Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **5090/22**

Paper 2 Theory **May/June 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 **16** pages. Blank pages are indicated.

[Turn over

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Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 In the diagram below the boxes on the left contain the names of organs of the human body.

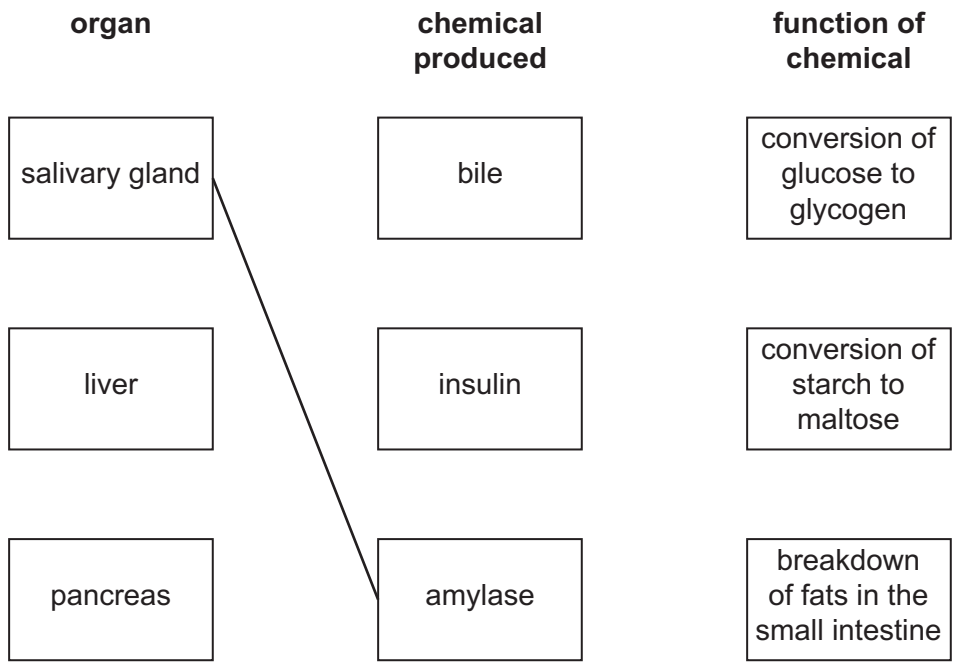
The boxes in the middle contain the names of chemicals produced by these organs.

The boxes on the right contain descriptions of one function of each of these chemicals.

Draw lines to link each organ with the chemical it produces **and** to link each chemical with the description of its function.

One line has been drawn for you.

Draw **five more** lines.

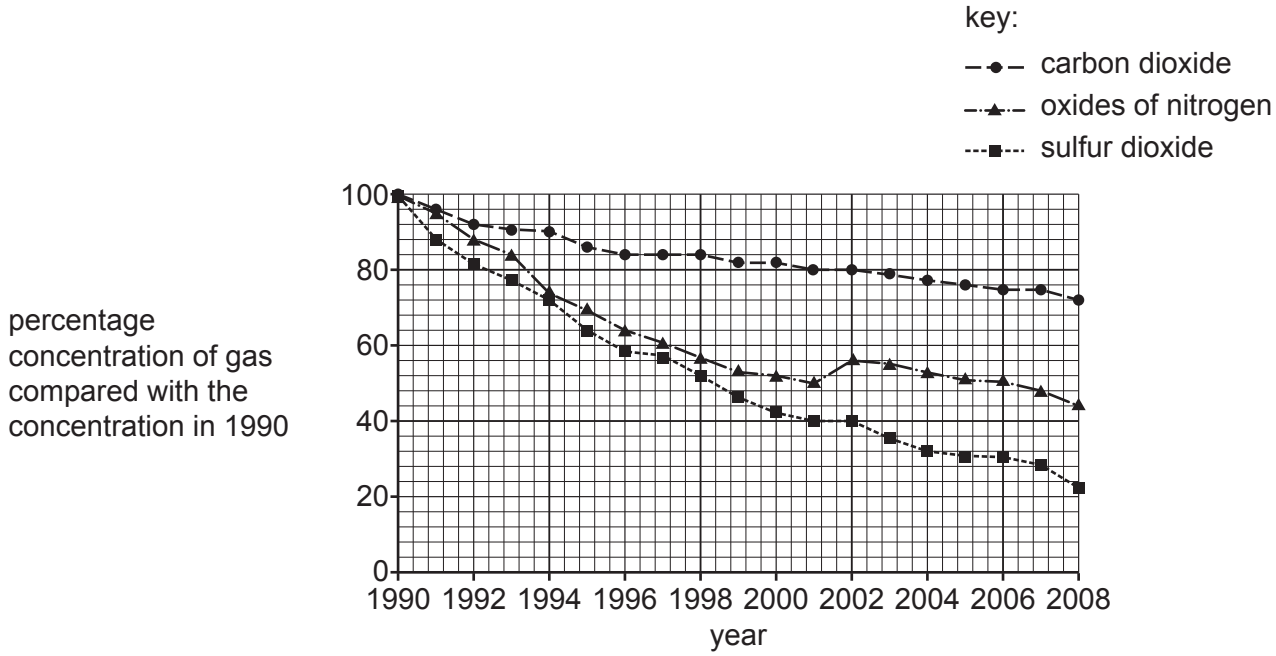


[5]

2 The pollution of air and water may result from human activity. This pollution can lead to many harmful effects on ecosystems. A knowledge of these harmful effects has led to a reduction in human activity that leads to this pollution.

(a) One human activity that may lead to pollution of air is the production of electricity.

The graph shows changes in the release of gases into the air during the production of electricity over a period of 18 years by 32 countries.



(i) Describe, using data from the graph, the trends shown.

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(ii) During this period of 18 years, the total amount of electricity produced each year by the 32 countries increased.

Suggest **one** change in the processes used by these countries to produce electricity that may account for the trends shown in the graph.

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..... [1]

(iii) Pollution of the air by each of the gases named in the graph leads to harmful effects on ecosystems.

Suggest **and** explain the **positive** effects on ecosystems of the trends shown in the graph.

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..... [3]

(b) A survey of the populations of several species of fish in part of a river was carried out in 2003 and again in 2007.

(i) The population of one species of fish decreased from 1385 to 28 over this period.

Calculate the percentage decrease in the population of this species of fish.

..... % [1]

(ii) The scientists who carried out the surveys suggested that the fish population might recover if conservation actions are taken.

Suggest **one** possible conservation action that could be recommended by the scientists **and** describe how they could find out whether this action is successful.

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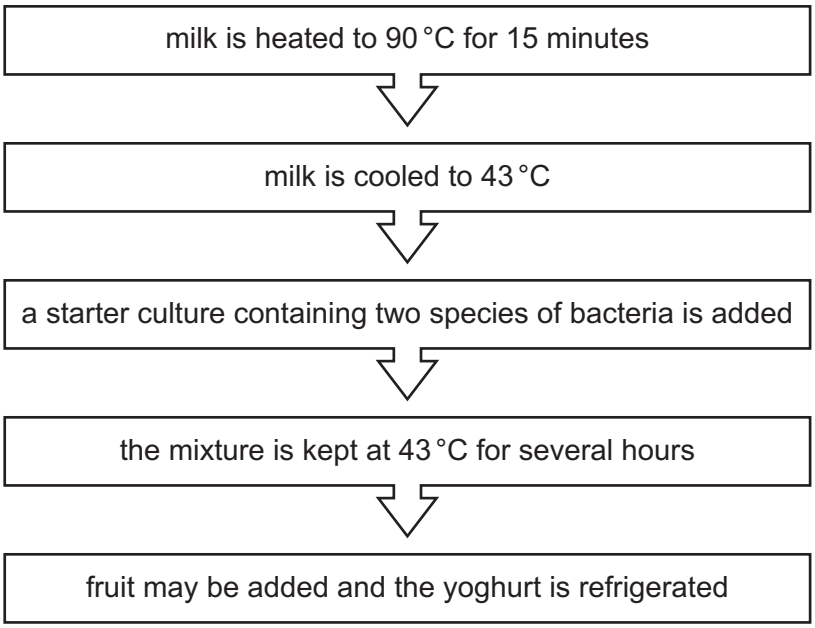
[Total: 12]

3 The flow chart shows steps taken in the production of yoghurt from milk.



(a) Heating the milk to 90 °C for 15 minutes sterilises the milk.

Suggest the importance of sterilising the milk.

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(b) Explain why the milk must be cooled to 43 °C before the starter culture of bacteria is added.

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(c) The two species of bacteria added to the milk are **not** mobile and are **not** pathogens.

(i) State the external structure used for movement by some species of bacteria.

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(ii) Explain why it is important that the bacteria added to milk are not pathogens.

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..... [1]

(d) Describe, with reference to **named** chemicals, the role of the bacteria during the time for which the mixture is kept at 43 °C.

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(e) Suggest **and** explain **one** benefit to human health of eating yoghurt to which fruit has been added rather than eating yoghurt to which no fruit has been added.

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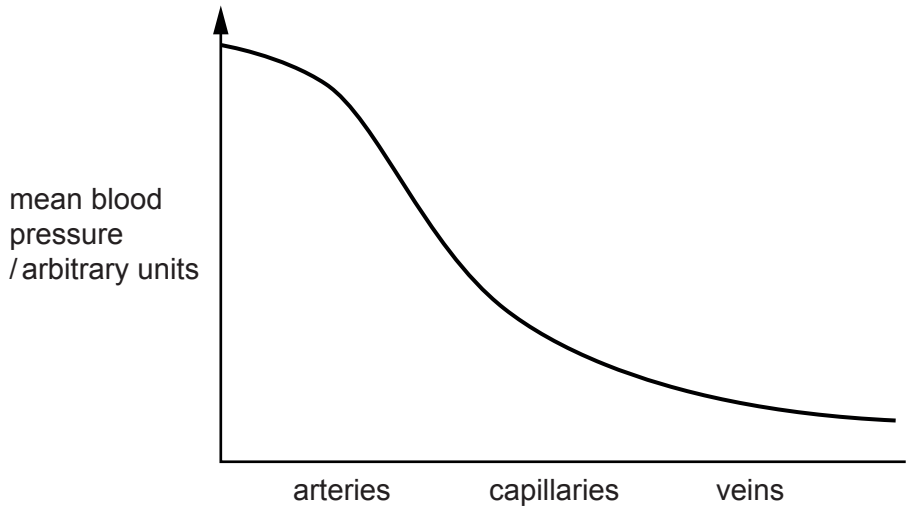
..... [2]

[Total: 13]

4 The human double circulation has both

- a circulation taking blood to and from the body tissues, and
- a circulation taking blood to and from the tissues of the lungs.

The graph shows the change in mean blood pressure in the blood vessels as blood passes to and from the **body tissues**.



(a) Name, for the circulation shown in the graph

(i) the first artery that blood enters with the highest mean blood pressure

..... [1]

(ii) the last vein that blood enters with the lowest mean blood pressure.

..... [1]

(b) Explain, using your knowledge of the structures of arteries and veins, the change in mean blood pressure shown in the graph.

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(c) Describe, with reference to the movement of **named** substances, the process that takes place as blood passes through the capillaries of the body tissues.

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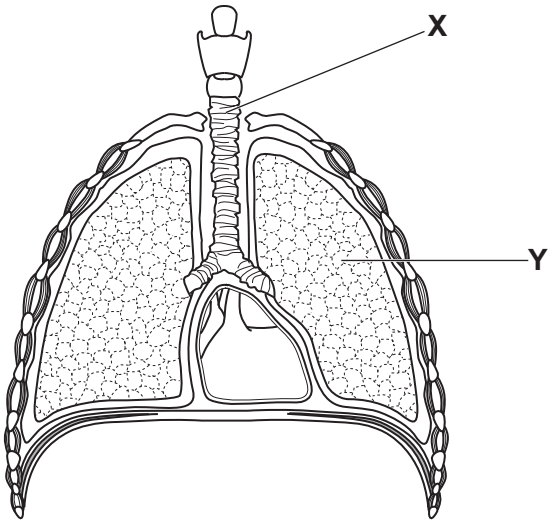
(d) Draw on the graph on page 8 a line to show the change in the mean blood pressure as blood passes to and from the **tissues of the lungs**.

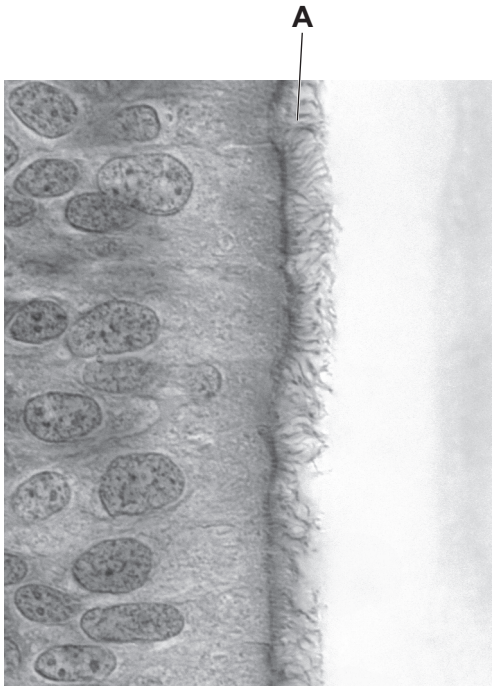
[2]

[Total: 10]

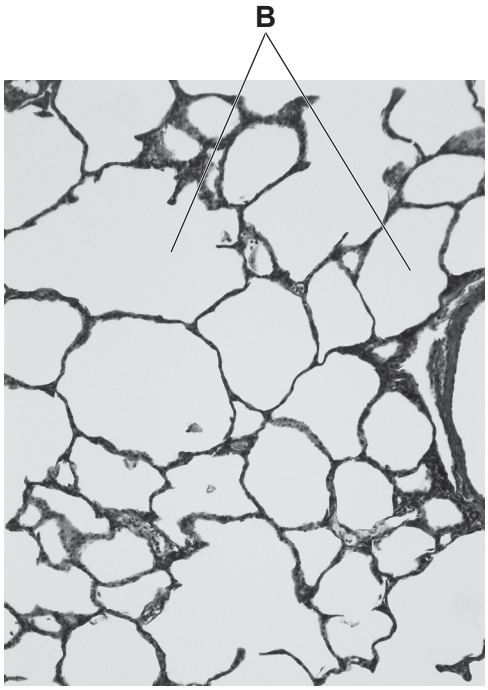
5 The diagram shows the human breathing system.



The photomicrographs below show further details of the two components labelled **X** and **Y**, from the breathing system of a non-smoker seen using a light microscope.



magnification of **X**



magnification of **Y**

(a) (i) Name the structures labelled **A**.

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(ii) Describe the role of the structures labelled **A**.

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(b) (i) Name the structures labelled **B**.

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(ii) Describe the changes to the structures labelled **B** that would be caused by tobacco smoke **and** explain the possible effects on a smoker of these changes.

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(iii) Outline **two** reasons why many people regard smoking as socially unacceptable.

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[2]

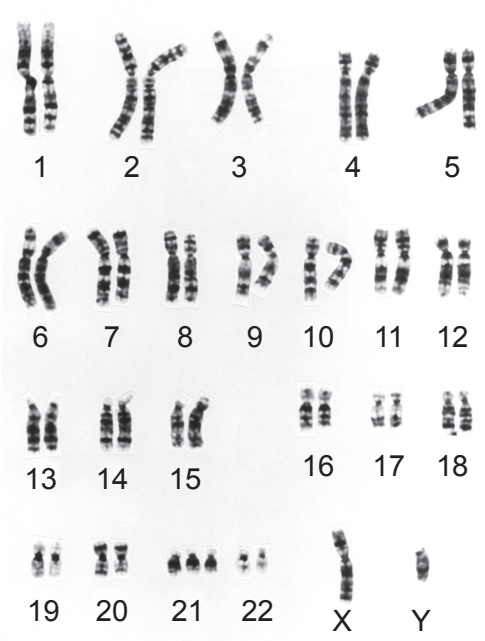
[Total: 10]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 The diagram shows a magnified image of the chromosomes from one skin cell of a person.



(a) State **two** conclusions that can be made about this person using **only** information in the diagram **and** explain each conclusion.

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[5]

(b) Name the type of gamete produced by a human male.

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Outline the process for producing this type of gamete.

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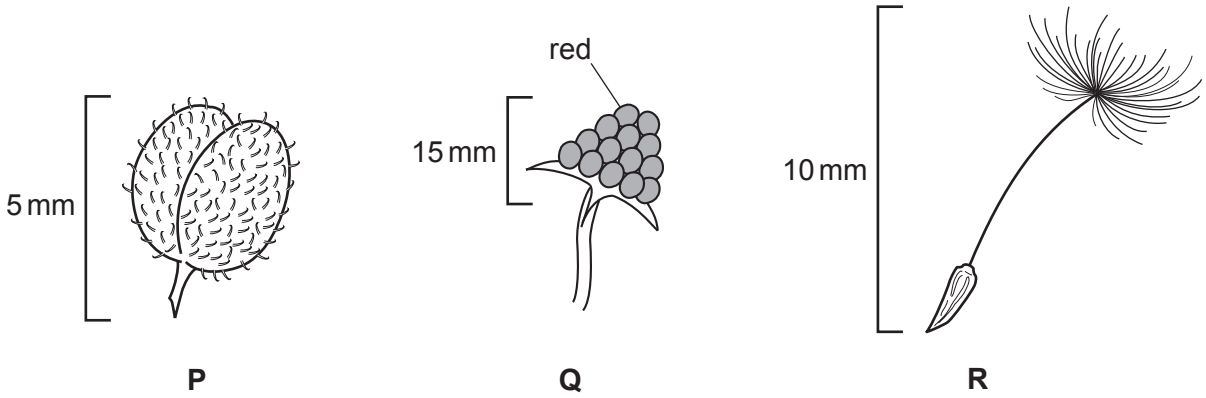
[5]

[Total: 10]

7 The diagram shows three fruits, **P**, **Q** and **R**.

Each fruit was produced by a different species of plant.



(a) Suggest, with reference to structures shown in the diagram, how each fruit is dispersed.

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Q .....

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R .....

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[7]

(b) Outline the importance to a plant species of fruit dispersal.

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[Total: 10]

Section C

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

Write your answers in the spaces provided.

8 **(a)** Describe how a plant takes in carbon dioxide from the air and mineral ions from the soil.

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(b) Outline how a **named** mineral ion taken in by a plant from the soil is made available for use in the leaves of the plant to produce chlorophyll.

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[Total: 10]

9 The nitrogen cycle makes nitrogen available for the production of proteins in plants. These plants may then be eaten by humans and the proteins digested.

(a) Outline the roles of bacteria in the nitrogen cycle.

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(b) Describe the digestion of proteins in **one named** organ of the alimentary canal.

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[Total: 10]