UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4314545244

BIOLOGY **5090/22**

Paper 2 Theory **May/June 2013**

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, 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

For Examiner's Use

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

Write your answers in the spaces provided.

1 Fig. 1.1 shows a vertical section through a pair of guard cells and some other cells on the lower surface of a leaf.

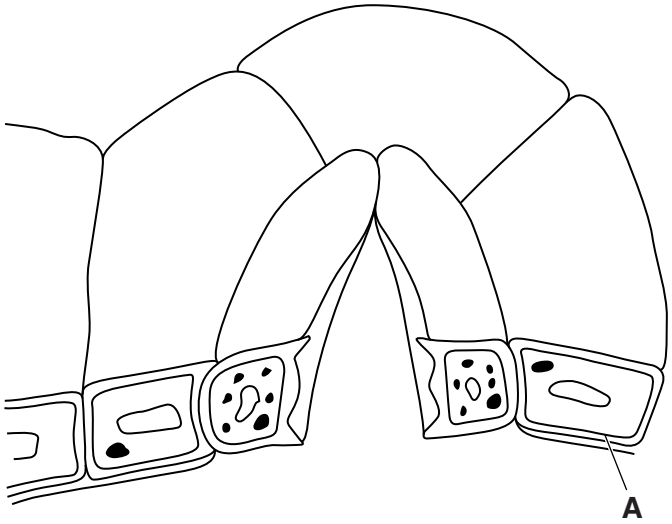


Fig. 1.1

(a) (i) Name the type of cell labelled **A** on Fig. 1.1. ..... [1]

(ii) Draw an arrow on Fig. 1.1 to show the position of the stoma. [1]

(b) Fig. 1.1 shows the guard cells as they appear at 1300 hours. In the space below, draw a diagram to show the guard cells, **in surface view**, as they would appear at 0100 hours.

On your diagram, draw and label the structural features of **one** of the guard cells.

[4]

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(c) Explain the advantage to the plant of the difference in the guard cells at 1300 hours and at 0100 hours.

For Examiner's Use

1300 hours .....

.....

.....

0100 hours .....

.....

.....[5]

[Total: 11]

2 In 1822, a man, Alexis Bidagan, suffered an injury from a gun fired at close range. The injury was in the form of a hole about 10 cm in diameter, penetrating both his chest and stomach walls, below his diaphragm. When the wound healed, the edge of the hole in his stomach sealed itself with the edge of the hole in his chest wall. Fig. 2.1 shows the position of the opening that remained to Alexis's stomach until he died 58 years later.

For Examiner's Use

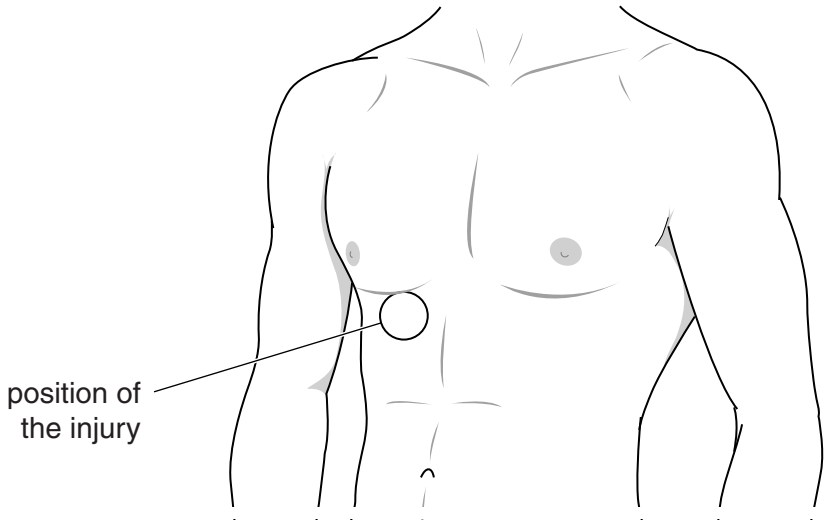


Fig. 2.1

(a) Name **two** organs, other than the stomach, that would have been exposed to infection through the hole **before** the wound healed.

1 .....

2 ..... [2]

(b) Suggest why there would have been less chance of the inside of his stomach suffering from an infection than other organs.

.....

.....

.....

.....[3]

(c) If the wound had extended above his diaphragm, explain why Alexis would have experienced some breathing difficulties until the wound healed.

For Examiner's Use

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.....[5]

[Total: 10]

3 Lupins are leguminous plants. Fig. 3.1 shows a lupin plant with nodules on its roots.

For Examiner's Use

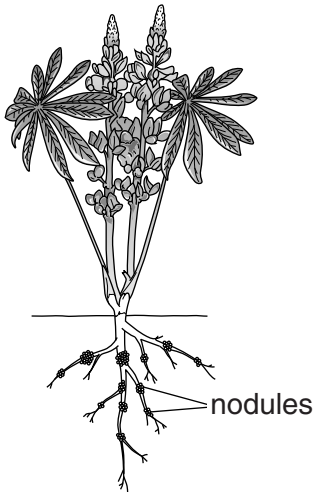


Fig. 3.1

(a) (i) State the type of microorganism found in the nodules. ..... [1]

(ii) Explain the role of these microorganisms in the nitrogen cycle.

.....

.....

.....

.....[3]

(b) Commercially produced lupins have flower spikes that are larger and with a greater variety of colours than wild lupins.

Suggest how these changes have come about.

.....

.....

.....

.....

.....

.....[5]

(c) Wild lupins growing at very high altitudes are much smaller than other varieties. Suggest **two** factors that may be responsible for this.

1 .....

2 .....[2]

[Total: 11]

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4 Fig. 4.1 shows part of the circulatory system, and **some** of the structures associated with organ **B**.

For Examiner's Use

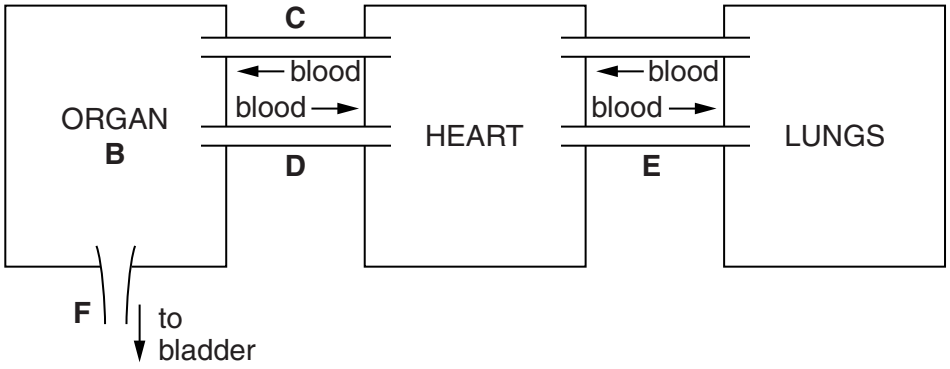


Fig. 4.1

(a) Name organ **B** in Fig. 4.1 ..... [1]

(b) (i) Name blood vessels **C** and **E** in Fig. 4.1.

C .....

E ..... [2]

(ii) Name the chambers of the heart, in the order in which blood passes through them from **D** to **E** in Fig. 4.1.

.... [2]

(c) Complete Table 4.1 to show **four** differences between the contents of **F** and the blood vessel, **C**, in a healthy person.

Table 4.1

difference	**C**	**F**
1		
2		
3		
4		

[4]

[Total: 9]

5 Fig. 5.1 shows a fermenter used for the large-scale production of antibiotics by microorganisms.

For Examiner's Use

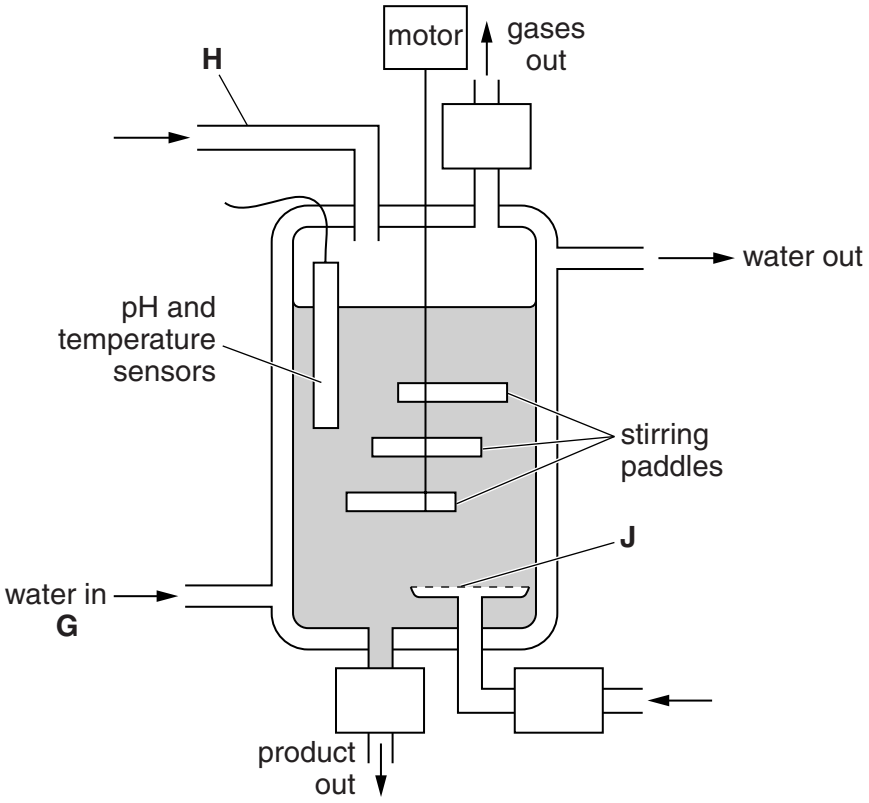


Fig. 5.1

(a) State the term for the manufacture of antibiotics using a fermenter.

.....[1]

(b) State the purpose of the water which enters the fermenter at **G**.

.....[1]

(c) Explain the importance of controlling the pH and temperature of the contents of the fermenter.

.....

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.....

..... [2]

(d) Describe the function of part **H** and part **J**.

For Examiner's Use

part **H** .....

.....

.....

.....

part **J** .....

.....

.....

.....[5]

[Total: 9]

Section B

For Examiner's Use

Answer **all** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Crops can be grown under controlled conditions in large buildings.

Describe and explain how such buildings can provide the conditions needed for maximum crop production.

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.....[7]

(b) Suggest why seeds from crops grown in this way may produce fewer offspring and only small variations compared with crops grown naturally.

.....

.....

.....

.....

.....[3]

[Total: 10]

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For Examiner's Use

7 **(a)** List the components of a balanced diet. State **one** use of each component.

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.....

.....

.....

.....

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.....

.....[6]

(b) Explain how this diet should be modified for each of the following people:

(i) a person with diabetes

.....

.....

.....

.....[2]

(ii) a person with a history of heart problems.

.....

.....

.....

.....[2]

[Total: 10]

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[Turn over

Section C

For Examiner's Use

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

Write your answers in the spaces provided.

8 **(a)** Define the term *hormone*.

.....

.....

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.....[3]

(b) State where male hormones and female hormones are produced in mammals and describe their roles in reproduction.

male hormones .....

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female hormones .....

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.....[7]

[Total: 10]

For Examiner's Use

9 **(a)** Describe the structure and functions of capillaries in the circulatory system.

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.....[5]

(b) Describe the functions of each of the following:

(i) white blood cells

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.....[3]

(ii) platelets.

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.....[2]

[Total: 10]

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