UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8103202447

BIOLOGY **0610/31**

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	
7	
Total	

This document consists of **18** printed pages and **2** blank pages.

1 Fig. 1.1 shows a vertical section through a flower of soybean, *Glycine max*, following self-pollination. Fig. 1.2 shows part of the section at a higher magnification.

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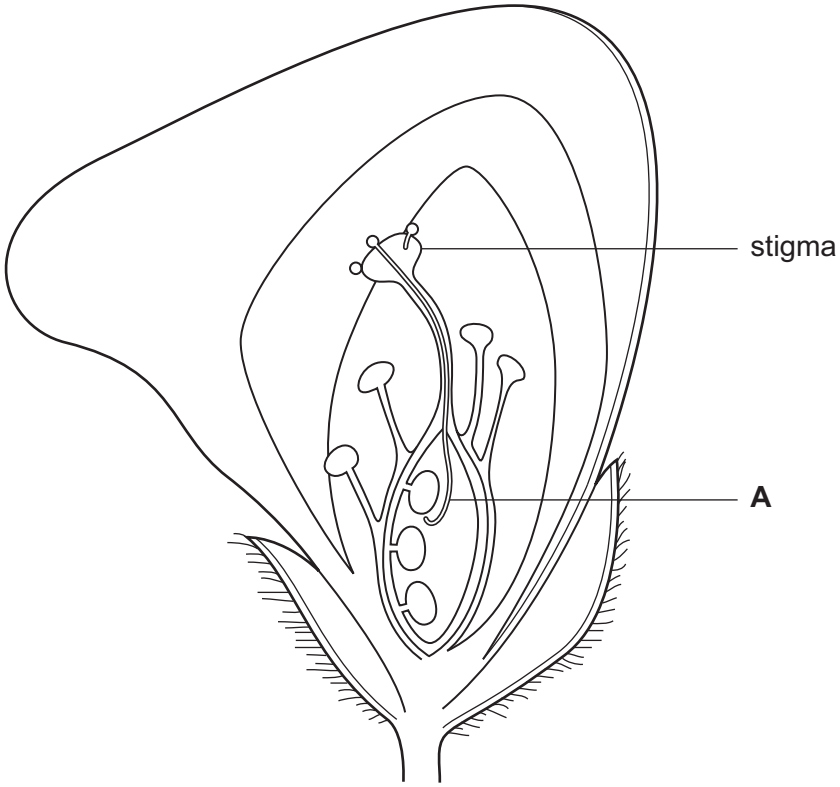

Fig. 1.1

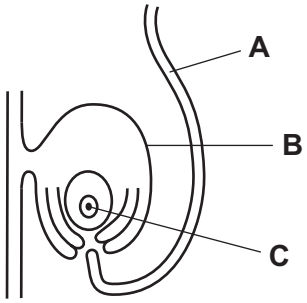

Fig. 1.2

(a) (i) Name the parts labelled **A** to **C** shown in Figs. 1.1 and 1.2.

A .....

B .....

C ..... [3]

For Examiner's Use

(ii) Describe what happens to the structures shown in Figs. 1.1 and 1.2 to bring about fertilisation. You may refer to the structures labelled **A** to **C** by their letters if you wish.

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..... [3]

(iii) Explain the advantages **and** disadvantages of self-pollination for flowering plants, such as soybean.

advantages .....

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disadvantages .....

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..... [4]

(b) Soybean is a dicotyledonous plant.

(i) Name the genus to which the soybean belongs.

..... [1]

(ii) State two features which are **only** found in dicotyledonous plants.

1. .....

2. ..... [2]

[Total: 13]

[Turn over

2 The human menstrual cycle is controlled by four hormones. Fig. 2.1 is a diagram that shows the site of production and the target organs of these hormones.

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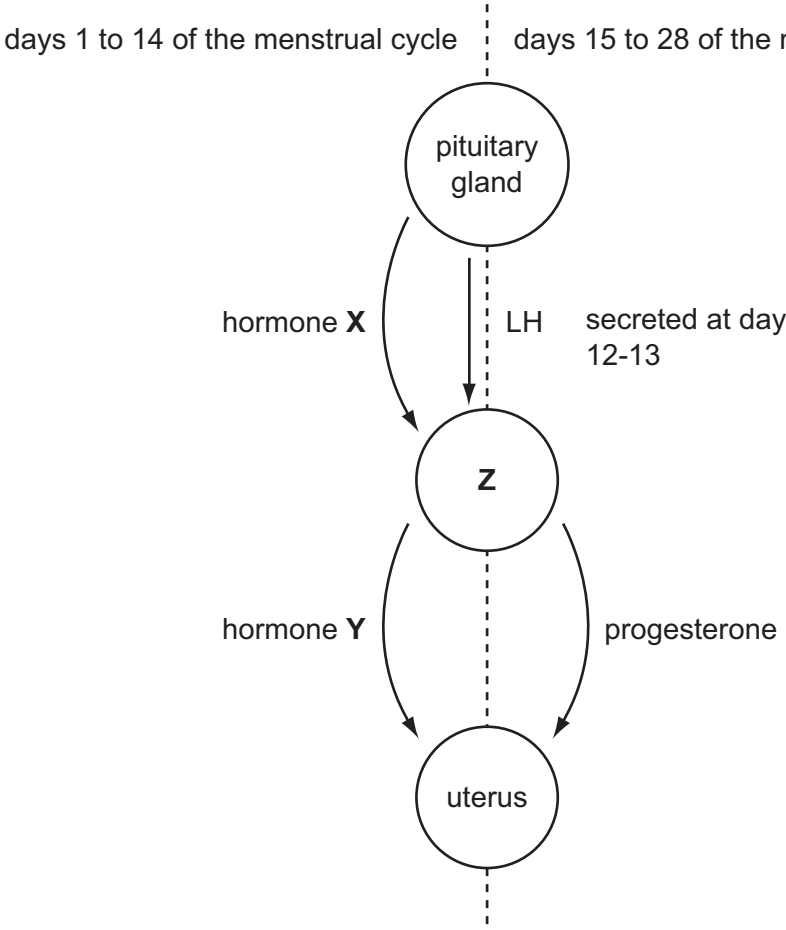

Fig. 2.1

(a) (i) Name hormones **X** and **Y**.

X .....

Y ..... [2]

(ii) Name organ **Z**.

..... [1]

(b) Describe the roles of progesterone during the menstrual cycle **and** during pregnancy.

For Examiner's Use

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..... [3]

(c) Many medical experts agree that breast-feeding of babies is better than bottle-feeding using formula milk.

State **two** advantages and **one** disadvantage of breast-feeding.

advantage 1 .....

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advantage 2 .....

.....

disadvantage .....

..... [3]

[Total: 9]

3 **(a)** Define the term *aerobic respiration.*

For Examiner's Use

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During exercise the movement of the ribcage enables air to enter the lungs.

(b) Describe how the ribcage is moved during inspiration (breathing in) and explain how this causes air to enter the lungs.

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(c) Explain how the ribcage returns to its resting position during expiration (breathing out).

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Some students carried out an investigation on a 16-year old athlete. Table 3.1 shows the results of their investigation on the athlete's breathing at rest and immediately after 20 minutes of running.

For Examiner's Use

Ventilation rate is the volume of air taken into the lungs per minute.

Table 3.1

	at rest	immediately after 20 minutes of running
rate of breathing / breaths per minute	12	20
average volume of air taken in with each breath / dm^3	0.5	3.5
ventilation rate / dm^3 per minute	6.0	.....

(d) (i) Calculate the ventilation rate of the athlete immediately after 20 minutes of running.

Write your answer in Table 3.1. [1]

(ii) Explain why the athlete has a high ventilation rate **after the exercise has finished**.

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..... [5]

[Total: 14]

4 The lymphatic system consists of:

- thin-walled lymph vessels that drain tissue fluid from many organs of the body
- lymph nodes that contain the cells of the immune system

The fluid in the lymph vessels is moved in a way similar to the movement of blood in veins.

Fig. 4.1 shows part of the lymphatic system.

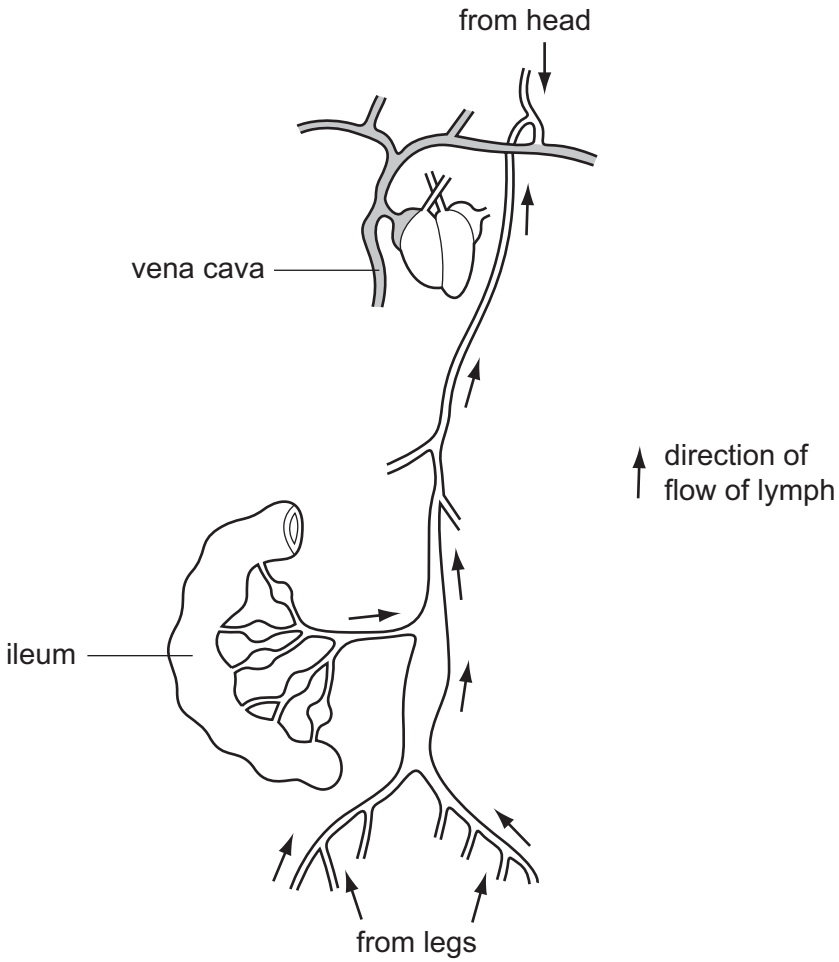

Fig. 4.1

(a) Suggest how lymph is moved in the lymph vessels.

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..... [2]

(b) After a meal rich in fatty foods, the lymph leaving the ileum is full of fat droplets.

Explain why there are fat droplets in the lymph leaving the ileum.

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For Examiner's Use

Lymph flows through lymph nodes. Fig. 4.2 shows the action of white blood cells in a lymph node when bacteria are present.

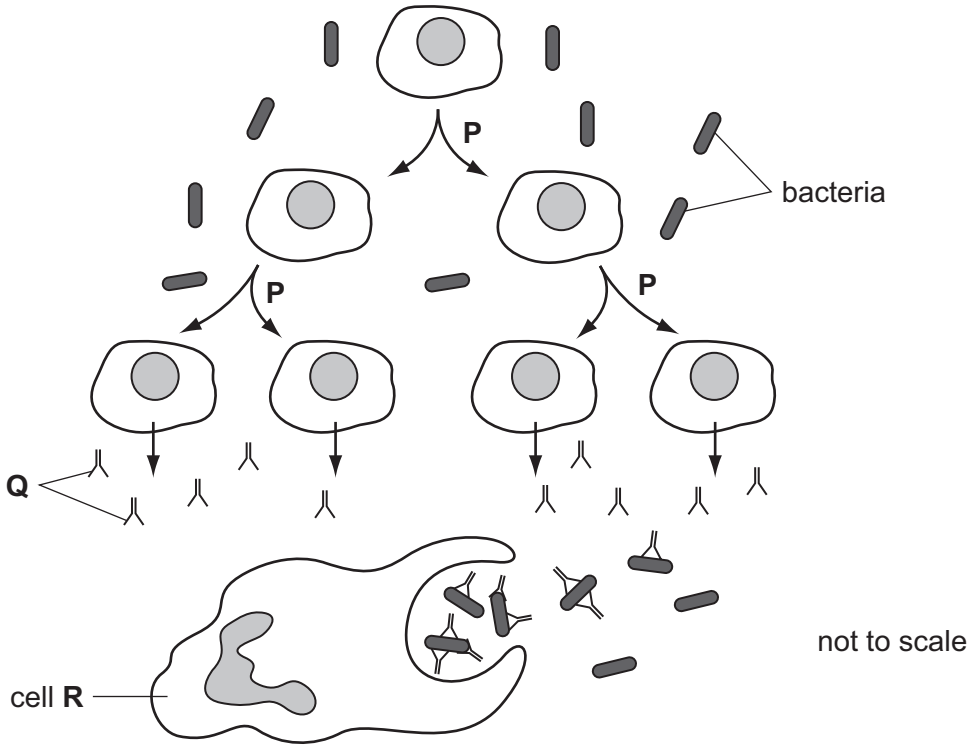

Fig. 4.2

(c) (i) Name the type of nuclear division shown at **P** in Fig. 4.2.

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[1]

(ii) Name the molecules labelled **Q** in Fig. 4.2.

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[1]

(iii) Describe how bacteria are destroyed by cell **R**.

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[3]

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Question 4 continues on Page 12

Antibiotics are used to treat bacterial infections. An investigation was carried out into the effect of prescribing antibiotics on antibiotic resistance in 20 countries. Fig. 4.3 shows the results of this investigation. Each point represents the result for a country.

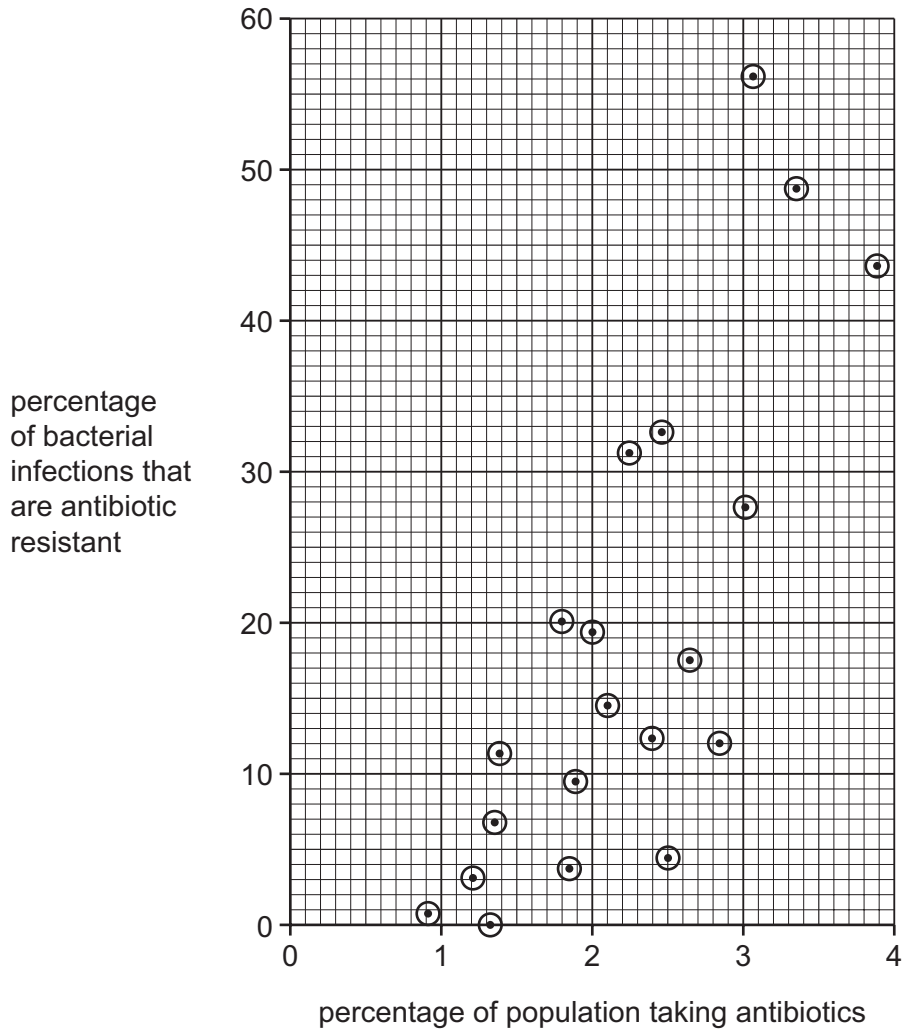

Fig. 4.3

(d) Describe the results shown in Fig. 4.3. Credit will be given for using figures from Fig. 4.3 to support your answer.

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(e) Many different antibiotics are used.

Suggest why some antibiotics are used less frequently than others.

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[Total: 15]

For Examiner's Use

5 Marine conservationists are concerned that fish stocks in the sea are decreasing. Drastic measures will have to be taken to stop the extinction of many fish species.

Fig. 5.1 shows a marine food web. Tuna are large carnivorous fish that are an important human food. Dolphins may be caught in fishermen's nets and die.

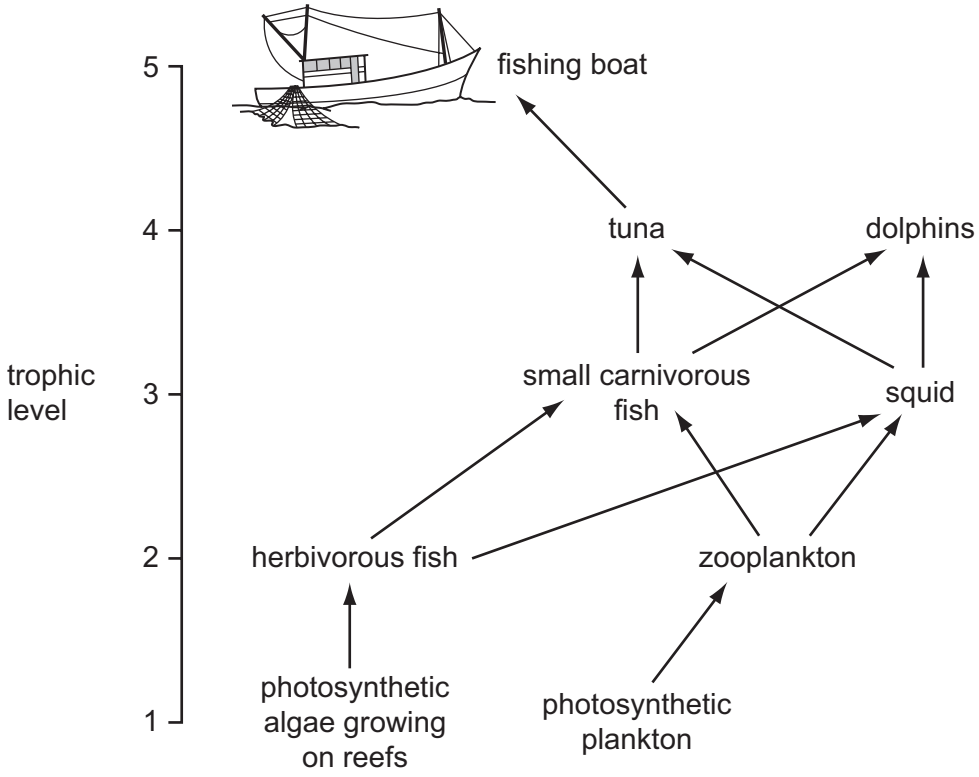

Fig. 5.1

(a) State the names given to trophic levels **1** and **3**.

1 .....

3 ..... [2]

(b) Explain why it is more energy efficient for humans to eat herbivorous fish rather than tuna.

For Examiner's Use

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(c) Explain why it is necessary to conserve animals, such as tuna and dolphins, which are at trophic level 4.

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..... [4]

(d) Many seas are polluted by non-biodegradable plastics.

Suggest the likely effects of this pollutant on the marine environment.

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[Total: 11]

[Turn over

6 *Daphnia* is a small arthropod animal found in freshwater. The population of *Daphnia* in a lake in Oregon (in the northern temperate region) was sampled at regular intervals between March and November in 2006 and 2007. During 2006 there were very few *Daphnia* in any of the samples. At the end of that year fish were removed from the lake.

- The population of *Daphnia* in March, April and May 2007 was 1 animal per m^3 of water sampled.
- The population then increased exponentially to 100 000 per m^3 at the beginning of July.
- By the end of August the population had decreased to 10 000 per m^3 and the population remained at this number until the end of November.

(a) Sketch a line on Fig. 6.1 to show the population of *Daphnia* from March to the end of November 2007. [3]

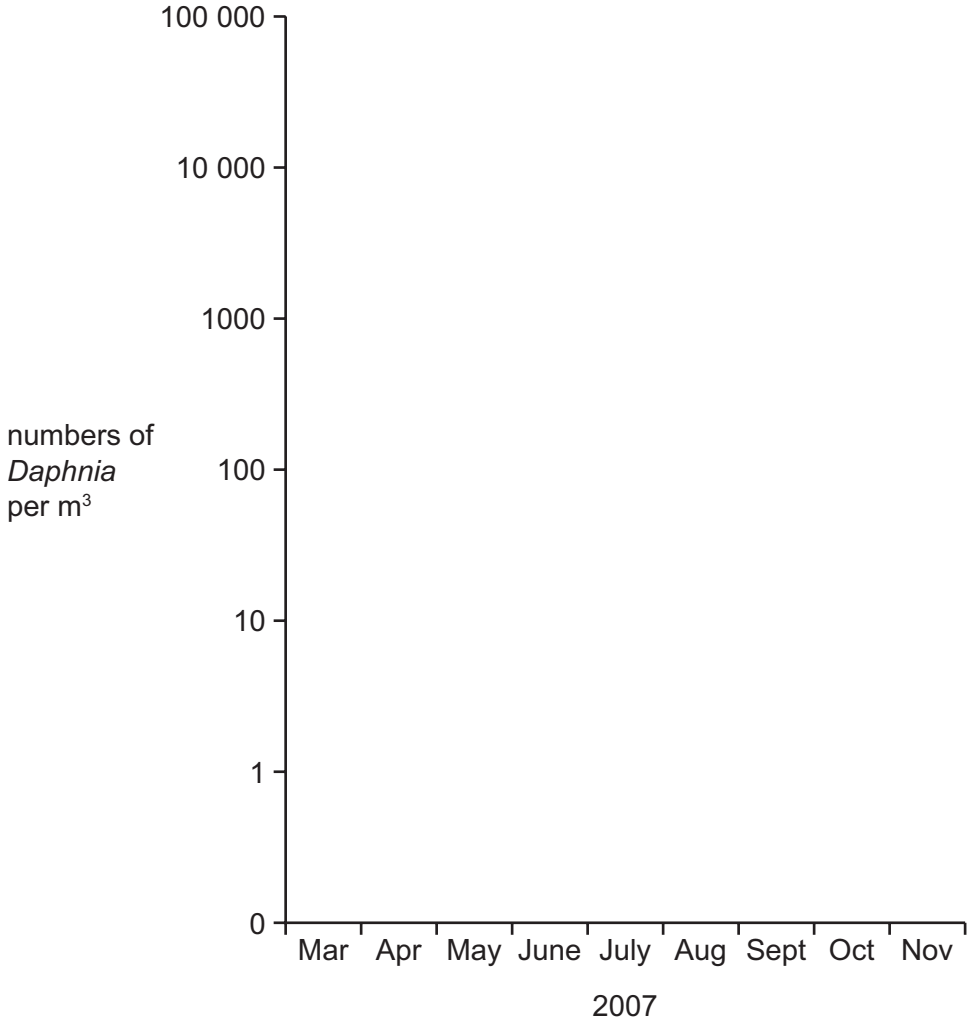

Fig. 6.1

(b) Suggest why there were very few *Daphnia* present in the lake in 2006.

For Examiner's Use

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..... [2]

(c) Explain the changes in the population of *Daphnia* in 2007.

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[Total: 9]

For Examiner's Use

7 Seeds of the mung bean, *Phaseolus aureus*, were germinated and grown in a dish for a few days in the dark. The dish was then placed as shown in Fig. 7.1 **A**.

Fig. 7.1 **B** shows the seedlings after a further two days in the dark.

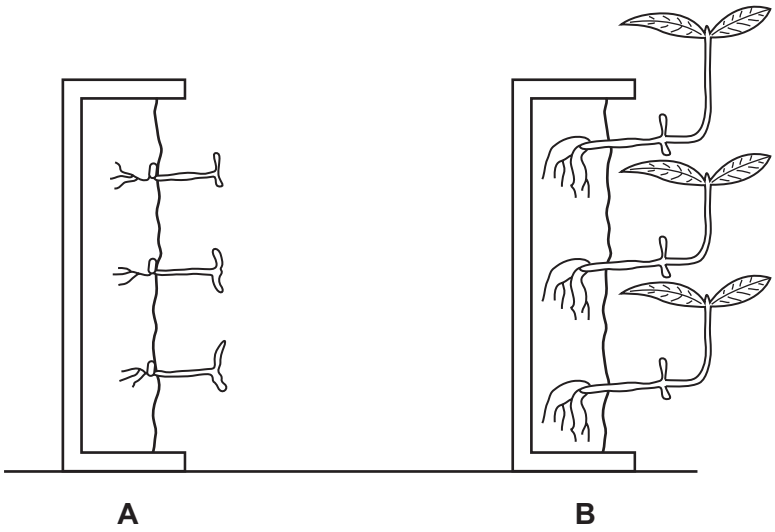

Fig. 7.1

(a) Name the response shown by the roots in Fig. 7.1.

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[1]

(b) Suggest why the seedlings were kept in the dark during this investigation.

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[1]

(c) Explain why it is important for their early growth that the roots and shoots of seedlings respond in the way shown in Fig. 7.1**B**.

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[2]

(d) The response shown by the shoots in Fig. 7.1**B** is coordinated by auxins.

Explain how auxins bring about this growth response in shoots.

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For Examiner's Use

(e) Weed seedlings are sprayed with synthetic auxins to kill them.

Suggest how these weedkillers spread throughout the plant.

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[Total: 9]

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