

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

**BIOLOGY**

**5090/02**

Paper 2

October/November 2004

**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,

- fasten all your work securely together;
- 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 **12** printed pages.

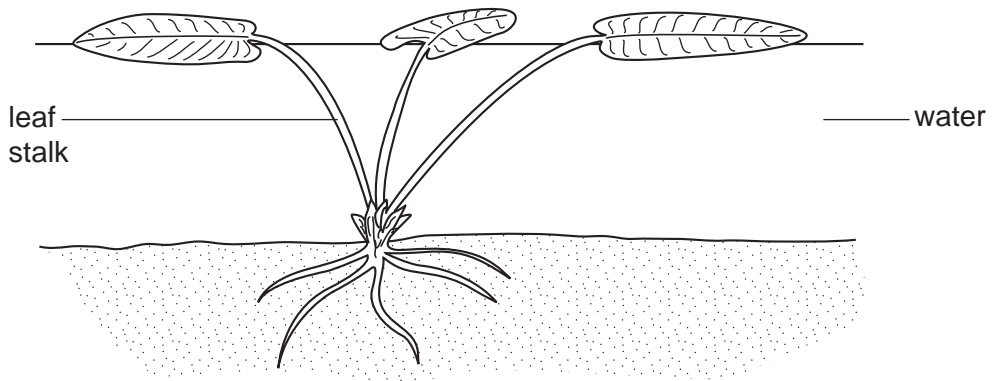


**Section A**

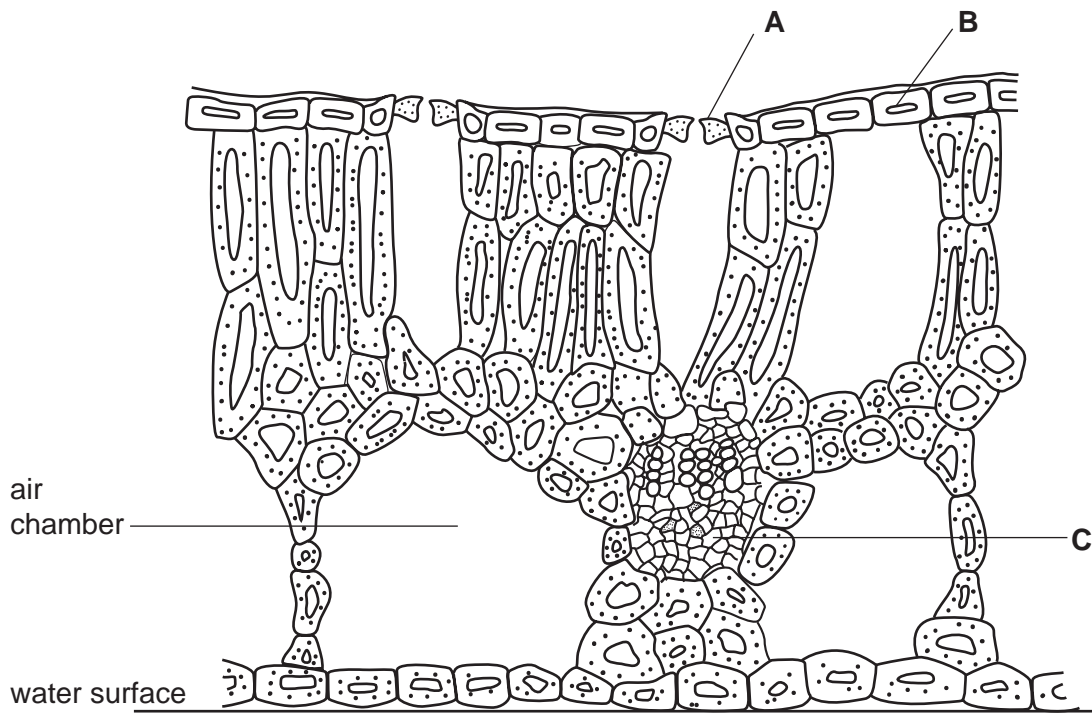
Answer **all** questions.

Write your answers in the spaces provided.

1 Fig. 1.1 shows a water plant and Fig. 1.2 shows a section through one of its leaves.



**Fig. 1.1**



**Fig. 1.2**

(a) Identify the types of cell found at **A**, **B** and **C**.

**A** .....

**B** .....

**C** .....

[3]

(b) (i) Suggest a function of the air chambers in Fig. 1.2 related to maintaining the position of the leaf.

.....

(ii) State a different function of the air chambers which helps photosynthesis.

.....[2]

(c) State three ways in which the structure of this leaf differs from that of a typical plant growing on land.

1. ....

2. ....

3. ....[3]

(d) Fig. 1.3 shows the water plant from Fig. 1.1 as it looks when it is **not** in the water. Fig. 1.4 shows a plant growing on land.



Fig. 1.3

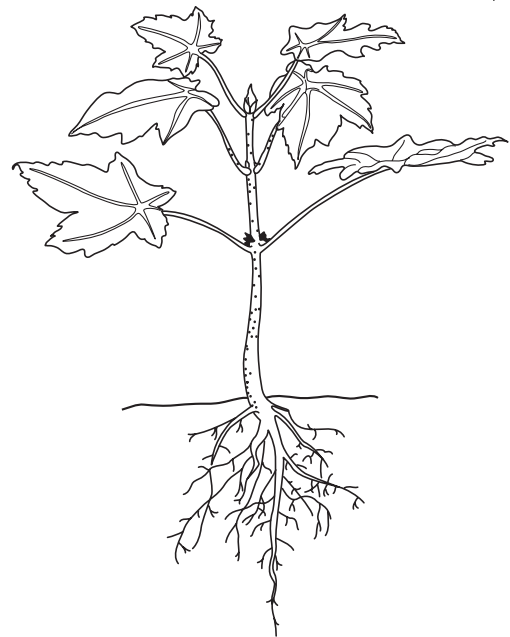


Fig. 1.4

Suggest an explanation for the difference in the strength of the leaf stalks of the water plant (Figs. 1.1 and 1.3) and the land plant (Fig. 1.4).

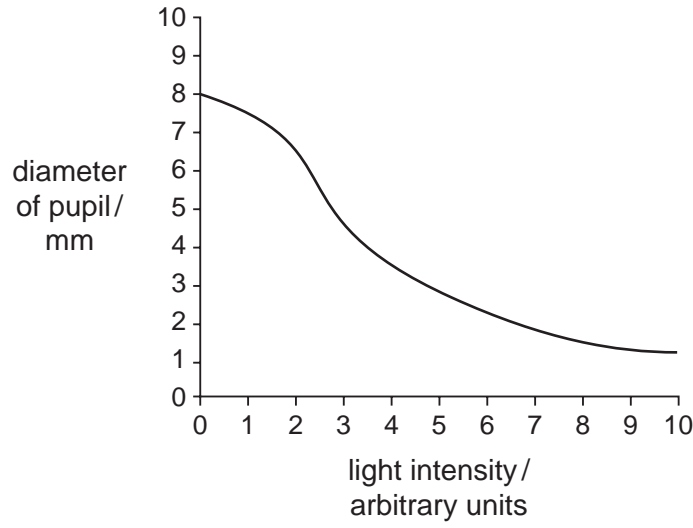
.....

.....

.....[2]

[Total: 10]

- 2 In an experiment, a person looked at the same light source from various different distances. The diameter of their pupil was measured at each position. Fig. 2.1 shows how the diameter varied.



**Fig. 2.1**

- (a) Describe the relationship between light intensity and pupil diameter shown in Fig. 2.1.

.....  
.....  
.....[2]

- (b) What type of response accounts for this change in pupil diameter?

.....[1]

**(c)** Explain how the response is brought about as the light intensity is increased from 2 to 4 arbitrary units.

.....

.....

.....

.....

.....

.....

.....

.....[5]

**(d)** Albino people lack colouring material (pigment) in their bodies.  
Suggest why albino people should avoid looking at bright lights.

.....

.....

.....

.....

.....[3]

[Total: 11]

3 Fig. 3.1 represents four genes on a part of the X chromosomes from a body cell of a woman.

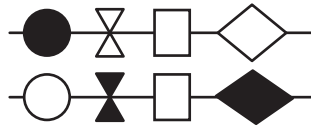


Fig. 3.1

(a) In the space below, draw these genes as they might appear in one of her ova (gametes).

[3]

(b) Fig. 3.2 shows the same section of an X chromosome in another cell of the same person in which the structure of one of the genes has changed.



Fig. 3.2

(i) State the name given to such a change in a gene.

.....[1]

(ii) Suggest a possible cause of such changes in genes.

.....[1]

(c) Fig. 3.3 shows the alleles of a person with blood group A.

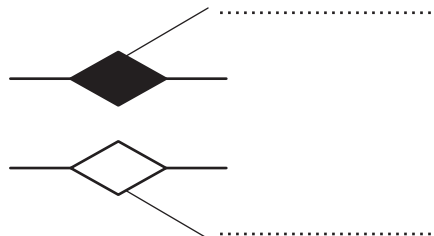


Fig. 3.3

The symbols  $I^A$ ,  $I^B$  and  $I^O$  can be used for the alleles controlling blood groups.

- (i) Using these symbols, label the alleles in Fig. 3.3. [2]
- (ii) Explain why a person with blood group AB would not be expected to have an offspring with group O blood.

.....

.....

.....

.....

.....

.....[3]

[Total: 10]

4 Fig. 4.1 shows a number of organisms living together.

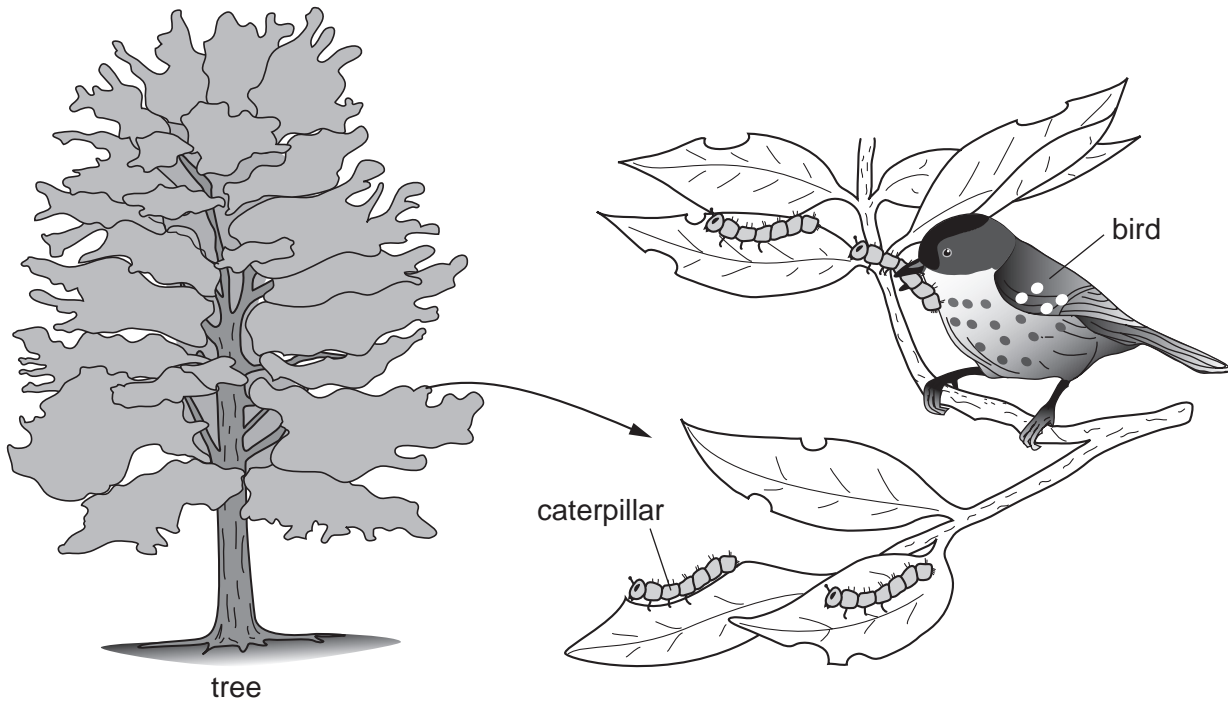


Fig.4.1

(a) What name is given to such a collection of organisms together with the habitat in which they live?

.....[1]

(b) In the space below, draw and label a food chain linking the organisms shown. Indicate on your drawing where energy enters the chain. You do **not** need to draw pictures of the organisms.

[2]



- (c) (i)** In the space below, draw and label a pyramid of biomass for the organisms in this habitat.

[2]

- (ii)** Draw and label a pyramid of numbers for the same habitat.

[2]

- (d)** The birds in this habitat then become severely infected by parasites (e.g. fleas). Draw a labelled pyramid of numbers below to include these parasites.

[2]

[Total: 9]

5 Fig. 5.1 shows the human alimentary canal.

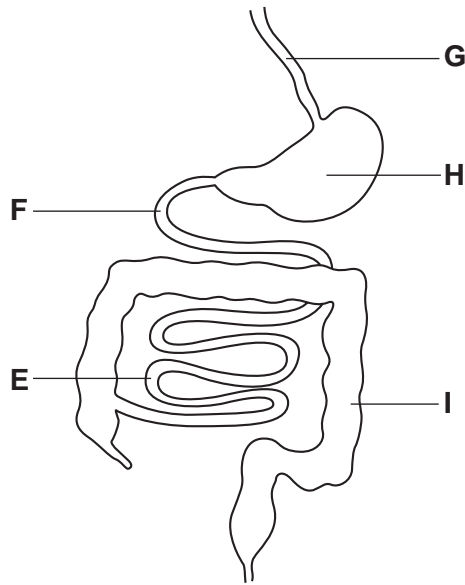


Fig. 5.1

(a) Name parts **G**, **H** and **I**.

**G** .....

**H** .....

**I** .....

[3]

(b) In which lettered part does most of the absorption of substances in solution occur?

..... [1]

Fig. 5.2 shows the concentration of a drug (drug **J**) in a person's blood during the time after it was swallowed.

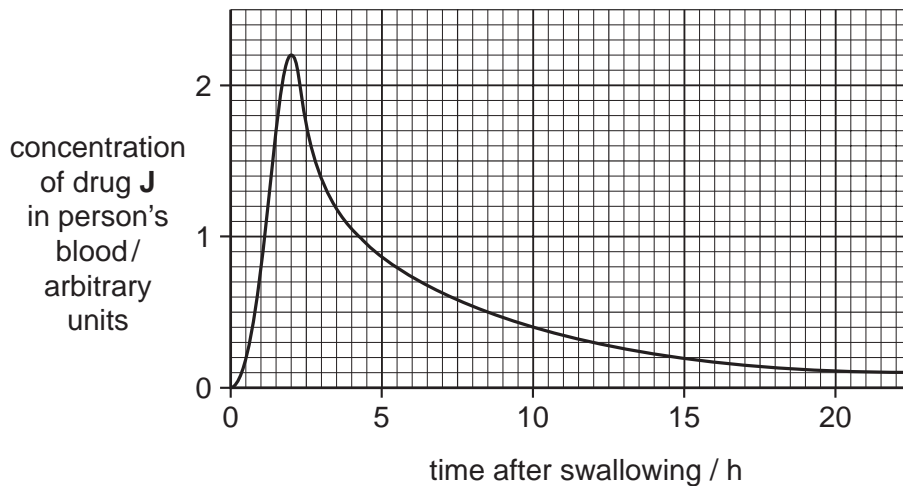


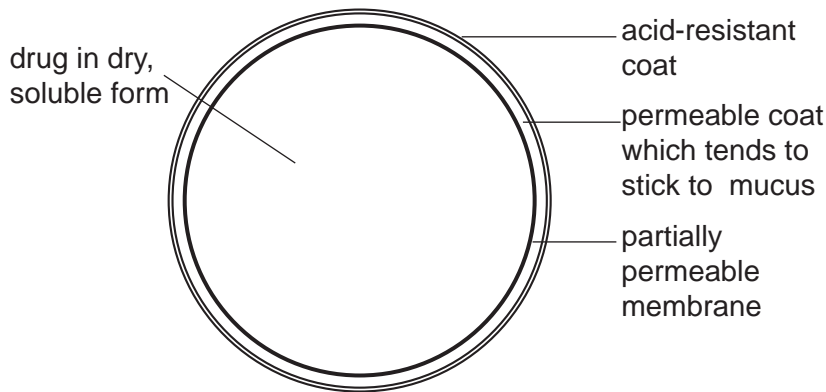
Fig. 5.2

Drug **J** is taken with a meal.

(c) (i) How long after swallowing the drug does it reach the highest concentration in the person's blood?  
..... [1]

(ii) Suggest in which part of the alimentary canal this drug is absorbed most rapidly into the blood.  
..... [1]

Fig. 5.3 shows a pill designed to release its drug (drug **K**) in the alimentary canal over a longer period of time.



**Fig. 5.3**

(d) Using the information in Fig. 5.3, explain why it takes longer for drug **K** than it does for drug **J** to reach its highest blood concentration.

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

(e) Suggest why the pill shown in Fig. 5.3 may take more time to pass through the alimentary canal than the food with which it is swallowed;

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

[Total: 10]

## Section B

Answer **three** questions.

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

- 6** (a) Explain how the heart functions as a pump and keeps blood flowing in only one direction. [7]
- (b) Explain how the difference in the pressure of the blood in the pulmonary artery and in the aorta is related to (i) the structure of the ventricles and (ii) where the blood is going. [3]

[Total: 10]

- 7** (a) Describe and explain the gaseous exchange occurring between a plant leaf and the atmosphere (i) overnight and (ii) during the daylight. [5]
- (b) Suggest and explain how these processes might be affected during the day by (i) an increase in atmospheric carbon dioxide and (ii) a lack of water in the soil. [5]

[Total: 10]

Answer only **Question 8 Either** or **Question 8 Or**

- 8 Either** (a) Compare human male and female gametes in terms of (i) size, (ii) numbers and (iii) movement. In each case, suggest reasons for the differences you describe. [8]
- (b) Explain (i) what is meant by a *natural* method of birth control and (ii) why it is the least reliable method of birth control. [2]

[Total: 10]

- 8 Or** (a) Compare the male and female gametes of a plant in terms of (i) numbers and (ii) movement. In each case, suggest reasons for the differences you describe. [7]
- (b) Explain the advantages of asexual reproduction. [3]

[Total: 10]

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