Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

5097905526

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **October/November 2020**

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. Blank pages are indicated.

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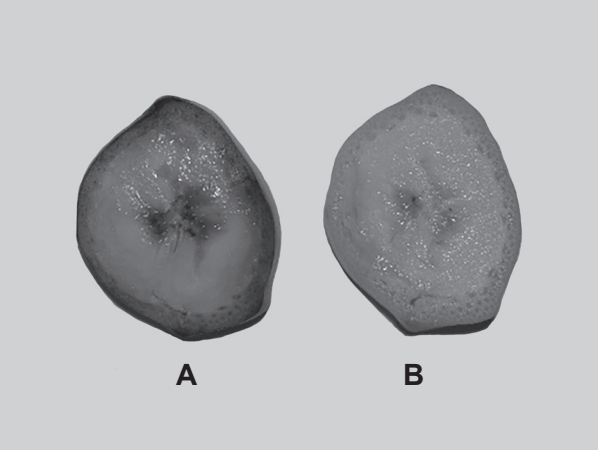
Answer **all** questions in the spaces provided.

1 When tissue from some plants is cut, the cut surface turns brown. This is because enzymes are released which cause reactions between chemicals in the plant and oxygen to produce brown substances.

The photograph below shows two slices cut from a banana. Slice **A** was exposed to the air for two hours and slice **B** was freshly cut. The freshly cut slice was a creamy yellow colour.



Some students decided to investigate the effect of different treatments on the rate at which a banana turns brown.

They cut three slices from the same banana, each 1 cm wide.

- One slice, **C**, was placed in a beaker of dilute hydrochloric acid (HCl) for two minutes. It was then removed and placed on a white tile.
- One slice, **D**, was placed on the white tile and cut into many small pieces.
- The third slice, **E**, was left untreated on the white tile.

The students observed the slices and recorded the colour of each after 5, 10 and 20 minutes.

After 5 minutes, they also measured and recorded the pH of the cut surface of each slice.

Their results are shown below.

After 5 minutes: *HCl treatment - pH 2, creamy yellow; cut up slice - pH 6, very pale brown; untreated slice - pH 6, creamy yellow*

After 10 minutes: *HCl treatment - creamy yellow; cut up slice - pale brown; untreated slice - very pale brown*

After 20 minutes: *HCl treatment - creamy yellow; cut up slice - brown; untreated slice - pale brown*

(a) **(i)** Enter the students' data in the tables.

time / minutes	colour		
	slice dipped in HC*l* (C)	**slice cut into small pieces (D)**	**untreated slice (E)**
5			
10			
20			

pH		
slice dipped in HC*l* (C)	**slice cut into small pieces (D)**	**untreated slice (E)**

[3]

(ii) The untreated slice **E** was the control in this investigation. Explain why this was included.

.....

..... [1]

(iii) The banana slice **C** was placed in a small beaker containing 50 cm^3 of dilute hydrochloric acid. Name the piece of apparatus you would use to measure accurately 50 cm^3 of dilute hydrochloric acid.

..... [1]

(iv) Describe how you would safely remove the banana slice from the hydrochloric acid.

.....

..... [1]

(v) Describe how you would measure the pH of the surfaces of the banana slices.

.....

.....

.....

.....

..... [3]

(b) **(i)** Describe the effect of dilute hydrochloric acid by comparing the results for slices **C** and **E**.

.....

..... [1]

(ii) Suggest a reason for the effect of dilute hydrochloric acid.

.....

..... [1]

(iii) State the effect of cutting up slice **D** into small pieces by comparing the results with **E**.

.....

..... [1]

(iv) Suggest a reason for this effect in slice **D**.

.....

..... [1]

(c) The students found it difficult to describe their observations in this investigation. Suggest a reason why they found it difficult and an improvement to their method to overcome this.

reason.....

.....

improvement.....

.....
[2]

(d) Using a method similar to the one in this investigation design an experiment to determine the optimum (best) pH for a banana to turn brown.

.....

.....

.....

.....

.....

.....

.....

.....

.....

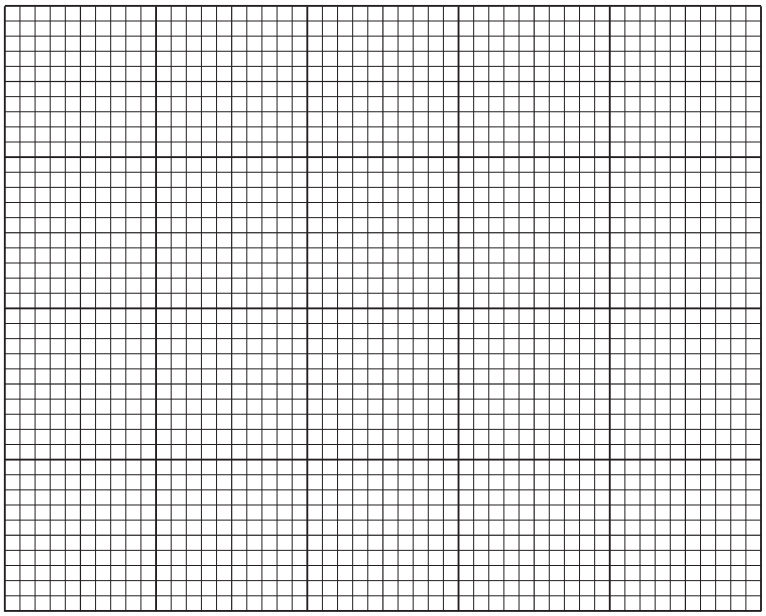
..... [5]

[Total: 20]

2 A student investigated the effect of exercise on her rate of breathing. She started exercising at two minutes and stopped exercising at eight minutes. The data collected is shown in the table.

time / minutes	**rate of breathing / breaths per minute**
0	14
2	14
4	24
6	35
8	35
10	19

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



[4]

(b) Use your graph to find the rate of breathing at five minutes. Show your working on the graph.

rate ..... [2]

(c) Describe how the student could have measured her rate of breathing.

.....

..... [1]

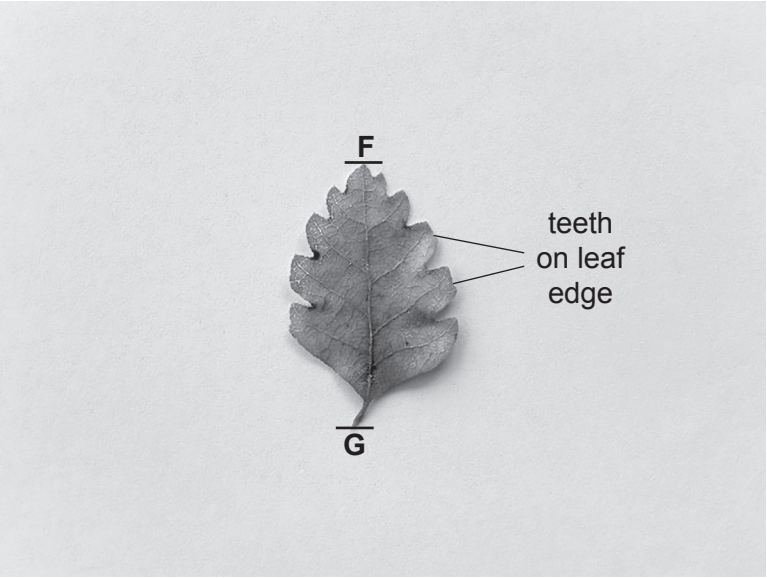
(d) Exercise increases the rate of breathing. State **one other** measurement that the student could have recorded to determine the full effect of exercise on breathing.

.....

..... [1]

[Total: 8]

3 The photograph shows a leaf of a southern beech tree.



magnification ×1

(a) **(i)** Make a large drawing of the leaf in the space below.

[5]

(ii) **On the photograph** draw a straight line to join **F** and **G**.

Measure and record the length of the line.

.....

On your drawing draw a straight line in the same position as on the photograph.

Measure and record the length of the line.

.....

[3]

(iii) Calculate the magnification of your drawing compared to the original size of the leaf. Space for working.

magnification × ..... [2]

(b) Biological keys can be used to identify species. A biological key for five different species of southern beech tree is shown below.

Use this key to identify the name of the tree whose leaf is shown in the photograph on page 8.

To use the key start at 1 and read the two alternatives, (a) and (b). Decide which one is correct and tick [✓] the box next to that option. If indicated, go to the next number. Continue with this procedure until you identify the tree leaf in the photograph.

1	(a)	Leaf with a smooth edge	☐ mountain beech
	(b)	Leaf with teeth on edge	☐ go to 2
2	(a)	Leaf 20–40 mm long	☐ go to 3
	(b)	Leaf 6–15 mm long	☐ silver beech
3	(a)	Leaf with 4–7 teeth on each side	☐ red beech
	(b)	Leaf with 8–12 teeth on each side	☐ hard beech

name of tree .....

[2]

[Total: 12]

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