UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2012**

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.

For Examiner's Use	
Section A	
Section B	
Section C	
Total	

This document consists of **13** printed pages and **3** blank pages.

Section A

For Examiner's Use

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

Write your answers in the spaces provided.

1 **(a)** **(i)** Name the process by which plants manufacture carbohydrates from raw materials.

..... [1]

Starch is an insoluble carbohydrate stored inside plant cells.

(ii) Explain why starch is a more suitable storage substance than the soluble sugar glucose.

.....

.....

..... [2]

(b) Before a plant can use it, the stored starch must first be broken down by an enzyme. Fig. 1.1 shows the '*lock and key*' hypothesis of how enzymes work.

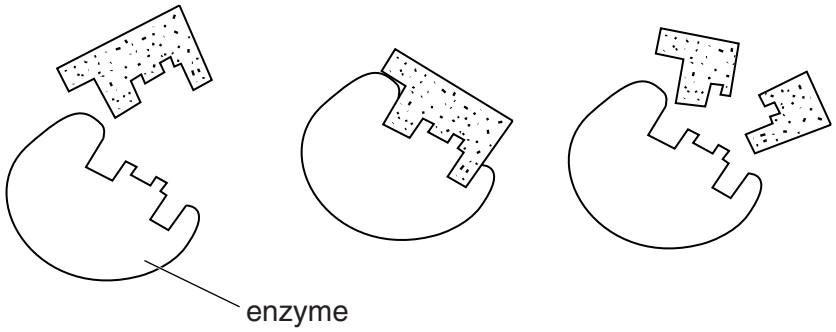

Fig. 1.1

Describe the '*lock and key*' hypothesis of enzyme action shown in Fig. 1.1.

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.....

.....

..... [3]

(c) In an investigation, two plants were grown in a solution containing mineral ions including nitrate and magnesium. Plant **A** was provided with air containing oxygen and plant **B** was provided with air from which the oxygen had been removed. Fig. 1.2 shows the plants after a period of growth in these conditions.

For Examiner's Use

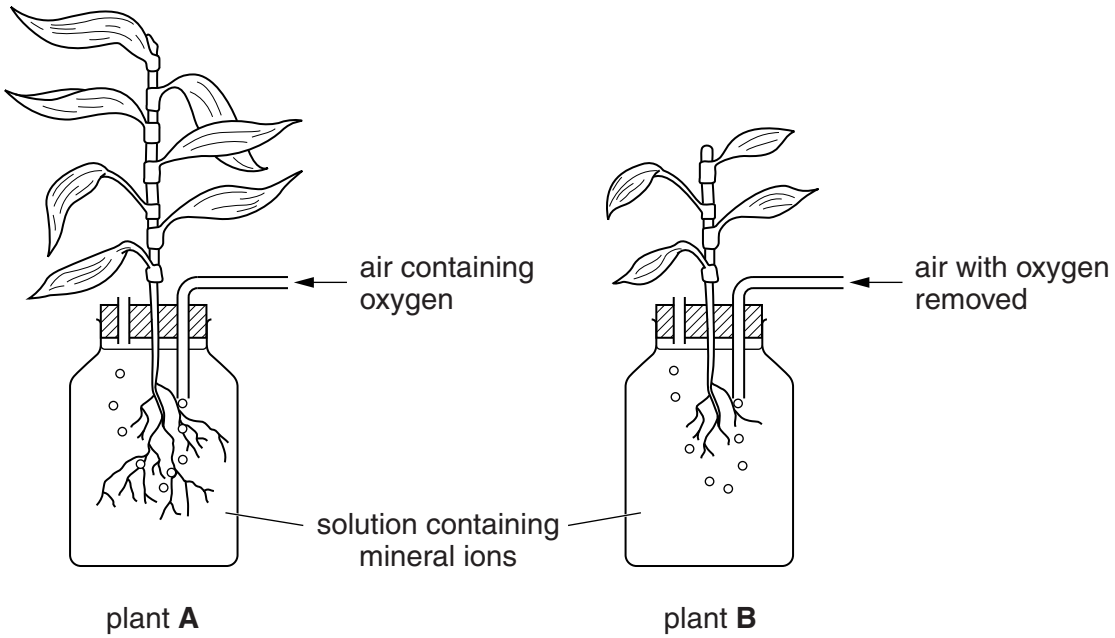

Fig. 1.2

Suggest reasons for the increased growth of the plant in the solution supplied with air containing oxygen.

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..... [4]

[Total: 10]

2 Fig. 2.1 shows a fresh fruit and the same fruit after being left at a temperature of 25 °C for 14 days.

For Examiner's Use

fresh fruit | fruit after 14 days

Fig. 2.1

Bacteria and fungi are two groups of microorganism which cause the fruit to change appearance during the 14 days.

(a) Complete Table 2.1 to show three **differences** between the characteristics of bacteria and fungi.

Table 2.1

	bacteria	fungi
1		
2		
3		

[3]

(b) Name the process that is responsible for the appearance of the fruit after 14 days.

.....

[1]

(c) Fungi reproduce by asexual reproduction.

(i) Name the type of cell division that occurs during asexual reproduction.

..... [1]

(ii) Explain how asexual reproduction results in genetically identical offspring.

.....

.....

..... [2]

(d) Microorganisms use glucose ($C_6H_{12}O_6$) found in the fruit to carry out aerobic respiration. Complete the equation for aerobic respiration.

Glucose ($C_6H_{12}O_6$) + ... → ..... + ...

[1]

(e) **(i)** Explain why increasing the temperature surrounding the fruit would speed up the changes shown in Fig. 2.1.

.....

.....

..... [2]

(ii) Suggest **two** ways in which the fruit may be preserved to prevent the changes shown in Fig. 2.1 from occurring.

1. .....

2. .....

[2]

[Total: 12]

[Turn over

3 Cystic fibrosis is a genetic condition in humans that results from a failure to inherit a particular dominant allele of a gene.

For Examiner's Use

(a) State where genes are found in a cell.

..... [1]

(b) (i) Use a fully labelled genetic diagram to show how cystic fibrosis is inherited by the children of two heterozygous parents. Use the letter **D** to represent the dominant allele and **d** to represent the recessive allele.

[3]

(ii) State the expected ratio of phenotypes in the children.

..... [1]

Fig. 3.1 shows some of the main regions of the alimentary canal in a person.

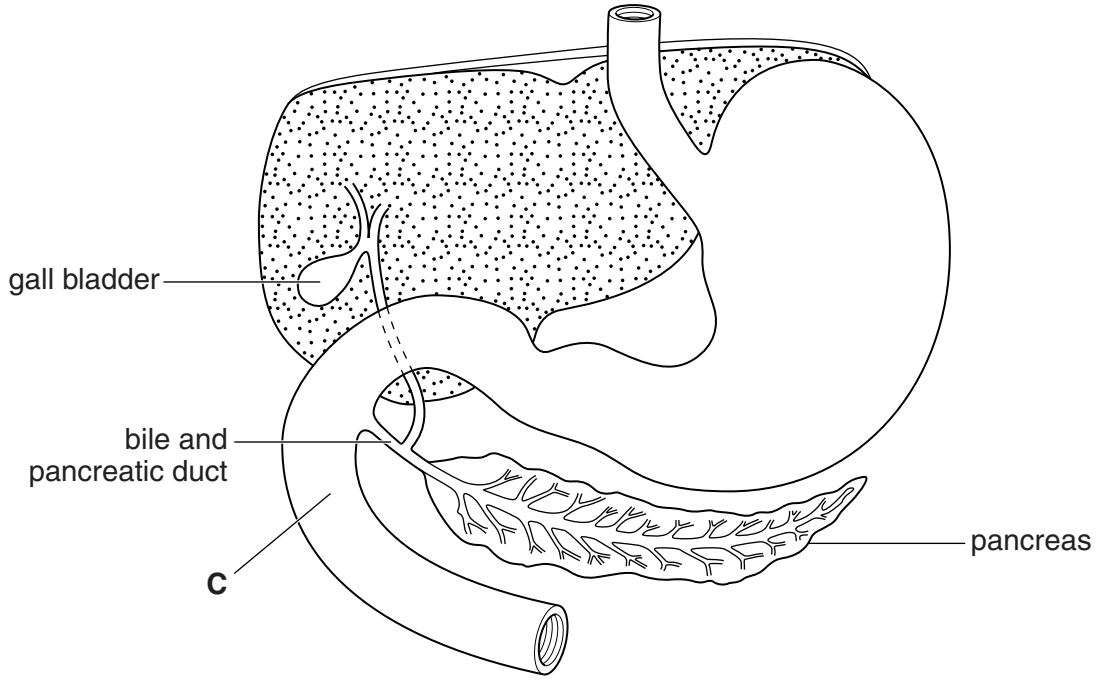

Fig. 3.1

(c) State the name of region **C**.

..... [1]

(d) One effect of cystic fibrosis is that the bile and pancreatic duct becomes blocked with mucus. Suggest why a person whose bile and pancreatic duct is blocked may find it difficult to gain weight despite eating a balanced diet.

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..... [4]

[Total: 10]

[Turn over

4 Fig. 4.1 shows a horizontal section of the human eye and the pathway taken by light rays as they leave an object.

(a) Complete the diagram by continuing the lines from the object to show how the light rays produce a focussed image on the retina.

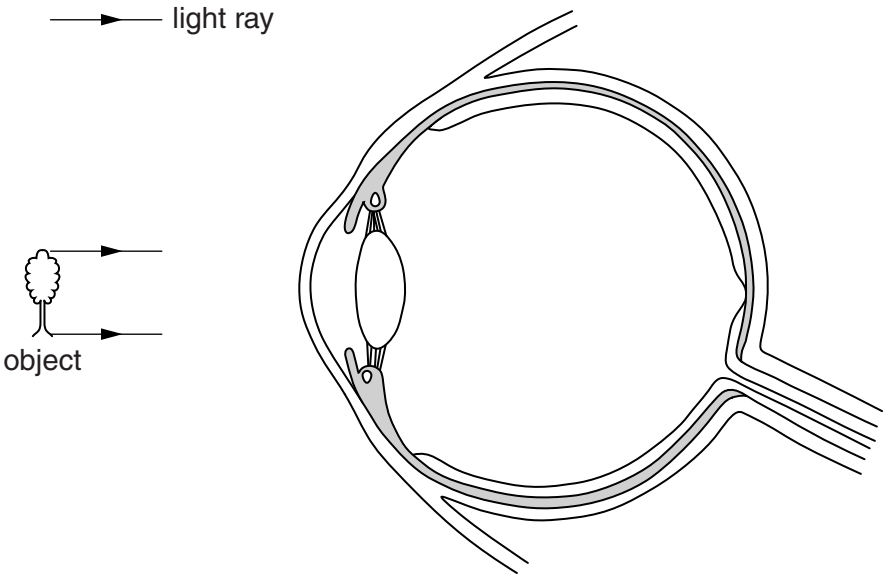

Fig. 4.1

[3]

(b) (i) State how the appearance of the pupil in the eye will change when a person moves from dim light into an area of bright light.

..... [1]

(ii) Explain how this change is brought about by structures in the eye.

.....

.....

..... [2]

(c) The change in appearance of the pupil when entering an area of bright light is a reflex action.

(i) Define the term *reflex action*.

.....

..... [2]

(ii) Suggest why drugs that prevent this reflex action from occurring should be avoided.

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..... [2]

[Total: 10]

5 **(a)** Fig. 5.1 shows the arrangement of teeth in the lower jaw of an adult person.

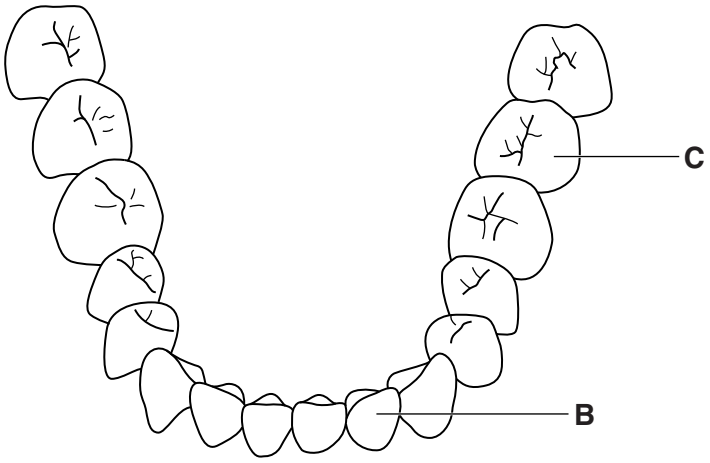

Fig. 5.1

Identify the types of teeth labelled **B** and **C** and state one function of each.

type **B** .....

function ..... [2]

type **C** .....

function ..... [2]

(b) During a single day two people ate the same amount of food containing a large amount of carbohydrate.

Person D ate the food in three equal portions at 7.00 am, 1.00 pm and 8.00 pm, following which he brushed his teeth using toothpaste before going to bed.

Person E ate the food in smaller portions more frequently during the day and did not brush her teeth before going to bed.

(i) List the chemical elements that make up carbohydrates.

..... [1]

(ii) If persons **D** and **E** continue their eating habits for several years, suggest in which person dental decay will occur first. Explain your reasoning.

person .....

explanation .....

.....

.....

.....

..... [3]

[Total: 8]

Section B

For Examiner's Use

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** State the function of phloem in a plant.

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..... [2]

(b) Describe how a molecule of water moves through a plant from the soil until it enters the atmosphere through the leaves.

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..... [8]

[Total: 10]

For Examiner's Use

7 **(a)** **(i)** State **one similarity** and **one difference** in the functions of the urethra in a male and in a female adult person.

similarity .....

.....

difference .....

..... [2]

(ii) State the **differences** between male and female human gametes in terms of size, numbers and mobility.

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..... [3]

(b) Describe the **advantages** and **disadvantages** of surgical methods of birth control.

advantages .....

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disadvantages .....

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..... [5]

[Total: 10]

Section C

For Examiner's Use

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

Write your answers in the spaces provided.

8 **(a)** Describe ways in which farmers can reduce the risk of water pollution.

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..... [5]

(b) With reference to **named** examples, describe the reasons for recycling materials.

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..... [5]

[Total: 10]

For Examiner's Use

9 **(a)** Outline the sequence of events that take place in the body when a person breathes out.

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..... [5]

(b) State and explain the **similarities** and **differences** between air breathed in and air breathed out.

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..... [5]

[Total: 10]

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