Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

5476251005

BIOLOGY **5090/31**

Paper 3 Practical Test **October/November 2022**

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

You are going to investigate the composition of two foods, **A** and **B**.

You are provided with the reagents for three different tests.

For the first test:

- label a test-tube **A1**
- place food **A** on a tile and cut a cube 1 cm × 1 cm × 1 cm from it
- carefully cut this cube into three parts, all the same size
- take one of these three parts, cut it into small pieces and put the small pieces into test-tube **A1**
- pour 2 cm^3 of ethanol into test-tube **A1**
- place a stopper in the top of the test-tube and shake the test-tube well
- remove the stopper and place the test-tube in a rack
- carefully clean your cutting equipment
- label a test-tube **B1**
- repeat the process above using food **B**, taking care to cut one piece into a similar number of small pieces as for food **A**.

Allow the solid contents to settle to the bottom of both test-tubes, which should take no more than ten minutes. Continue with the question while the solid contents settle.

(a) **(i)** Explain why it was necessary to clean your cutting equipment after cutting food **A**.

.....

..... [1]

(ii) Suggest why you were asked to cut **A** and **B** into a similar number of small pieces.

.....

..... [1]

For the second test:

- label one test-tube **A2** and another test-tube **B2**
- cut the second part of cube **A** into small pieces and put the small pieces into test-tube **A2**
- pour 2 cm^3 of distilled water into test-tube **A2**
- use a glass rod to stir the contents of test-tube **A2**
- clean the glass rod and your cutting equipment
- repeat the steps above using the second part of cube **B** and test-tube **B2**
- add 2 cm^3 of biuret reagent to each of test-tubes **A2** and **B2**.
- stir the contents of test-tubes **A2** and **B2** for one minute, cleaning the glass rod after stirring **A2**
- place the test-tubes in a rack to allow the solid contents to settle.

Return to test-tubes **A1** and **B1**. Continue with the following instructions for test-tubes **A1**, **B1** and the remaining two empty test-tubes:

- label one empty test-tube **A1W** and another empty test-tube **B1W**
- add 3 cm^3 of distilled water to each of the test-tubes **A1W** and **B1W**
- take test-tube **A1** and carefully pour the liquid from the top of the mixture into test-tube **A1W**
- take test-tube **B1** and carefully pour the liquid from the top of the mixture into test-tube **B1W**.

For the third test:

- on a tile, add iodine solution to the third pieces of food **A** and food **B**.

(b) **(i)** Observe the appearance of the solutions in test-tubes **A1W**, **B1W**, **A2**, **B2** and the foods **A** and **B** tested with iodine solution. Record your observations in the table.

test reagent	**observations**	
	food A	**food B**
ethanol		
biuret reagent		
iodine solution		

[7]

(ii) Using the information in the table, state what you can conclude about the composition of **A** and **B**.

test with ethanol .....

.....

test with biuret reagent .....

.....

test with iodine solution .....

.....

[6]

(c) State **two** possible sources of error in these tests that may have affected the results.

For each source of error suggest how it could be overcome.

1. source of error .....

suggestion .....

.....

2. source of error .....

suggestion .....

.....

[4]

[Total: 19]

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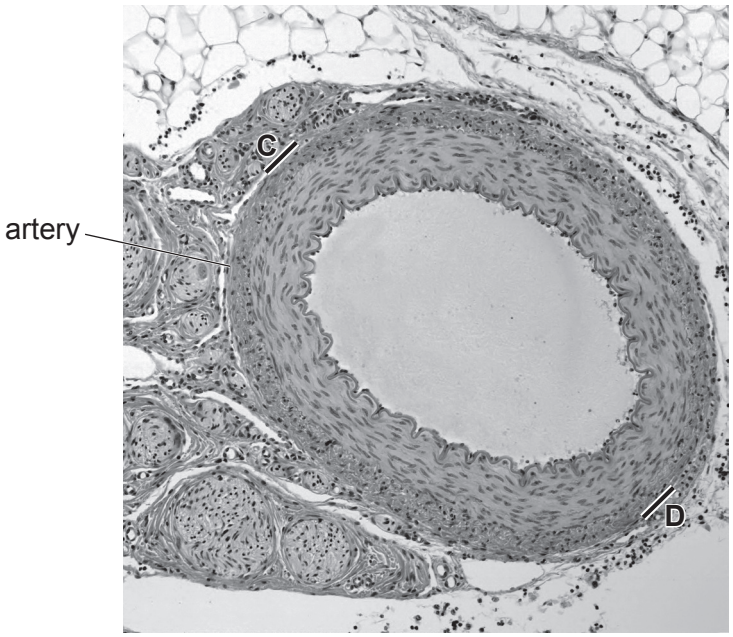
2 The photomicrograph shows a section through a small artery in a muscle.



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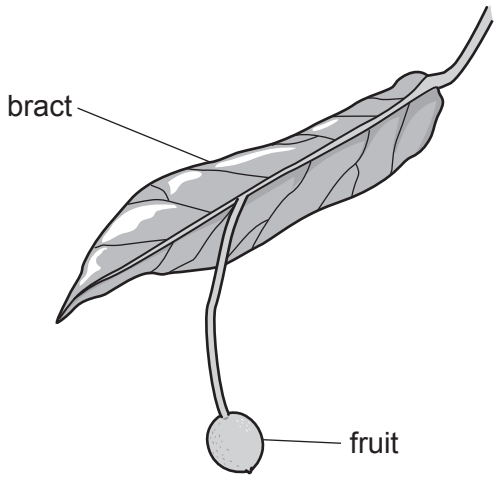
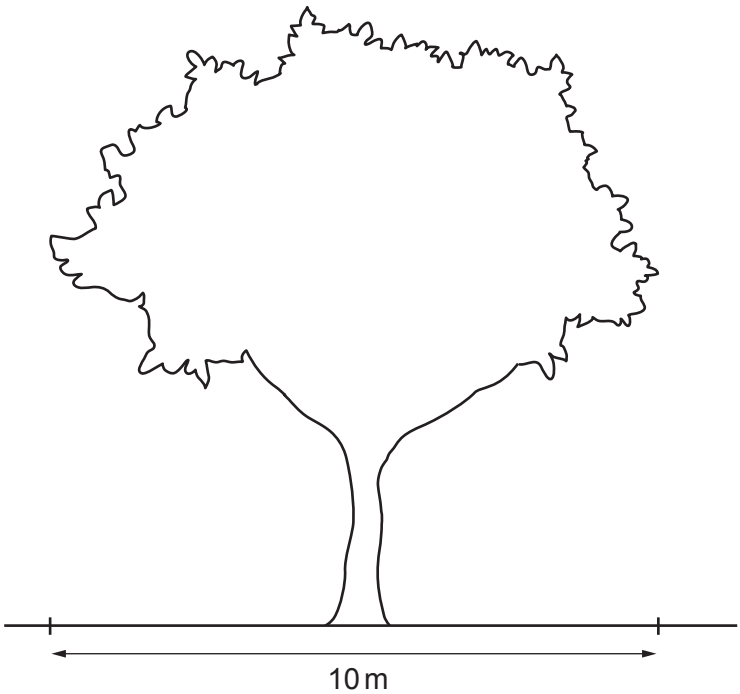
3 A tree produces fruits that are attached to thin leaf-like structures called bracts. One fruit with a bract is shown in the diagram.



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.



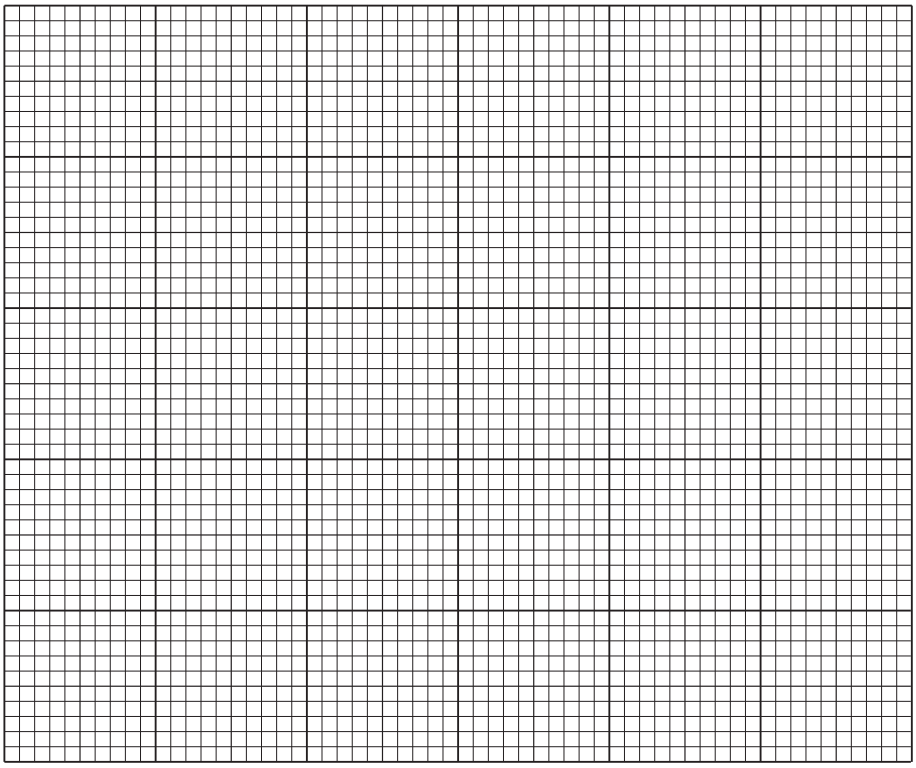
She used a 1 m × 1 m square frame. At increasing distances from the base of the tree, she placed this frame on the ground and looked at any fruits inside the frame.

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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