UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9095627811

BIOLOGY **0610/32**

Paper 3 Extended **October/November 2010**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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	
Total	

This document consists of **19** printed pages and **1** blank page.

For Examiner's Use

1 Fig. 1.1**A** shows a buttercup, *Ranunculus cymbalaria*. Fig. 1.1**B** shows details of a flower of the same plant.

Fig. 1.1

(a) Explain, **using only features visible in Fig. 1.1**, why *Ranunculus cymbalaria* is classified as a dicotyledonous plant rather than as a monocotyledonous plant.

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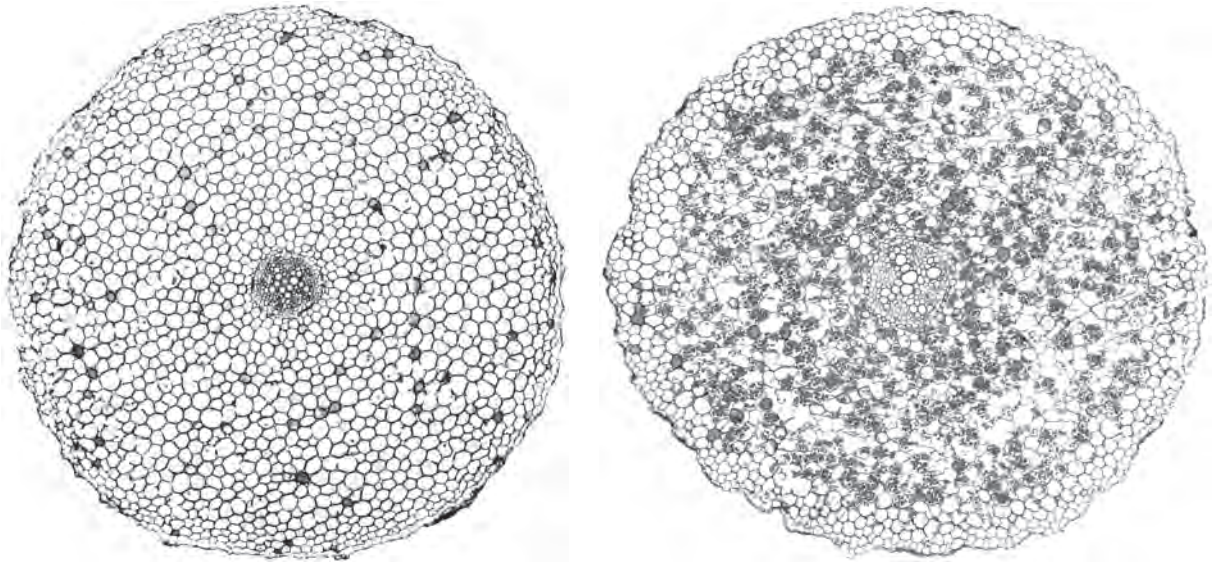
..... [2]

Fig. 1.2 shows a transverse section through a buttercup root at the end of the cold winter (**W**) and at the end of the warm, moist summer (**S**). At the end of the winter, the cells contain very few starch grains. At the end of the summer, most of the root cells contain many starch grains.



W **S**

Fig. 1.2

(b) Suggest why there are few starch grains in the cells of **W** compared with a large number of starch grains in the cells of **S**.

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(c) Describe how enzymes in root cells synthesise starch.

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[Turn over

(d) As temperature is increased, for example from 10 °C to 30 °C, enzyme activity increases.

For Examiner's Use

Explain how increasing temperature affects enzyme activity.

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[Total: 10]

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2 **(a)** Define the term *excretion*.

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Fig. 2.1 shows a dialysis machine for treating people who have kidney failure. The dialysate (dialysis fluid) is a solution of glucose and salts.

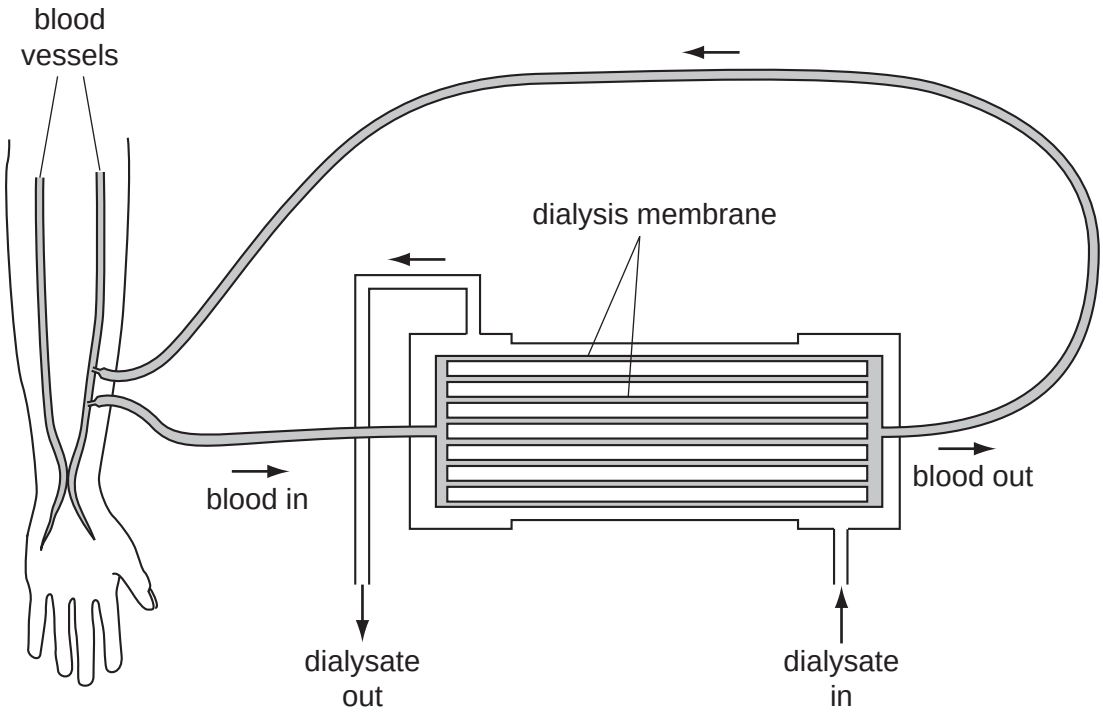

Fig. 2.1

(b) Explain how, when the patient is receiving dialysis treatment

(i) the loss of plasma proteins and red blood cells is prevented,

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(ii) the normal glucose concentration of the blood is maintained.

For Examiner's Use

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(c) A person with kidney failure received regular dialysis treatment for 17 days.

Fig. 2.2 shows how the concentration of urea in the blood changed over the 17 days.

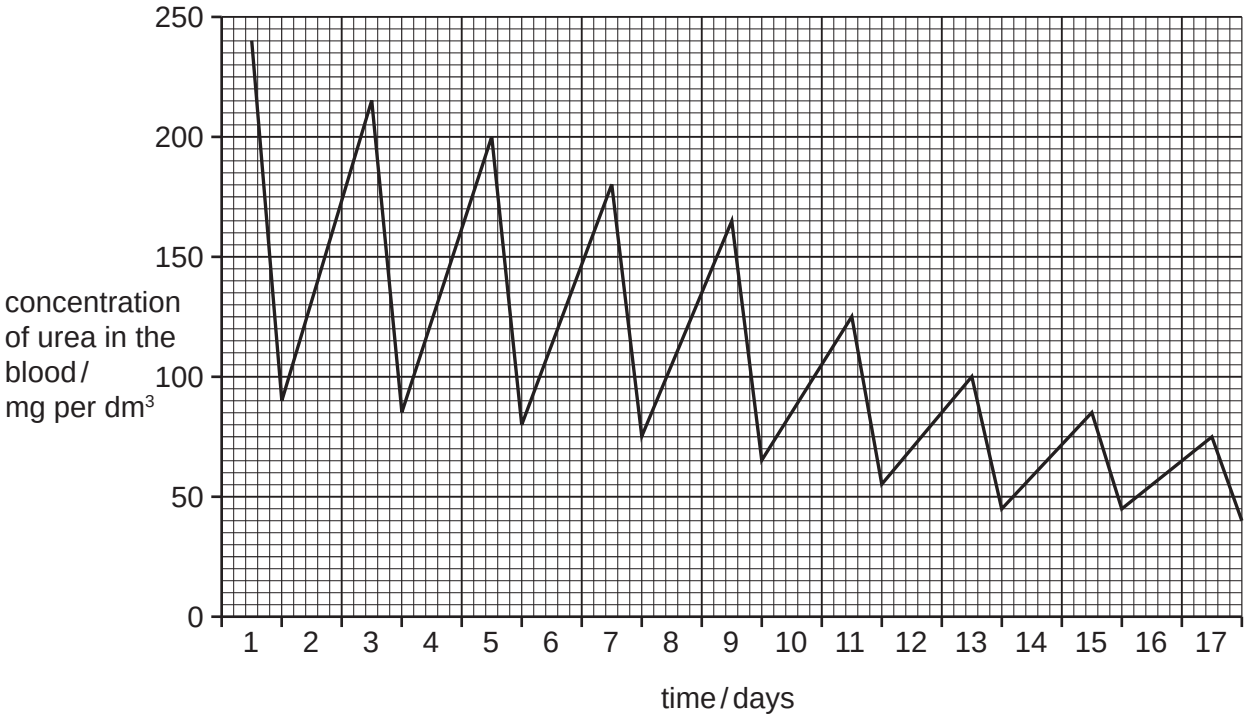

Fig. 2.2

(i) State how many times the person received dialysis treatment.

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(ii) Calculate the decrease in the concentration of urea in the blood from the beginning of dialysis until the end of the treatment.

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(iii) Describe the changes that occur in the urea concentration in the blood over the period shown in Fig. 2.2. You will gain credit for using the data in Fig. 2.2 in your answer.

For Examiner's Use

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(iv) Explain the changes in urea concentration in the blood as shown in Fig. 2.2.

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[Total: 15]

3 **(a)** In the space below write a balanced chemical equation for anaerobic respiration in muscles.

For Examiner's Use

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Some students investigated the breathing of a 16-year old male athlete. Fig. 3.1 shows the pattern of his breathing for 60 seconds when resting. Fig. 3.2 shows the pattern of his breathing while he took some exercise for 60 seconds.

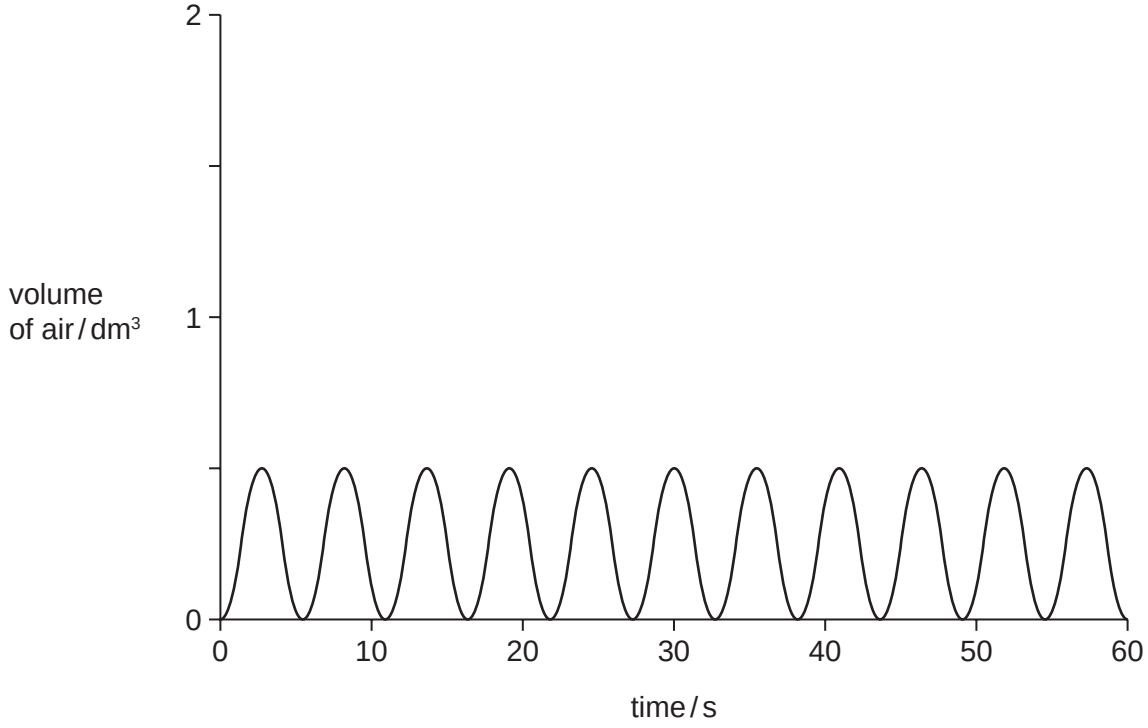

Fig. 3.1

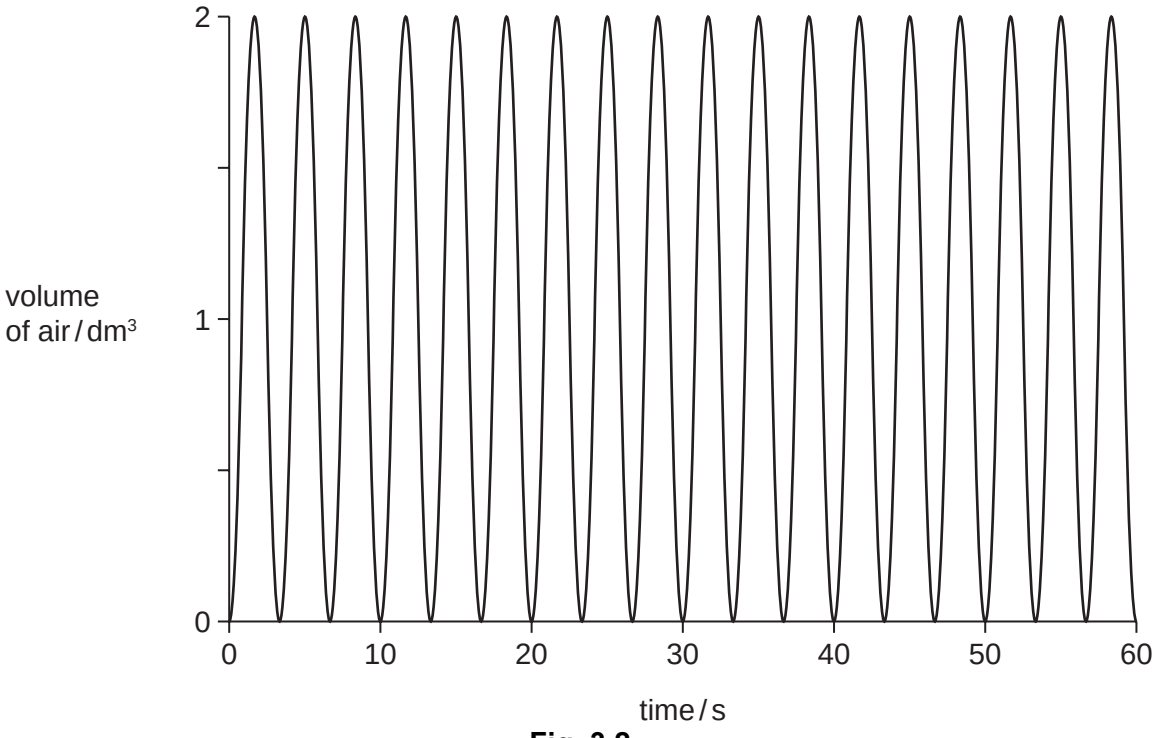

Fig. 3.2

Table 3.1 shows a summary of the results obtained by the students.

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Table 3.1

	breathing at rest	breathing during exercise
volume of air breathed in with each breath / dm^3	0.5	.....
rate of breathing / number of breaths per minute	11	.....
volume of air breathed in per minute / dm^3	5.5	.....

(b) Using information from Fig. 3.2, complete Table 3.1.

Write your answers in Table 3.1. [3]

(c) Explain the effect of exercise on the student's breathing.

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(d) During strenuous exercise, the hormone adrenaline causes changes in the pulse rate and in the concentration of glucose in the blood.

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Explain the importance of these changes during strenuous exercise.

pulse rate .....

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concentration of glucose in the blood .....

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[Total: 15]

For Examiner's Use

4 The human immunodeficiency virus (HIV) infects white blood cells. The virus is reproduced inside these white blood cells.

(a) Describe what may happen to viruses that leave infected white blood cells.

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(b) Describe the possible long-term effects of HIV on the immune system.

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(c) People with HIV may be treated with a variety of drugs.

(i) Define the term *drug*.

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(ii) Explain why antibiotics cannot be used to control HIV.

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[Total: 8]

5 In many parts of the world, raw sewage drains into rivers. Raw sewage contains organic matter which acts as food for bacteria. The breakdown of organic matter by bacteria has an effect on the oxygen concentration and species of invertebrate animals in rivers.

Fig. 5.1 shows the changes in oxygen concentration along a river.

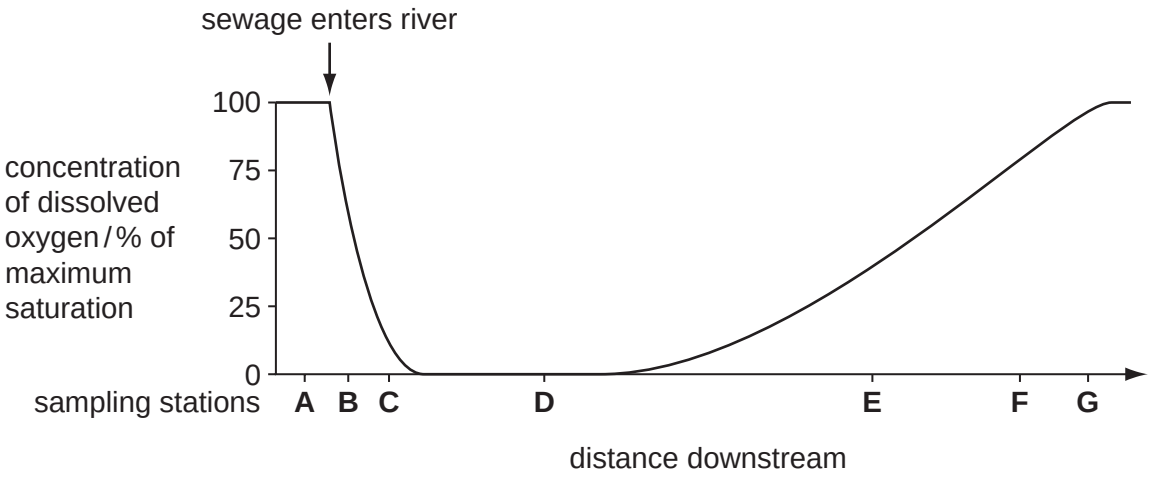

Fig. 5.1

Table 5.1 shows the invertebrate animals at seven sampling stations, **A** to **G**, along the river.

Table 5.1

key

✓ invertebrate animal present

invertebrate animals	sampling stations										
	A	**B**	**C**		**D**		**E**		**F**		**G**
stonefly nymph	✓										✓
freshwater shrimp	✓								✓		✓
caddis fly larva	✓								✓		✓
mayfly nymph	✓	✓					✓		✓		✓
midge larva	✓	✓	✓				✓		✓		✓
rat-tailed maggot		✓	✓		✓						
water louse	✓	✓					✓		✓		✓
wandering snail							✓		✓		✓
tubifex worm	✓	✓	✓		✓		✓		✓		✓

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(a) (i) Describe the changes that occur to the oxygen concentration in the river as shown in Fig. 5.1. You will gain credit for using the data in Fig. 5.1 in your answer.

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(ii) Name the invertebrate animal that is only found in water with the highest oxygen concentration.

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(iii) Name the **two** invertebrate animals that tolerate the lowest oxygen concentrations.

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..... [1]

(iv) Suggest **and** explain the changes in the number of different species of invertebrate animals along the river, as shown in Table 5.1.

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[Turn over

Sewage treatment works receive raw sewage.

This sewage contains food molecules, such as cellulose, starch, protein and fat.

(b) Explain how bacteria breakdown these nutrient molecules.

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The concentration of nitrate ions is often very high in the water leaving a sewage treatment works.

In some places, the water passes through a series of reed beds as shown in Fig. 5.2.

The water leaving the reed beds and entering the river contains very low concentrations of nitrate ions.

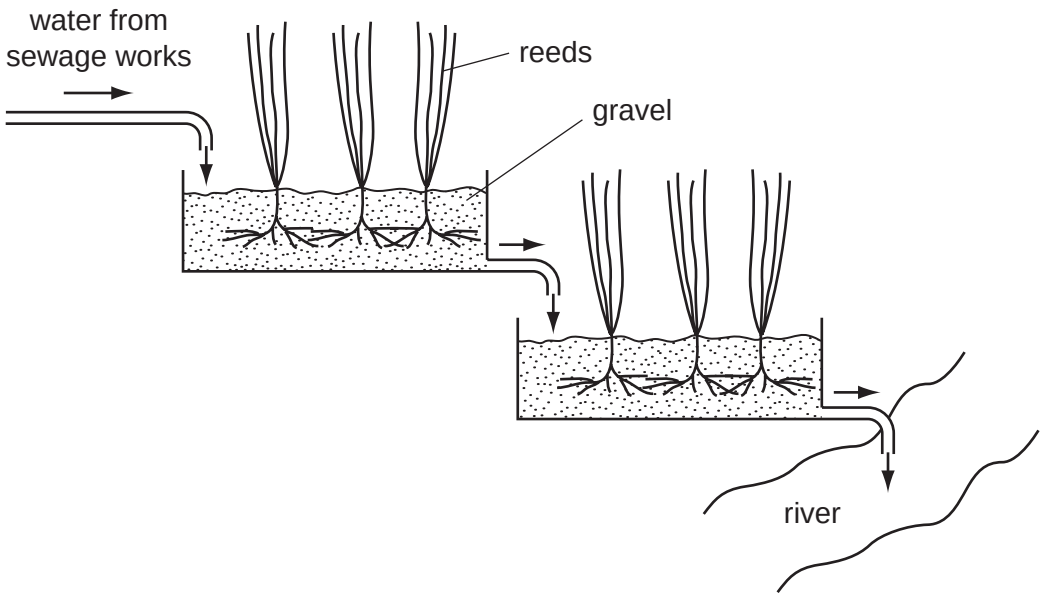

Fig. 5.2

(c) Explain **two** ways in which the concentration of nitrate ions may be reduced as the water flows through the reed beds.

For Examiner's Use

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(d) Some bacteria that live in reed beds release methane. Other sources of methane are cattle and flooded rice fields.

Explain the environmental consequences of an increase in the methane concentration in the atmosphere.

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[Total: 19]

[Turn over

6 **(a)** Define the term *self-pollination*.

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For Examiner's Use

Snapdragon plants have flowers with three colours: red, pink and white.

Some students investigated the inheritance of flower colour in snapdragons.

In **cross 1** they cross-pollinated plants that were homozygous for red flowers with plants that were homozygous for white flowers. They collected and planted the seeds from cross 1. All of the resulting plants had pink flowers.

In **cross 2** they self-pollinated all the pink-flowered plants and found that in the next generation there were red-flowered plants, white-flowered plants and pink-flowered plants.

(b) Complete the genetic diagrams to show how flower colour is inherited in snapdragon plants.

Use the symbol I^R for the allele for red flowers and I^W for the allele for white flowers.

cross 1

parental phenotypes	red flowers	×	white flowers
parental genotypes	.....	×	.....
gametes	.....		.....

offspring genotypes	.....
offspring phenotypes	pink flowers

cross 2

parental phenotypes	pink flowers	×	pink flowers	
parental genotypes	.....	×	.....	
gametes	....		....	

For Examiner's Use

offspring genotypes .....

ratio of offspring phenotypes ..... [4]

(c) Another student cross-pollinated pink-flowered plants with white-flowered plants.

Complete the genetic diagram to show the results that the student would expect.

phenotypes	pink flowers	×	white flowers
genotypes	.....	×	.....
gametes	....		.....

offspring genotypes .....

ratio of offspring phenotypes ..... [3]

(d) Explain the advantages of sexual reproduction to a species of flowering plant, such as the snapdragon.

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[Total: 13]