Cambridge Assessment International Education

# Cambridge O Level

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| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | | |

*3300357717 0*

**BIOLOGY** **5090/31**

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 | |
| Total | |

This document has **8** 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** The tissue of a peeled potato tuber is composed of many similar cells.

You are going to investigate the effect of varying concentrations of sucrose solution on some potato tissue.

You are provided with some potato tissue, distilled water (**A**) and three sucrose solutions (**B**, **C** and **D**).

Solutions **B**, **C** and **D** are different concentrations of sucrose solution.

- Label four test-tubes **A**, **B**, **C** and **D**.
- Cut four strips from the potato each measuring 5 mm × 5 mm in cross-section and 80 mm long. This is their starting length, which must be identical for each strip.
- Place one strip in each of the four test-tubes.
- Add solution **A** to the test-tube labelled **A** so that it covers the potato strip.
- Do the same for test-tube **B** with solution **B**, test-tube **C** with solution **C** and test-tube **D** with solution **D**.

**(a) (i)** Record the time. .....

- Leave the potato strips in the solutions for 25–35 minutes.

**Continue with Questions 1(b) and 2 while you are waiting.**

- After the strips have been in solutions **A**, **B**, **C** and **D** for 25–35 minutes, pour away the solutions. Remove the strips and place them on a white tile, making sure that you can identify each strip. Record the time.

  time strips were removed from solutions .....

  Calculate how long the strips had been left in the solutions, to the nearest minute.

  total time that strips were left in the solutions ..... minutes

[2]

**(ii)** Describe what you did to make sure that, when you removed the strips from the test-tubes, you knew which potato strip had been in which solution.

.....

..... [1]

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**(iii)** Measure the lengths of strips **A**, **B**, **C** and **D**. Record the lengths of each strip at the **start** and **end** of the investigation and calculate the changes in length. Enter your results in the table.

| solution | start length / mm | end length / mm | change in length / mm | flexibility of strip |
|---|---|---|---|---|
| **A** | | | | |
| **B** | | | | |
| **C** | | | | |
| **D** | | | | |

[5]

**(iv)** Gently bend each strip to see how flexible it is. The more easily it bends, the more flexible it is. Decide the order of decreasing flexibility and use the scale to record this in the table. Record the most flexible strip as ++++ and the least flexible as +.

| | |
|---|---|
| **most flexible/bendable** | ++++ |
| | +++ |
| | ++ |
| **least flexible/bendable** | + |

[2]

**(v)** Describe and explain the changes in length and flexibility in the potato strip that had been **in solution A**.

.....

.....

.....

.....

.....

.....

.....

..... [3]

**(vi)** Identify **two** problems with the method used in this investigation that might have led to unreliable conclusions. Suggest a way in which each could have been improved to make the results more reliable.

problem 1 .....

improvement 1 .....

.....

problem 2 .....

improvement 2 .....

.....
[4]

**(b)** Another student investigated the effect of varying concentrations of sucrose solution on some potato tissue by measuring changes in the **mass** of the tissue.

He placed five pieces of potato tissue, each with a mass of 5 g, in five separate test-tubes.

The test-tubes contained either distilled water or one of four concentrations of sucrose solution.

Later he poured away the solutions.

**(i)** State **two** factors, apart from the mass of tissue, that should have been kept constant when using this method.

1 .....

2 ..... [2]

When he removed the pieces of tissue from the test-tubes, he carefully dried them on a paper towel.

**(ii)** Explain why it was important to dry them.

.....

.....

.....

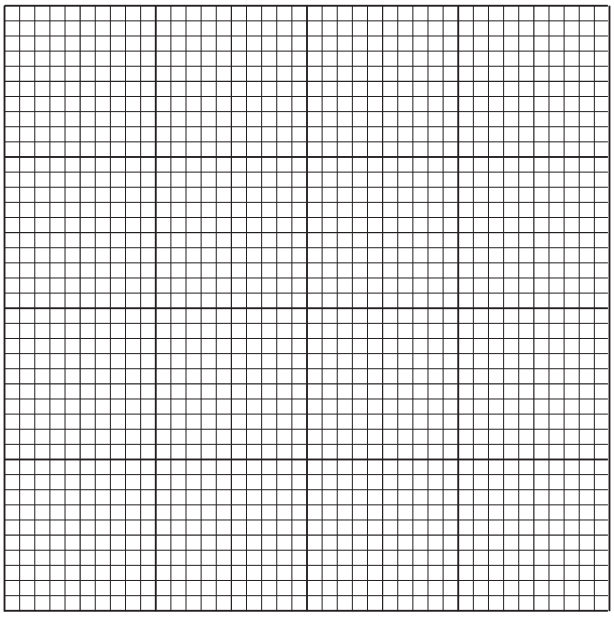
..... [2]

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The table shows the measurements at the end of the investigation.

| sucrose concentration / mol per $dm^3$ | mass at end of investigation / g |
|---|---|
| 0.0 | 5.7 |
| 0.2 | 5.2 |
| 0.4 | 4.6 |
| 0.5 | 4.3 |
| 0.8 | 3.3 |

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



[4]

**(iv)** Use your graph to determine the concentration of sucrose which will produce no change in mass.

concentration ..... [2]

**(v)** Describe the method you used to determine this concentration of sucrose.

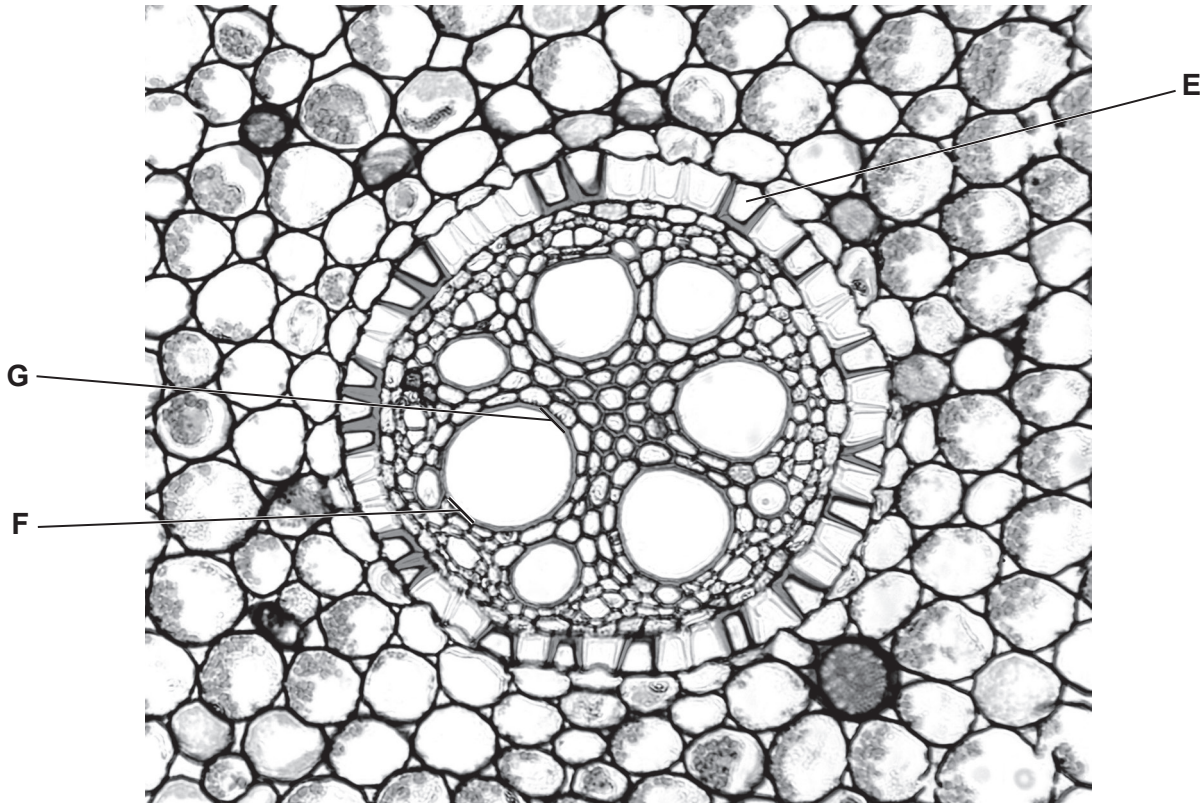
.....

.....

..... [1]

[Total: 28]

**2** The photomicrograph shows the central part of a plant root as seen under a light microscope.




magnification ×200

**(a) (i)** The xylem and phloem are surrounded by a layer of tissue that is one cell thick. The cell labelled **E** is in this layer.

Make a large drawing of cell **E** and the cells that touch it on the outside and inside of the layer.

[4]

**(ii)** Measure the diameter of the xylem vessel between **F** and **G**.

..... mm [1]

**(iii)** Calculate the actual diameter of the xylem vessel.

Space for working.

diameter ..... mm [2]

**(b)** Some of the outer cells in the photomicrograph contain small particles.

Describe in detail how you would prepare a section of the root for observation under the microscope to see whether these cells contain starch.

.....

.....

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..... [5]

[Total: 12]

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