



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.

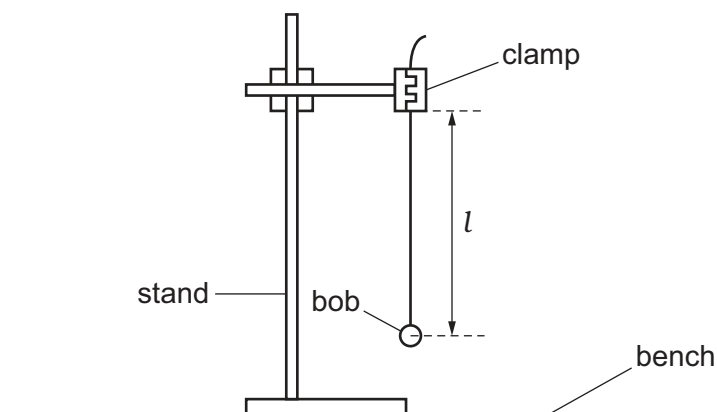


Figure 1.1

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 $l = 0.350$ 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 $l = 0.700$ 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.

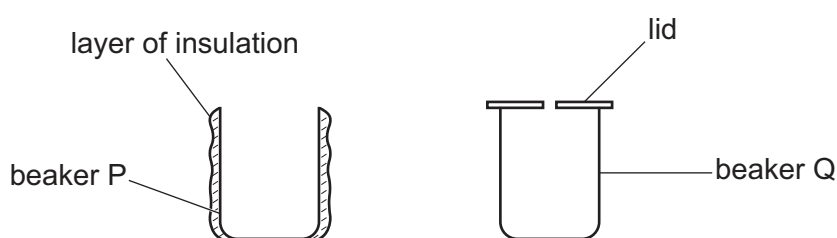


Figure 2.1

- (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]



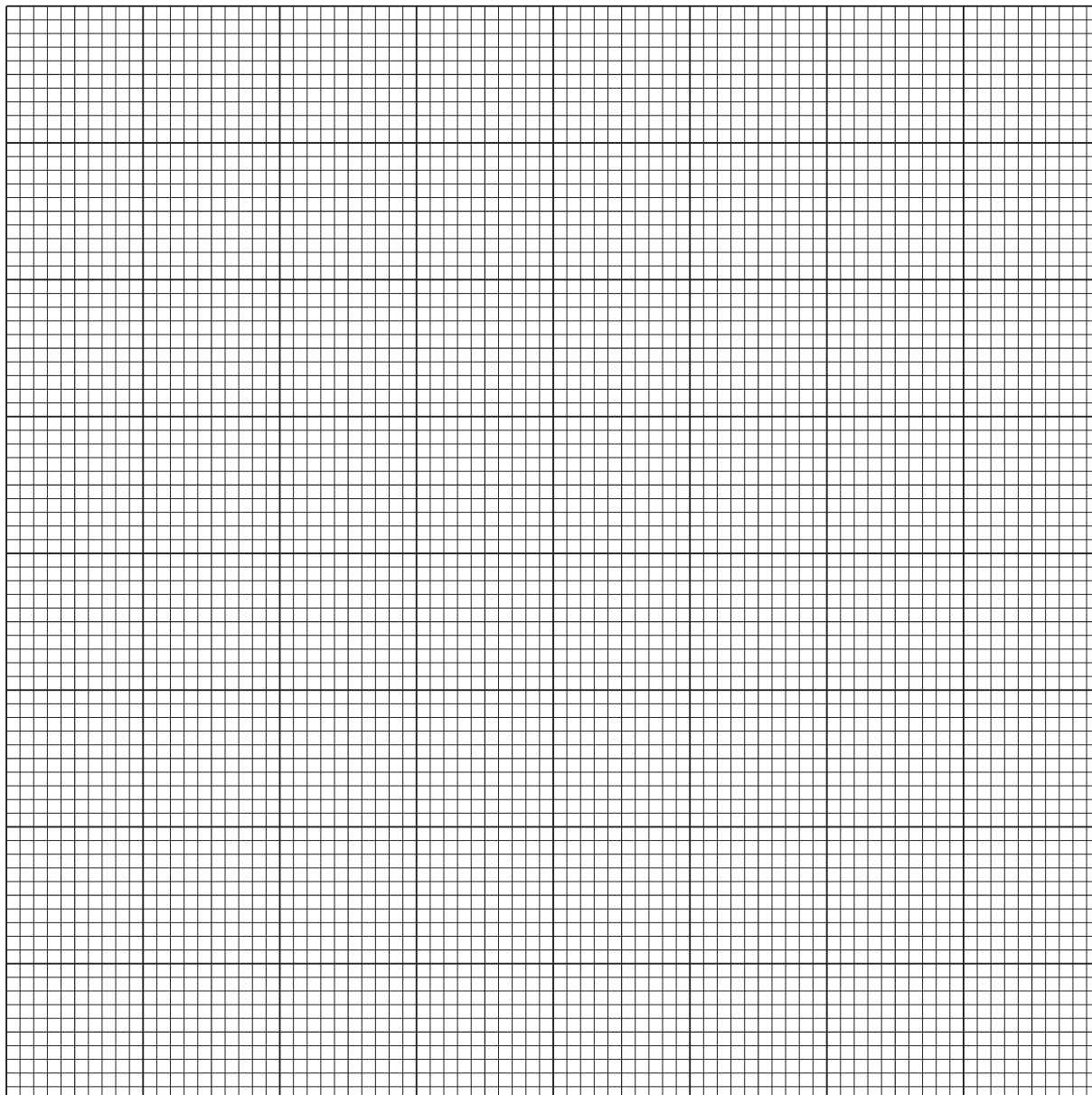


Figure 3.1

- (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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.....

.....





[6]



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