MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION
General Certificate of Education Ordinary Level

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SCIENCE (PHYSICS, BIOLOGY) 5087/05

Paper 5 Practical Test **For examination from 2024**

SPECIMEN PAPER

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Please check that your name, Centre/index number and school name are printed **CORRECTLY** on the barcode label.
Give details of the practical shift and laboratory, where appropriate, in the boxes provided.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, glue, correction fluid or highlighters.
The use of an approved scientific calculator is expected, where appropriate.
DO **NOT** WRITE ON ANY BARCODES.

Shift
Laboratory

Answer **both** questions.
You are advised to spend 45 minutes on each question.

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	
Total	

This document consists of **11** printed pages and **1** blank page.

Singapore Examinations and Assessment Board

Cambridge Assessment International Education

[Turn over

1 In this experiment, you will investigate the oscillations of a simple pendulum.

(a) • Set up the apparatus as shown in Fig. 1.1.

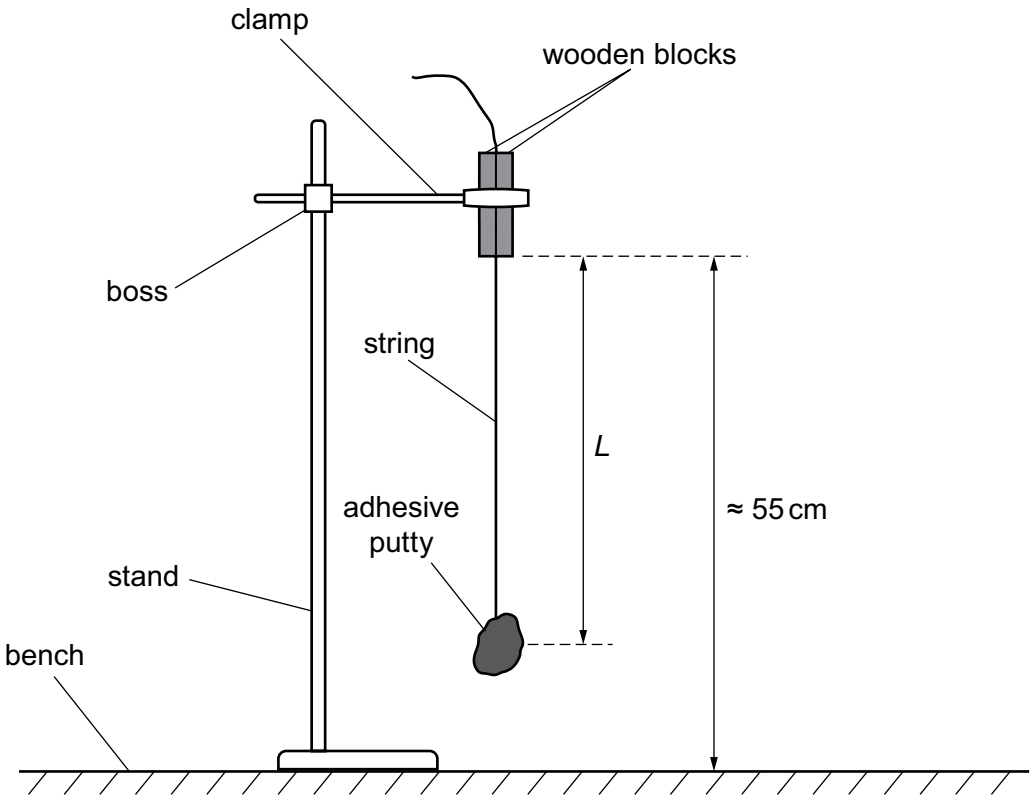


Fig. 1.1

- Adjust the clamp so that the distance between the bottom of the two wooden blocks and the bench is approximately 55 cm.
- Adjust the string by pulling the string through the wooden blocks so that the length *L* from the bottom of the wooden blocks to the middle of the putty is approximately 42 cm.
- Measure and record *L* to the nearest 0.1 cm.

L = ... cm

- Gently move the adhesive putty by about 3 cm towards the stand.
- Release the putty and start the stop-watch.
- Measure and record the time t_1 for **ten** oscillations to the nearest 0.01 s.

t_1 = ...

- Repeat the measurement of time t_2 for **ten** oscillations.
  Record t_2 to the nearest 0.01 s.

t_2 = ...

- Calculate the mean time t for **ten** oscillations, giving your answer to the nearest 0.01 s.

t = ...

- Calculate t^2, giving your answer to two decimal places.

t^2 = ...
[1]

- Record these values of L, t_1, t_2, t and t^2 in Table 1.1 on **Page 4**.

(b)
- Repeat the experiment until you have six different values of L.
- Each value of L must be between 25.0 cm and 50.0 cm.
- Record your measurements of L, t_1 and t_2 in your table of results.
- For each value of L, calculate values of t and t^2 in your table of results.

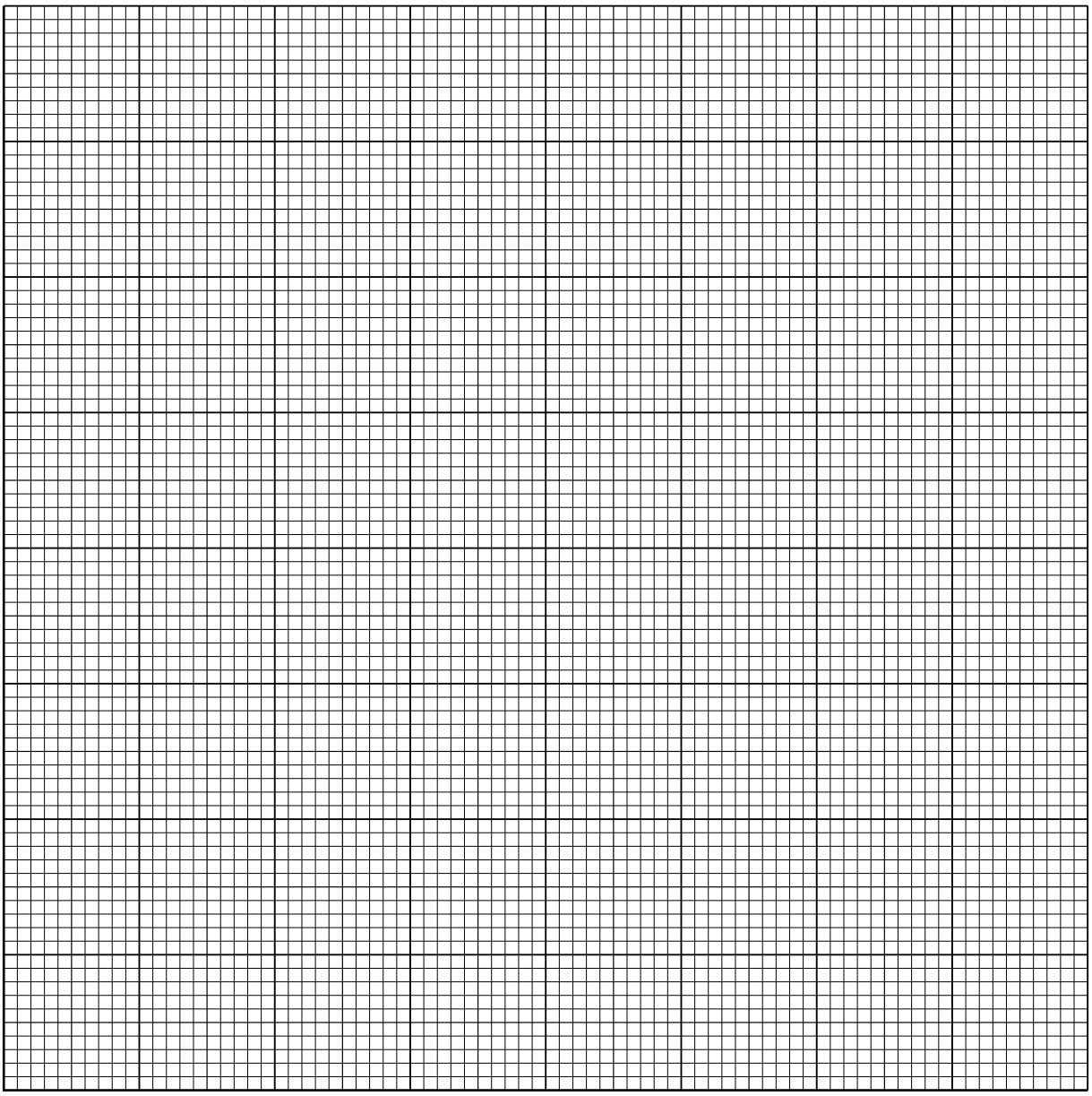
Table 1.1

L / cm	t_1 / s	t_2 / s	t / s	

[4]

(c) On the graph grid, plot a graph of t^2 (y-axis) against L (x-axis).

Draw the best-fit straight line.



[4]

(d) (i) Determine the gradient of your line.
Show your working clearly.

gradient = ... [2]

(ii) The acceleration of free fall g is related to the gradient by the equation:

$$\text{gradient} = \frac{\pi^2 K}{g}$$

where K is a constant and g has the value of $981\,\text{cm}/\text{s}^2$.

Use this equation to determine a value for K.
Give your answer to three significant figures.

K = ... [1]

(e) Suggest one improvement to increase the accuracy of the measurement of L.

.....

.....

..... [1]

(f) Describe how you could change this experiment to investigate how *t* depends on the mass *M* of the adhesive putty.

.....

.....

.....

.....

.....

..... [2]

[Total: 15]

2 You are provided with a variegated (green and white) leaf which is partly covered with a mask of black paper. The mask prevents light from reaching the leaf.

(a) Step 1. Half-fill the 250 cm^3 beaker with water.

Step 2. Place the beaker on a tripod and heat it until the water boils.

While the water in the beaker is being heated, continue with **2(a)(i)**.

(i) In the space below, draw a diagram of the leaf to show the mask and the green and white areas of the leaf. Label your diagram.

[2]

Step 3. When the water in the beaker is boiling, remove the mask from the leaf and use the forceps to submerge the leaf into the boiling water. Keep the leaf in the boiling water for at least 3 minutes.

Step 4. **Turn off the gas to the Bunsen burner.**

Step 5. Use the forceps to remove the leaf from the boiling water and put the leaf into the empty boiling tube.

Step 6. Use the dropper of the container labelled **alcohol** to add alcohol to the boiling tube so that it just covers the leaf. **Keep the alcohol away from any open flames.**

Step 7. Place the boiling tube in the beaker of hot water and leave it for 5 minutes.

Step 8. Use the test-tube holder to remove the boiling tube from the hot water and place it in the test-tube rack.

Step 9. Use the forceps to take the leaf out of the boiling tube carefully and gently dip it in the hot water in the beaker for about 30 seconds.

Step 10. Spread the leaf out on the petri dish and add enough iodine solution to cover the leaf. Leave the leaf for 2 minutes.

Step 11. Pour the excess iodine solution from the petri dish into the beaker labelled **for waste**.

(ii) After completing step 11, draw a diagram of the leaf again in the space below. Label your diagram to indicate the areas with **and** without starch.

[2]

(iii) Use the results of the investigation to suggest **two** conditions needed for starch formation in a leaf.

1 .....

2 .....
[2]

(iv) The alcohol removed the chlorophyll from the green parts of the leaf.

Suggest why this was necessary.

.....

..... [1]

(b) A student was provided with a variegated plant.

Using a variegated plant and a chemical that absorbs carbon dioxide, briefly describe an experimental setup that could be used to investigate if carbon dioxide is needed for photosynthesis. State one variable to be kept constant in this investigation. You can include any equipment or materials normally available in a school laboratory.

.....

.....

.....

..... [3]

(c) You will investigate the amount of carbon dioxide in the atmosphere and in air you breathe out (exhale). You are provided with the apparatus shown in Fig. 2.1. When carrying out the tests in part **(i)** you must **take care not to ingest any limewater**.

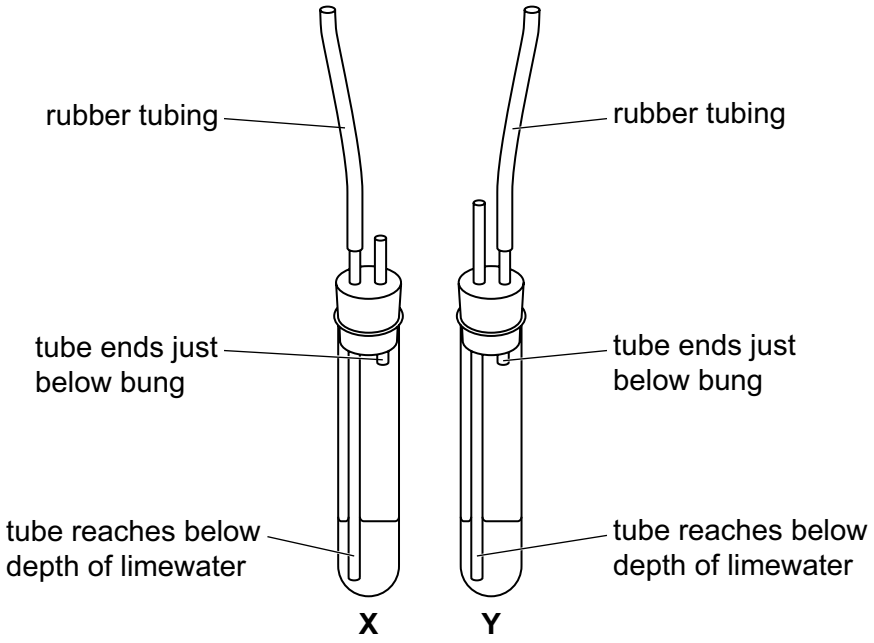


Fig. 2.1

(i) Step 1 Place the end of the rubber tubing of boiling tube **X** in your mouth.

Step 2 Breathe out very gently through the rubber tubing using your mouth. Repeat until you observe a change in the limewater. Record in Table 2.1 the number of times you breathed out for the limewater to change.

Step 3 Breathe in very gently using your mouth through the rubber tubing of boiling tube **Y**. Repeat until you observe a change in the limewater. Record in Table 2.1 the number of times you breathed in for the limewater to change.

Table 2.1

boiling tube	number of times you breathed in / out
X	
Y	

[1]

(ii) Describe the change you observed in the limewater.

.....

..... [1]

(iii) Using your results, compare the carbon dioxide concentration in the atmosphere and in exhaled air.

.....

..... [2]

(iv) Identify **one** possible source of error in the procedure you used in **2(c)(i)**.

..... [1]

[Total: 15]

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