UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTER NUMBER

CANDIDATE NUMBER

4101933035

BIOLOGY (US) **0438/33**

Paper 3 Extended **May/June 2013**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Center 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.

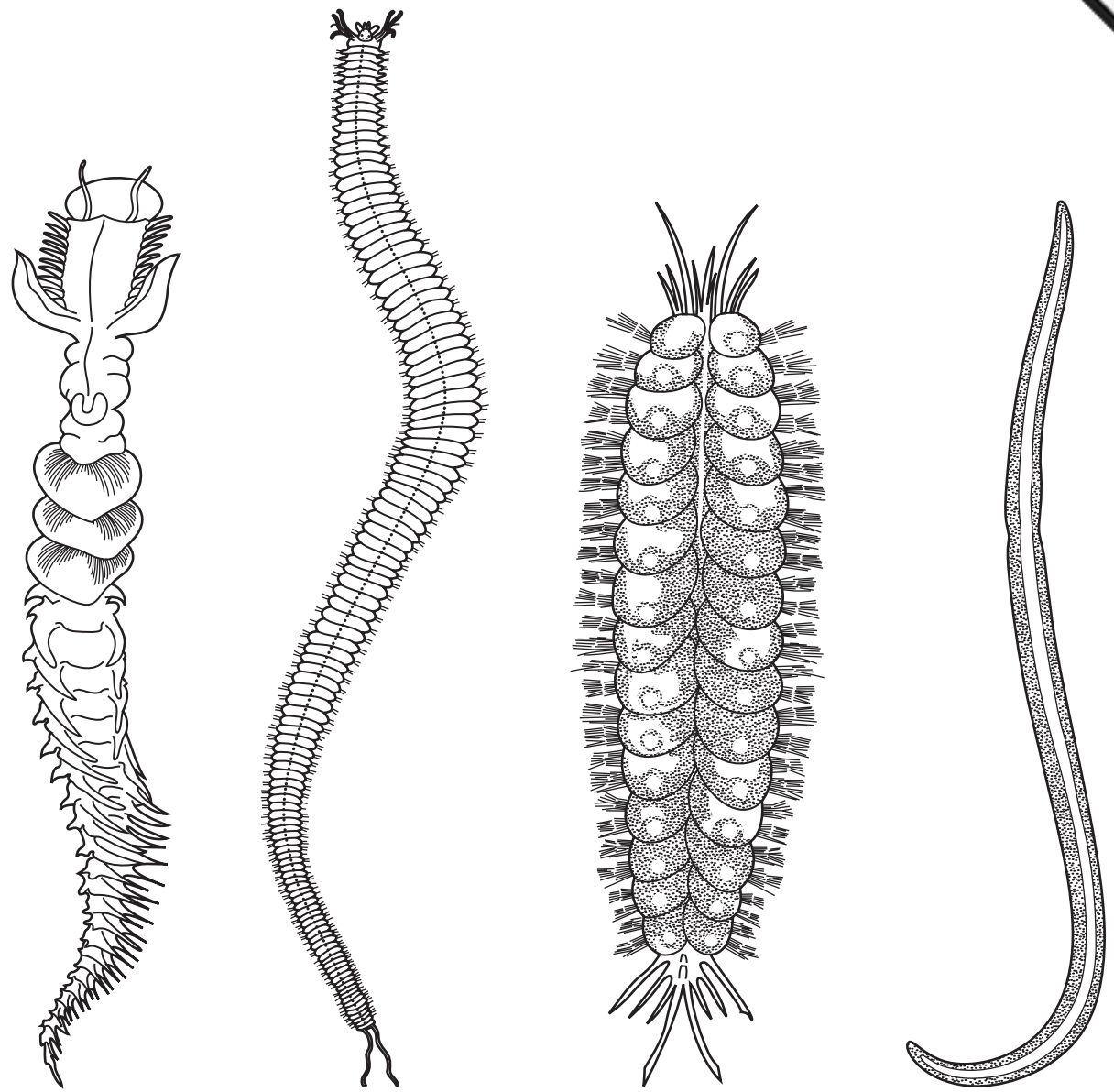
Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

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

1 Fig. 1.1 shows three annelid species and *Ascaris lumbricoides*, a species of nematod



not drawn to scale

Fig. 1.1

(a) State **three** features shown by the three annelid species that are **not** shown by the nematode species.

1 .....

2 .....

3 ..... [3]

(b) Organisms are given two names, e.g. *Nereis diversicolor*.

State what is meant by the first name.

.....

[1]

(c) *N. diversicolor* is a filter feeder. It filters plankton from sea water.

Annelids like *N. diversicolor* form an important part of the ecosystems of estuaries.

Fish feed on annelids when the sea covers the mud in the estuary.

When the tide is out wading birds are the main predators of annelids.

Birds of prey are the main predators of the wading birds.

(i) Explain the term *ecosystem*.

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[3]

(ii) Use the space below to draw a food chain for the estuary ecosystem **when the tide is out**.

[2]

(iii) Describe the advantages of drawing a food web rather than a food chain for an ecosystem.

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[2]

(d) The palolo worm is a species of annelid that lives on coral reefs in the Pacific Oc

At certain times of the year, all the worms in an area leave their burrows to swim to th surface.
They all release their gametes into the water at the same time.
This is known as mass spawning.

Suggest the advantages of having mass spawning occurring only at certain times of the year and not all year round.

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..... [3]

(e) Meiosis is involved in producing gametes in palolo worms.

Describe how meiosis differs from mitosis **and** explain why meiosis is important for the production of gametes.

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..... [4]

[Total: 18]

2 Fanwort, *Cabomba caroliniana*, is an aquatic plant often used to provide oxygen in tanks.

Some students investigated the effect of temperature on the rate of photosynthesis of *C. caroliniana*. The apparatus that they used is shown in Fig. 2.1.

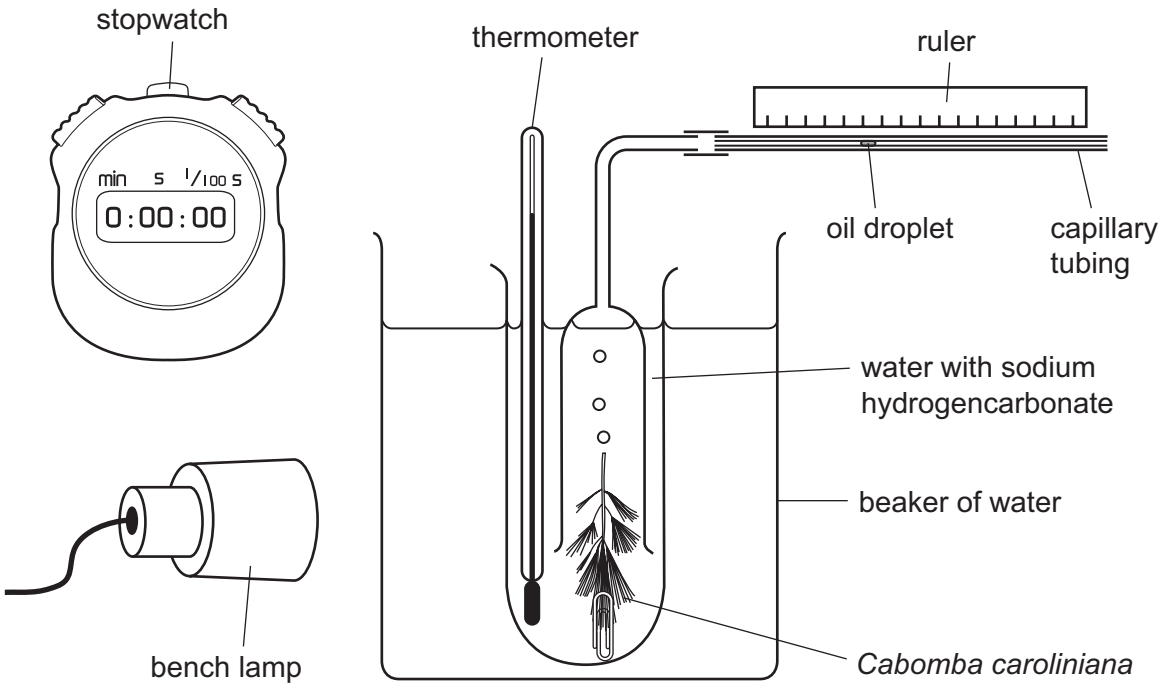

Fig. 2.1

(a) Explain why:

(i) the lamp was kept at the same distance from the *C. caroliniana* throughout the investigation;

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..... [2]

(ii) the water was enriched with carbon dioxide by adding sodium hydrogencarbonate.

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..... [2]

The students determined the rate of photosynthesis by measuring the movement of droplet along the glass tubing.

Their results are shown in Table 2.1.

Table 2.1

temperature / °C	distance traveled by the droplet / mm per minute			
	1	2	3	mean
17	5	3	3	3.7
21	10	15	11	12.0
23	20	10	15	15.0
25	30	15	15	20.0
30	50	40	30	40.0
45	5	3	5	4.3
50	1	0	1	0.7

(b) Describe the effect of temperature on the **rate of photosynthesis** of *C. caroliniana*.

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..... [3]

(c) Photosynthesis is a chemical process catalyzed by enzymes.

Explain how the results shown in Table 2.1 support the idea that enzymes are involve in photosynthesis.

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..... [4]

(d) *C. caroliniana* originally grew only in Latin America.

This plant has escaped into the wild in Australia where its rapid growth has reduced the biodiversity of many streams and rivers.

Suggest why the growth of *C. caroliniana* in Australia is far greater than in Latin America.

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..... [2]

[Total: 13]

3 Fig. 3.1 shows a diagram of a cell from the pancreas that secretes the hormone, insu

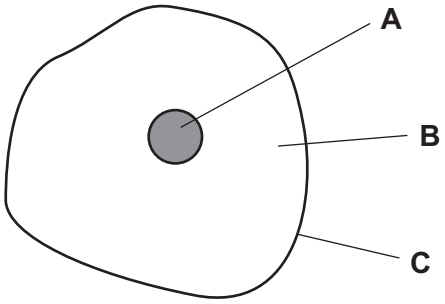

Fig. 3.1

(a) State **one** function of each of the parts of the cell labeled **A**, **B** and **C**.

A .....

B .....

C ..... [3]

(b) Glucose in the blood is absorbed by liver cells and muscle cells. These cells convert glucose to glycogen for storage.

Explain why glucose needs to be converted to glycogen for storage rather than remaining dissolved in the blood.

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..... [2]

(c) Other cells in the pancreas secrete the hormone glucagon.

Glucagon stimulates liver cells, but has no effect on muscle cells.

(i) State the effect that glucagon has on liver cells.

.....

..... [1]

(ii) State how hormones, such as glucagon and insulin, travel around the body.

.....

..... [1]

(d) Hormone Growth Promotants (HGPs) are hormones. HGPs are used to improve the production of food from animals.

Many of these HGPs are hormones that are secreted naturally by the gonads (ovaries and testes).

Name **two** hormones that are secreted by the gonads.

1 .....

2 ..... [2]

(e) The hormones are given to cattle by placing implants behind the ears. These release the hormones slowly during the animal's life time.

The advantages of using HGPs in meat production are:

- more meat is produced per animal;
- a 15 to 30 % increase in growth rate;
- a 5 to 15 % improvement in conversion of feed into meat;
- a decrease in greenhouse emissions from cattle.

Suggest:

(i) the advantages of an increase in the conversion of feed into meat for the farmer;

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..... [2]

(ii) how the use of HGPs leads to a decrease in greenhouse emissions from cat

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..... [2]

(f) HGPs are used in animal production systems in North America and Australia.

The European Union (EU) has banned the use of HGPs and the import of meat from countries where the hormones are used.

Suggest reasons for the ban on the use of HGPs in the EU.

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..... [2]

[Total: 15]

4 Blood is distributed through the body of a mammal in blood vessels. The blood su... muscles changes considerably at the start and at the end of exercise.

Fig. 4.1 shows a cross section of a blood vessel as seen with an electron microscope.

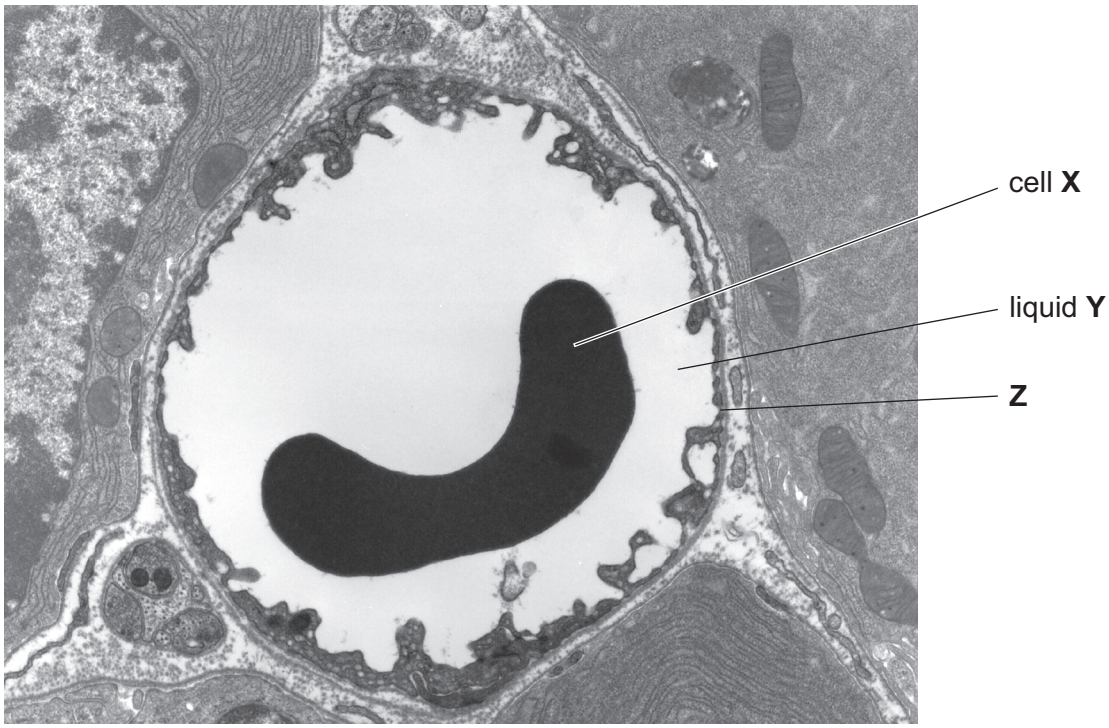

Fig. 4.1

(a) Name:

(i) cell **X**;

..... [1]

(ii) liquid **Y**;

..... [1]

(iii) the type of blood vessel shown in Fig. 4.1.

..... [1]

(b) State **three** substances that move across the wall of the blood vessel at **Z**.

1 .....

2 .....

3 ..... [3]

(c) Table 4.1 shows the distribution of blood to different organs at rest and during ex

Table 4.1

regions of the body	blood flow / cm^3 per minute		percentage change / %
	at rest	during strenuous exercise	
heart muscle	250	750	200
kidneys	1 200	600	-50
skeletal muscles	1 000	12 500	
skin	400	1 900	375
liver and alimentary canal	1 400	600	-57
brain	750	750	0
others	600	400	-33
total	5 600	17 500	213

(i) Calculate the percentage change in the blood supply to the skeletal muscles.

Show your working.

Write your answer in Table 4.1.

[1]

(ii) Explain why it is necessary for the blood supply to muscles to increase exercise.

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..... [5]

(iii) The volume of blood to different organs varies as shown in Table 4.1.

During exercise, blood flow to the skin increases and to the kidneys decreases.

Describe the changes that occur in blood vessels to cause blood flow to increase **and** to decrease.

increase blood flow .....

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decrease blood flow .....

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..... [4]

[Total: 16]

5 Mammals and flowering plants both have internal fertilization and internal developme

(a) Describe what happens after pollination that results in fertilization in flowering plants.

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..... [3]

(b) Fig. 5.1 shows a fetus developing inside the uterus.

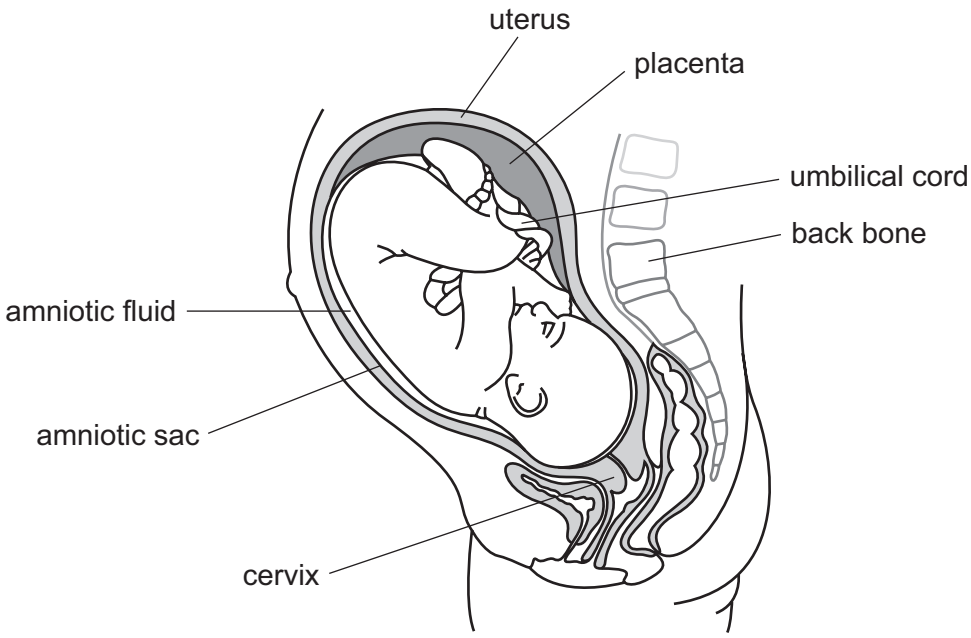

Fig. 5.1

Describe how the structures **named in Fig. 5.1** provide the following needs of the fetus.

protection .....

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constant temperature .....

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nutrients .....

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excretion of metabolic waste .....

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..... [8]

[Total: 11]

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6 Many biologists study populations of organisms in their natural habitats.

(a) Define the term *population*.

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..... [2]

Question 6 continues on page 18.

(b) A 10-year study was carried out to investigate the relationship between voles and owls. Voles are small mouse-like mammals and owls are carnivorous birds.

The results are shown in Fig. 6.1 and Fig. 6.2.

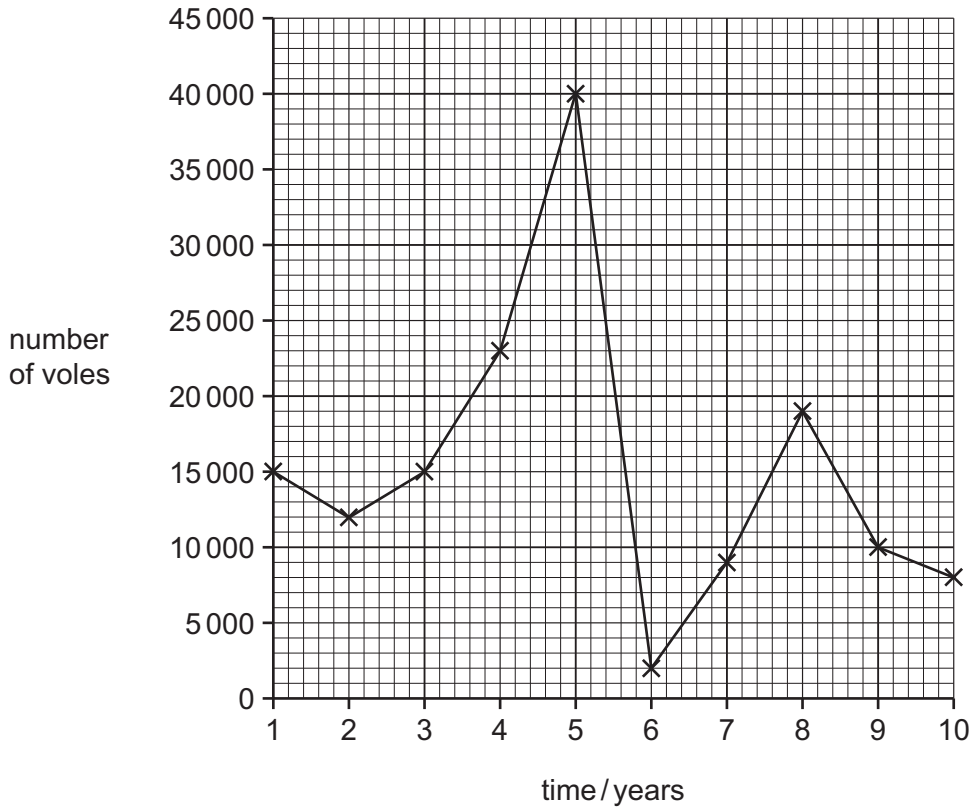

Fig. 6.1

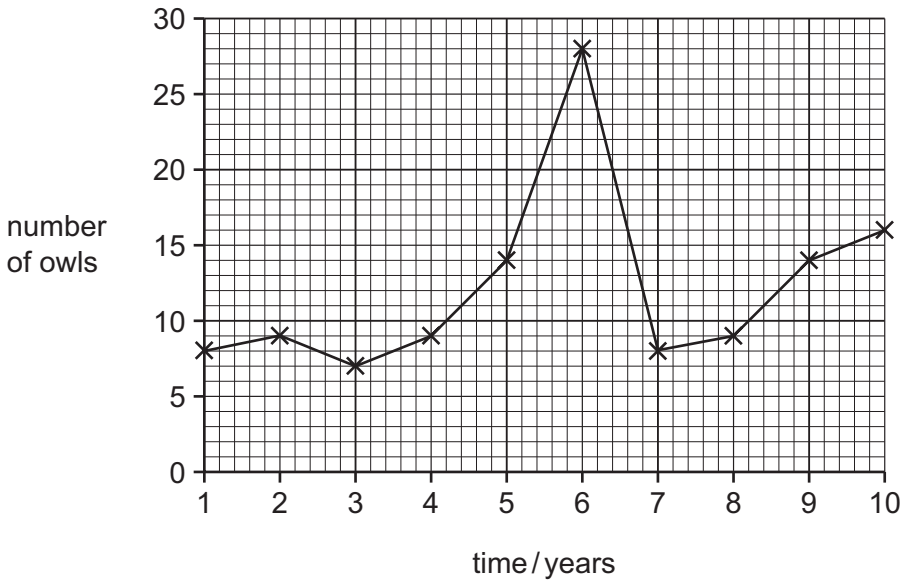

Fig. 6.2

(i) Suggest **three** reasons for the decrease in the population of voles between y and 6.

1 .....

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2 .....

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3 .....

..... [3]

(ii) State the evidence from Fig. 6.1 and Fig. 6.2 that supports the idea that voles form a large part of the food eaten by owls.

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[Total: 7]

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