

Name:	Class:	Class Register Number:
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中正中学

CHUNG CHENG HIGH SCHOOL (MAIN)

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PRELIMINARY EXAMINATION 2026 SECONDARY 4

PHYSICS

6091/03

Paper 3 Practical Test

Wednesday 19 August 2026

1 hour 50 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number clearly in the spaces provided at the top of this 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.

Answer **all** questions.

All of your answers should be written in this Question Paper; scrap paper must **not** be used.

Graph paper is provided in this Question Paper. Additional sheets of graph paper should be used only if it is necessary to do so.

You will be allowed to work with the apparatus for a maximum of 55 minutes for each section.

You are expected to record your observations as soon as they are made.

An account of the method of carrying out the experiment is **not** required.

The use of an approved scientific calculator is expected, where appropriate.

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	
Total	

This document consists of **12** printed pages and **2** blank pages.

[Turn over

Section A

- 1 *Buoyant force is the upward force that a fluid exerts on any object that is submerged in it. In this experiment, you will investigate the effect of buoyant force acting on an object.*

You are provided with:

- a retort stand with boss and clamp
- a cork with a pin
- a metre rule with a hole at the 50 cm mark
- a slotted mass attached to a string with a loop at the end
- a metal bob attached to a 30 cm string with a loop at the end
- a 250 cm³ plastic beaker
- a measuring cylinder
- a shared electronic balance

Note: Use the same metre rule for both Question 1 and Question 2.

(a) Measure and record:

- (i) the mass M of the metal bob,
- (ii) the mass m of the slotted mass.

$M = \dots\dots\dots$ [1]

$m = \dots\dots\dots$ [1]

(b) Measure and record the volume V of the metal bob.

$V = \dots\dots\dots$ [1]

(c) Calculate the buoyancy force B acting on the metal bob by water, using the following equation.

$$B = \rho V g,$$

where ρ is the density of water 1 g/cm³,
 V is the volume of the metal bob in cm³,
 g is the gravitational strength 0.010 N/g.

$B = \dots\dots\dots$ [1]

- (d) Set up the apparatus as shown in Fig. 1.1.

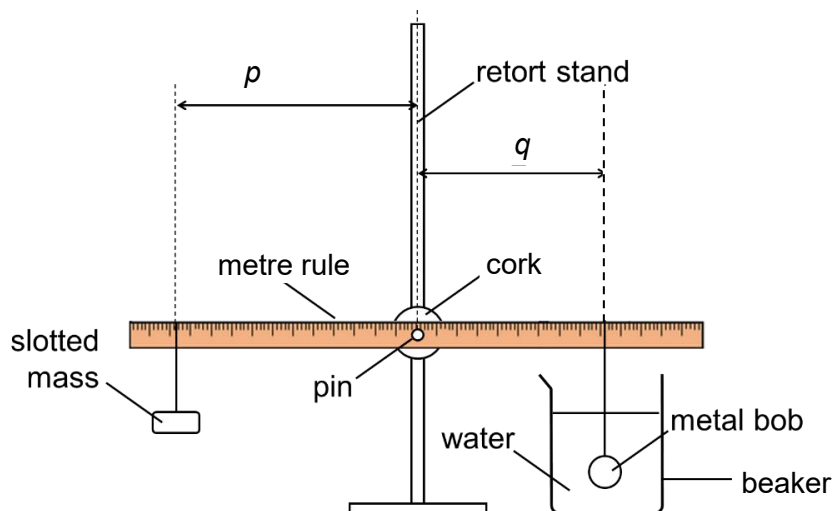


Fig 1.1

Hang the slotted mass on the left. While keeping the metal bob on the right completely immersed in water, balance the rule by adjusting the length p and q .

Measure and record the length p and q .

$p = \dots\dots\dots$

$q = \dots\dots\dots$ [1]

- (e) It is suggested that the buoyancy force B can also be calculated using the equation:

$$B = Mg - mg \left(\frac{p}{q} \right)$$

where $g = 0.010 \text{ N/g}$.

- (i) Use your values of M , m , p and q to calculate another value for the buoyancy force B .

$B = \dots\dots\dots$ [1]

[Turn over

- (ii) Explain whether your experimental result in (c) agrees with the suggestion in (e)(i). Support your explanation with experimental data.

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..... [2]

- (f) Describe one significant source of error in the experimental procedure for (d).

Suggest an improvement that could be made to the experimental procedure to address this source of error.

source of error

.....

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improvement for source of error

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[2]

[Total: 10]

- 2 In this experiment, you will determine a value for the acceleration due to gravity, g , using a pendulum.

You are provided with:

- retort stand with a top and bottom clamp
- split cork
- a metal bob with a string attached
- stopwatch
- metre rule

Note: Use the same metre rule for both Question 1 and Question 2.

- (a) Set up the apparatus as shown in Fig. 2.1.

Adjust length L so that it is approximately 50 cm.

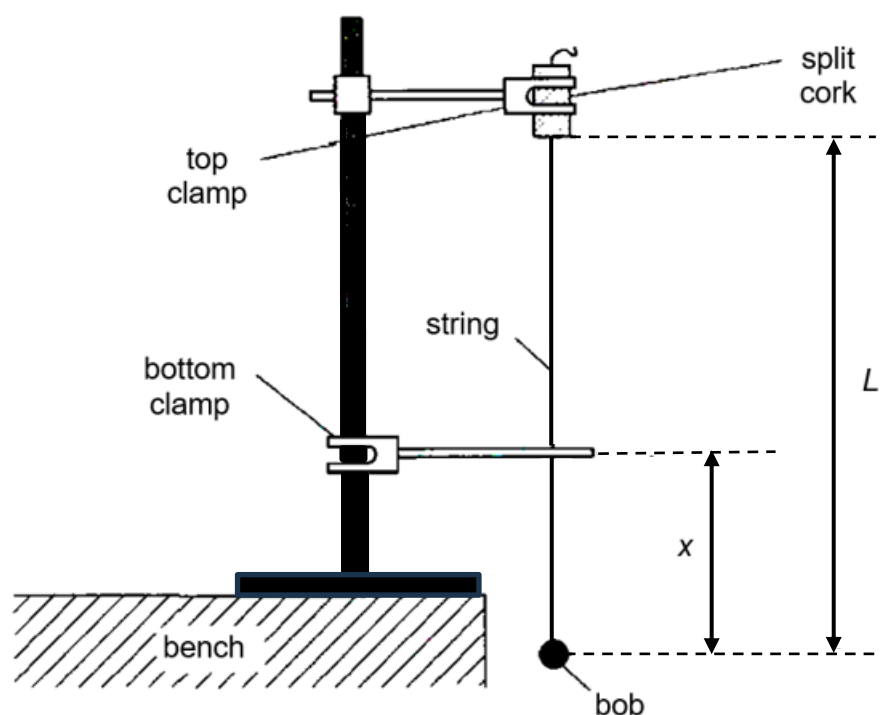


Fig. 2.1 (side view)

- (i) Measure and record the value of L in metres.

$L = \dots\dots\dots$ [1]

- (ii) Adjust the bottom clamp up or down until x is approximately 11 cm. The length x is measured from the centre of the rod on the bottom clamp to the middle of the pendulum bob as shown in Fig 2.1.

Ensure that the rod on the bottom clamp is horizontal, and that it just touches the string.

Tighten the clamp, measure and record this value of x in metres.

$x = \dots\dots\dots$ [1]

[Turn over

- (iii) Move the bob 5 to 10 cm from its vertical position away from the rod, as shown in Fig. 2.2, and release it so that it swings freely.

When the string touches the rod, start the stopwatch.

The next time the string touches the rod, count this as one oscillation.

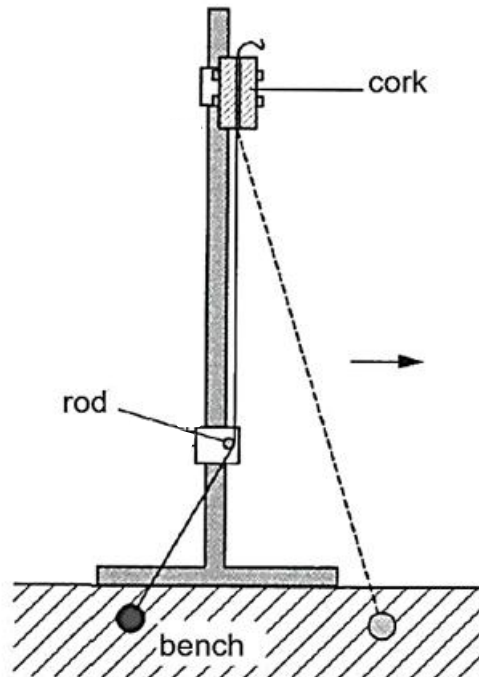


Fig. 2.2 (front view)

Determine an accurate value for the period T of the oscillation.

$T = \dots\dots\dots$ [2]

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Section B

- 3 In this experiment, you will investigate how the voltage across a thermistor varies with the temperature of the thermistor.

You are provided with:

- a d.c. power supply
- a switch
- a thermistor
- a fixed resistor
- a thermometer
- a 250 ml glass beaker
- a plastic beaker
- a supply of very hot water
- a voltmeter
- 8 connecting leads.

Set up the apparatus as shown in Fig. 3.1.

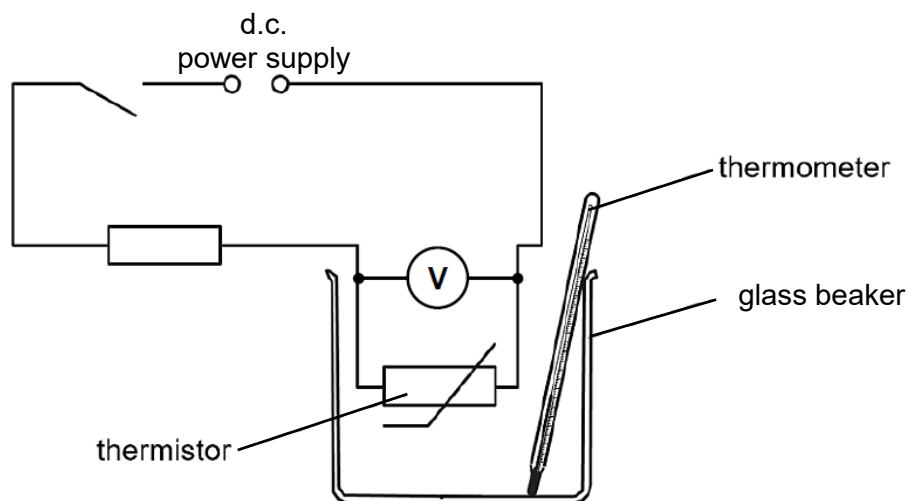


Fig. 3.1

- (a) Record the room temperature T_R using the thermometer.

$T_R = \dots\dots\dots$

- (b) Close the switch. Record the voltmeter reading, V_R .
Open the switch.

$V_R = \dots\dots\dots$ [1]

[Turn over

- (c) Collect hot water from the boiler using the plastic beaker provided.
 Pour the hot water into the glass beaker until it reaches the 200 cm³ mark.
 The thermistor should be fully immersed in the hot water.
 Close the switch.

- (i) Record the highest temperature of the hot water T_W on the thermometer.
 T_W should be at least 70 °C.

Record the voltage V_W on the voltmeter.

$$T_W = \dots\dots\dots [1]$$

$$V_W = \dots\dots\dots$$

- (ii) Calculate the change in temperature T_C and voltage V_C using the equations shown.

$$T_C = T_W - T_R \quad \text{and} \quad V_C = V_R - V_W$$

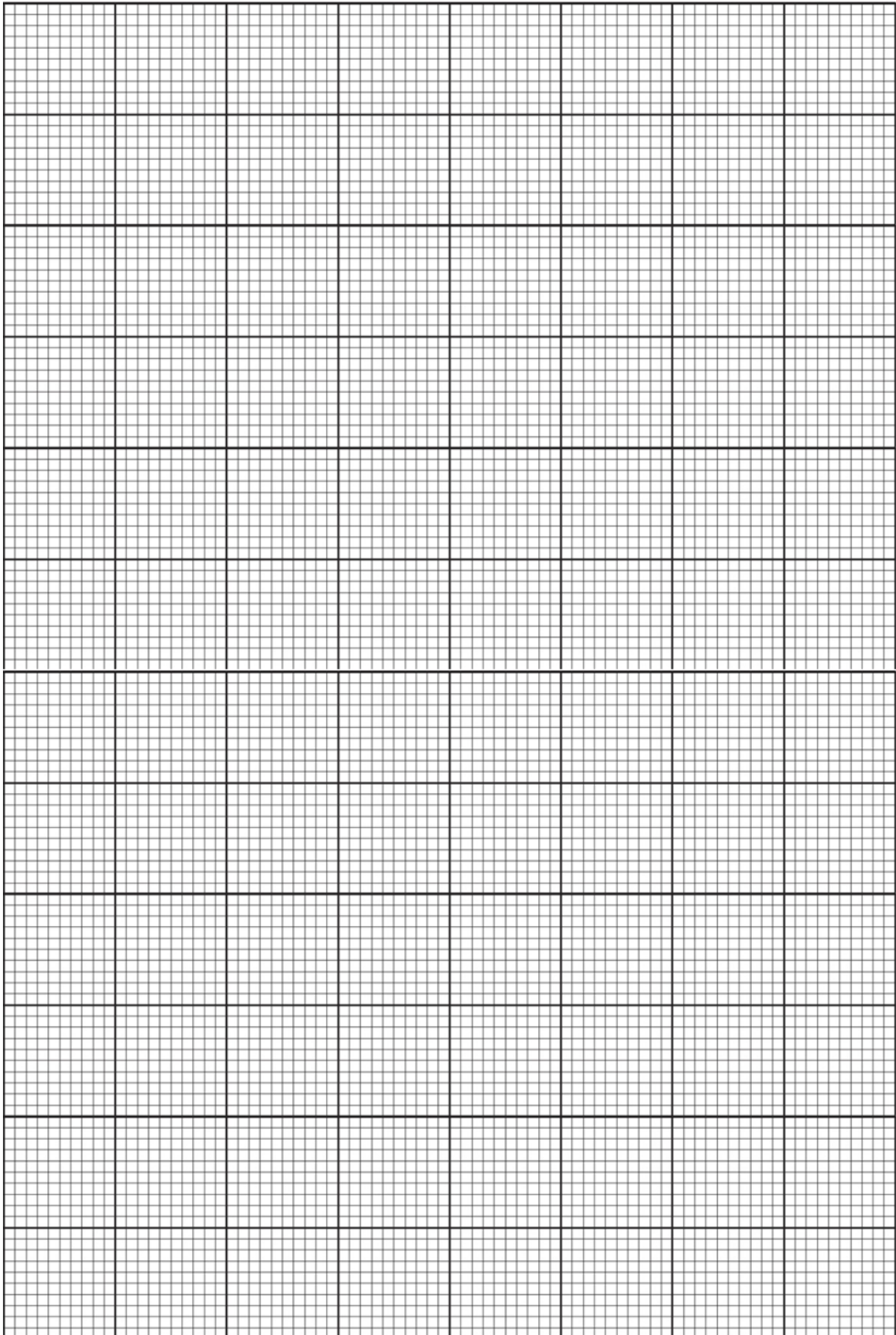
$$T_C = \dots\dots\dots [1]$$

$$V_C = \dots\dots\dots [1]$$

- (d) As the water cools, V_W also changes.
 For further values of V_W , measure the corresponding values of T_W .
 Open the switch at the end of the experiment.
 Calculate the corresponding values of V_C and T_C and record your values for V_W , T_W , V_C and T_C in a suitable table.
 Include your values in (c). [4]

- (e) (i) On the grid provided, plot a graph of T_C against V_C . Draw the line of best fit.

[4]



[Turn over]

(ii) Determine the gradient of the line.

gradient = [2]

(iii) Determine the y-intercept of the line.

y-intercept = [1]

(f) Comment on the relationship between T_C and V_C .

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..... [1]

- (g) Describe and explain two significant sources of error in the experimental procedure.

Suggest an improvement that could be made to the experiment to address each of these sources of error.

source of error 1

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improvement for source of error 1

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source of error 2

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improvement for source of error 2

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[4]

[Total: 20]

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