

Centre Number	Candidate Number	Name
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**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**General Certificate of Education Ordinary Level**

**BIOLOGY**

Paper 2

**5090/02**

October/November 2003

**1 hour 45 minutes**

Additional Materials: Answer Paper

**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 soft pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer **all** the questions including questions 6, 7 and 8 **Either** or **8 Or**.

Write your answers on the separate answer paper provided.

At the end of the examination,

1. fasten all your work securely together;
2. write an **E** (for Either) or an **O** (for Or) next to the number 8 in the grid below to indicate which question you have answered.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question.

You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.

FOR EXAMINER'S USE	
Section A	
Section B	
6	
7	
8	
<b>TOTAL</b>	

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

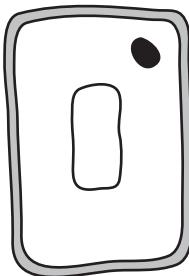
This document consists of **10** printed pages and **2** blank pages.

**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows a cell from an organism.



**Fig. 1.1**

- (a) (i) In which type of living organism are cells similar to the one shown in Fig. 1.1 normally found?

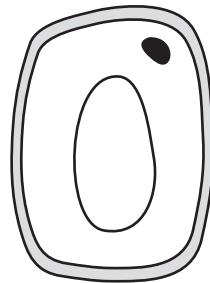
..... [1]

- (ii) State two reasons for your choice of living organism in (i).

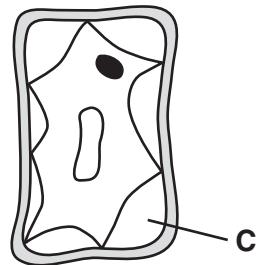
1. ....

2. .... [2]

Fig. 1.2(a) shows the same cell after it had been placed in solution **A** for ten minutes. The cell was then transferred to solution **B** and Fig. 1.2(b) shows how it appeared after a further ten minutes.



**Fig. 1.2(a)**



**Fig. 1.2(b)**

- (b) Explain what has occurred to cause the cell to appear as it does in Fig. 1.2(a).

.....  
.....  
..... [3]

- (c) Compared with the water potential of the cell, what can be deduced about solutions **A** and **B**?

*solution A* .....

*solution B* ..... [2]

- (d) What will be found in region **C** in Fig. 1.2(b) at the end of the experiment?

.....

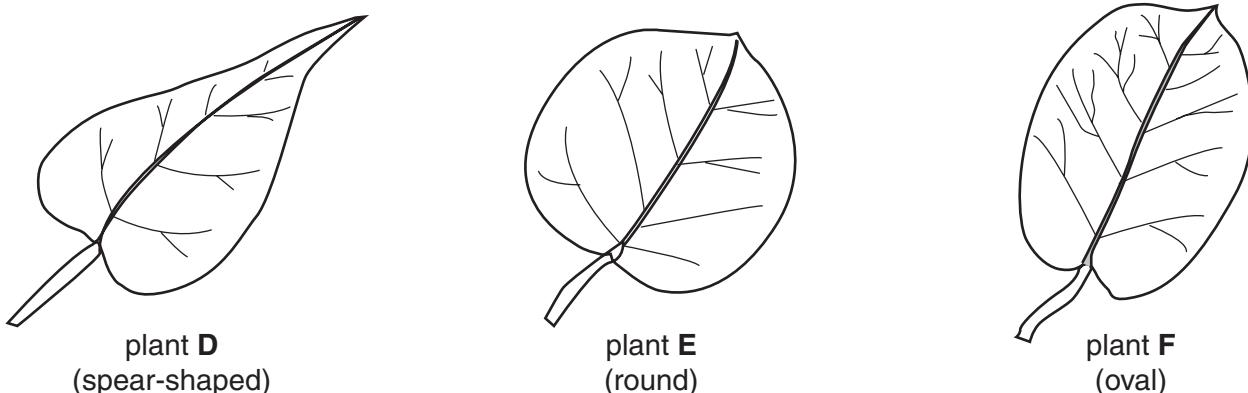
Explain your answer.

.....

..... [2]

[Total : 10]

- 2 Fig. 2.1 shows leaves from three plants, **D**, **E** and **F**, of the same species.



**Fig. 2.1**

In this species of plant, leaf shape is controlled by two alleles,  $S^1$  and  $S^2$ . Plants **D** and **E** are both homozygous for leaf shape and plant **F** is heterozygous.

- (a) State the phenotype of the heterozygous plant. ....[1]
- (b) (i) In the space below, construct a genetic diagram to show how a particular cross will **always** result in **all** offspring having a different phenotype from both parents.

[5]

- (ii) Suggest an explanation for the offspring in your answer to (b)(i) always having leaves of a different shape from either of the parent plants.

..... [2]

- (c) In some cases when two plants shown in Fig. 2.1 are crossed, the offspring produced have two different leaf shapes in a ratio of 1:1.

In the space below, construct a genetic diagram to show how this happens.

[3]

[Total : 11]

- 3 Fig. 3.1 represents part of a starch molecule.



**Fig. 3.1**

- (a) (i) Name the enzyme in the human alimentary canal that digests this molecule.

..... [1]

- (ii) In the space below, draw a diagram to show the result of this enzyme's action on the starch molecule.

[1]

- (iii) List the regions in the alimentary canal where this enzyme is active.

..... [2]

- (b) Olestra is a synthetic, edible fat similar to naturally-occurring saturated (animal) fats. The human alimentary canal and associated organs cannot produce an appropriate enzyme to act on it.

- (i) State a process that **all** fats, including olestra, undergo in the alimentary canal.

..... [1]

- (ii) State two processes that all fats, **other than olestra**, undergo in the alimentary canal.

1 ..... [1]

2 ..... [2]

- (c) Suggest two health-related advantages of using olestra in food preparation.

1. .... [1]

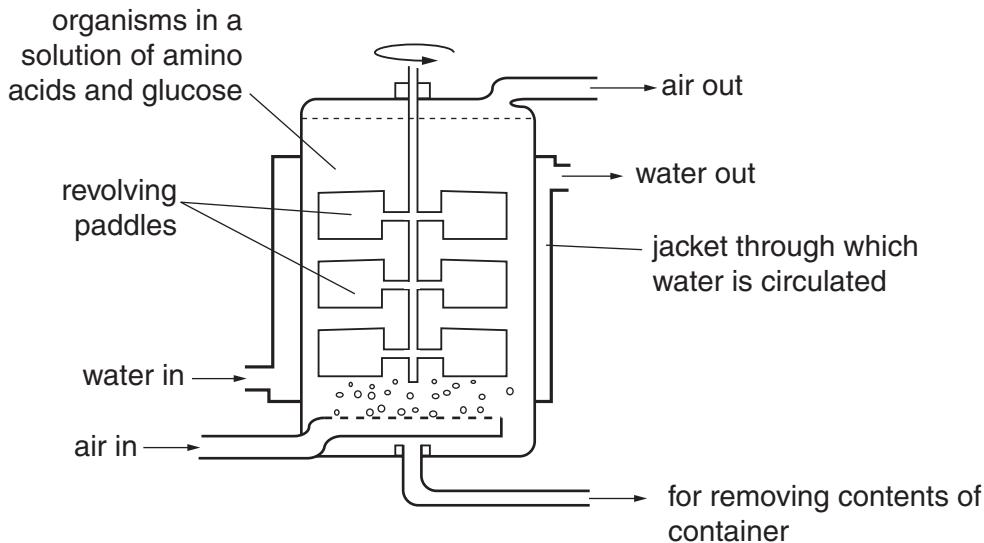
2. .... [2]

- (d) Suggest a possible disadvantage of using olestra.

..... [1]

[Total : 10]

- 4 Fig. 4.1 shows apparatus used in the manufacture of an antibiotic.



**Fig. 4.1**

- (a) (i) Name the type of organism used in the manufacture of antibiotics.

..... [1]

- (ii) Name an antibiotic that is manufactured in this way. .... [1]

- (b) The manufacturing process involves the presence of a solution containing both amino acids and glucose.

Explain the value of these to the organism.

*amino acids* .....

.....

*glucose* .....

..... [4]

- (c) Explain why

- (i) air is introduced into the apparatus;

.....

..... [1]

- (ii) the air enters through very many small holes, rather than one large one.

.....

..... [1]

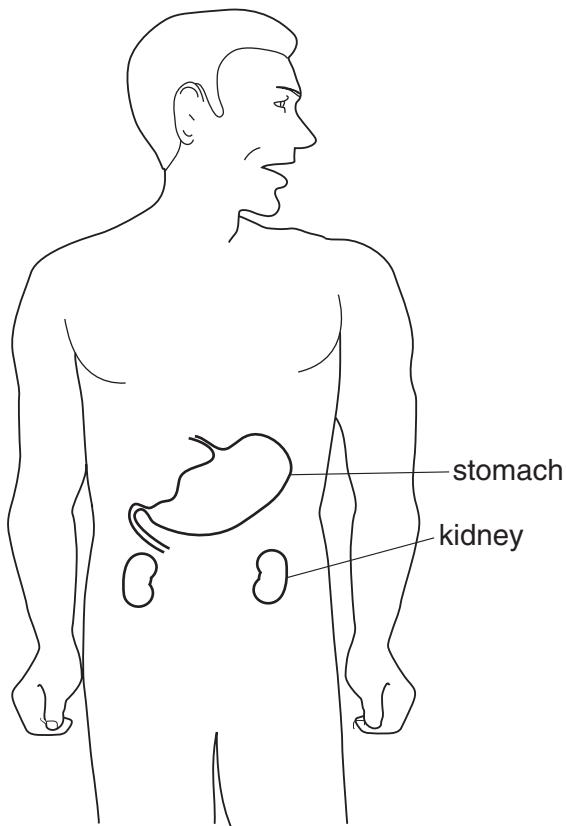
- (d) Suggest the importance of the water circulating in the jacket around the container.

.....

..... [2]

[Total : 10]

- 5 Fig. 5.1 shows an outline of the upper part of a human body and the positions of some of the internal organs.



**Fig. 5.1**

- (a) Some glands (endocrine glands) produce chemical substances that alter the activity of target organs.

Name the group of chemical substances produced by endocrine glands.

..... [1]

- (b) (i) On Fig. 5.1, use the letters **G** and **H** and label lines to indicate the positions of two different endocrine glands. [2]

- (ii) Complete Table 5.1 for glands **G** and **H**.

**Table 5.1**

	name of gland	chemical produced	effect on the body
<b>G</b>			
<b>H</b>			

[4]

- (c) Suggest an explanation for the fact that the chemicals produced by endocrine glands are usually in the form of small molecules.

.....  
.....  
.....

[2]

[Total : 9]

**Section B**

Answer **all** the questions including questions 6, 7 and 8 **Either or 8 Or.**

Write your answers on the separate answer paper provided.

- 6** (a) (i) Describe how the structure of a **named** fruit or seed that is wind-dispersed differs from the structure of a **named** fruit or seed that is animal-dispersed.  
 (ii) For the fruits or seeds you have described in (i), explain how their structure adapts each to their particular method of dispersal. [5]
- (b) Suggest why (i) water and (ii) a suitable temperature are important in the process of seed germination. [5]

[Total : 10]

- 7** (a) Explain with details how the transpiration rate of a plant is affected by  
 (i) decreasing the humidity of the surrounding air  
 (ii) increasing the temperature of the surrounding air. [7]
- (b) Suggest how transpiration is of value to a plant. [3]

[Total : 10]

Question 8 is in the form of an **Either/Or** question. Only answer question 8 **Either** or question 8 **Or**.

- 8 Either** (a) Explain how the following are involved in the process of breathing.  
 (i) the diaphragm [4]  
 (ii) intercostal muscles [4]
- (b) Describe the function of the cilia in the trachea. [2]

[Total : 10]

**Or** Describe how the following help to maintain a constant internal environment.

- (a) the skin [7]  
 (b) the kidneys [3]

[Total : 10]

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