

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

**BIOLOGY**

**5090/02**

Paper 2

May/June 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 **three** questions.

Write your answers on the separate Answer Paper provided.

At the end of the examination, 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.

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	
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.

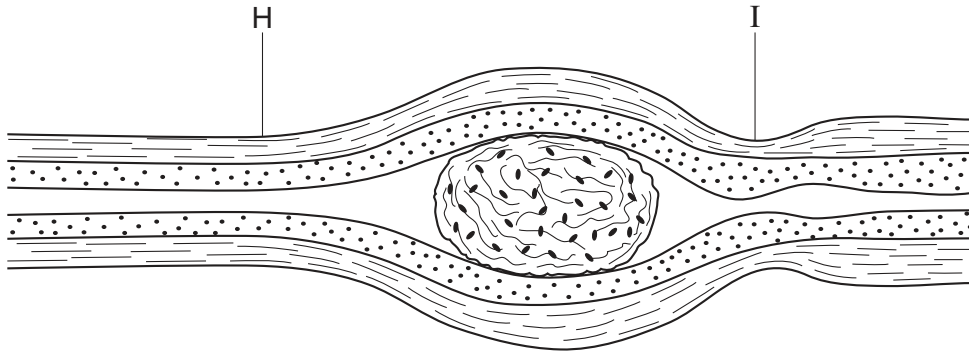
This document consists of **11** printed pages and **1** blank page.

**Section A**

Answer **all** the questions.

Write your answers in the spaces provided.

- 1 Fig. 1.1 shows some food as it moves along the small intestine.



**Fig. 1.1**

- (a) Draw an arrow underneath Fig. 1.1 to show the direction in which the food is moving. [1]

- (b) Describe what is happening to the muscles in the wall of the small intestine at positions **H** and **I**, and explain how this causes the food to move.

at **H** .....

.....

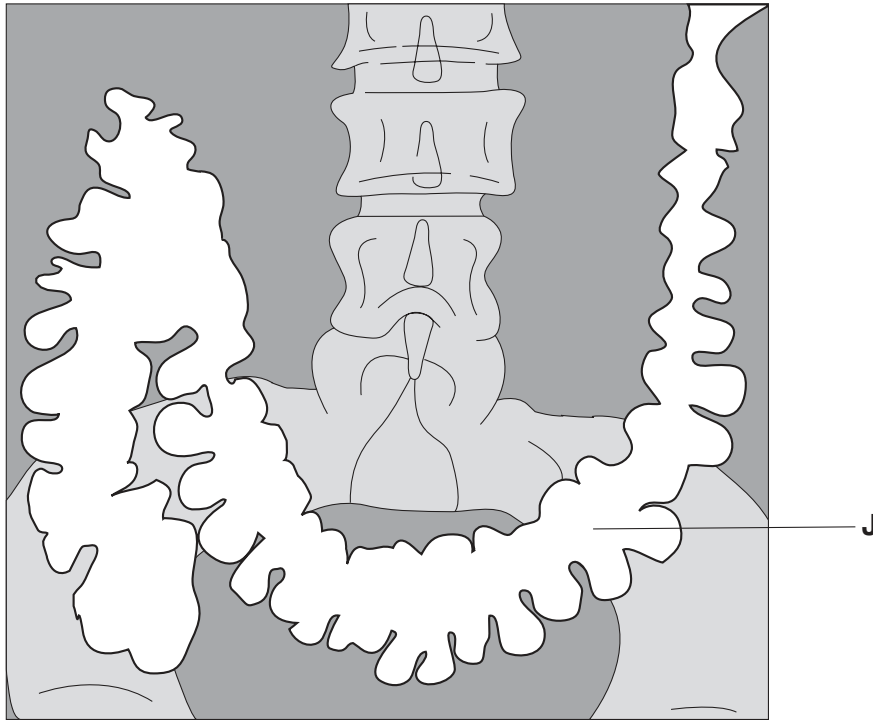
.....

at **I** .....

.....

..... [5]

Fig. 1.2 shows a diagram of an X-ray of part of the intestine.

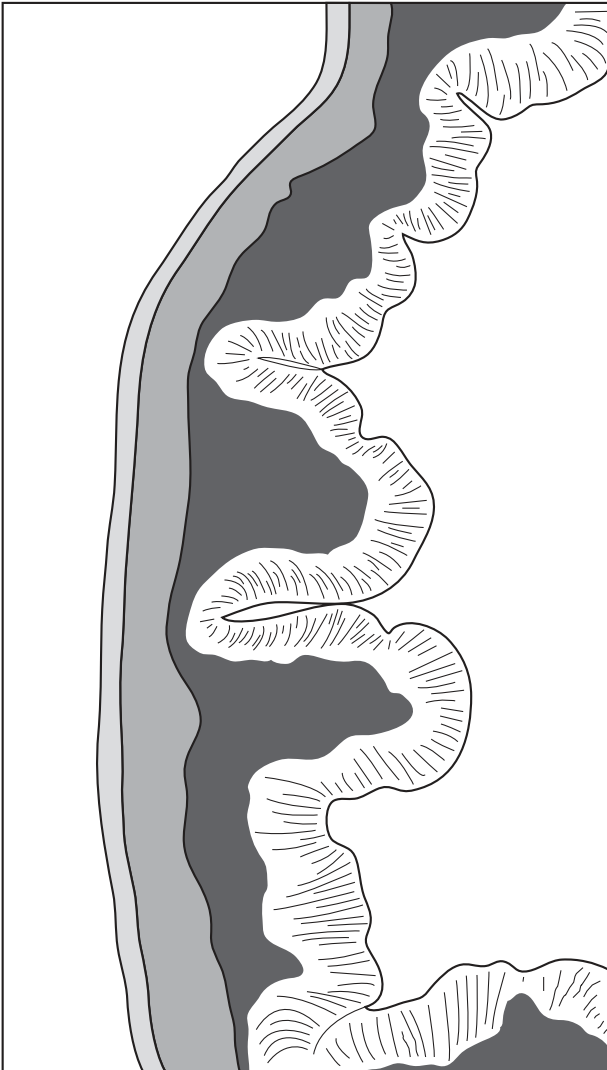


**Fig. 1.2**

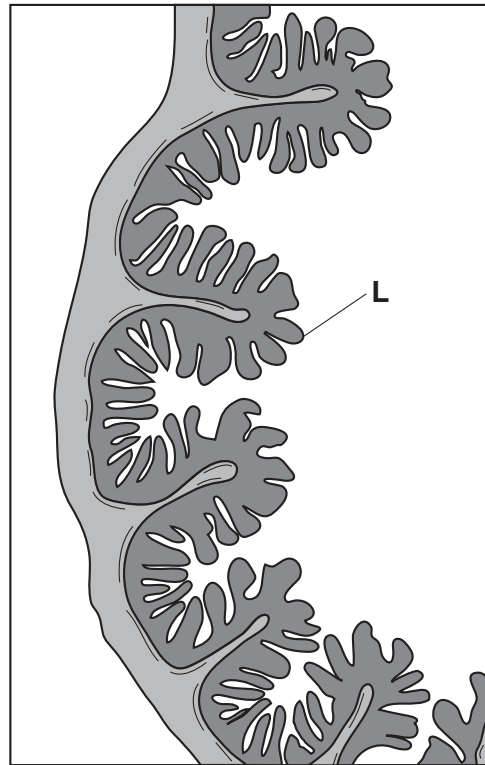
(c) Identify region **J**, the lightest area in Fig. 1.2.

**J** ..... [1]

(d) Fig. 1.3 (a) shows the walls of region **J** highly magnified. Fig. 1.3 (b) shows the highly magnified walls of another part of the intestine, region **K**.



**Fig. 1.3 (a)**



**Fig. 1.3 (b)**

(i) Identify structure **L** shown in Fig. 1.3 (b).

**L** .....

(ii) Suggest an explanation, related to the functions of the two regions, for the appearances of regions **J** and **K**.

.....  
.....

[4]

[Total : 11]

2 Fig. 2.1 shows, in order, four stages in which an enzyme-controlled chemical reaction may occur.

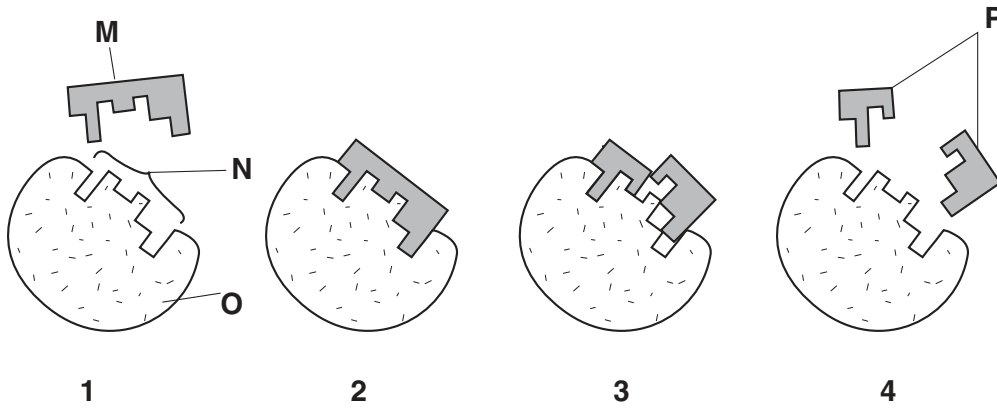


Fig. 2.1

(a) Identify **M**, **N**, **O** and **P**.

**M** .....

**N** .....

**O** .....

**P** .....

[4]

(b) By referring to Fig. 2.1, explain why only a small amount of enzyme is needed to catalyse a reaction involving many molecules.

.....  
..... [1]

(c) (i) Explain how a rise in temperature may increase the rate of an enzyme-controlled reaction.

.....  
.....

(ii) At high temperatures, enzymes are denatured and can no longer act as catalysts.

By using the letters **M** and **N** from Fig. 2.1, suggest what happens when an enzyme is denatured.

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

[4]

[Total : 9]

- 3 The structure on the head of a chicken (the comb) can be of different shapes. Fig. 3.1 shows how two different shapes of comb, 'walnut' and 'pea', were inherited in an experiment. Walnut comb is dominant.

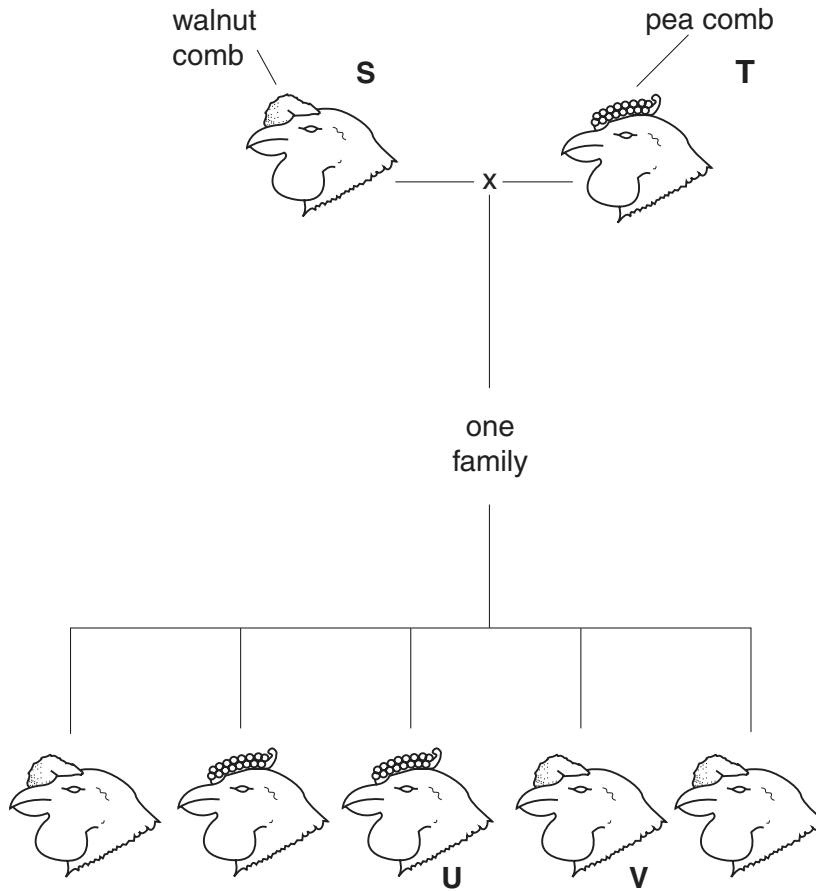


Fig. 3.1

- (a) (i) Assuming that comb shape is controlled by one pair of alleles, use **Q** for the dominant allele and **q** for the recessive allele to show the genotypes of the following chickens.

**S** .....

**T** .....

**U** .....

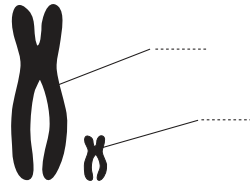
**V** .....

[4]

- (ii) Chickens **S** and **V** were bred together. What proportion of their offspring had a pea comb? Show your working.

proportion ..... [2]

(b) Fig. 3.2 shows the sex chromosomes of a human being.



**Fig. 3.2**

- (i) On Fig. 3.2, identify each chromosome. [2]
- (ii) Fig. 3.3 shows the sex chromosomes taken from a **male** chicken.



**Fig. 3.3**

Complete Table 3.1, identifying the sex chromosomes in human beings and suggesting the identity of the sex chromosomes in chickens.

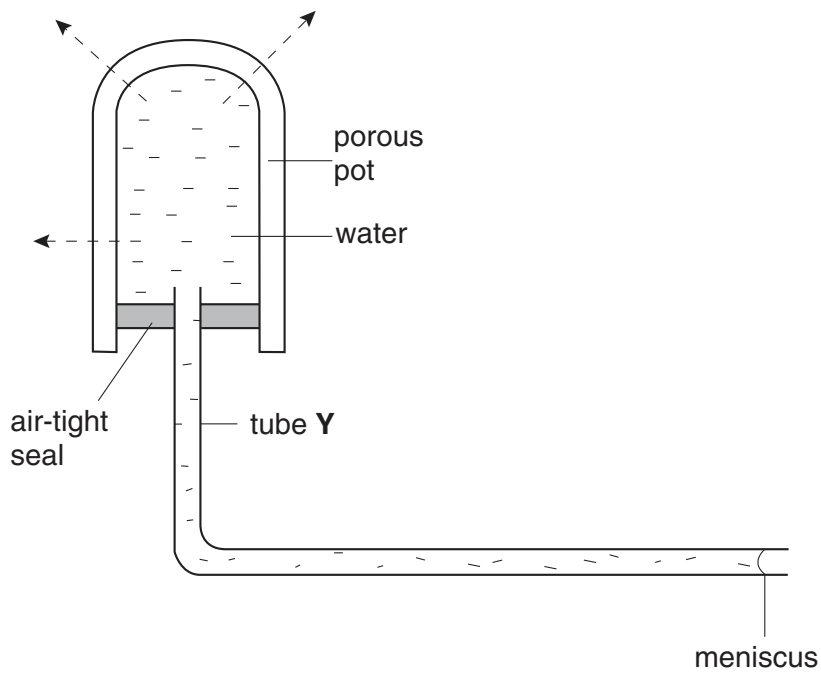
**Table 3.1**

individual's sex	sex chromosomes	
	human being	chicken
male		
female		

[3]

[Total : 11]

- 4 Fig. 4.1 shows apparatus set up to demonstrate a process that occurs in plants.



**Fig. 4.1**

- (a) Name the process.

.....

[1]

- (b) Which structural features in a plant are represented in Fig. 4.1 by

- (i) the pores in the porous pot,

.....

- (ii) the porous pot,

.....

- (iii) tube Y?

.....

[3]

- (c) State two conditions that could speed up the rate at which the meniscus moves along tube Y.

1. ....

2. .... [2]



- (d) (i) State the effect on the movement of the meniscus of placing a transparent polythene bag over the porous pot. Explain your answer.

*effect* .....

*explanation* .....

- (ii) Another experiment was set up as in Fig. 4.1 using a similar tube but instead of the porous pot, a leafy shoot was inserted into the tube and sealed with an air-tight seal. When a transparent polythene bag was placed over the shoot, the effect on the meniscus was the same as in (i).

Explain why this effect was even greater when a **black** polythene bag was placed over the leafy shoot.

.....

.....

[5]

[Total : 11]

5 Fig. 5.1 shows different organisms in an ecosystem.

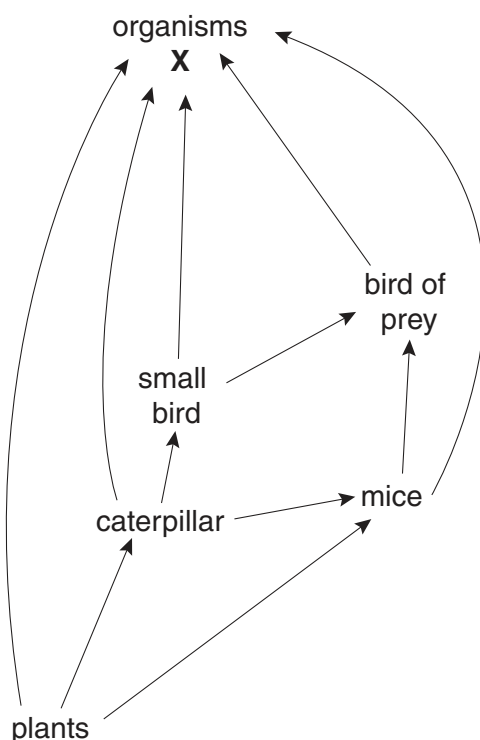


Fig. 5.1

(a) State what is represented by the arrows between the organisms in this ecosystem.

..... [1]

(b) Which organisms will exist in the largest numbers?

..... [1]

(c) Which organisms would be most likely to exist in the smallest numbers? Give reasons for your answer.

*organisms* .....

*reasons* .....

..... [3]

(d) Explain the importance of organisms X to the other living organisms in the ecosystem.

.....

.....

..... [3]

[Total : 8]

**Section B**

Answer **three** questions.

Question **8** is in the form of an **Either/Or** question. Only one part should be answered.

Write your answers on the separate answer paper provided.

- 6 (a) Explain how energy is trapped by a plant, stored and then released several days later. [7]
- (b) Explain why a plant growing in soil deficient in magnesium stores far less energy than one growing in soil rich in magnesium. [3]

[Total : 10]

- 7 (a) Describe the path taken by a molecule of oxygen as it passes from air in the lungs to a muscle cell in the body. [6]
- (b) Sometimes babies are born with a hole between the left and right sides of the heart, through which blood can pass. Explain the effect this has on the double circulation system of the baby's body. [4]

[Total : 10]

- 8 **Either** (a) Describe the large-scale production of a **named** antibiotic. [5]
- (b) Explain (i) the advantages and (ii) the dangers of using antibiotics to treat infections. [5]

[Total : 10]

- Or** (a) Explain the harmful effects of cigarette smoke and, where possible, link each effect to a specific component. [6]
- (b) Describe the dangers of heroin abuse. [4]

[Total : 10]

