Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6090985632

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2014**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **both** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section C
Answer **either** question 8 **or** question 9.
Write your answers in the spaces provided on the Question Paper.

You are advised to spend no longer than one hour on Section A.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

Electronic calculators may be used.

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Section A

Answer **all** the questions in this section.

Write your answers in the spaces provided.

1 Fig. 1.1 shows a sample of human blood seen using a microscope.

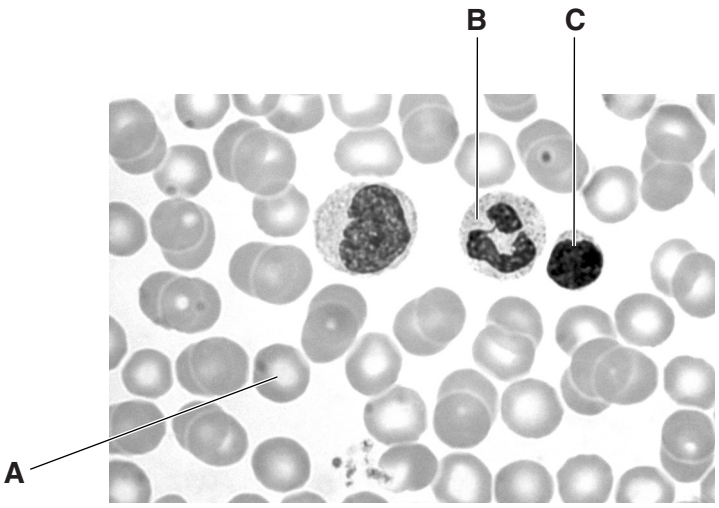


Fig. 1.1

(a) (i) Name the type of cell labelled **A** in Fig. 1.1. State the function of this type of cell.

type of cell .....

function

.....
[2]

(ii) Use your knowledge of the structure of this type of cell to suggest why the cell labelled **A** in Fig. 1.1 appears to be more lightly coloured at its centre than at its edge.

.....

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.....

.....

.....[3]

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(b) (i) Name the type of cells labelled **B** and **C** in Fig. 1.1.

B ..... **C** ..... [1]

(ii) Some diseases can cause a person to have fewer of cells **B** and **C** in the blood. Use your knowledge of how cells **B** and **C** carry out their functions to suggest a problem this may cause for a person. Give an explanation for your answer.

problem

.....

explanation

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[4]

[Total: 10]

2 Fig. 2.1 shows the mean distance that molecules must travel during gas exchange between air in the lungs and blood in the circulatory system in birds and mammals.

This distance is known as the thickness of the blood-gas barrier.

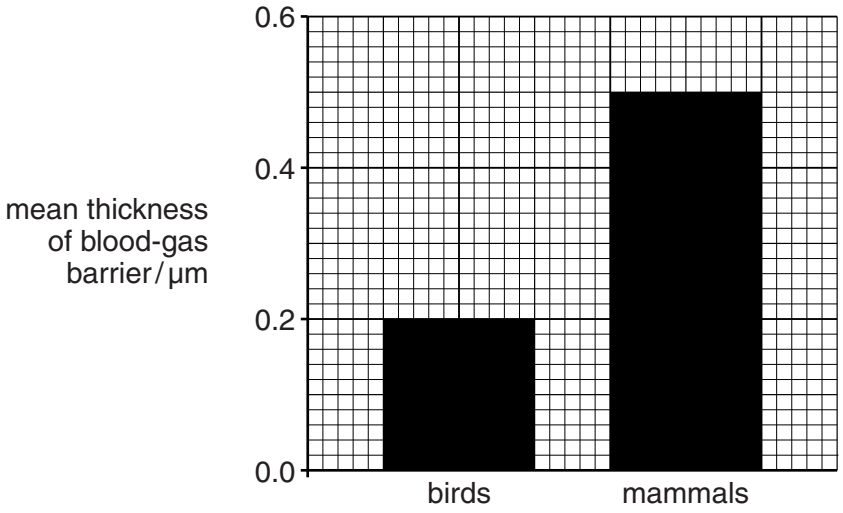


Fig. 2.1

(a) Name **two** gases that cross the blood-gas barrier during gas exchange.

1. .....

2. ..... [1]

(b) **(i)** Use information from Fig. 2.1 to compare the thickness of the blood-gas barrier in birds and mammals.

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.....[2]

(ii) Explain how the difference in thickness of the blood-gas barrier suggests that movement of a bird by flying requires more energy than movement by a mammal on land.

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.....[3]

[Total: 6]

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3 Fig. 3.1 shows some parts of the human alimentary canal and associated organs.

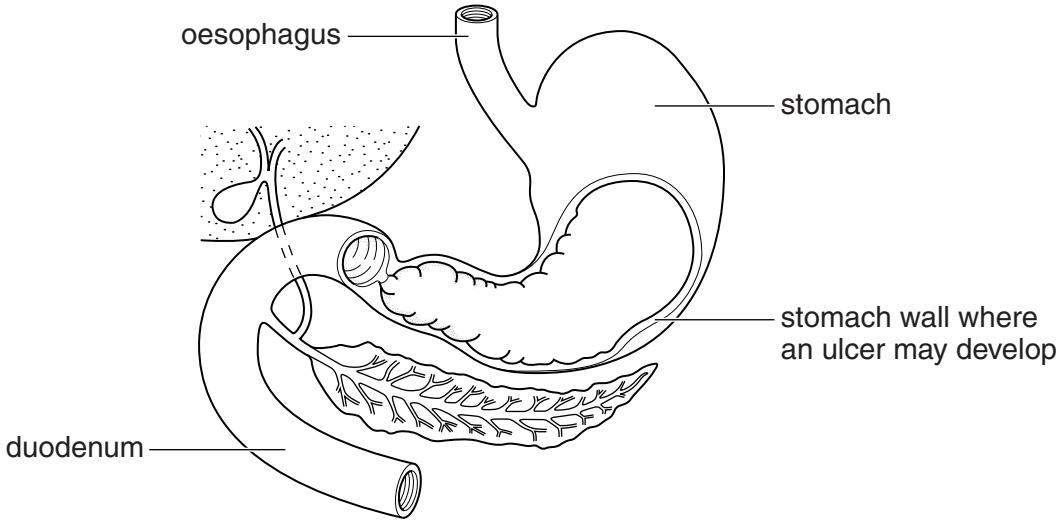


Fig. 3.1

(a) Name and describe the process that moves food down the oesophagus to the stomach.

name of process .....

description of process.....

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[4]

(b) A sore can develop on the wall of the stomach. This sore is called an ulcer, which can cause a person pain. The pain may be relieved by taking a drug that reduces the amount of acid produced by the cells in the stomach wall.

Suggest and explain how the processes taking place in the stomach may be affected in a person taking this drug.

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.....[4]

(c) Infection with a type of bacterium in a person's stomach can increase the likelihood of an ulcer developing.

(i) Name a type of drug that may be taken to treat bacterial infection.

..... [1]

(ii) Suggest and explain what problems may occur if a person stops the treatment before all the bacteria are killed.

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.....[3]

[Total: 12]

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Turn over for Question 4

4 Fig. 4.1 shows a type of plant cell.

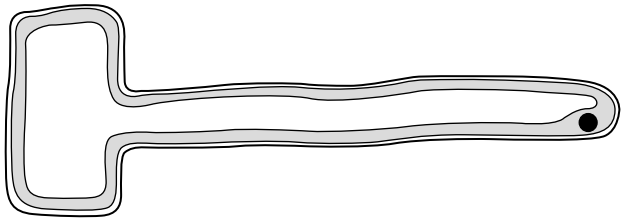


Fig. 4.1

(a) (i) Name the type of cell shown in Fig. 4.1.

..... [1]

(ii) Describe how water is taken up from the soil into the cytoplasm of the cell shown in Fig. 4.1.

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.....[3]

(b) The cell shown in Fig. 4.1 also takes up ions from the soil. Fig. 4.2 shows the relationship between the rate of ion uptake and the concentration of oxygen in the soil surrounding the cell.

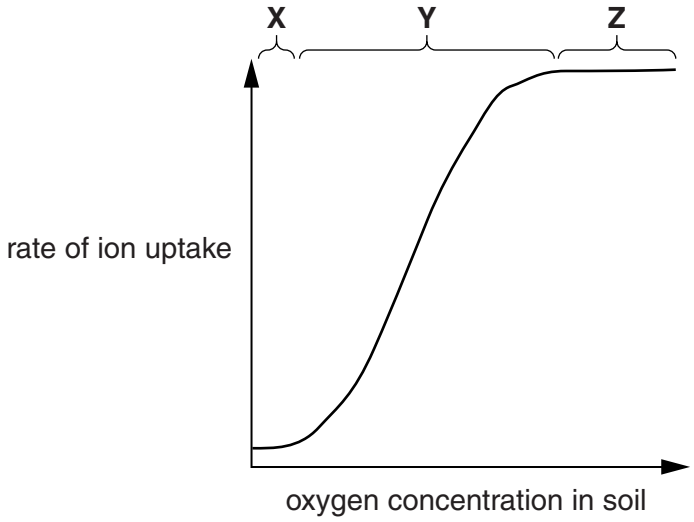


Fig. 4.2

(i) Using Fig. 4.2, describe the effect of increasing oxygen concentration in the soil on the rate of ion uptake.

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.....[2]

(ii) Suggest how most ions are taken up during section **X** and section **Y** on Fig. 4.2. Give an explanation for your answers.

process during section **X** .....

process during section **Y** .....

explanation

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[5]

(iii) Suggest a reason for the shape of the graph during section **Z** on Fig. 4.2.

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.....[1]

[Total: 12]

5 Fig. 5.1 shows a food chain.

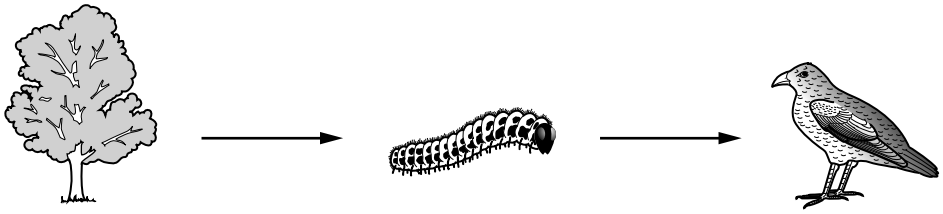


Fig. 5.1

(a) (i) Name the trophic level of each of the following organisms in the food chain shown in Fig. 5.1.

tree .....

caterpillar..... [2]

(ii) In the space below, draw a pyramid of biomass for the food chain shown in Fig. 5.1. Label each of the trophic levels.

[2]

(iii) Describe how the pyramid of numbers for the food chain shown in Fig. 5.1 would differ from the pyramid of biomass. Give an explanation for your answer.

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.....[2]

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(b) Some farmers keep animals that they will sell for people to eat. Suggest why these farmers may restrict the activity of these animals and keep the surrounding temperature close to the body temperature of the animals.

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[Total: 10]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Define the term *homeostasis.*

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.....[2]

(b) Use the concept of control by negative feedback to explain what would happen in each of the following situations.

(i) A person goes outside wearing only short trousers and a short-sleeved shirt on a day when the air temperature is below 10 °C.

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.....[4]

(ii) A person drinks an excessive volume of water.

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.....[4]

[Total: 10]

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7 **(a)** Compare the processes of mitosis and meiosis.

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(b) Use your knowledge of how sex is inherited to explain which parent determines the sex of a child.

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[Total: 10]

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[Turn over

Section C

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

Write your answers in the spaces provided.

8 **(a)** Explain how humans are dependent upon the process of photosynthesis.

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.....[6]

(b) State and explain the appearance of a plant that lacks each of the following ions.

magnesium

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nitrate

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[4]

[Total: 10]

9 **(a)** Outline the role of a **named** type of microorganism in the production of each of the following products.

bread

type of microorganism .....

role .....

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yoghurt

type of microorganism .....

role .....

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[4]

(b) Describe and explain how a fermenter is used to produce the antibiotic penicillin from a **named** microorganism.

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.....[6]

[Total: 10]

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