



Cambridge O Level

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PHYSICS

5054/32

Paper 3 Practical Test

May/June 2026

1 hour 30 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. Do **not** use correction fluid or tape.
- 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.

- 1 In this experiment, you will investigate the oscillations of a pendulum and determine two values for the acceleration due to gravity.

You are provided with:

- a clamp, boss and stand
- a pendulum bob attached to approximately 90 cm of thread
- a metre rule with a millimetre scale
- a stopwatch.

The pendulum has been assembled for you as shown in Figure 1.1.

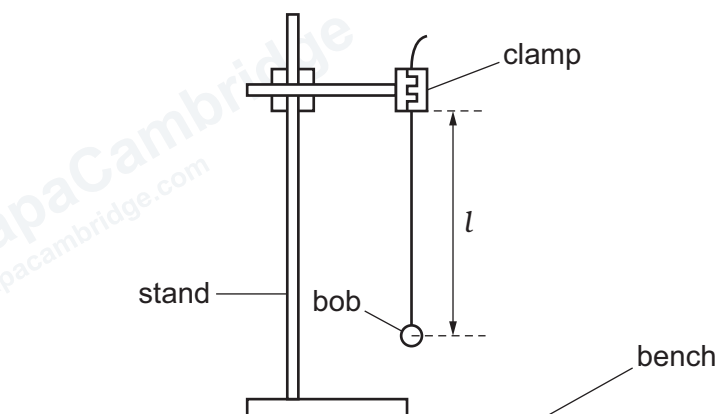


Figure 1.1

The length l of the pendulum is the distance from the bottom of the clamp to the centre of the pendulum bob.

(a) procedure

Adjust the length of the string until the length l of the pendulum is 0.350 m.

Give the bob a small sideways displacement and release it so that it oscillates.

- (i) Measure the time t for 20 oscillations of the pendulum.

Record your answer in Table 1.1.

[1]

- (ii) Calculate the period T of the pendulum. The period is the time for 1 oscillation of the pendulum.

Record your answer in Table 1.1.

[1]

Table 1.1

l/m	t/s	T/s
0.350		
0.700		



- (b) Adjust the length of the string until the length l of the pendulum is 0.700 m.

Repeat the procedure in 1(a).

Record all your results in Table 1.1.

[1]

- (c) Using data from Table 1.1, show that T is **not** proportional to l .

.....
 [1]

- (d) The acceleration due to gravity in m/s^2 can be calculated using the equation shown.

$$g = \frac{39l}{T^2}$$

- (i) Calculate a first value g_1 for the acceleration due to gravity, using the data for $l = 0.350 \text{ m}$ from Table 1.1.

Show your working and give your answer to 2 significant figures.

$$g_1 = \dots\dots\dots \text{m/s}^2 \quad [2]$$

- (ii) Calculate a second value g_2 for the acceleration due to gravity, using the data for $l = 0.700 \text{ m}$ from Table 1.1.

$$g_2 = \dots\dots\dots \text{m/s}^2 \quad [1]$$

- (e) Two quantities can be considered to be the same within the limits of experimental accuracy if their values are within 10% of each other.

Compare your value of g_1 from **1(d)(i)** with your value of g_2 from **1(d)(ii)**.

State if your two values can be considered to be the same.

Support your statement with a calculation.

calculation

statement [2]

- (f) State **one** technique that you use when doing this experiment to ensure that your results are accurate.

.....

 [1]

[Total: 10]



Turn over



- 2 In this experiment, you will compare two methods of reducing the rate of temperature decrease in a beaker of hot water.

You are provided with:

- 2 beakers labelled P and Q, one with insulation and the other with a lid
- a stirring thermometer, measuring from -10°C to 110°C , graduated in 1°C intervals
- a supply of hot water at approximately 80°C
- paper towels to mop up any water spillages
- a stopwatch.

Beaker P is wrapped with a layer of insulation but has no lid. Beaker Q has a lid but no layer of insulation.

The beakers are shown in Figure 2.1.

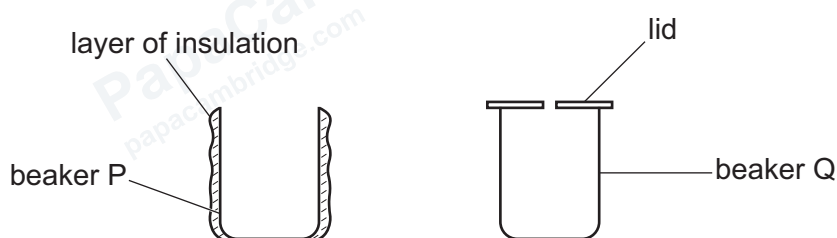


Figure 2.1

- (a) Ask the supervisor to pour 200 cm^3 of hot water into beaker P.

Place the thermometer into the water, and wait until the reading on the thermometer has stopped increasing.

- (i) Measure the temperature θ of the hot water in the beaker to the nearest 0.5°C , and immediately start the stopwatch.

Record the temperature at time $t = 0$ in the second column of Table 2.1.

[1]

Table 2.1

	beaker P	beaker Q
$t / \dots\dots\dots$	$\theta / \dots\dots\dots$	$\theta / \dots\dots\dots$
0		
240		

- (ii) Allow the hot water to cool for 240s. Measure the temperature θ of the hot water in the beaker.

Record the temperature at time $t = 240\text{ s}$ in the second column of Table 2.1.

[1]



- (b) Remove the lid from beaker Q.

Ask the supervisor to pour 200 cm^3 of hot water into beaker Q.

Replace the lid.

Place the thermometer through the hole in the lid into the water.

Wait until the reading on the thermometer has stopped increasing.

- (i) Repeat the measurements in **2(a)(i)** and **2(a)(ii)**, recording your values for beaker Q in the third column of Table 2.1. [2]
- (ii) Add the units to the column headings in Table 2.1. [1]
- (c) Use your temperature readings in Table 2.1 to calculate the temperature decrease of the hot water in beaker P and in beaker Q after cooling for 240 s.

temperature decrease in beaker P = ... °C

temperature decrease in beaker Q = ... °C [1]

- (d) Use your answers to **2(c)** to compare the **rates** of temperature decrease of the water in beakers P and Q.

.....

.....

..... [2]

- (e) State **one** factor that must be controlled to make a valid comparison between the rates of temperature decrease of beaker P and beaker Q.

.....

..... [1]

- (f) This experiment compares the effect of a layer of insulation with the effect of a lid on the rate of decrease of temperature.

A student wants to find how the rate of decrease of temperature of the water in a beaker surrounded by a layer of insulation compares with the rate of decrease of temperature of the water in a beaker with no insulation.

Suggest **one** change to the apparatus that will enable this new comparison to be made.

.....
..... [1]

[Total: 10]



3 In this experiment, you will investigate the potential difference across resistors in a circuit.

You are provided with:

- a battery of 3 cells connected in series
- an ammeter
- a voltmeter
- a switch
- 5 fixed resistors labelled with their values
- connecting leads.

A circuit has been assembled for you by the supervisor.

(a) Draw a diagram of the circuit using standard electrical symbols.

[2]

(b) procedure

Connect the 12Ω resistor into the gap between the terminals labelled P and Q in the circuit.

Close the switch.

Measure and record the potential difference V across the battery.

Measure and record the current I in the circuit.

Open the switch.

$V = \dots\dots\dots$ V

$I = \dots\dots\dots$ A
[2]

(c) Remove the 12Ω resistor from the circuit.

Repeat the procedure and measurements in **3(b)** for each of the other four resistors.

Record your values of V and I in Table 3.1. Include the values of V and I from **3(b)**.

Table 3.1

resistance R/Ω	potential difference V/V	current I/A
12		
15		
18		
22		
33		

[2]

(d) On the grid provided in Figure 3.1, plot a graph of V on the y-axis against I on the x-axis.

Start the x-axis from $I = 0$ A.

Do **not** start the y-axis from $V = 0$ V.

Draw the straight line of best fit.

[4]

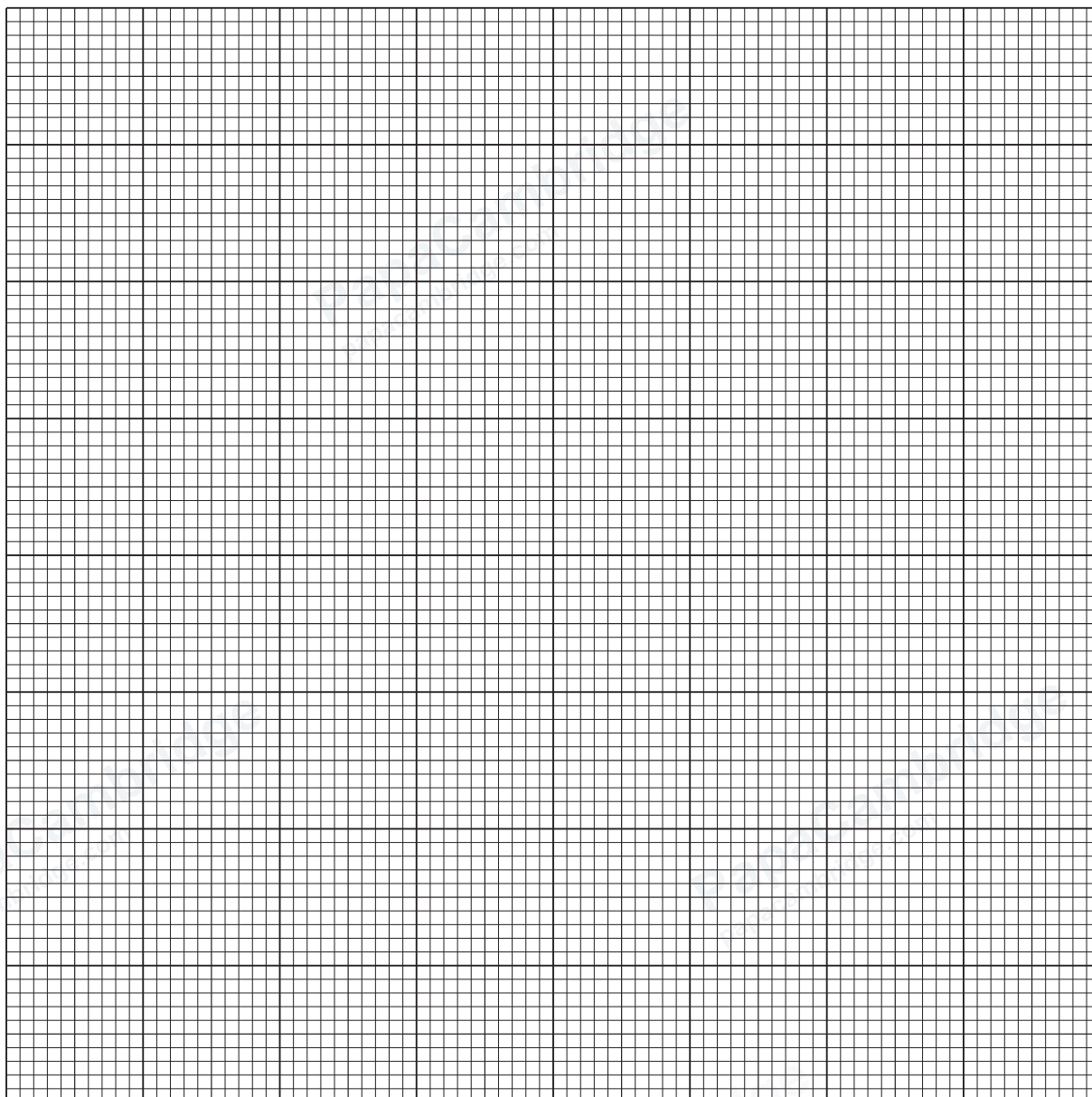


Figure 3.1

- (e) Determine the gradient G of your line. Show all working, and indicate on the graph the values you use.

$G =$ [2]



- (f) The magnitude of the gradient G of your line is equal to the resistance r of the battery of cells.

Write down the value of r .

Record your answer to the nearest ohm.

$r = \dots\dots\dots \Omega$ [1]

- (g) When doing the experiment, it is important that the terminals P and Q are not allowed to come into direct contact with each other at any time.

Suggest why terminals P and Q **must not** touch.

.....
 [1]

[Total: 14]





Turn over



- 4 When air moves over the surface of hot water in a beaker, it changes the rate of cooling of the hot water.

Plan an experiment to investigate the relationship between the speed of a fan producing the moving air and the rate of cooling of the hot water in the beaker.

The apparatus available includes:

- a supply of hot water
- a beaker
- a thermometer
- an electric fan with five speed settings.

You may also use any apparatus commonly available in a school laboratory.

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

In your plan include:

- any other apparatus needed
- a brief description of the method, including what you will measure and how you make sure that your measurements are accurate
- the variables you will control
- a results table to record your measurements (you are not required to enter any readings in the table)
- how you will process your results to reach a conclusion.

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