



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
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.

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1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

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.

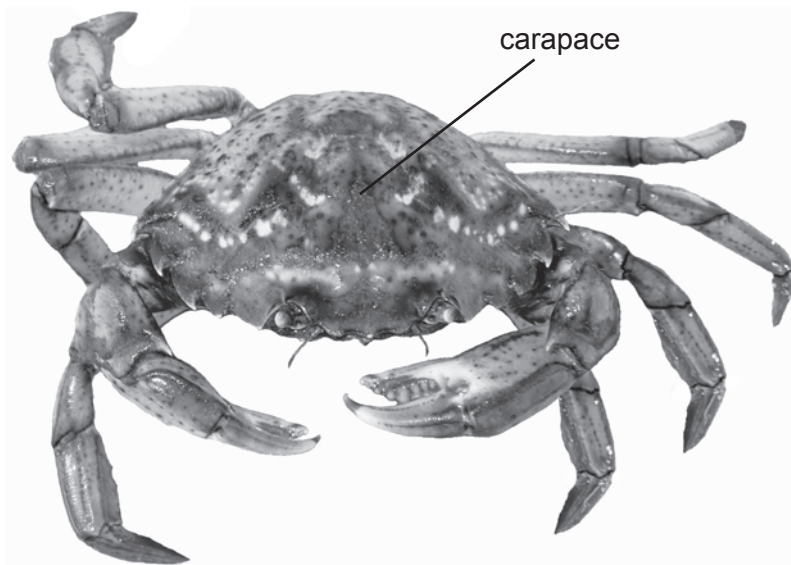


Fig. 1.1

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	☐
crustaceans	☐
insects	☐
myriapods	☐

[1]

(b) Fig. 1.2 shows five crabs.

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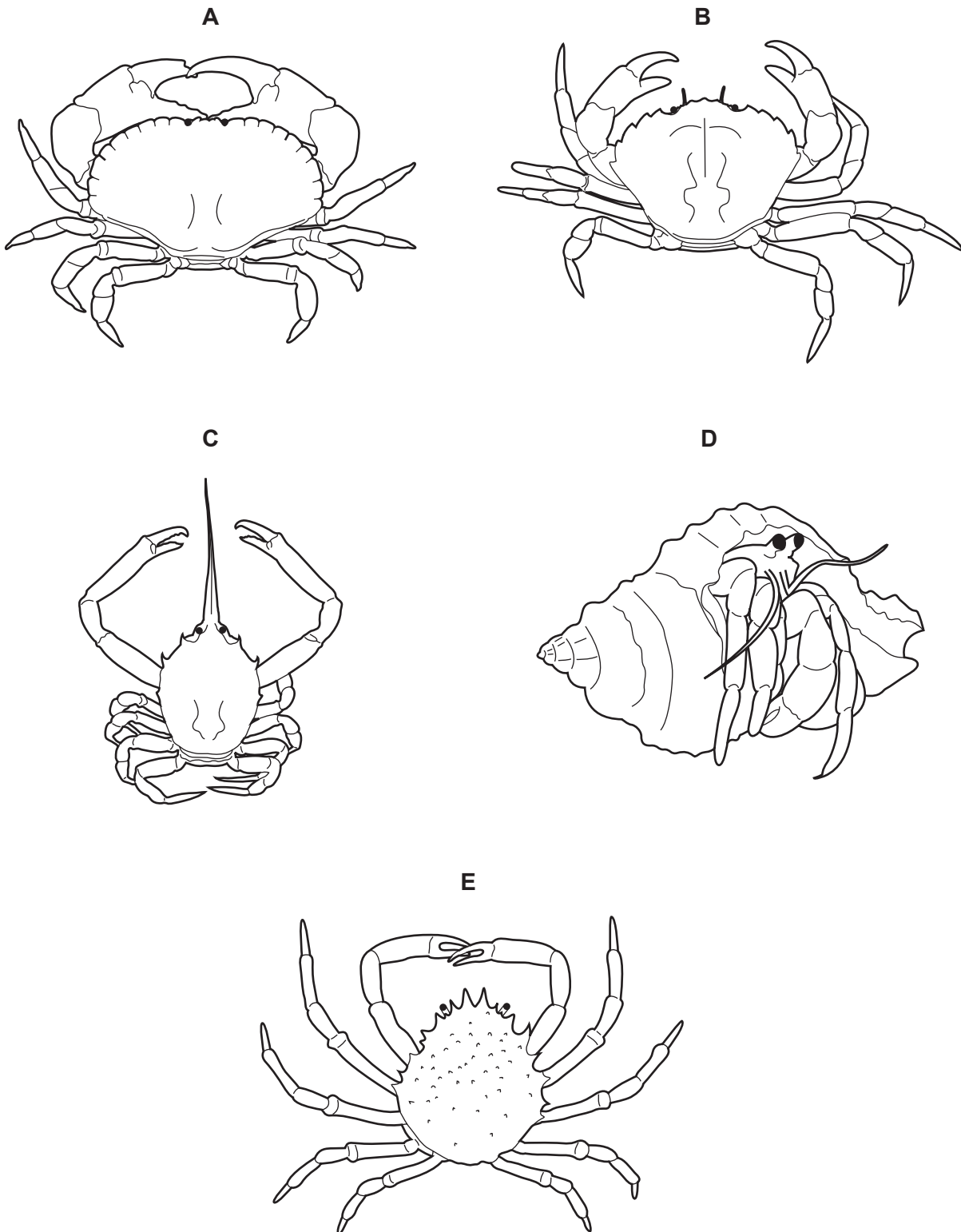


Fig. 1.2

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
A	
B	
C	
D	
E	

[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.

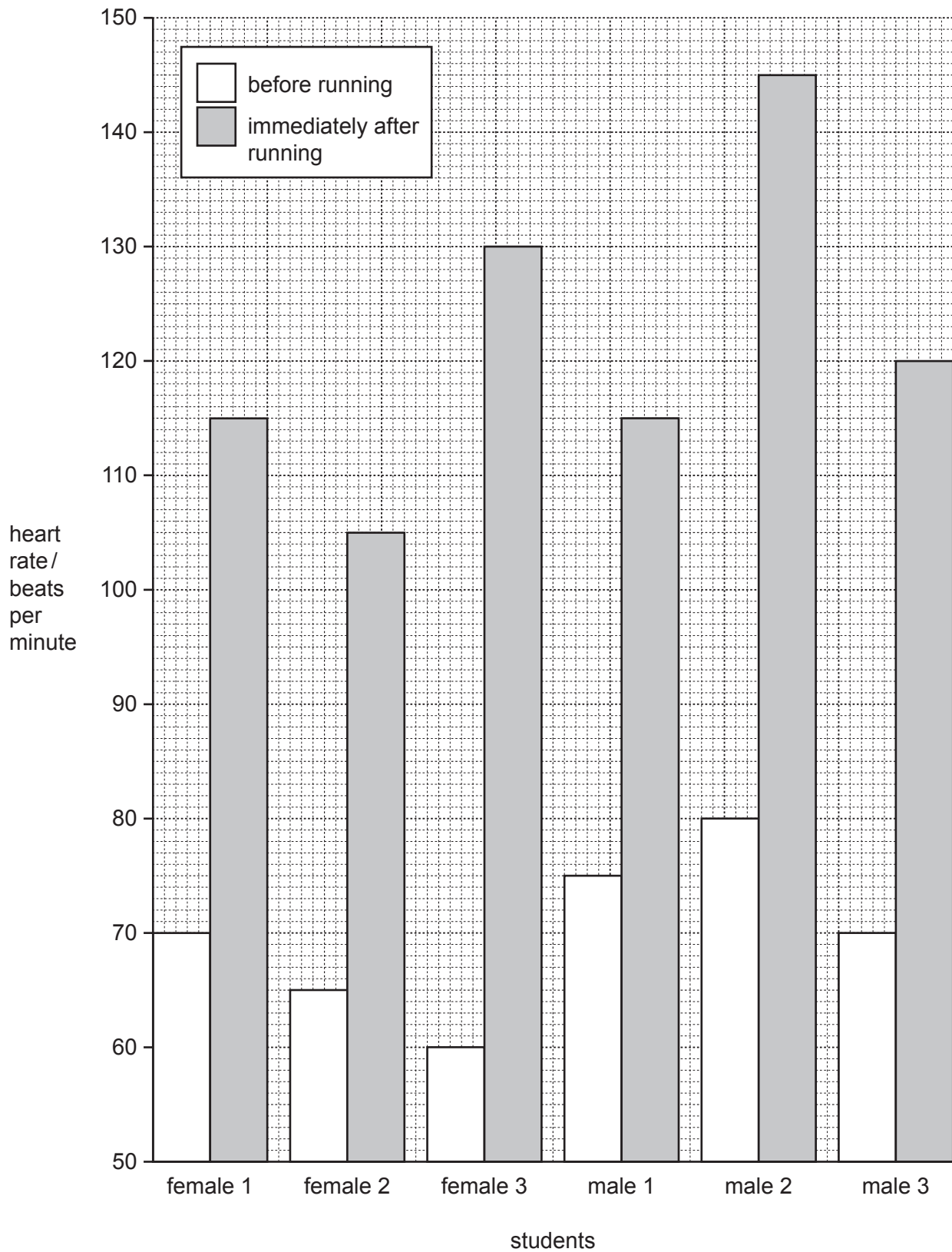


Fig. 2.1

- (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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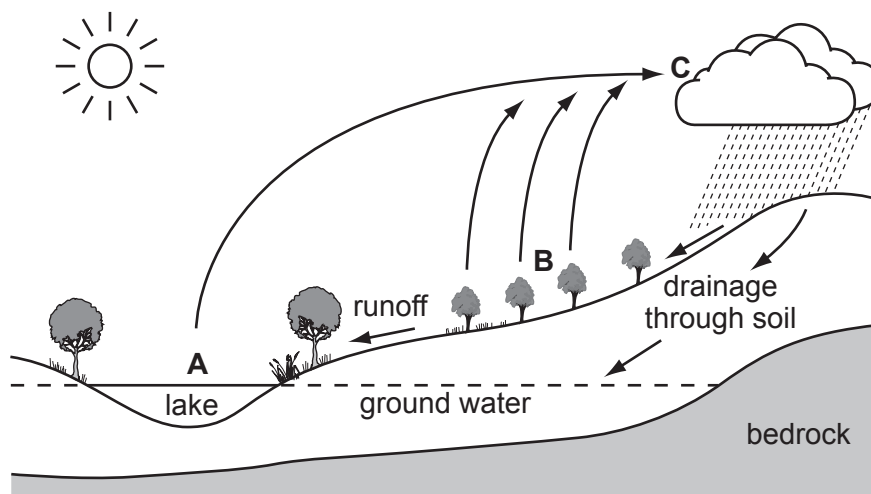


Fig. 4.1

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

A

B

C [3]

- (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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.....

.....

.....

.....

.....

..... [3]

[Total: 8]

5 Fig. 5.1 shows an Arctic food web.

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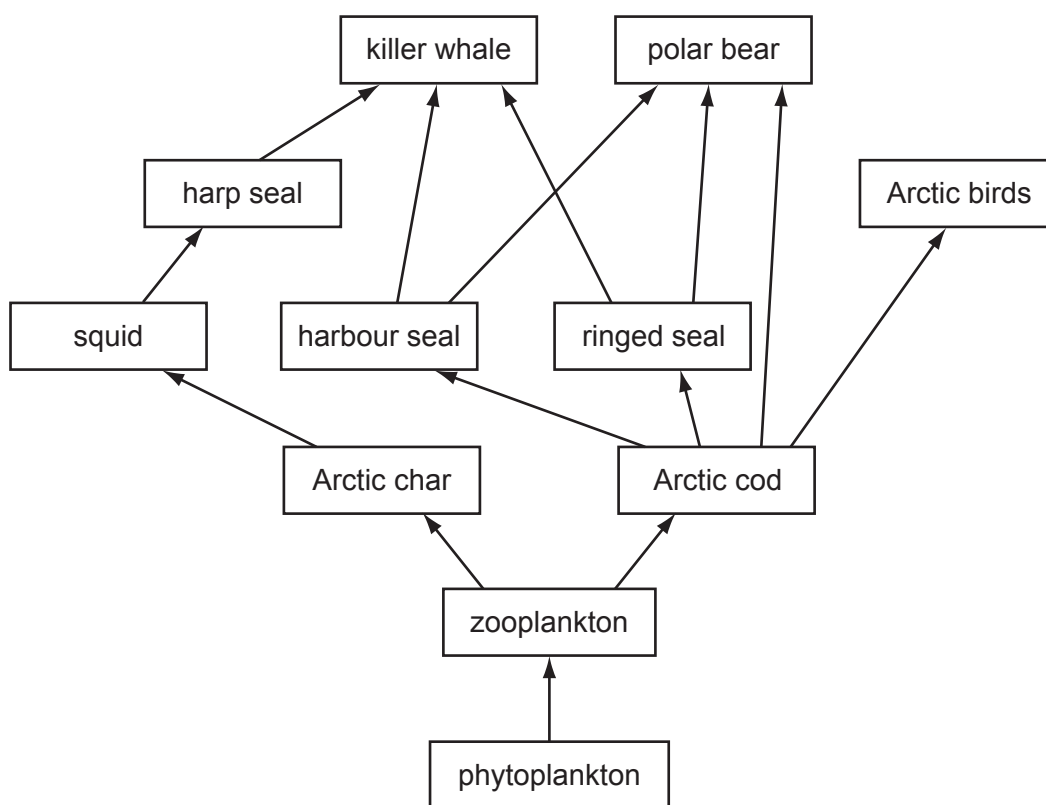


Fig. 5.1

(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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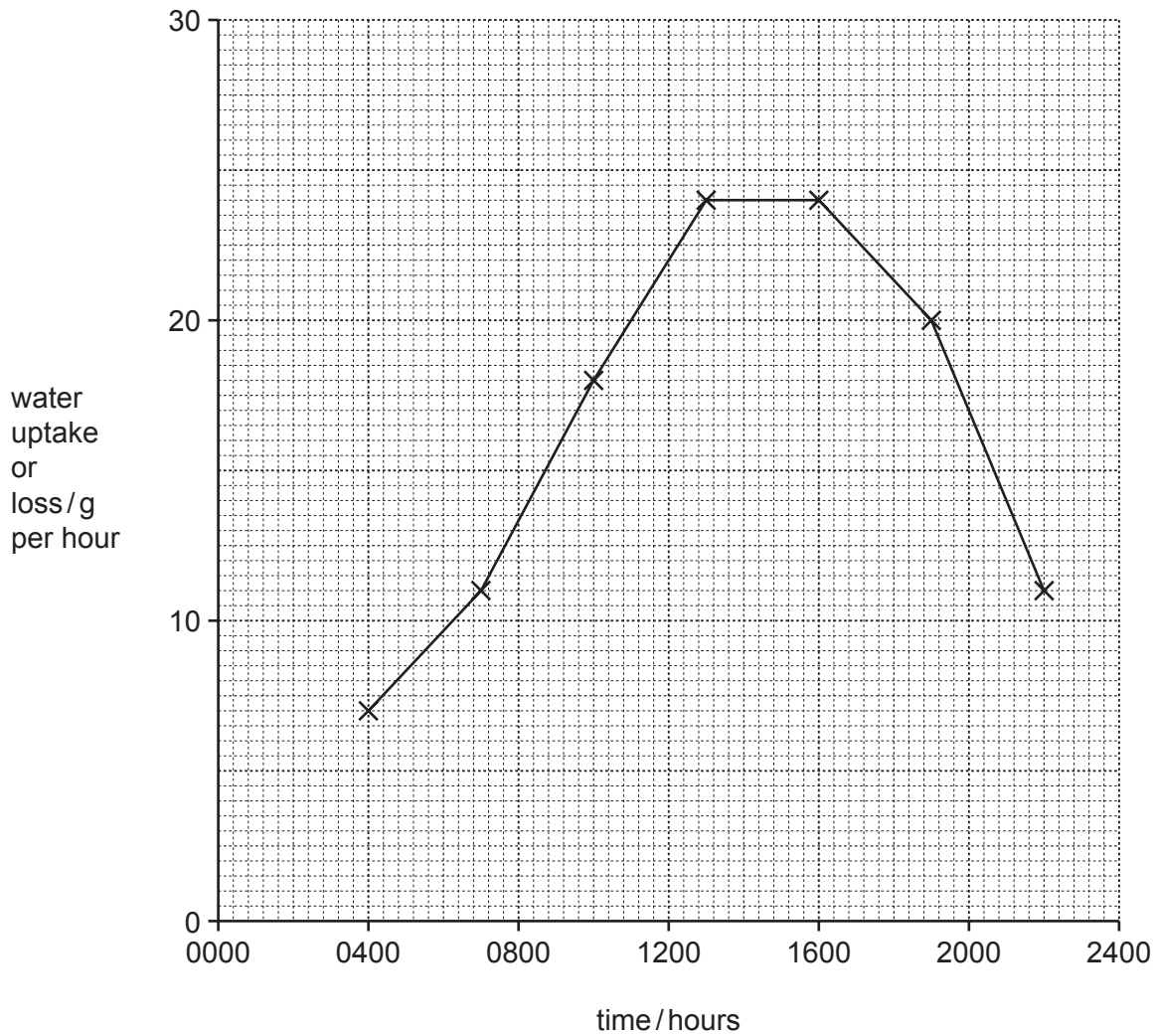
Table 6.1

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:

(a) sexual intercourse,

.....

.....

.....

..... [2]

(b) fertilisation,

.....

.....

.....

.....

.....

..... [3]

(c) implantation.

.....

.....

.....

..... [2]

[Total: 7]

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

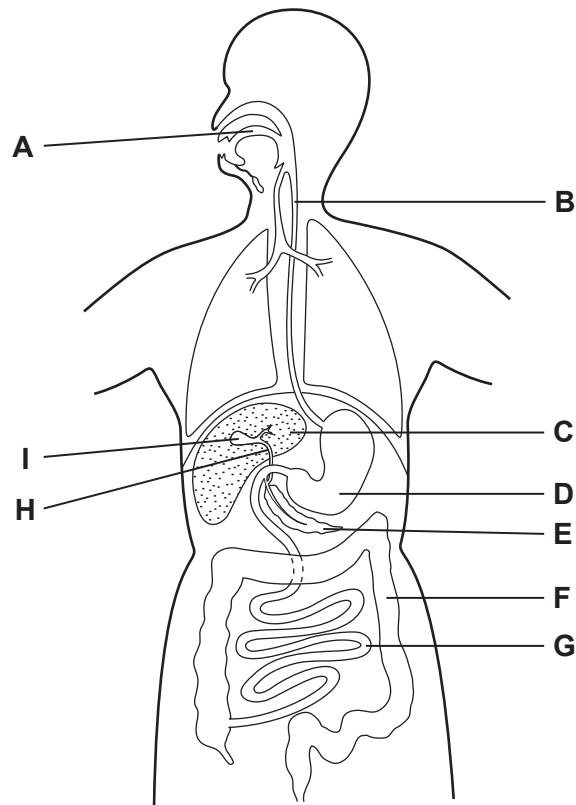


Fig. 9.1

- (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.

(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
A	all red
B	some red and some white
C	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**.

.....

.....

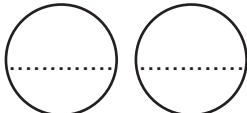
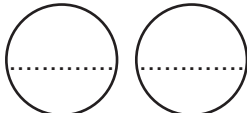
.....

..... [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.

	parent 1		parent 2
parental phenotypes	red-flowered	.	red-flowered
parental genotypes		.	
gametes		+	
offspring genotypes			
offspring phenotypes			

[4]

[Total: 10]

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