Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

5238146989

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2020**

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 **12** pages. Blank pages are indicated.

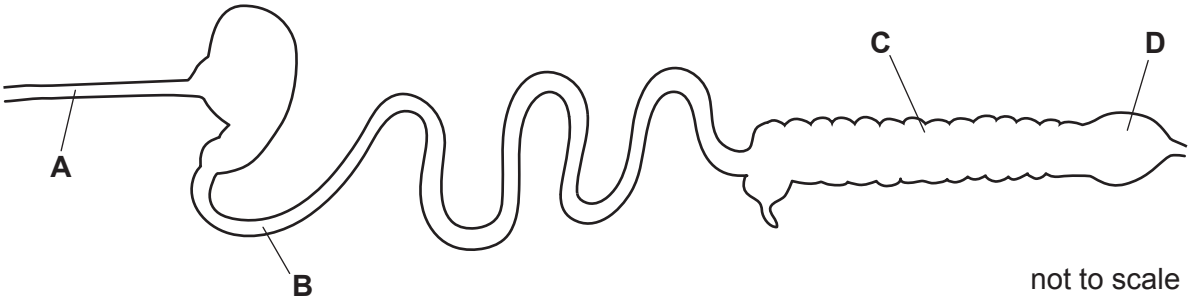
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Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 The diagram represents what the human alimentary canal would look like if it was removed from a person and straightened out.



not to scale

(a) (i) Identify the parts **A**, **B**, **C** and **D** labelled on the diagram.

A .....

B .....

C .....

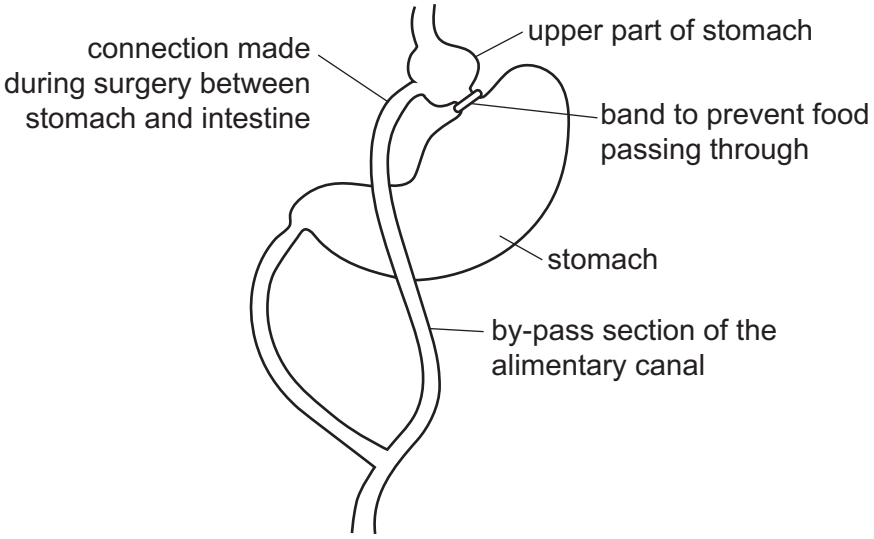
D .....

[4]

(ii) State which part has the absorption of water as its main function.

..... [1]

(b) Gastric (stomach) by-pass surgery is sometimes used to help a person to lose weight. The diagram shows the result of this type of surgery.



(i) The digestion of **one** food substance is most likely to be affected by this surgery. State which food substance and explain your answer.

food substance .....

explanation .....

.....

..... [2]

(ii) Suggest how this surgery may help a person to lose weight.

.....

.....

.....

..... [3]

[Total: 10]

2 Corals are a collection of small animals living together in the sea. Their skeletons produce coral reefs. The cells of these animals contain microscopic, green, plant-like organisms called algae.

(a) Suggest the name of the process by which the algae make their food and explain your answer.

process .....

explanation .....

..... [2]

(b) The corals and the algae depend on each other to survive.

Suggest

- how the algae benefit from the corals

  .....

  .....

  .....

- how the corals benefit from the algae.

  .....

  .....

  .....

[5]

(c) An increase in the average temperature of the sea over the last 20 years has caused the algae to manufacture chemicals that are poisonous to the corals.

Suggest and explain the long-term effect on the corals and on the algae of this rise in temperature.

.....

.....

.....

..... [3]

[Total: 10]

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3 Atmospheric air contains several gases.

(a) Complete the table to show the approximate percentage of each gas listed.

gas	percentage in atmospheric air
carbon dioxide	
oxygen	
nitrogen	

[3]

(b) **(i)** Name a gas **not** listed in the table which will be present in a higher concentration in an industrial region than in the countryside.

..... [1]

(ii) Explain why this gas will be present in a high concentration in an industrial region.

.....

.....

.....

..... [3]

(c) Suggest why there are usually fewer species of wildlife in industrial regions than in the countryside.

.....

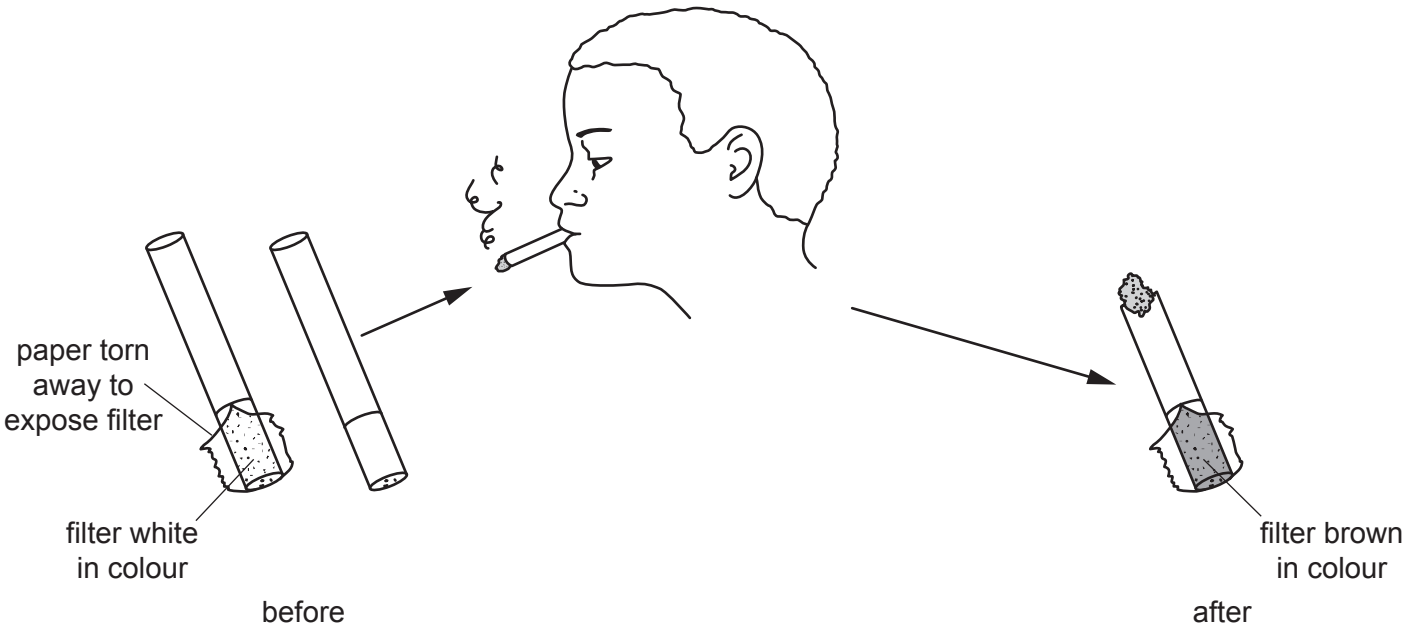
.....

.....

..... [4]

[Total: 11]

4 The diagram shows two identical cigarettes before they have been smoked. In one of them, the paper round the filter has been torn away to expose the filter beneath. It also shows a cigarette after it has been smoked, again with its filter exposed.



Tar is the chemical which turns the filter brown in colour.

(a) State **two** harmful effects of tar.

1 .....

2 .....
[2]

(b) **(i)** Name **two** other chemicals produced by cigarettes when they are smoked and, for each, state **one** of its harmful effects.

chemical 1. .....

harmful effect .....

chemical 2. .....

harmful effect .....
[4]

(ii) Describe how these chemicals can pass from a cigarette to the fetus of a pregnant woman.

.....

.....

.....

.....

..... [4]

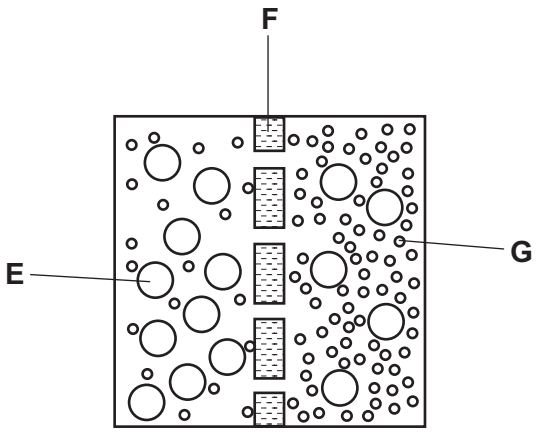
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5 **(a)** Name the substance absorbed by plants using the process of osmosis.

..... [1]

(b) The diagram represents osmosis taking place between two sucrose solutions of different concentrations.



Identify **E**, **F** and **G**.

molecule **E** .....

structure **F** .....

molecule **G** .....

[3]

(c) Explain, with reference to the diagram, how osmosis takes place.

.....

.....

.....

.....

.....

..... [5]

[Total: 9]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** State the functions of the aorta and the vena cava and describe how each is adapted for its functions.

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.....

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.....

.....

.....

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..... [7]

(b) Some people are born with a hole in their heart that allows blood to pass between the left and the right sides of the heart. Suggest how this condition may affect the efficiency of their circulatory system.

.....

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.....

.....

..... [3]

[Total: 10]

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7 **(a)** Explain how energy originally supplied by the Sun is eventually used to power the muscles of a lion when it runs.

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..... [7]

(b) Explain why human communities now consider it important to recycle materials.

.....

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.....

.....

..... [3]

[Total: 10]

Section C

Answer **either** question 8 **or** question 9.

Write your answers in the spaces provided.

8 **(a)** Explain why plants that are grown commercially are often reproduced by asexual methods.

.....

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..... [5]

(b) In some parts of the world, bees, which are insects, are being killed in large numbers by a parasite called the varroa mite. Suggest why this is widely considered to be a potentially serious problem to ecosystems.

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..... [5]

[Total: 10]

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9 **(a)** Describe, with examples, what is meant by the term *mutation*. Name factors which may increase the rate of mutation.

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..... [5]

(b) Artificial Insemination is a method of breeding farm animals in which the semen (liquid containing sperm) from a selected male animal is sent to a farmer to fertilise females of the same species.

Suggest possible advantages of this method over natural methods of breeding farm animals.

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..... [5]

[Total: 10]

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