Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

2804765217

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **October/November 2021**

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 **12** pages. Any blank pages are indicated.

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

1 The tissue of a peeled potato tuber is composed of many similar cells. A student investigated the effect of varying concentrations of sucrose solution on some potato tissue.

She was provided with:

- a potato tuber with the outer peel removed
- distilled water labelled **A**
- three sucrose solutions of different concentrations labelled **B**, **C** and **D**.

She cut four strips of tissue from the potato, each measuring 5 mm × 5 mm in cross-section and 80 mm long. This was their length at the start of the investigation.

(a) (i) Describe in detail how you would cut strips of potato to this size.

.....

.....

.....

.....

.....

..... [3]

The student then labelled four test-tubes **A**, **B**, **C** and **D**. She placed one potato strip in each and then added distilled water to test-tube **A**, and the sucrose solutions **B**, **C** and **D** to test-tubes **B**, **C** and **D**. She made sure that each potato strip was fully covered by solution.

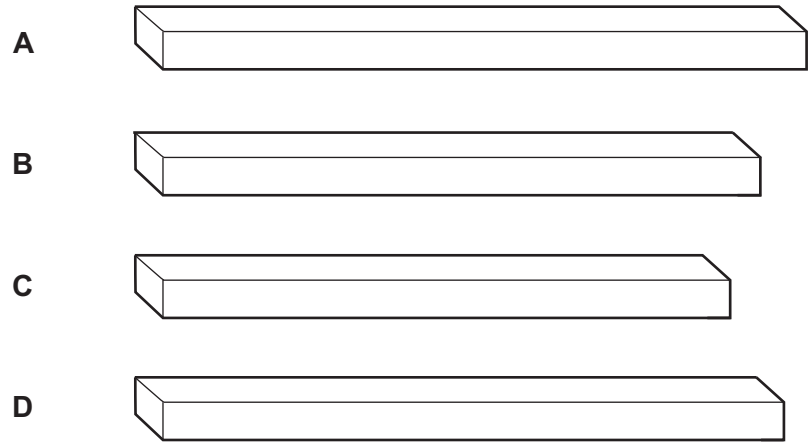
After 30 minutes, she poured away the solutions and prepared to remove the potato strips from the test-tubes to measure them.

(ii) Describe what she could do to ensure that, after they had been removed from the test-tubes, she knew which potato strip had been in which solution.

.....

..... [1]

The diagram shows the four potato strips after 30 minutes in the solutions.



(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				

[3]

She also assessed the flexibility of each strip by gently bending them. The more easily the strip bent, the more flexible it was. She recorded her results in her notebook:

strip C most flexible

strip A least flexible

strip D more flexible than A but less flexible than C

strip B more flexible than D but less flexible than C

(iv) Arrange the strips in order of decreasing flexibility and use the scale below 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**.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(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 different 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.

.....

.....

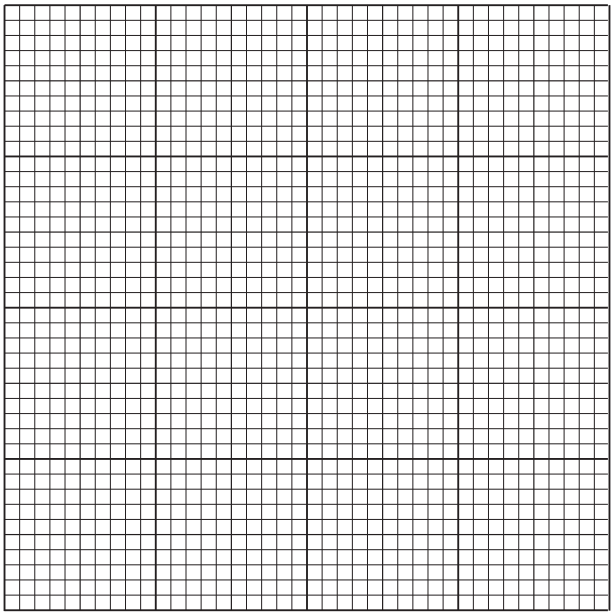
.....

..... [2]

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.

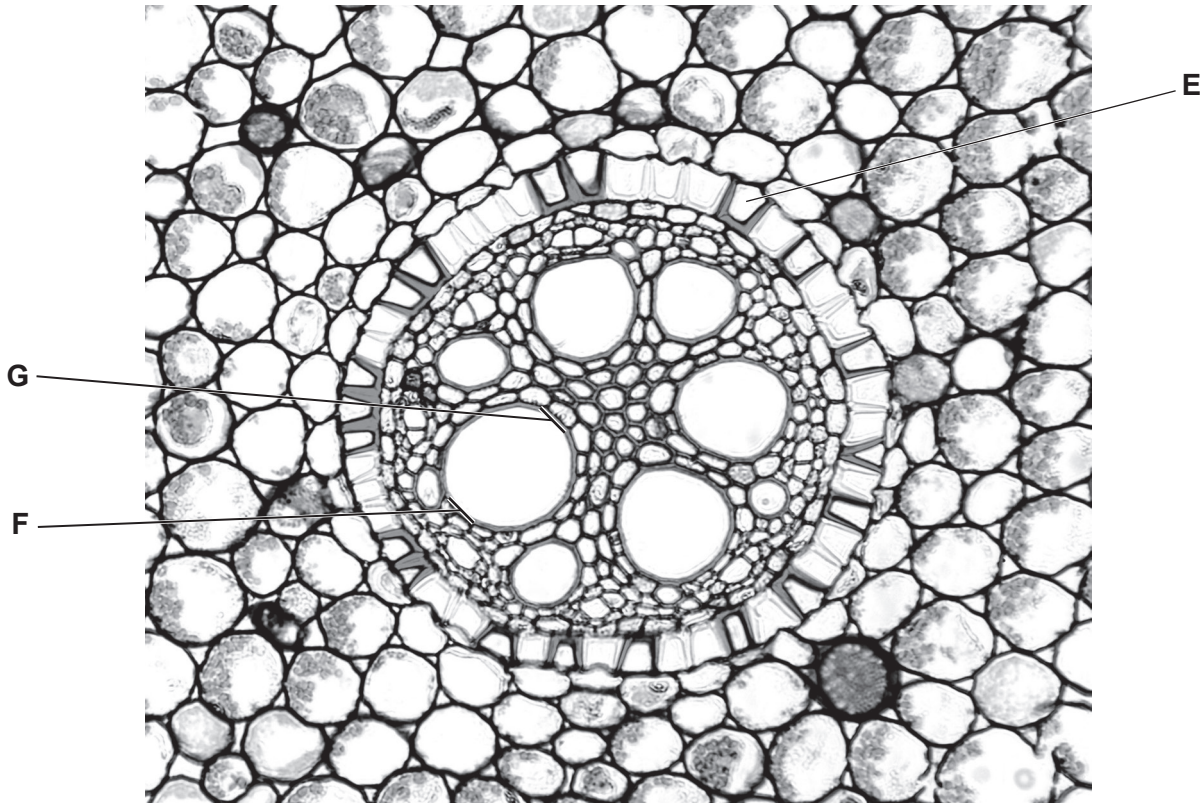
.....

.....

..... [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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