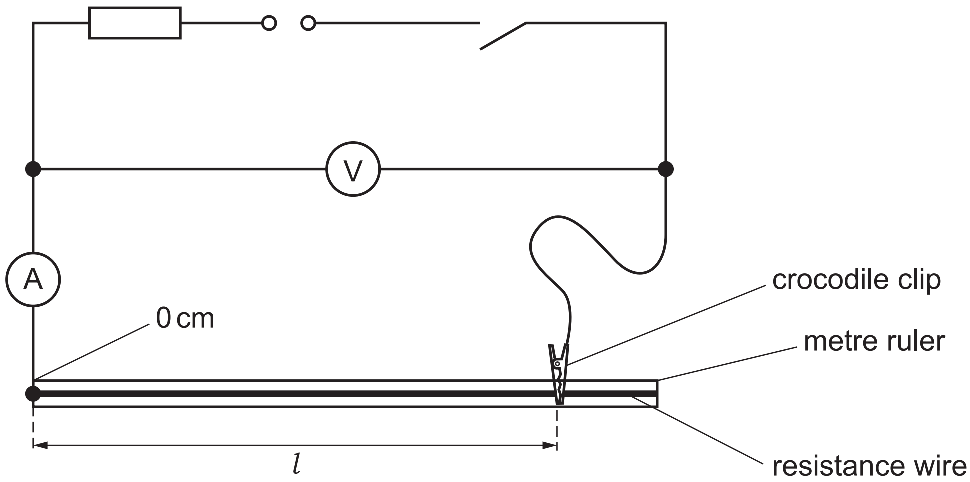

Fig. 3.1

(a) Connect the crocodile clip to a length l = 20.0 cm of the resistance wire.

Close the switch.

Measure and record in Table 3.1, the value of potential difference (p.d.) V and current I for the resistance wire.

Connect the crocodile clip to lengths l = 40.0 cm, l = 60.0 cm, l = 80.0 cm and l = 100.0 cm of the resistance wire.
For each length l, measure and record in Table 3.1, the value of potential difference V and current I for the resistance wire.

Open the switch.

Table 3.1

l/cm	V/V	I/A	R/Ω
20.0			
40.0			
60.0			
80.0			
100.0			

[2]

(b) For each length l calculate and record in Table 3.1, the resistance R of the resistance wire. Use your values of V and I from Table 3.1 and the equation

$$R = \frac{V}{I}.$$

[2]

(c) Plot a graph of R/Ω (y-axis) against l/cm (x-axis).
Draw a straight line of best fit.

[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 gradient G is numerically equal to the resistance per unit length R_0 of the resistance wire.
Write down the value of R_0 for the resistance wire.

R_0 = ... Ω/cm [1]

(e) Suggest **one** practical reason why students carrying out this experiment may not obtain the same readings as yours. Assume that the procedure has been done carefully.

....

....

....

[1]

[Total: 11]

4 A student investigates the motion of a ball through the air.

Plan an experiment which will enable him to investigate how the range of the ball depends on the angle at which it is launched.
The range is the horizontal distance that the ball travels after leaving the end of the channel shown in Fig. 4.1 and before hitting the ground.

You are **not** required to do the experiment.

The apparatus available includes:

- a flexible channel, as shown in Fig. 4.1, which can be bent at different angles
- a selection of balls, each of different diameter and mass.

In your plan, you should:

- list any additional apparatus needed
- explain briefly how to do the experiment – you may add to Fig. 4.1 if it helps your explanation
- state the key variables to keep constant
- draw a table with column headings, to show how to display the readings (you are **not** required to enter any readings in the table)
- explain how to use the results to reach a conclusion.

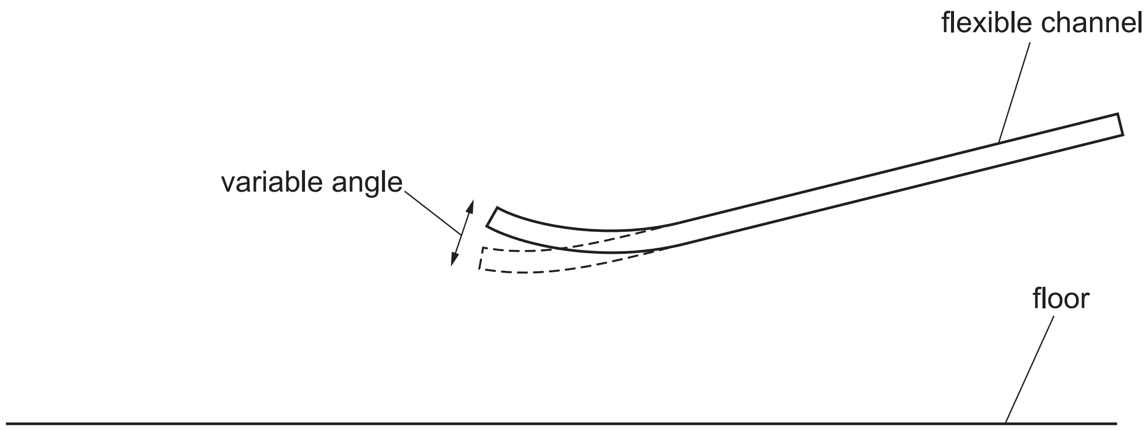

Fig. 4.1

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