Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

0230902660

BIOLOGY **5090/61**

Paper 6 Alternative to Practical **October/November 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 **12** pages. Any blank pages are indicated.

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

1 Foods can be tested to determine the types of molecules that they contain.

A student decided to carry out three tests to investigate the composition of two foods, **A** and **B**.

He cut a cube 1 cm × 1 cm × 1 cm of **A**.

He then cut that cube into three pieces each of the same size. One piece was used for each of the three tests.

He carried out the same procedure with **B**.

For the first test he followed these instructions:

- label a test-tube **A1**
- cut one of the three pieces of **A** into small pieces and put the small pieces into the test-tube
- pour 2 cm^3 of ethanol into the test-tube
- shake the test-tube well
- place the test-tube in a test-tube rack to allow the contents to settle at the bottom.

He repeated this procedure with one of the pieces of **B** with a test-tube labelled **B1** and placed it in the test-tube rack.

(a) **(i)** State what you would use to produce the 1 cm × 1 cm × 1 cm cubes of **A** and **B**.

.....

..... [1]

(ii) Describe what you would do to ensure that the tests with the small pieces of **A** and **B** were comparable.

.....

..... [1]

The student poured equal volumes of distilled water into two new test-tubes labelled **A1W** and **B1W**.

He took test-tube **A1** and carefully poured the liquid into test-tube **A1W**.

He followed the same procedure with test-tube **B1**, pouring the liquid into test-tube **B1W**.

He observed the mixtures and recorded his observations in his notebook.

For the second test he used the second pieces of **A** and **B**, cut into small pieces. The small pieces of **A** were added to test-tube **A2** and the small pieces of **B** were added to test-tube **B2**.

He added the same volume of distilled water to both test-tubes. He then used a glass rod to stir the contents of both test-tubes.

(iii) Explain why he cleaned the glass rod after using it in test-tube **A2** and before using it in test-tube **B2**.

.....

..... [1]

He then added the same volume of biuret reagent to both test-tubes.

The photograph shows a graduated measuring cylinder with the biuret reagent that he added to one of the test-tubes.

(iv) State the volume of biuret reagent that he added.

..... cm^3 [1]

After adding the biuret reagent he observed the mixtures in test-tubes **A2** and **B2** and recorded his observations in his notebook.

For the third test, he placed the third pieces of **A** and **B** on a white tile, added some iodine solution and recorded his observations in his notebook.

(b) (i) The student's notebook is shown.

appearance of solutions after tests

test-tube A1W - colourless

test-tube B1W - cloudy

test-tube A2 - pale purple

test-tube B2 - darker purple

iodine on A - brown

iodine on B - brown

Complete the table using only the information from his experimental method and his notebook.

test number	**test solution / reagent**	.....	
		food A	**food B**
1			
2			
3			

[5]

(ii) Use the student's observations to state what you can conclude about the composition of foods **A** and **B**.

test 1 .....

.....

test 2 .....

.....

test 3 .....

.....
[6]

He found that it was easy to cut **A** into a cube and divide it into three equal parts. However, he found that **B** crumbled (easily fell apart) which made it difficult to cut to produce a cube and to ensure that the three parts were of equal size.

(c) **(i)** Suggest how this problem could have affected the results in test-tubes **A2** and **B2** and your conclusions.

.....

.....

.....

.....

.....

..... [3]

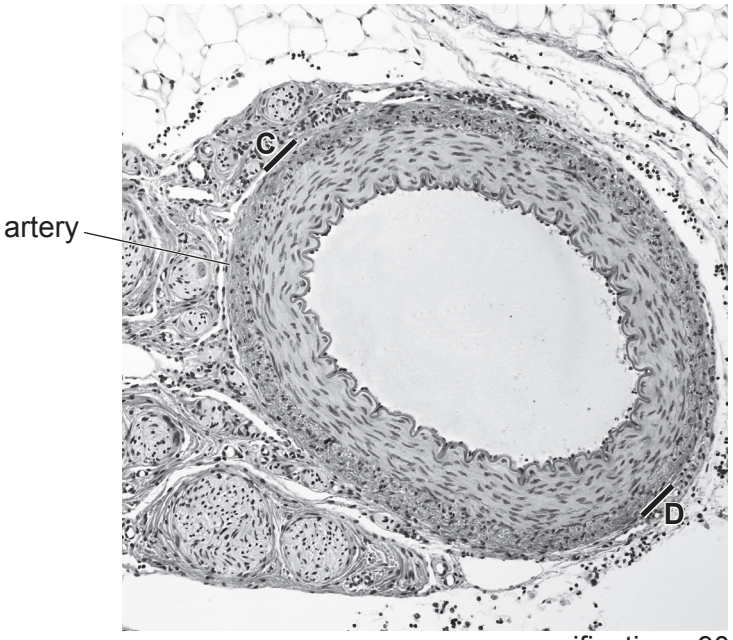
(ii) Suggest a change to the method to help overcome this problem.

.....

..... [1]

[Total: 19]

2 The photomicrograph shows a section through a small artery in a muscle.



magnification ×90

(a) In the space below make a large drawing of the artery. Do not draw individual cells.

[4]

(b) Draw a straight line on the photomicrograph to join lines **C** and **D**. Measure the length of this line.

.....

Calculate the actual width of the artery. Give your answer to 2 decimal places.

Space for working.

..... mm [3]

(c) As the heart pumps, it pushes blood through arteries causing them to expand and contract in response to the flow of blood. Each expansion and contraction is a pulse.

Describe in detail how you would determine your pulse rate when at rest, without using an electronic monitoring device.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

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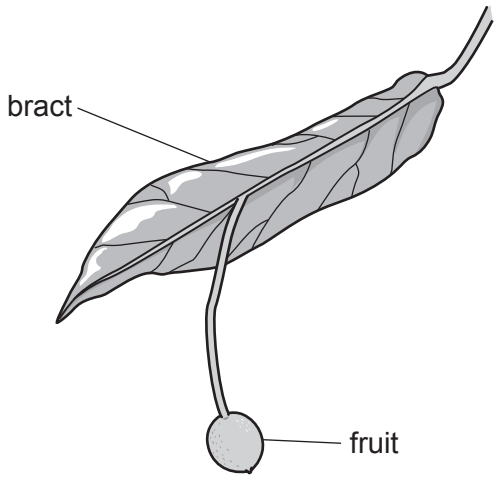
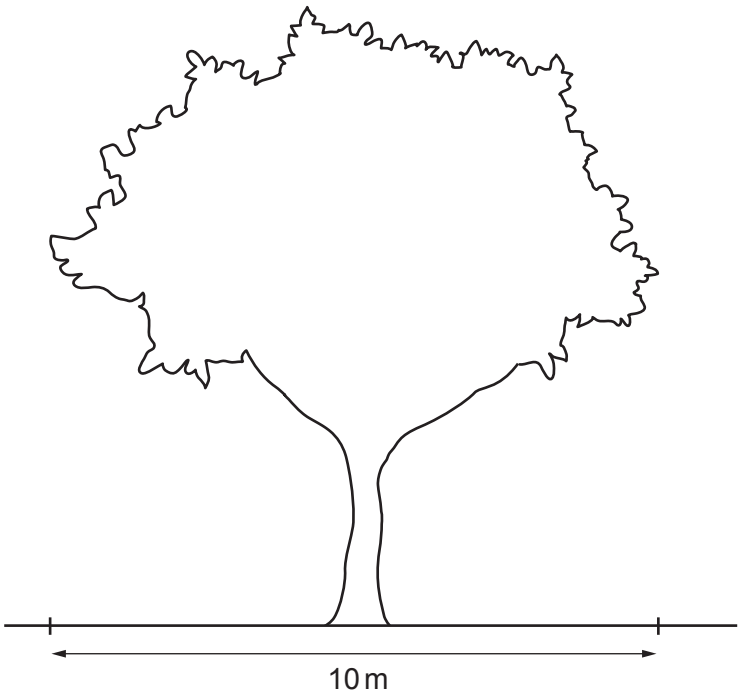
3 A tree produces fruits that are attached to thin leaf-like structures called bracts. One fruit with a bract is shown in the diagram.



magnification ×1

Usually the whole structure shown in the diagram drops from the tree. Sometimes only the small fruit drops without the bract.

A student investigated how far fruits were dispersed when they fell from the tree. An outline of the tree is shown in the diagram.



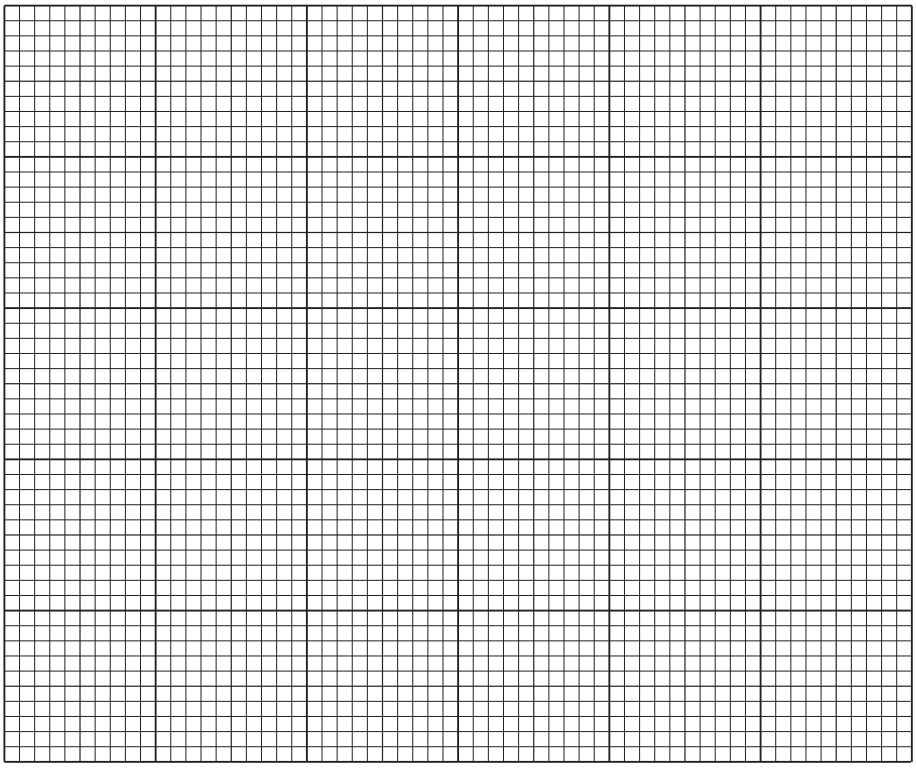
She used a 1 m × 1 m square frame. At increasing distances from the base of the tree, she placed this frame on the ground and looked at any fruits inside the frame.

Some fruits still had bracts attached and some did not. She counted the numbers of each and recorded them.

Her results are shown in the table.

distance from base of tree / m	number of fruits with bracts per frame	number of fruits without bracts per frame
0	15	35
5	23	38
10	16	0
15	8	0
20	4	0
30	2	0

(a) Construct line graphs of this data on the same axes on the grid below. Join the points with straight lines.



[5]

(b) Using your graph and the information given, describe:

(i) the distribution of fruits without bracts

.....

..... [1]

(ii) the distribution of fruits with bracts.

.....

.....

.....

..... [2]

(c) State one **environmental** variable that could affect how far a fruit with a bract is dispersed.

..... [1]

(d) Suggest one **other** variable that could affect how far a fruit with a bract is dispersed. Explain how this variable would affect the distance dispersed.

variable .....

explanation .....

.....

.....
[2]

[Total: 11]

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