



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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NUMBER

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**BIOLOGY**

**0610/21**

Paper 2 Core

**October/November 2011**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: ruler

**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 or graphs.

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

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

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	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>Total</b>	

This document consists of **20** printed pages and **4** blank pages.



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- 1 Fig. 1.1 shows a crab that is a member of the arthropod group.

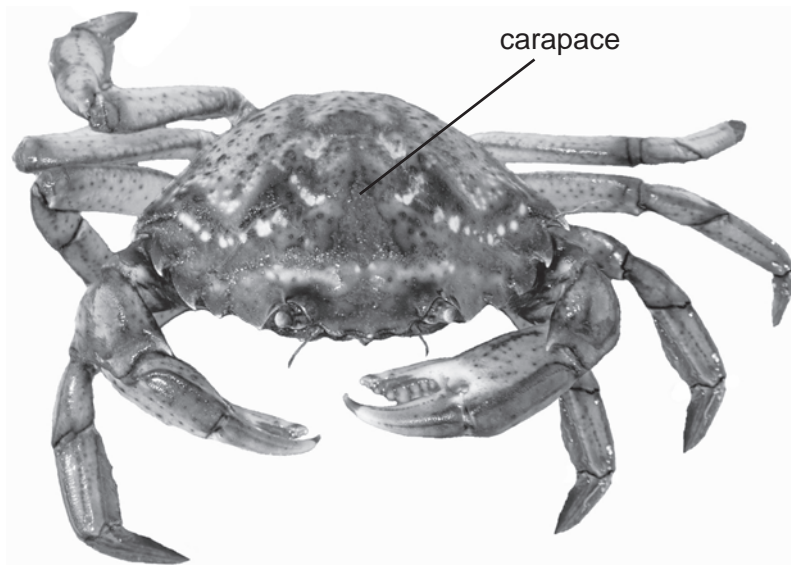


Fig. 1.1

Crabs have a hard shell (carapace) that covers the head and thorax.

The abdomen is often folded under the body below the carapace.

All crabs have five pairs of legs.

- (a) To which group of arthropods does the crab belong?

Tick (✓) **one** box to show your answer.

arachnids	<input type="checkbox"/>
crustaceans	<input type="checkbox"/>
insects	<input type="checkbox"/>
myriapods	<input type="checkbox"/>

[1]

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(b) Fig. 1.2 shows five crabs.

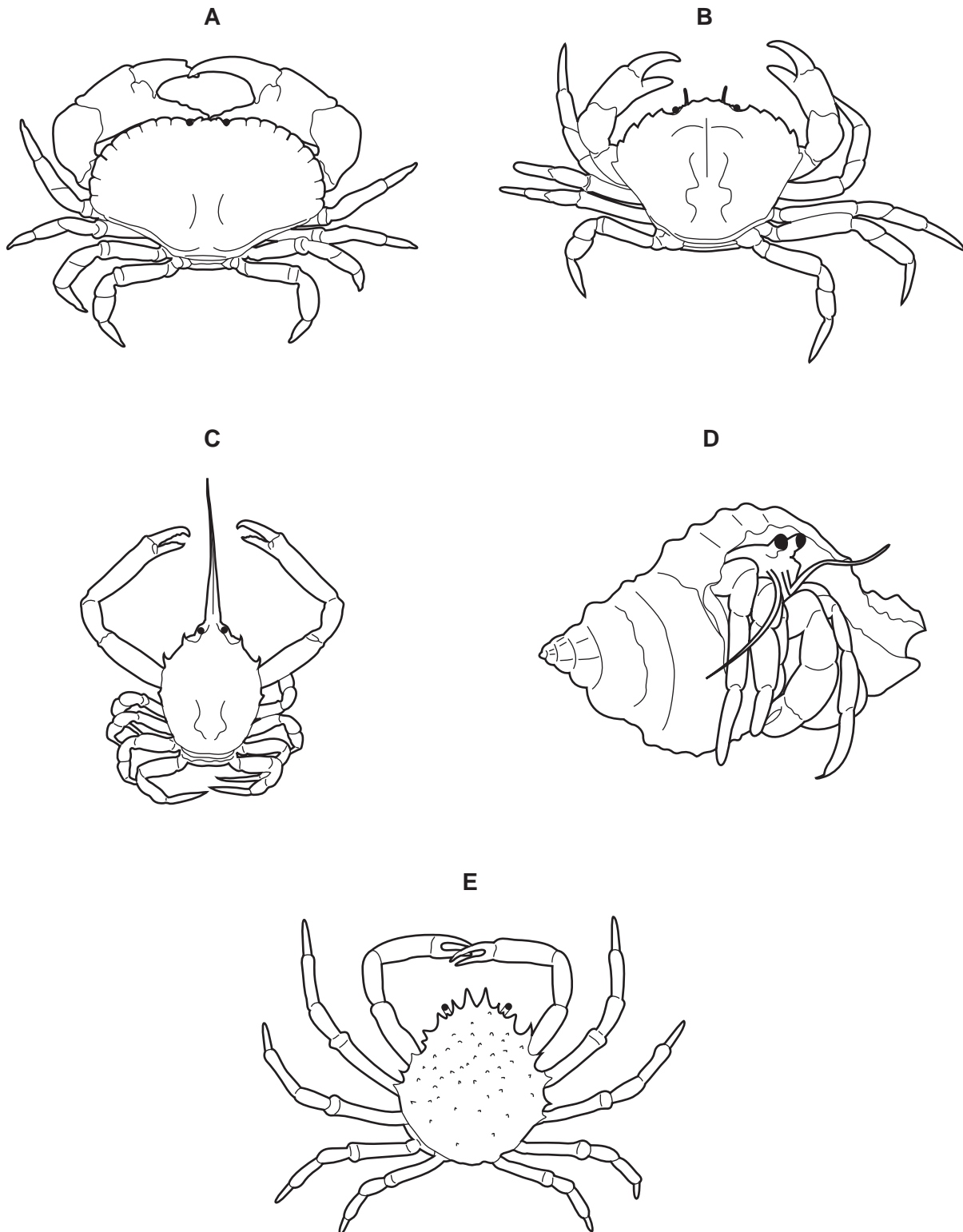


Fig. 1.2

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## 5

Use the key to identify each of the crabs.

Write the name of each crab in the correct box in Table 1.1.

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**Key**

	name of crab
1 (a) abdomen folded under carapace (b) abdomen tucked inside mollusc shell	go to 2 <i>Eupagurus</i>
2 (a) all legs are thin (b) front pair of legs is much wider than the rest	go to 4 go to 3
3 (a) front edge of carapace has sharp, jagged points (b) front edge of carapace is smooth	<i>Carcinus</i> <i>Cancer</i>
4 (a) front edge of carapace comes to a long, sharp point (b) front edge of carapace has lots of short points	<i>Corystes</i> <i>Maia</i>

**Table 1.1**

crab	name of crab
<b>A</b>	
<b>B</b>	
<b>C</b>	
<b>D</b>	
<b>E</b>	

[4]

[Total: 5]

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2 (a) The human circulatory system contains valves.

(i) State the function of these valves.

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

(ii) Complete Table 2.1 by placing a tick (✓) against **two** structures in the human circulatory system that have valves.

**Table 2.1**

structure in circulatory system	have valves
arteries	
capillaries	
heart	
veins	

[1]

(b) Describe how you could measure the heart rates of some students before they start running.

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

- (c) Fig. 2.1 shows the results of an investigation of the heart rates of some students before and immediately after running.

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Each student ran the same distance.

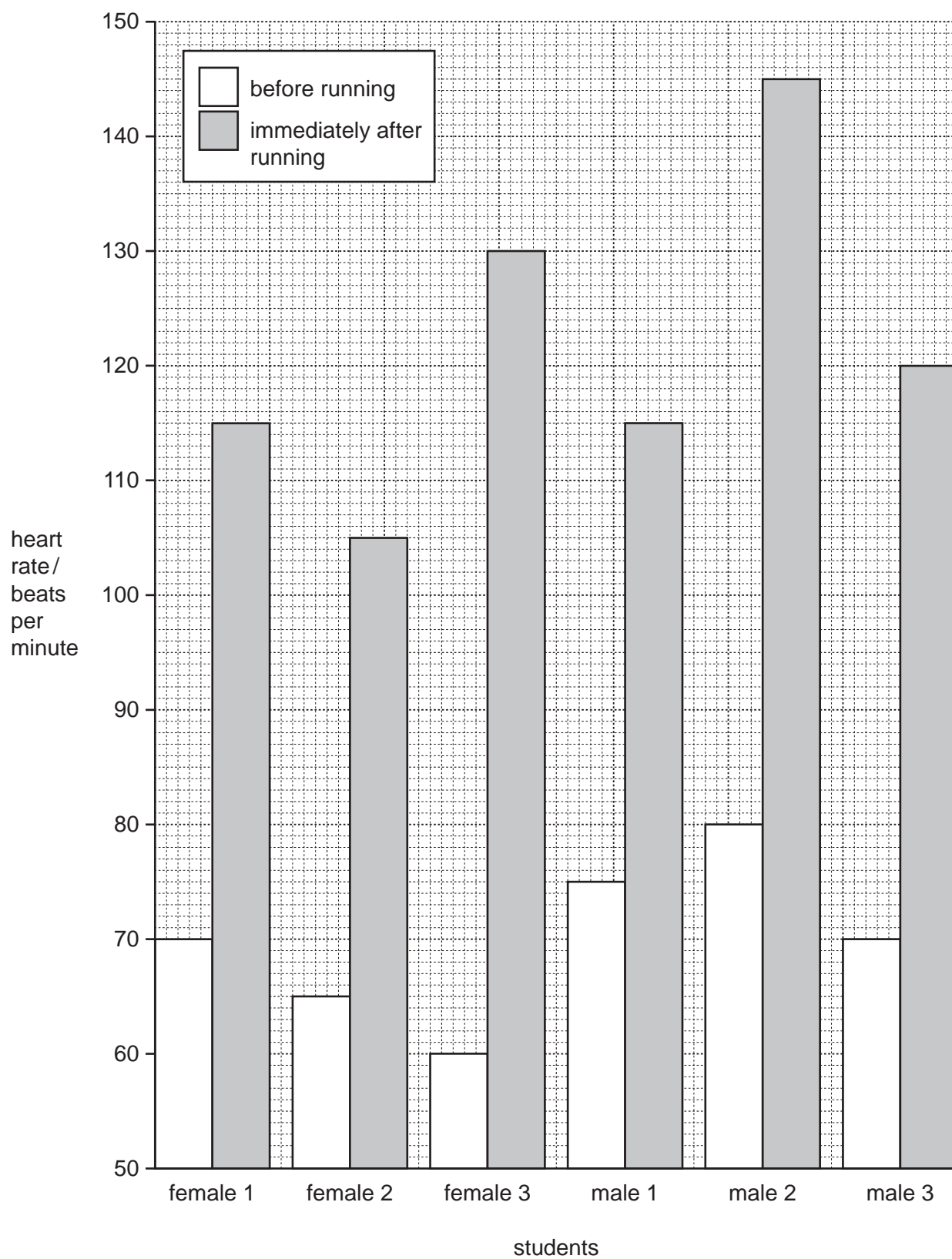


Fig. 2.1



(i) State which student has the lowest heart rate immediately after running.  
..... [1]

(ii) State which student has the largest change in heart rate from before to immediately after running.  
..... [1]

(iii) Describe any trends that you can see in the results.  
.....  
.....  
.....  
..... [2]

(d) Explain why heart rate changes when you run.  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

[Total: 12]

3 (a) Plants, like animals, respond to stimuli. Tropisms are an example of a plant response.

(i) Define the term *geotropism*.

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

(ii) Suggest the advantages of geotropic responses for a seed germinating in the soil.

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

(b) State three external conditions necessary for the germination of a seed in the soil.

1 .....  
2 .....  
3 ..... [3]

[Total: 8]

4 (a) Fig. 4.1 shows a water cycle.

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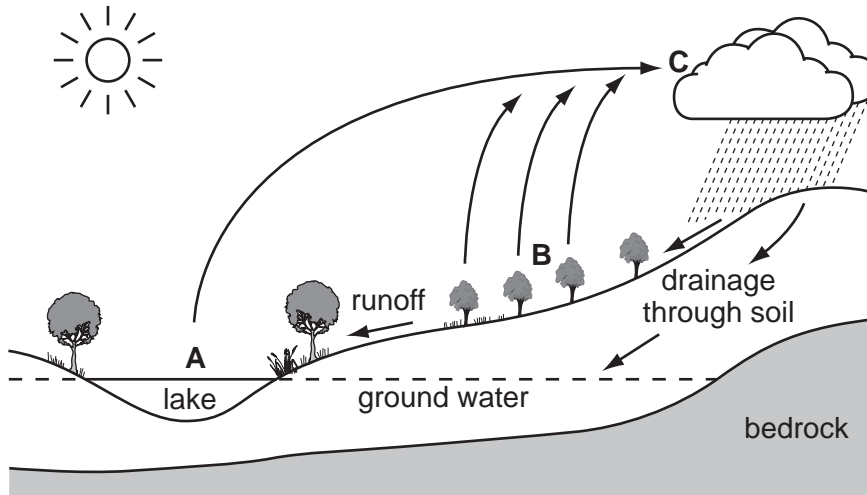


Fig. 4.1

(i) Name the processes happening at A, B and C.

- A ..... [3]
- B .....
- C .....

(ii) Suggest why the most rainfall occurs over hills and mountains.

..... [1]

.....

(b) Lakes are often naturally rich in nutrients such as nitrates.

Using information from Fig. 4.1, suggest how these nutrients are moved from the hill into the lake.

..... [1]

.....

(c) Explain why deforestation and the removal of plants from the sides of hills can lead to the flooding of lower areas of land.

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.....

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..... [3]

[Total: 8]

5 Fig. 5.1 shows an Arctic food web.

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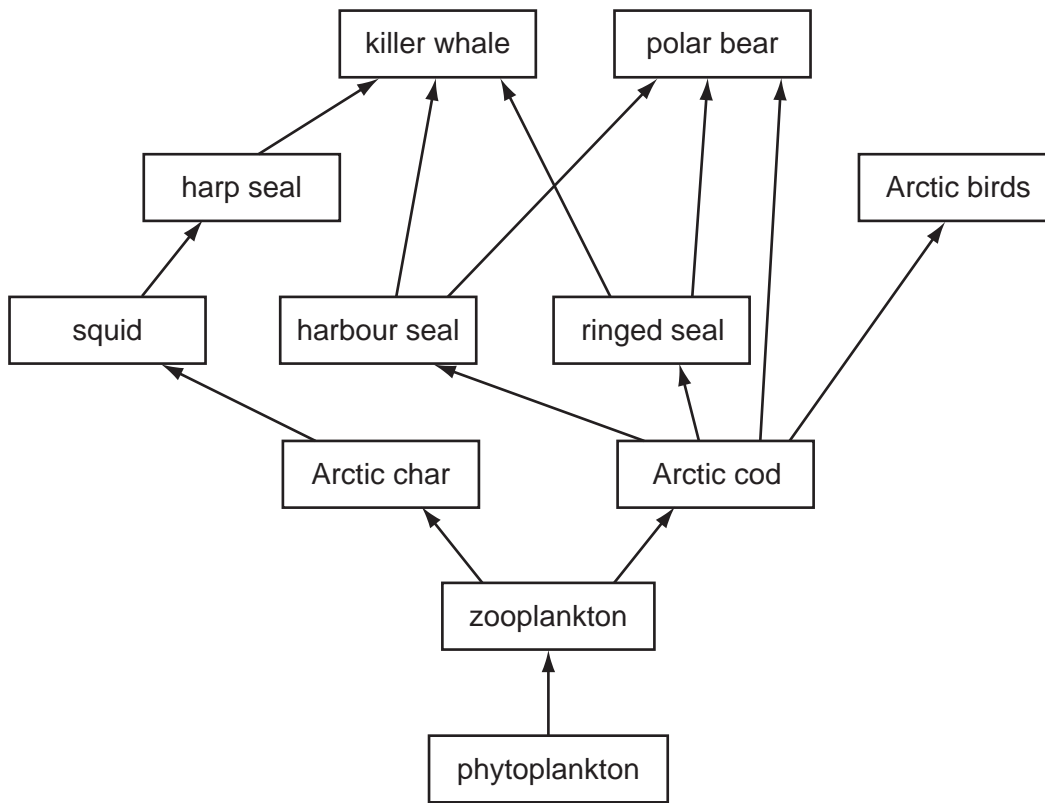


Fig. 5.1

(a) (i) The phytoplankton are the producers in this food web.

Name the process by which phytoplankton build up stores of chemical energy.

..... [1]

(ii) Name a secondary consumer in the food web in Fig. 5.1.

..... [1]

(iii) Complete the food chain using organisms shown in Fig. 5.1.

phytoplankton → ..... → ..... → killer whale

[1]

(b) The polar bear has been listed as an endangered species.

Explain what the term *endangered species* means.

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

(c) Suggest how the loss of the polar bear from the Arctic ecosystem could affect the population of killer whales.

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

[Total: 8]

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**Question 6 begins on the next page.**

- 6 An investigation of the uptake and loss of water by a plant was carried out over 24 hours. The results are shown in Table 6.1.

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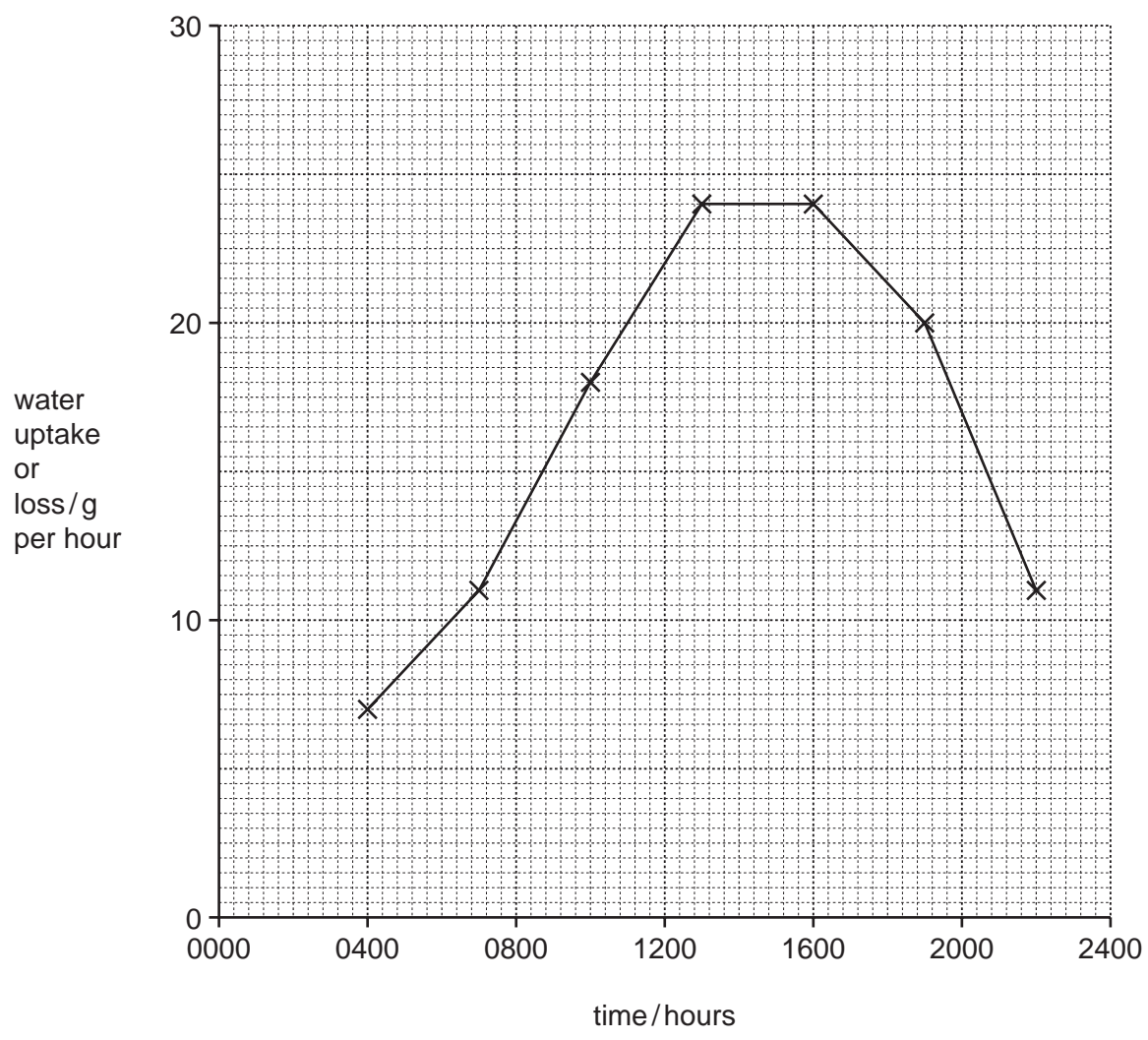
**Table 6.1**

time of day / hours	water uptake / g per hour	water loss / g per hour
0400	7	2
0700	11	8
1000	18	24
1300	24	30
1600	24	24
1900	20	13
2200	11	5



(a) (i) The data for water uptake have been plotted on the grid below.  
 Plot the data for water loss on the same grid. Label both curves.

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[4]

(ii) State the **two** times at which the uptake and loss of water were the same.

.....

[1]

(b) Explain how a **decrease** in temperature and humidity would affect the water loss by this plant.

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(i) temperature .....  
.....  
.....  
..... [2]

(ii) humidity .....  
.....  
.....  
..... [2]

[Total: 9]

7 Explain how the use of chemical fertilisers has increased food production in farming.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
..... [4]

[Total: 4]

8 Reproduction in humans is an example of sexual reproduction.

Outline what occurs during:

For  
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(a) sexual intercourse,

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

(b) fertilisation,

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

(c) implantation.

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

[Total: 7]

9 Fig. 9.1 shows the human digestive system and associated organs.

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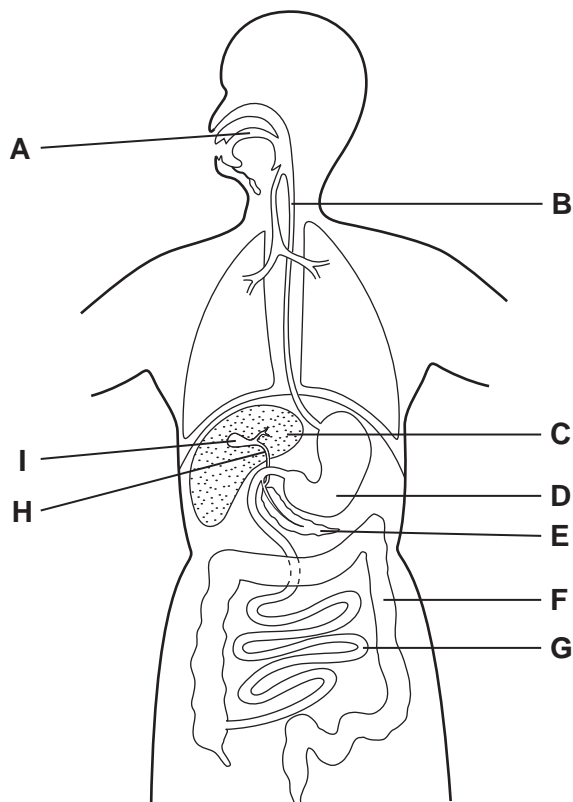


Fig. 9.1

(a) Use letters from Fig. 9.1 to identify the structures described.

Each letter may be used once, more than once, or not at all.

(i) **One** structure where digestion of protein occurs.

.....

(ii) **One** structure where bile is stored.

.....

(iii) **One** structure where peristalsis happens.

.....

(iv) **One** structure where starch digestion occurs.

.....

(v) **One** structure where amino acids are absorbed into the blood.

.....

[5]

(b) State two functions of each of the structures labelled **C** and **E** on Fig. 9.1.

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(i) structure **C**

1 .....

2 ..... [2]

(ii) structure **E**

1 .....

2 ..... [2]

[Total: 9]

10 Flowers from three red-flowered plants, **A**, **B** and **C**, of the same species were self-pollinated.

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(a) Explain what is meant by the term *pollination*.

.....

.....

.....

..... [2]

(b) Seeds were collected from plants **A**, **B** and **C**. The seeds were germinated separately and were allowed to grow and produce flowers.

The colour of these flowers is shown in Table 10.1.

**Table 10.1**

seeds from plant	colour of the flowers grown from the seeds
<b>A</b>	all red
<b>B</b>	some red and some white
<b>C</b>	some red and some white

(i) State the recessive allele for flower colour.

..... [1]

(ii) State which plant, **A**, **B** or **C**, produced seeds that were homozygous for flower colour.

..... [1]

(iii) Suggest how you could make certain that self-pollination took place in the flowers of plants **A**, **B** and **C**.

.....

.....

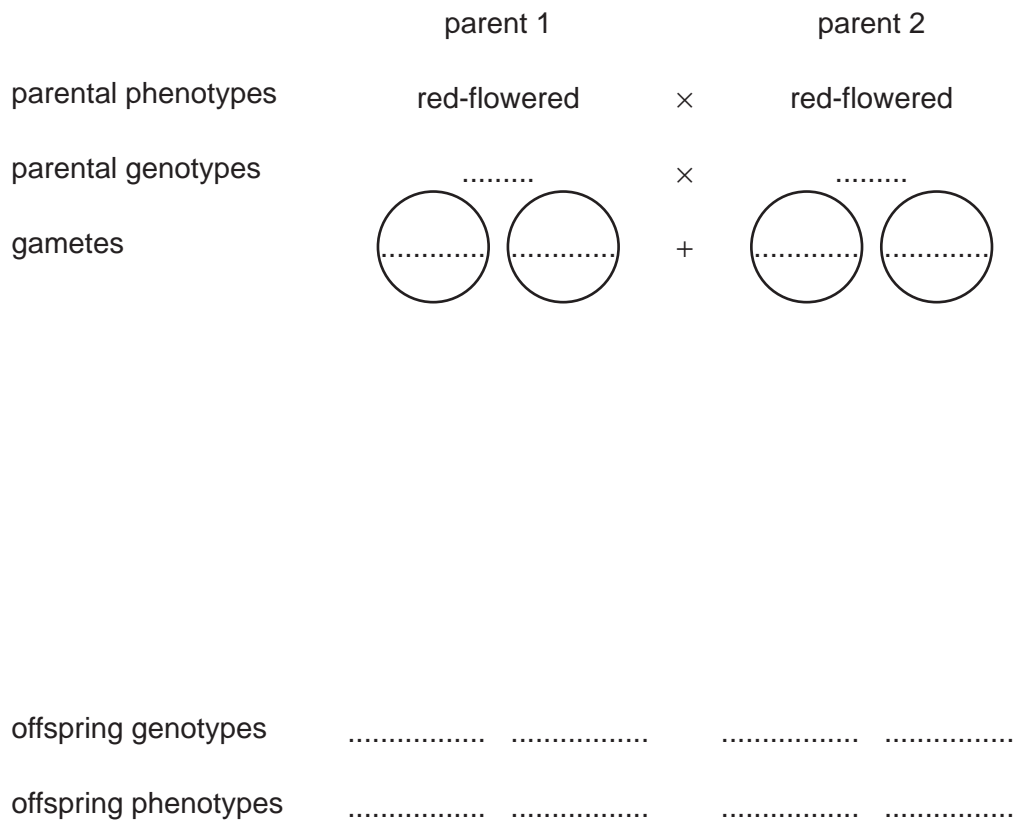
.....

..... [2]

(c) Complete the genetic diagram to explain how two red-flowered plants identical to plant **B** could produce both red-flowered plants and white-flowered plants.

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Use the symbols **R** to represent the dominant allele and **r** to represent the recessive allele.



[4]

[Total: 10]

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