Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

0136851603

BIOLOGY **5090/22**

Paper 2 Theory **May/June 2021**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Section A: answer **all** questions.
- Section B: answer **all** questions.
- Section C: answer **either** Question 8 **or** Question 9.
- 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 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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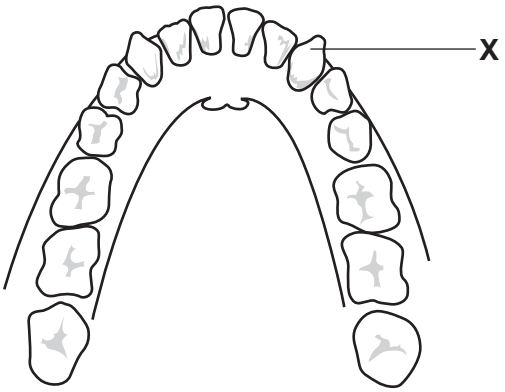
Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 The diagram shows the teeth in the lower jaw of a human.



(a) Name the type of tooth labelled **X** and describe **one** function of this type of tooth.

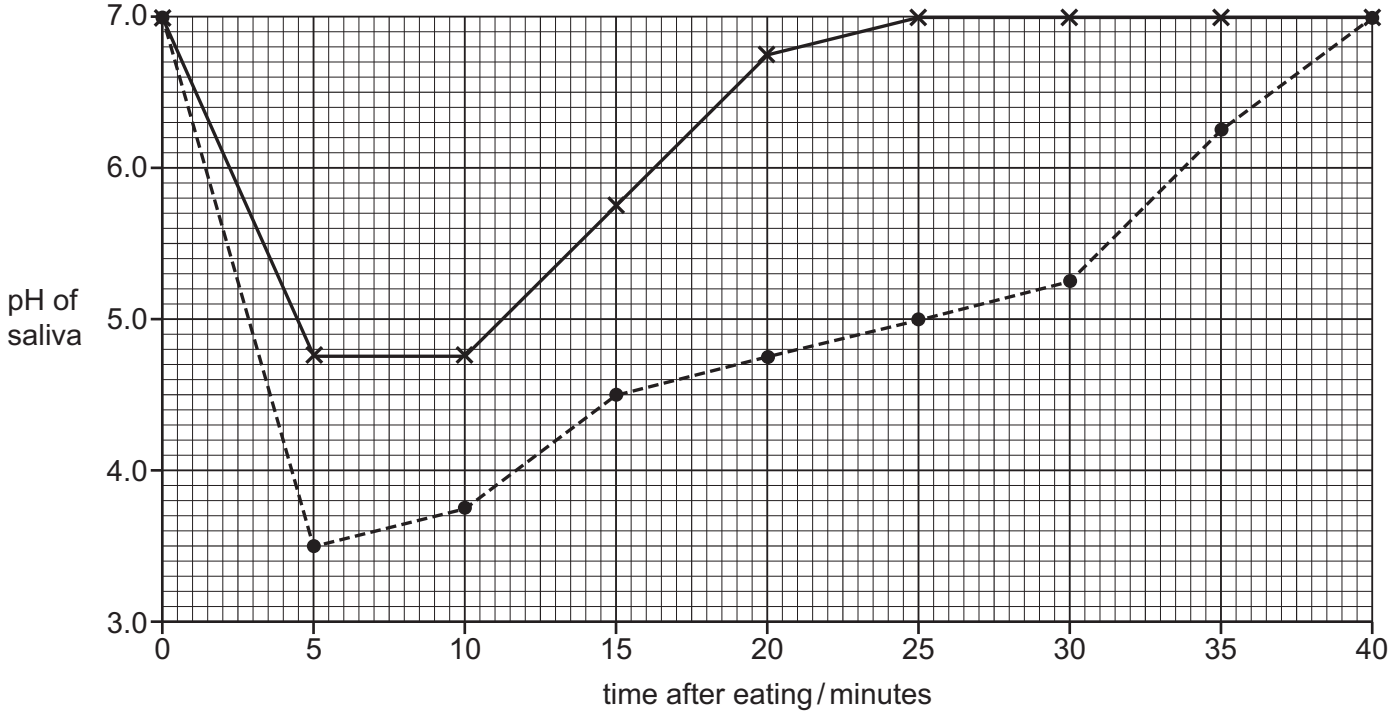
type of tooth .....

function .....

.....
[2]

(b) Food can be sweetened using honey or sugar.

The graph shows how the pH of saliva in the mouth changes with time after eating food sweetened with honey or sugar.



key
——— honey
- - - - - - sugar

(i) State the lowest pH of saliva in the mouth after eating food sweetened with honey.

..... [1]

(ii) It takes more time for saliva to return to pH 7.0 after eating food sweetened with sugar than after eating food sweetened with honey.

State how much more time it takes for the pH to return to 7.0.

..... [2]

(c) Dental decay is likely to occur when the pH of saliva falls below 5.5.

(i) Use information from the graph to explain whether sweetening food with honey or with sugar is more likely to lead to dental decay.

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..... [2]

(ii) State **two** ways to prevent dental decay.

1 .....

2 .....
[2]

(iii) A person with dental decay may also have gums that bleed. This makes it more likely that bacteria found in the mouth will enter the circulatory system.

Bacteria in the circulatory system can cause the blood to clot.

Small blood clots may move through the circulatory system to the coronary arteries.

Suggest and explain possible health problems that this may cause.

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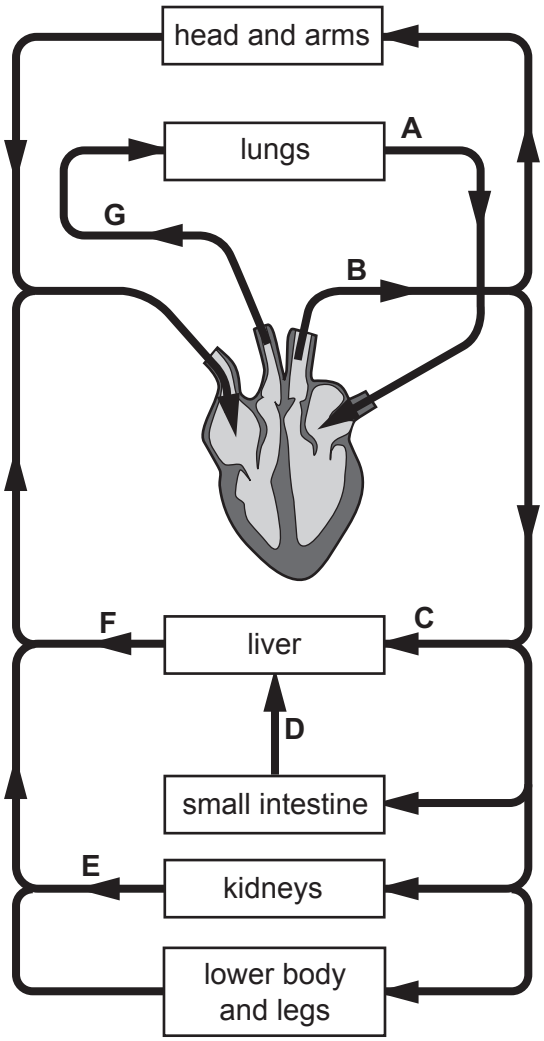
..... [4]

[Total: 13]

2 The diagram shows the arrangement of major blood vessels in the human circulatory system.

Arrows show the direction that blood moves in each vessel.



(a) Seven of the blood vessels have been labelled on the diagram using the letters **A** to **G**.

Complete the table by writing **one** letter, **A** to **G**, for each name or description of a blood vessel.

The first row has been completed for you.

name or description	blood vessel
the aorta	**B**
carries blood containing the lowest concentration of urea	
one vessel that carries oxygenated blood	
carries blood at the highest pressure	
carries blood containing the highest concentration of glucose	
the hepatic vein	
an artery that carries deoxygenated blood	

[6]

(b) Explain why the movement of blood through the circulatory system of a human is described as a double circulation.

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..... [3]

[Total: 9]

3 The diagram shows an elm tree.

(a) Elm trees may be infected by a fungus that causes a disease.

State **two** characteristics of a fungus.

1 .....

2 .....
[2]

(b) The fungus moves through an infected tree inside the xylem vessels.

The tree responds to stop the movement of the fungus by producing substances that block the xylem vessels. This causes the leaves of the tree to wilt and to become yellow.

Explain how the response of the tree to infection leads to these symptoms of disease.

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..... [5]

(c) An insect called the elm bark beetle is the vector of this disease.

Describe what is meant by the term **vector**.

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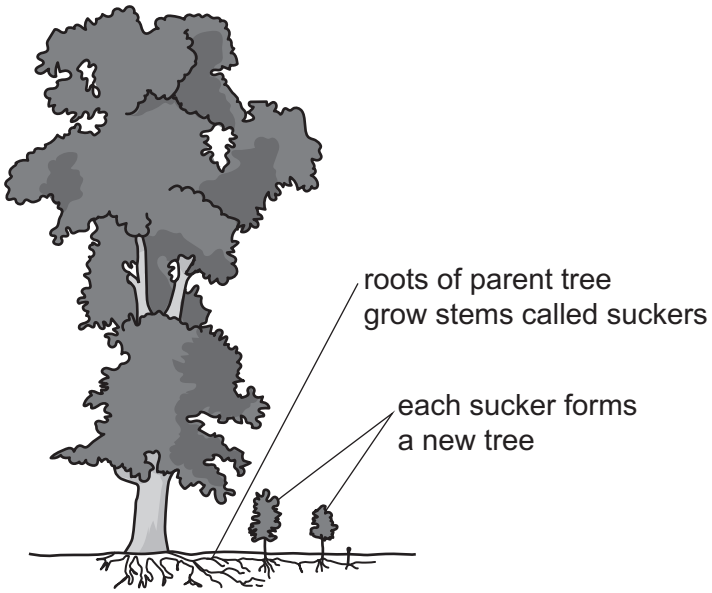
..... [2]

(d) Elm trees can reproduce when the roots from one parent tree spread out near the surface of the soil. This is shown in the diagram below.



(i) Name the type of reproduction shown in the diagram.

..... [1]

(ii) Suggest why this type of reproduction makes it difficult to control the spread of the disease caused by the fungus.

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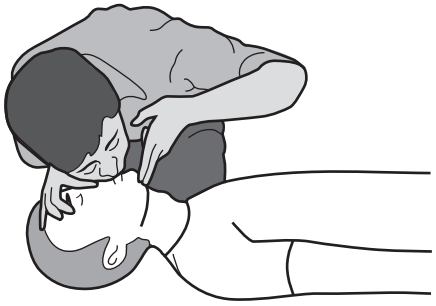
..... [3]

[Total: 13]

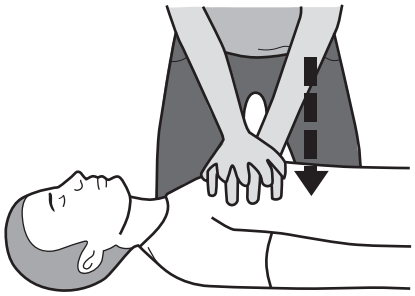
4 Cardiopulmonary resuscitation (CPR) is a first aid procedure.

Air is forced into a patient's lungs by another person. The heart is made to pump blood by repeated compression of the patient's chest over the heart.

A person performing CPR on a patient is shown in the diagrams.



air forced into lungs



repeated compression of chest

(a) **(i)** State what will be seen to happen to the patient's chest when air is forced into the lungs.

..... [1]

(ii) Name, in the correct order, the tubes through which air will travel from the patient's mouth to the alveoli of the lungs.

..... → ..... → .....

[2]

(iii) The air forced into the patient's lungs has different concentrations of gases compared to the air the patient would normally breathe in.

State **two** differences in the concentrations of gases.

.....

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..... [2]

(b) Explain how each action of the CPR procedure will benefit the patient:

air forced into the patient's lungs

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repeated compression of the patient's chest.

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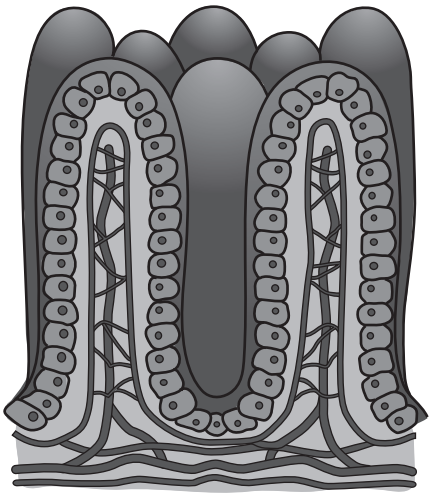
[4]

[Total: 9]

5 The diagram shows villi in the small intestine.



Outline the processes by which **named** molecules are absorbed from the contents of the small intestine into the blood.

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..... [6]

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Section B

Answer **both** questions in this section.

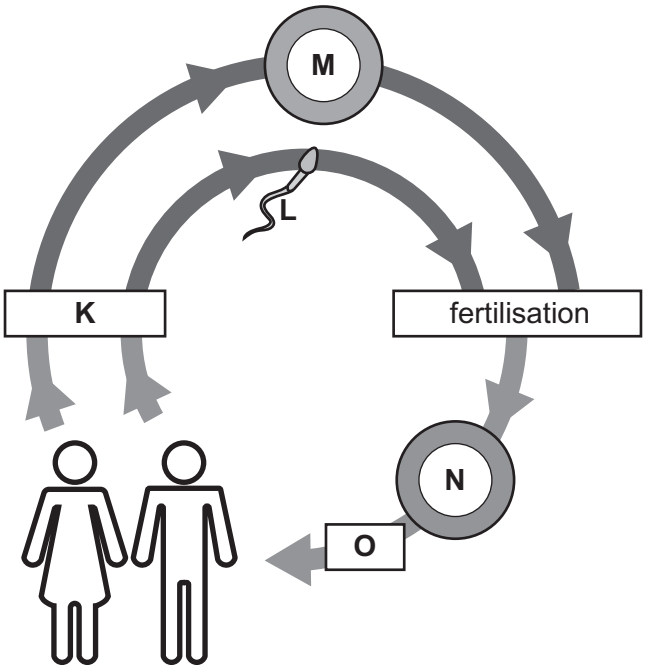
Write your answers in the spaces provided.

6 The diagram shows the human life cycle.

The components of the diagram are **not** drawn to the same scale.

The diagram shows:

- cells **L**, **M** and **N**
- two types of cell division, **K** and **O**.



(a) **L** and **M** are both the same type of cell.
Name this type of cell.

..... [1]

(b) Outline differences between the nucleus of cell **M** and the nucleus of cell **N**.

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..... [3]

(c) Name and compare the types of cell division **K** and **O**.

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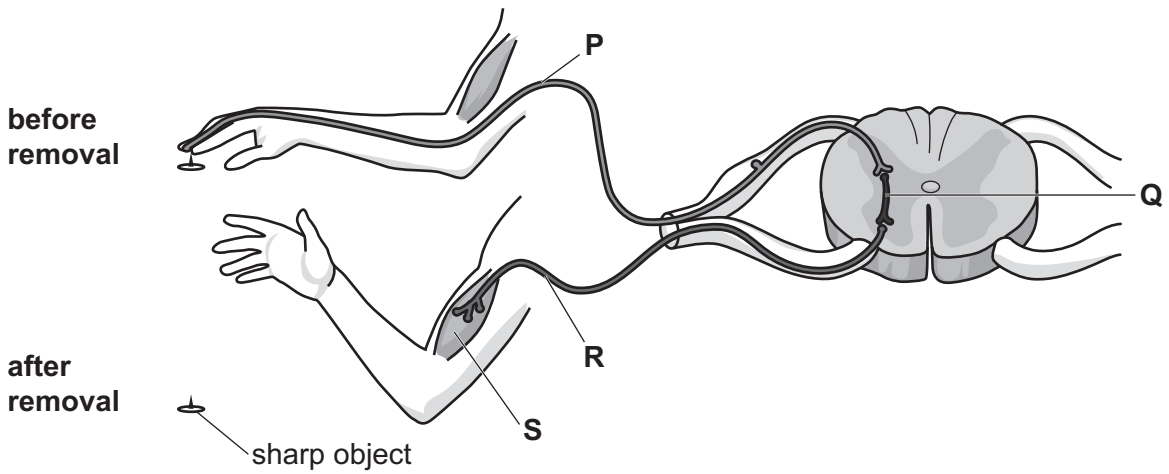
..... [6]

[Total: 10]

7 The diagram shows structures involved in a reflex action that results in removal of a person's hand from a sharp object.



(a) **(i)** Name and state the function of:

structure **P**

.....

.....

.....

structure **R**.

.....

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.....
[4]

(ii) Describe the location of structure **Q** in the nervous system.

.....

..... [2]

(b) Explain how the action of structure **S** results in the movement of bones at a **named** type of joint.

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..... [4]

[Total: 10]

Section C

Answer **either** Question 8 **or** Question 9.

Write your answers in the spaces provided.

8 State the functions of the human liver and explain the importance to a person of each function.

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[Total: 10]

9 Describe the large-scale production of a **named** antibiotic and explain the importance of each stage of the process.

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[Total: 10]

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