Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

3262168535

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **May/June 2022**

1 hour

You must answer on the question paper.

No additional materials are needed.

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 [ ].

This document has **8** pages. Any blank pages are indicated.

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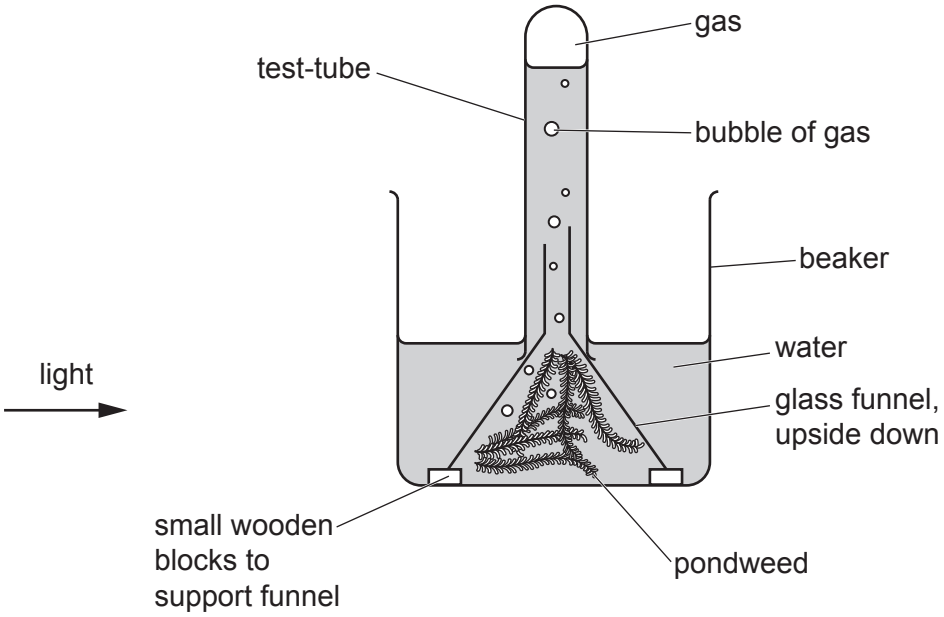
Answer **all** questions in the spaces provided.

1 Some students investigated the effect of temperature on the rate of photosynthesis in pondweed, a plant that lives in water.

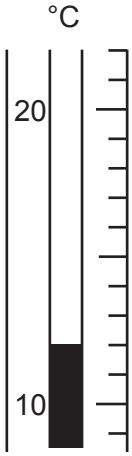
(a) The students set up the apparatus shown.



To measure the rate of photosynthesis, the students counted the number of bubbles of gas produced in five minutes.

They started the investigation by measuring the temperature of the water in the beaker.

(i) Use the thermometer in the diagram below to read the first temperature taken. Record the temperature in the table on page 4 and complete the table heading. [2]

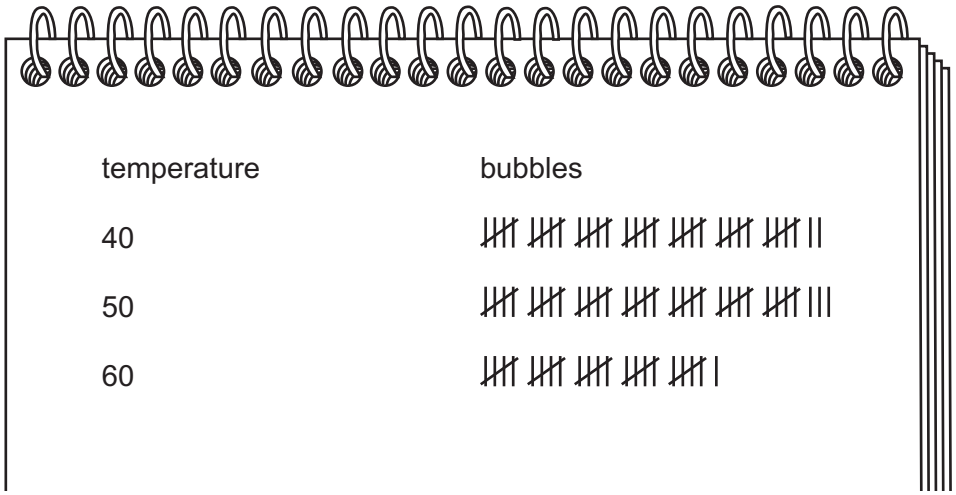


temperature /	rate of photosynthesis / number of bubbles in five minutes
	4
20	22
30	35
40	37
50	
60	

The students recorded the number of bubbles of gas produced by the pondweed for five minutes using a tally chart.

They replaced the water with warmer water, measured its temperature and again counted the number of bubbles of gas produced by the pondweed for five minutes. They recorded their results as before.

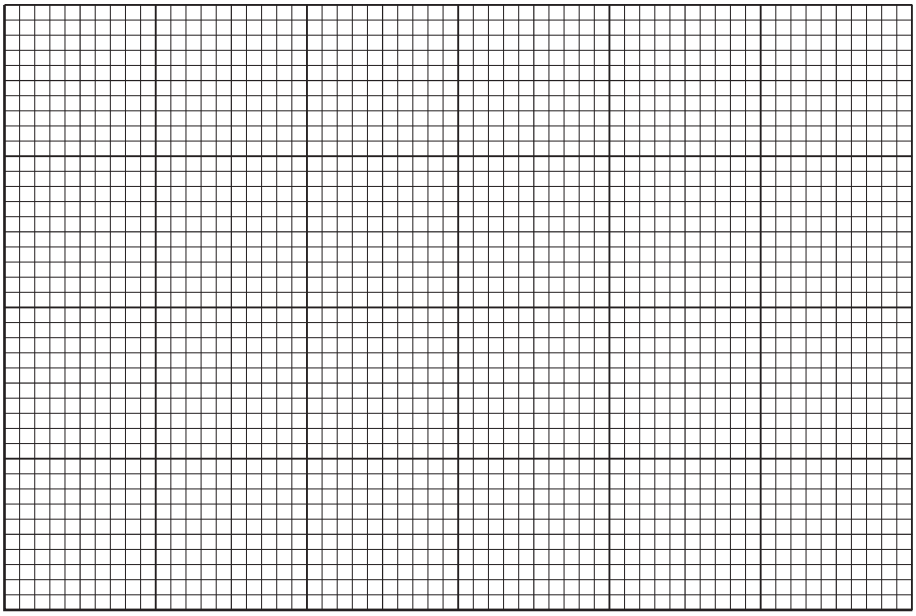
The students' tally chart is shown in the diagram.



The students then transferred their results to the table.

(ii) Complete the table by adding the number of bubbles to the rate of photosynthesis column. [2]

(b) **(i)** Construct a line graph of the data in the table on the grid. Join your points with ruled, straight lines. [4]



(ii) Use your graph to estimate the number of bubbles produced in five minutes at 25 °C to the nearest whole number. Show your working on the graph.

number of bubbles ..... [2]

(c) Use the data and your graph to describe the effect of temperature on the rate of photosynthesis.

.....

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..... [3]

(d) **(i)** Explain why measuring the volume of gas produced instead of counting the bubbles would have been a better method.

.....

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..... [3]

(ii) In this investigation the gas was collected in a test-tube. Name a piece of apparatus that could replace the test-tube to collect and measure the volume of gas released.

..... [1]

(e) **(i)** Design an investigation based on the apparatus shown in the diagram in **(a)** to find the effect of using different **masses** of pondweed on the rate of photosynthesis.

.....

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..... [6]

(ii) Predict the effect of increasing the mass of pondweed on the rate of photosynthesis.

..... [1]

(f) Glucose produced in photosynthesis is stored as starch in leaves.

Describe how you would test a green leaf for starch and how you would know that starch was present.

.....

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..... [3]

[Total: 27]

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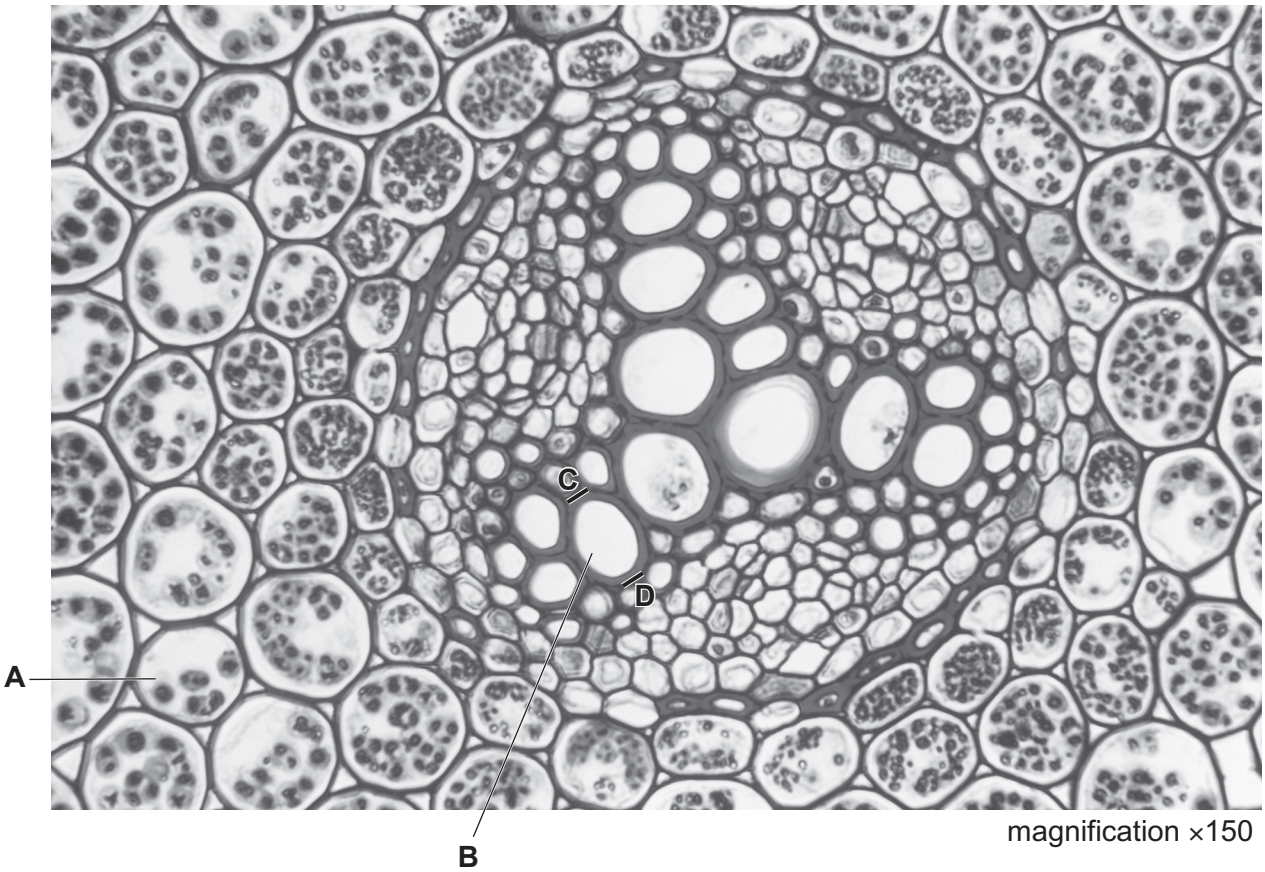
2 The photomicrograph shows a section through a plant root.



(a) In the space below make a large drawing of the cell labelled **A** as it appears in the photomicrograph.

Draw a line **on your drawing** to label the cell wall **W**.

[5]

(b) Complete the table by describing **three** visible differences between cell **A** and cell **B**.

	cell **A**	cell **B**
1		
2		
3		

[3]

(c) **(i)** Draw a straight line on cell **B** on the photomicrograph on page 7 to join **C**–**D**.

Measure and record the length of this line.

length of line **C**–**D** ..... mm [2]

(ii) Use your measurement in **(c)(i)** to calculate the **actual** diameter of cell **B**. Give your answer to 2 decimal places.

Space for working.

..... [3]

[Total: 13]

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