Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

6357486668

BIOLOGY **5090/32**

Paper 3 Practical Test **October/November 2021**

1 hour 15 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 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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

This document has **12** pages. Any blank pages are indicated.

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In order to plan the best use of your time, read through all the questions on this paper carefully before starting work.

1 Cells have membranes which can allow molecules to enter and leave the cell.

You are going to carry out an investigation into the movement of glucose and protein molecules through a membrane.

You are provided with:

- a piece of Visking tube that acts in a similar way to a cell membrane. It has a knot tied in one end to seal it. It has been soaked in distilled water to make it easier to handle.
- a large test-tube
- two solutions, **A** and **B**.

Use the following method:

- Half-fill the large test-tube with solution **A**.
- Take the Visking tube out of the distilled water.
- Hold the end of the tube without the knot and use your finger and thumb to rub it so that the tube opens. If you cannot open the end of the tube raise your hand for help to do this.
- Measure 15 cm^3 of solution **B** and add it to the inside of the Visking tube through the open end.
- Check that the contents are not leaking from the knotted end of the tube.
- Carefully rinse the outer surface of the Visking tube using distilled water and the container labelled **waste water**.
- Place the Visking tube into the large test-tube containing solution **A** so that it appears as shown in the diagram. The open end of the Visking tube should be folded over the top edge of the large test-tube.
- Check the levels of solution **A** in the large test-tube and solution **B** in the Visking tube. If solution **A** is below the level of solution **B**, add extra solution **A** to the large test-tube so that they are at the same level.

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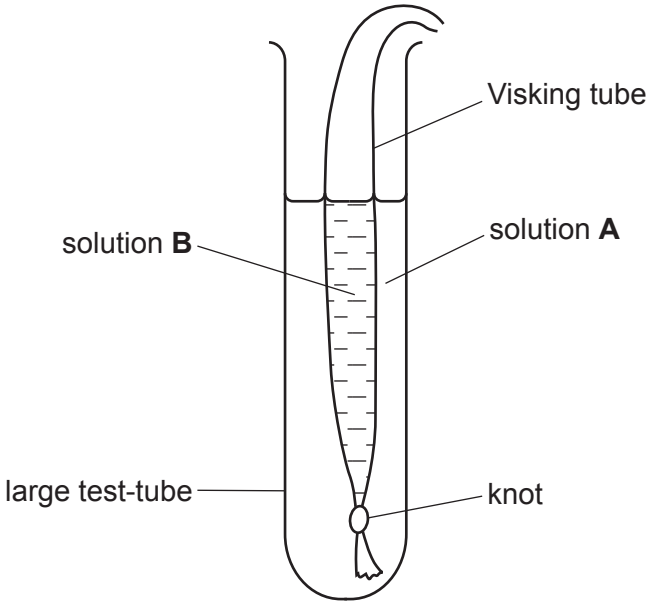

Record the time .....

- Leave this apparatus for 25–30 minutes.

Continue with questions (a)(i), (a)(ii) and 2 during this time.

You are provided with Benedict's solution to test for glucose and biuret reagent to test for protein.

(a) (i) Describe how you will carry out the tests for glucose and protein.

glucose

.....

.....

protein

.....

.....
[2]

(ii) Decide how you will label four test-tubes to use for testing solutions **A** and **B** for glucose and for protein.

- Label the test-tubes and record the labels in the table.
- Carry out the tests for glucose and protein on solutions **A** and **B**.

If you need hot water raise your hand when you require it. **Caution: water will be hot**.

Complete the table by recording your observations and conclusions.

solution	test	test-tube label	observation	conclusion
A	glucose			
	protein			
B	glucose			
	protein			

[5]

- After 25–30 minutes remove the Visking tube from the large test-tube and place it in the **waste water** container.

(b) (i) Record the time and then calculate the total time that the Visking tube was in the large test-tube.

time that Visking tube was placed in large test-tube .....

time that Visking tube was removed from large test-tube .....

length of time Visking tube was immersed in solution **A** ..... minutes
[2]

(ii) Test a sample of the solution from the large test-tube for glucose and another sample for protein. Raise your hand if more hot water is needed.

Record your observations and conclusions in the table.

test	observation	conclusion
glucose		
protein		

[3]

(iii) State **two** variables you should have controlled so that these repeat tests on solution **A** produced results that were comparable with those in the table in **(a)(ii)**.

1. .....

.....

2. .....

.....

[2]

(iv) Describe and explain what the results of all the tests you have done show about the permeability of the Visking tube.

.....

.....

.....

.....

.....

..... [3]

(v) Suggest why it was important to rinse the outside of the Visking tube before placing it in the large test-tube containing solution **A**.

.....

..... [1]

[Total: 18]

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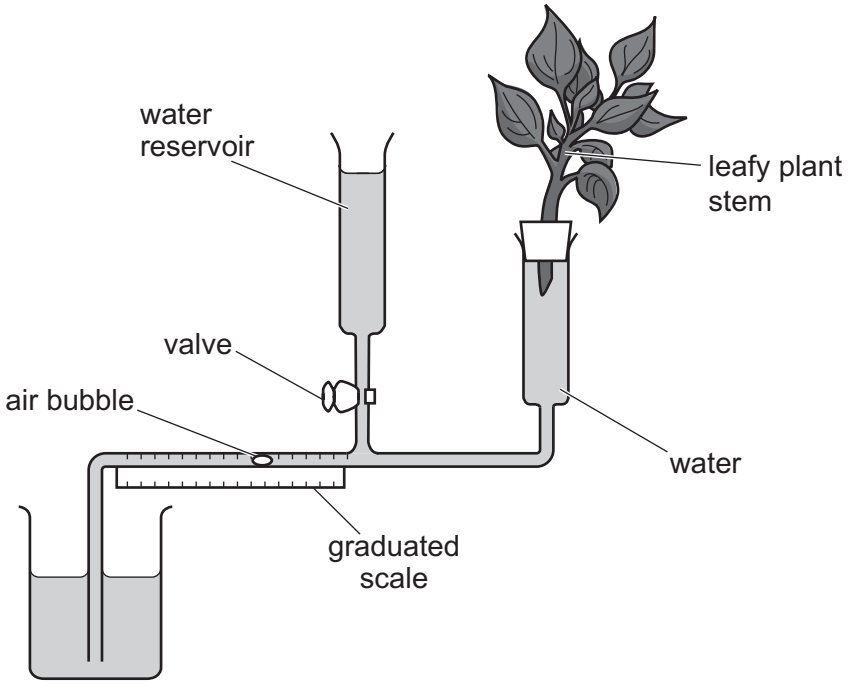
2 Transpiration results in water moving through plant stems. This can be measured using the apparatus shown in the diagram.



The cut end of a leafy plant stem is inserted in the apparatus. As transpiration occurs, water moves up the stem and is absorbed. This causes the air bubble in the apparatus to move along the tube towards the stem. The distance moved by this bubble in a known time is a measure of the rate of transpiration.

A student wanted to investigate the effect of air movement on the rate of transpiration.

She set up the apparatus in a room where there was no movement of air and left it for five minutes before recording any movement of the bubble.

(a) **(i)** Explain why the student left the plant for five minutes before starting recording.

.....

..... [1]

She used the valve to allow water from the reservoir to move the air bubble back to the start of the graduated scale.

She then recorded the position of the bubble every minute for five minutes.

She then set up an electric fan to blow air gently over the plant leaves.

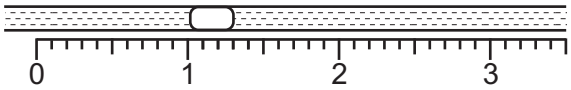
After five minutes she adjusted the air bubble so that it was at the start of the graduated scale and recorded its position every minute for five minutes.

Most of her results are shown in the table.

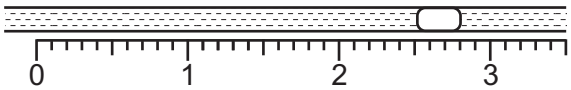
time / minutes	position of air bubble / cm	
	no air movement	moving air
0	0.0	0.0
1	1.0	1.3
2	2.1	
3	3.1	4.4
4	4.0	5.9
5	5.0	7.6

The diagrams show the position of the air bubble at one and two minutes when the plant was in moving air.

position of bubble
at one minute

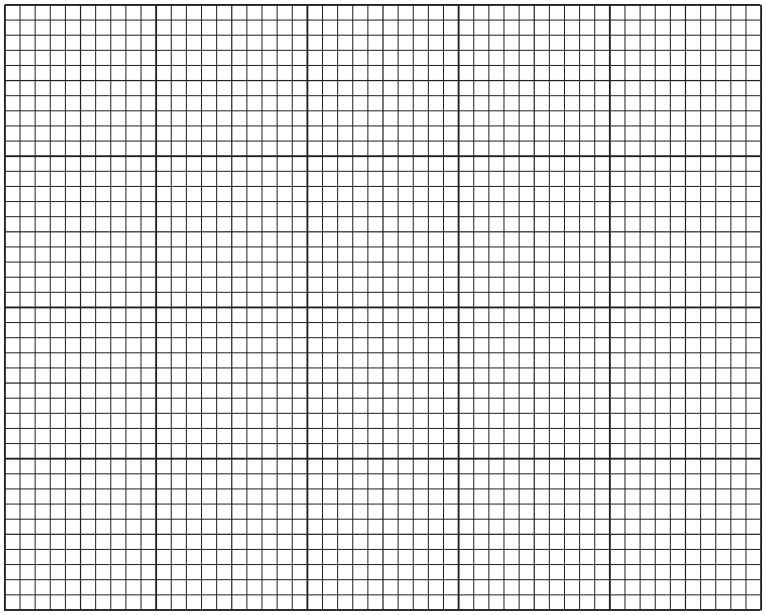


position of bubble
at two minutes



(ii) Observe the position of the bubble at 2 minutes and record it in the table. [1]

(iii) Construct a line graph of the data in the table on the grid below. Plot the data as two lines on the same axes. Join your points with ruled, straight lines.



[5]

(iv) Use the data to describe and compare the effect of still air and moving air on the rate of transpiration.

.....

.....

.....

.....

.....

..... [3]

(b) **(i)** Calculate how far the bubble moved between four and five minutes when the plant was in moving air.

..... cm [1]

The area of the cross-section of the hollow glass tube containing the air bubble was $0.785\,mm^2$.

(ii) Use the data to calculate the volume of water that was transpired by the plant between four and five minutes in moving air. Give your answer to 2 decimal places.

Space for working.

..... mm^3 [2]

(c) Another student repeated this investigation a week later, but her results were different.

Suggest **two** reasons why her results were different.

1. .....

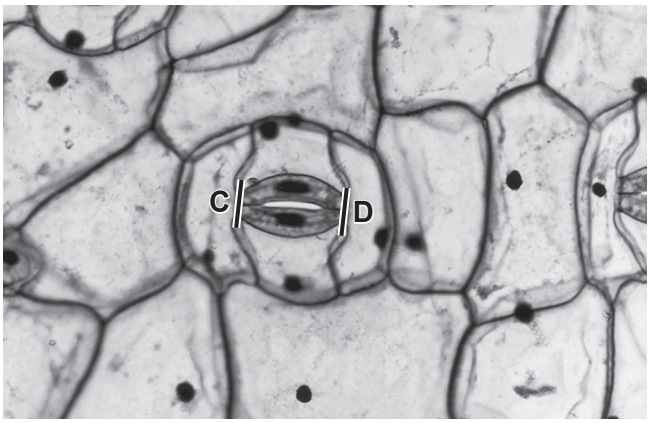
.....

2. .....

.....
[2]

[Total: 15]

3 The photomicrograph shows a surface view of a leaf epidermis.



(a) Make a large drawing of the two guard cells between points **C** and **D** and the epidermal cells touching the guard cells.

[4]

(b) Measure the length of a guard cell in the photomicrograph between points **C** and **D**.

..... mm

The actual length of the guard cell is 0.07 mm. Calculate the magnification of the photomicrograph to the nearest whole number.

Space for working.

magnification × .....
[3]

[Total: 7]

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