Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2003

BIOLOGY A (MODULAR) 3413/F
FOUNDATION TIER

Monday 2 June 2003 1.30 pm to 3.00 pm

F

In addition to this paper you will require:
a ruler.
You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions
- Use blue or black ink or ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information
- The maximum mark for this paper is 90.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

INHERITANCE AND SELECTION

1 (a) Use words from the box to complete the sentences about inheritance.

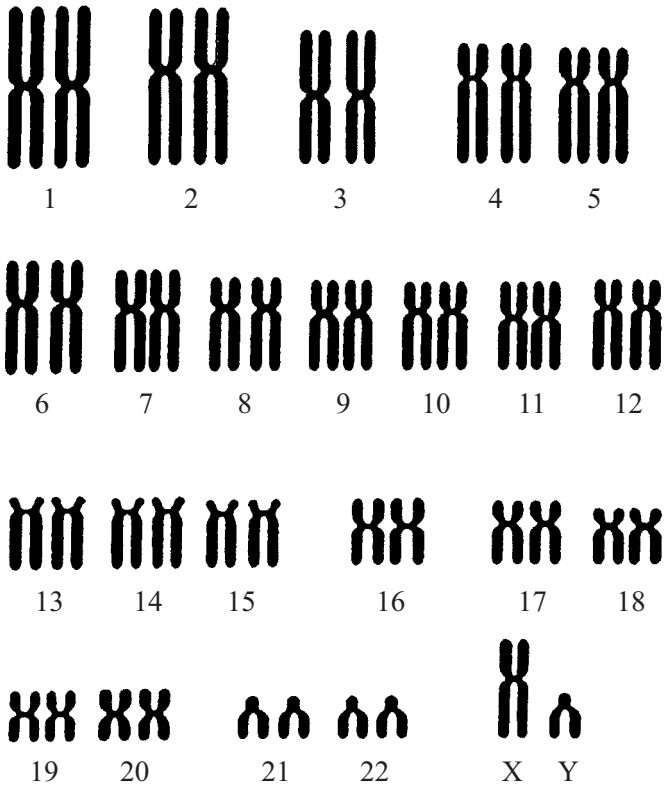
characteristic	**cytoplasm**	**gene**	**membrane**	**nucleus**

Chromosomes are found in the ..... of a cell.

Chromosomes have a long molecule of DNA. A section of a DNA molecule is called a

..... . *(2 marks)*

(b) The diagram shows the chromosomes from a body cell of a man.



How do you know the chromosomes must be from a man?

.....

.....

(1 mark)

(c) How would the chromosomes differ if they had been taken from a sex cell?

.....

.....

(1 mark)

4

TURN OVER FOR THE NEXT QUESTION

2 (a) Use words from the box to complete the sentences about the formation of fossils.

carbon dioxide	**hard**	**minerals**	**oxygen**
rock	**soft**	**water**	

Fossils are usually found in ..... .

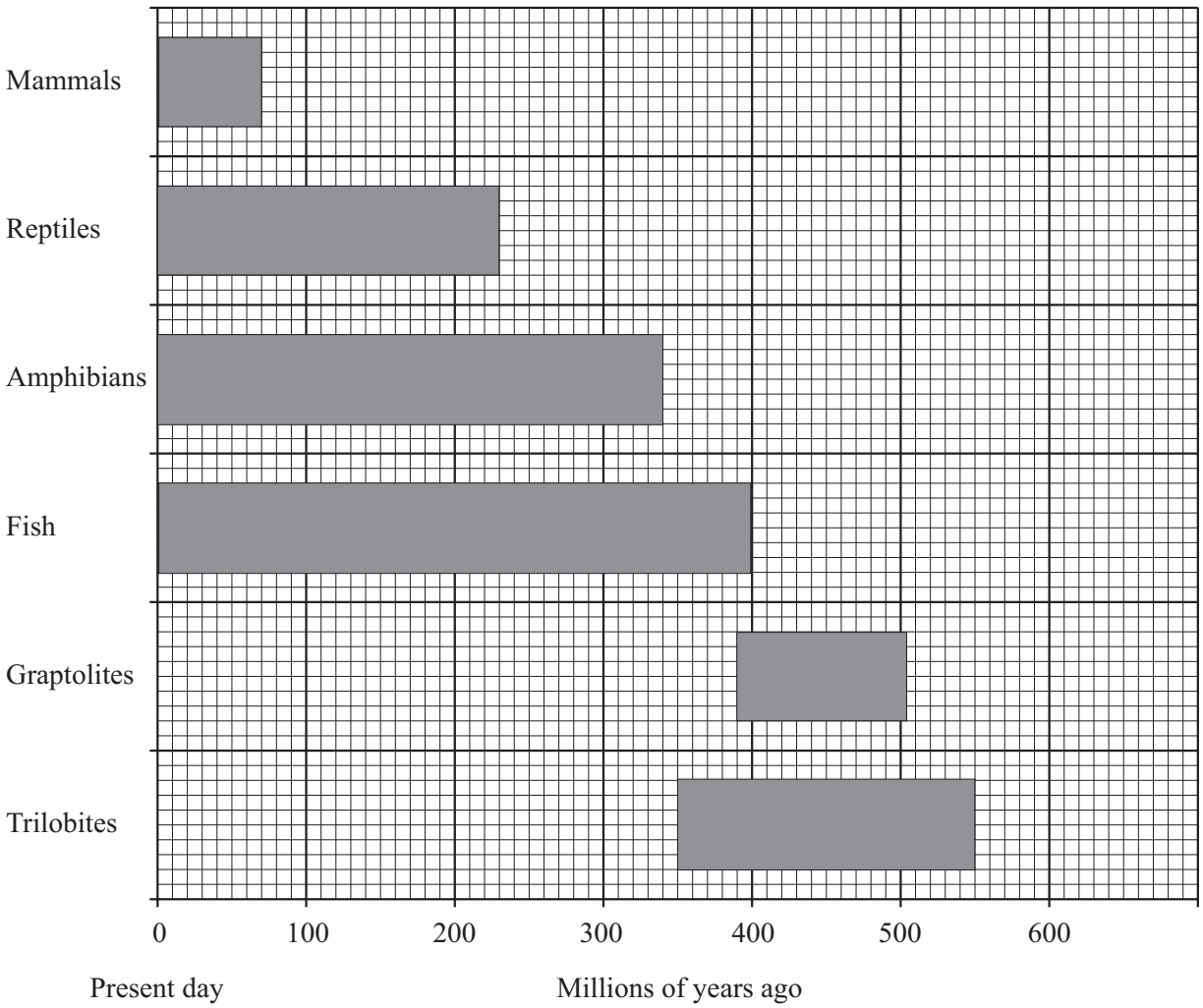
The ..... parts of animals are most likely to become fossils.

The ..... parts of animals usually decay.

These parts decay fastest when they have ..... and

..... . *(5 marks)*

(b) The chart shows when some animals and plants lived.



(i) When did fish first appear? ..... million years ago
(1 mark)

(ii) For how long were trilobites present? ..... million years
(1 mark)

(iii) Which **two** groups of animals were present 250 million years ago?

..... and .....
(1 mark)

(c) Suggest **two** reasons why groups of animals like the trilobites became extinct.

1 .....

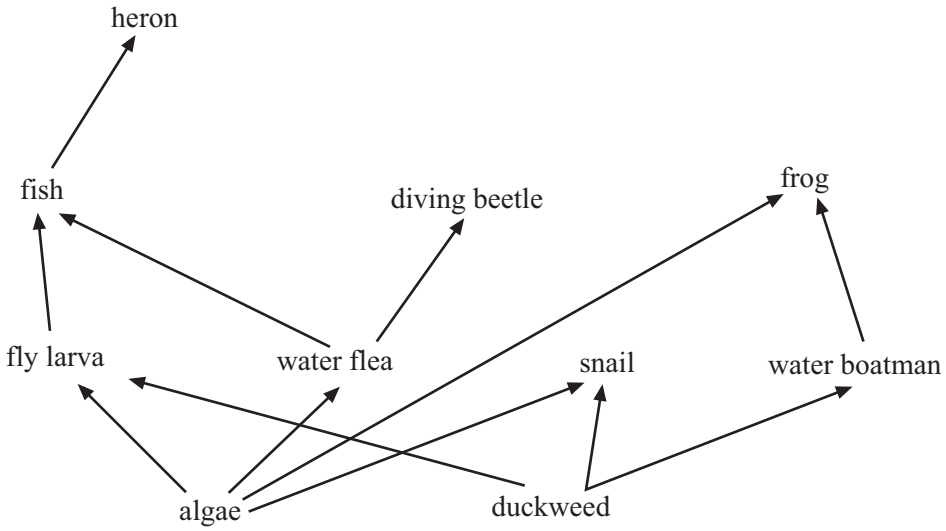
2 .....
(2 marks)

10

TURN OVER FOR THE NEXT QUESTION

ENVIRONMENT

3 The diagram shows part of a food web for a small pond.
Use the information in the diagram to answer the questions.



(a) Choose a predator from the food web and name its prey.

(i) Predator: .....

(ii) Prey: .....

(2 marks)

(b) Which organism feeds on both animals and plants?

.....

(1 mark)

(c) The number of herons visiting the pond has increased.
Explain how this might affect the number of fish and diving beetles living in the pond.

(i) Fish: The population of fish would decrease because .....

.....

.....

(ii) Diving beetles: The population of diving beetles would increase because .....

.....

.....

(2 marks)

(d) Draw a pyramid of biomass for the food chain:

duckweed → water boatman → frog

Label the pyramid.

(1 mark)

(e) What is the source of energy for the producers in this food chain?

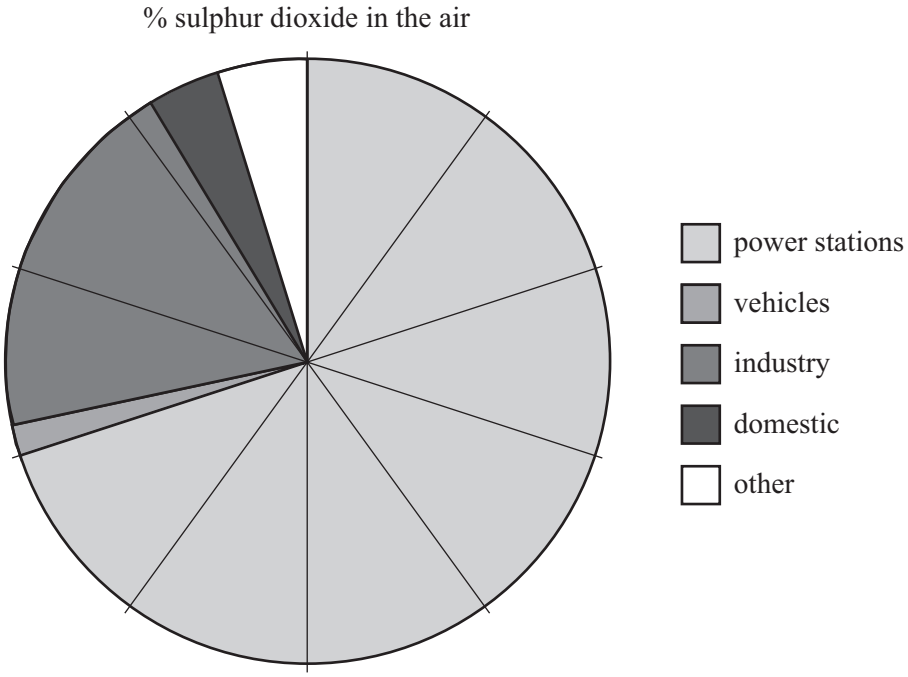
.....

(1 mark)

7

TURN OVER FOR THE NEXT QUESTION

4 The pie chart shows the sources of sulphur dioxide in the air.



(a) What percentage of sulphur dioxide gas is released from power stations?

.....

(1 mark)

(b) Why do some power stations produce sulphur dioxide gas?

.....

.....

(2 marks)

(c) Suggest how sulphur dioxide might harm living organisms.

.....

.....

.....

(2 marks)

5

BIOLOGY IN ACTION

5 (a) Place ticks in the table to indicate which structures are present in each type of microbe. The first column has been done for you.

Type of microbe	Cell wall	Protein coat	Cytoplasm	Nucleus
Yeast	✓			
Virus				
Bacteria	✓			

(3 marks)

(b) (i) Name the microbe used in bread making. .....

(1 mark)

(ii) Bread contains small holes, giving it a light texture.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Explain, in as much detail as you can, how these small holes in the bread are made.

.....

.....

.....

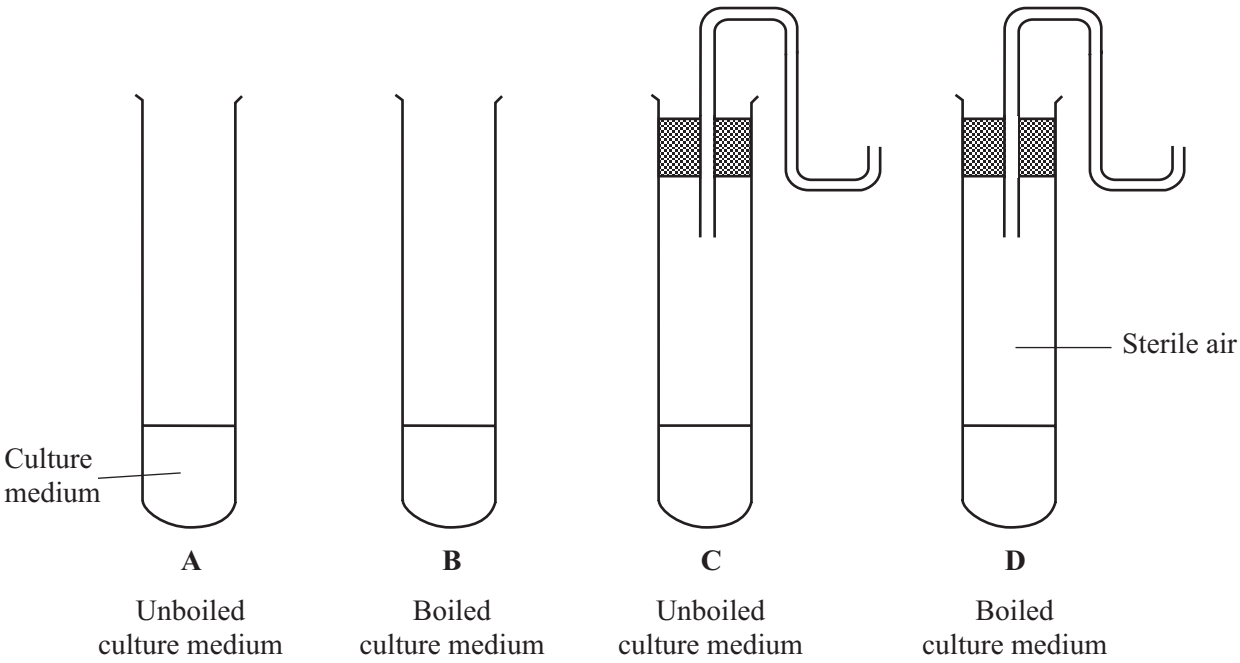
.....

.....

(4 marks)

8

6 The drawings show an experiment similar to one carried out by Pasteur to investigate decay.



(a) The culture medium contains sugars and mineral salts.
Explain why it must contain sugar.

.....

(1 mark)

(b) The table below shows the appearance of the culture medium after two days.

Tube	Appearance of culture medium
A	Very cloudy
B	Slightly cloudy
C	Slightly cloudy
D	Clear

(i) Explain why tube **A** was very cloudy after two days.

.....

.....

.....

.....

(3 marks)

(ii) Explain why tube **D** stayed clear.

.....

.....

.....

.....

(2 marks)

6

TURN OVER FOR THE NEXT QUESTION

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

7 (a) Explain why starch and proteins need to be digested.

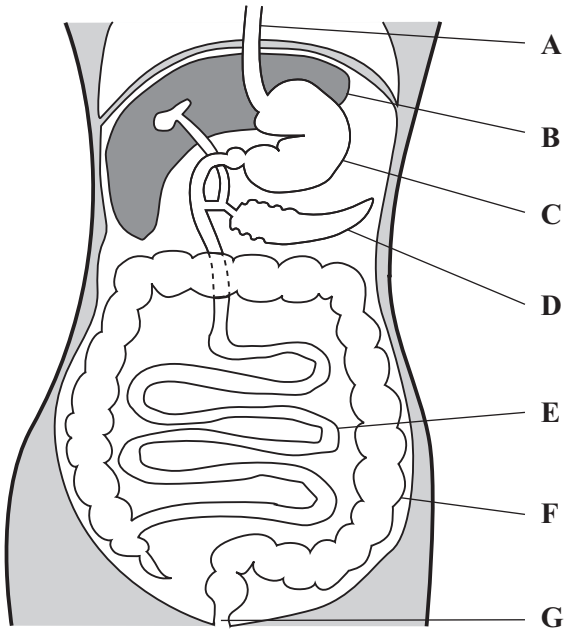
.....

.....

.....

(2 marks)

(b) This diagram shows the human digestive system.



Give the letter of the part of the digestive system where:

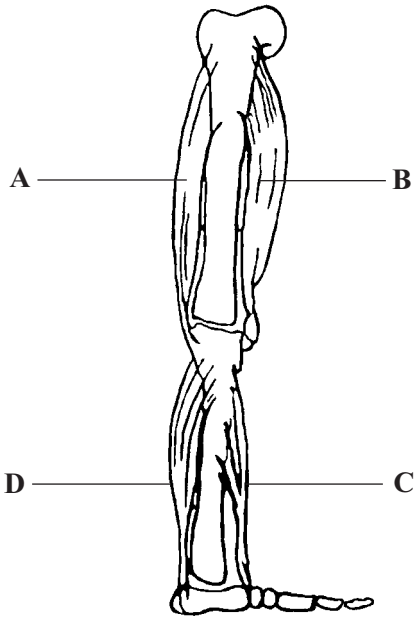
(i) the soluble products of digestion are absorbed; .....

(ii) most of the water is absorbed. .....

(2 marks)

4

8 The diagram shows some of the muscles of a human leg.



(a) Give the letter of the muscle which would contract:

(i) to bend the leg at the knee; .....

(ii) to point the toes downwards. .....

(2 marks)

(b) Muscle cells supply the energy needed for contraction.
Which **two** substances does the muscle need to supply this energy?

1 .....

2 .....

(2 marks)

4

TURN OVER FOR THE NEXT QUESTION

LEAVE MARGIN BLANK

INHERITANCE AND SELECTION

9 (a) (i) What is a mutation?

.....

(1 mark)

(ii) Name **one** environmental factor that could increase the chance of a mutation occurring.

.....

(1 mark)

(b) Mutations in the body cells may result in cancer.
The protein interferon is a drug used to treat some types of cancer.

Describe how bacterial cells can be used in genetic engineering to produce interferon.

.....

.....

.....

.....

.....

.....

(4 marks)

6

10 Hormones can be given to a woman to prevent her having children.

(a) Name **two** parts of her body that produce reproductive hormones.

.....

.....

(2 marks)

(b) Women may take hormones as a contraceptive.

(i) How can hormones be used to stop a woman becoming pregnant?

.....

.....

(1 mark)

(ii) Give **one** disadvantage of using hormones as a contraceptive.

.....

.....

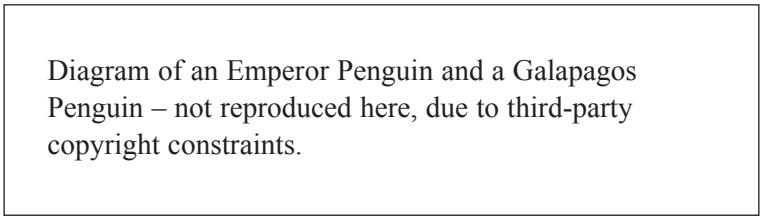
(1 mark)

4

LEAVE MARGIN BLANK

ENVIRONMENT

11



The Galapagos Penguin lives and breeds near the equator. The Emperor Penguin breeds in Antarctica in the winter.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Use the information in the diagram, and your own knowledge, to suggest how the Emperor Penguin is adapted to survive the icy winters.

.....

.....

.....

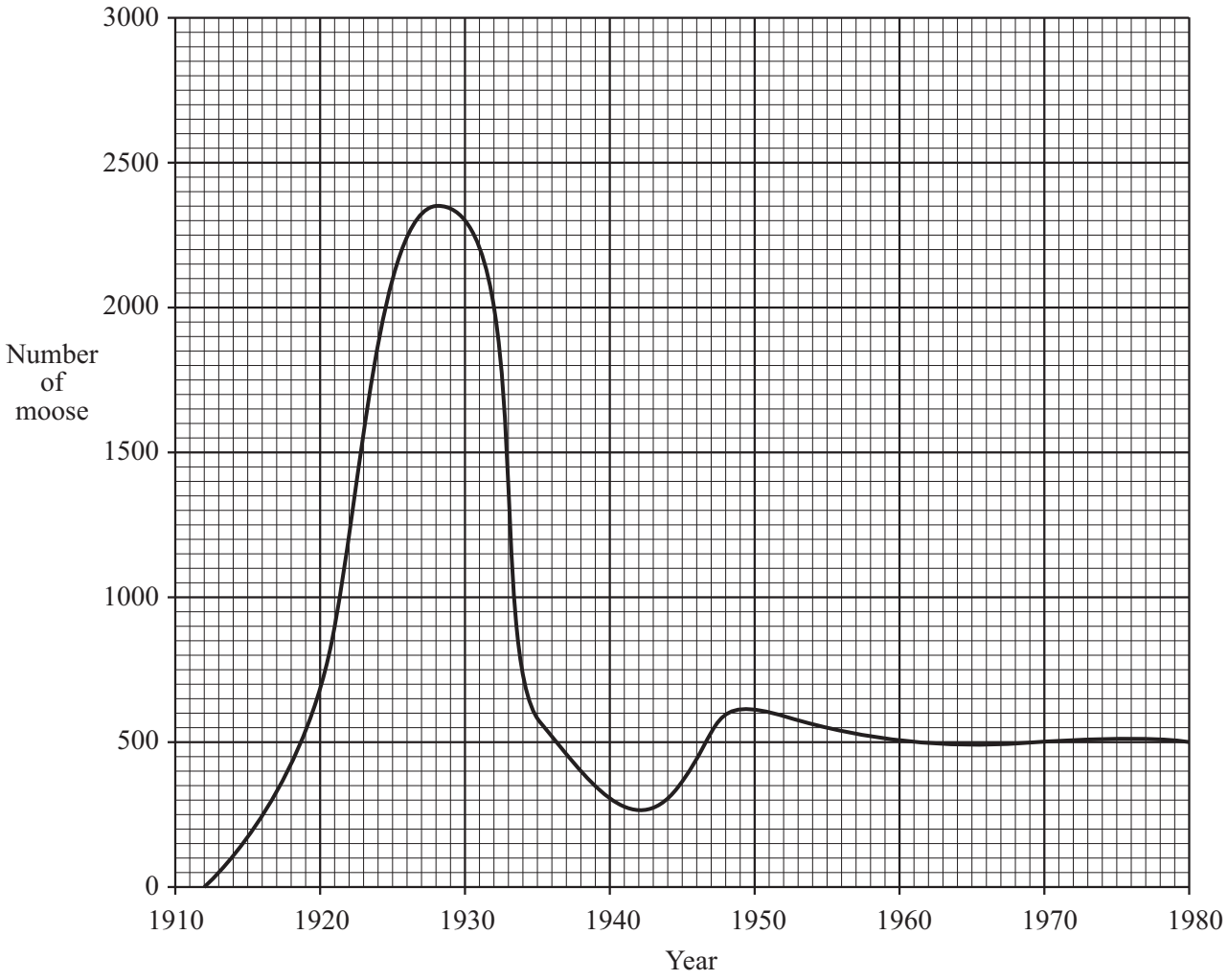
.....

.....

(4 marks)

4

12 A moose is a large herbivore. Some moose swam to an island in 1912 and began to breed. There were no predators of the moose on this island.
The graph shows how the size of the moose population changed between 1912 and 1980.



(a) What was the maximum population size? .....

(1 mark)

(b) Suggest a reason, apart from there being no predators, why the population rose between 1912 and 1928.

.....

(1 mark)

(c) Suggest **two** reasons why the population fell rapidly during the 1930s.

.....

.....

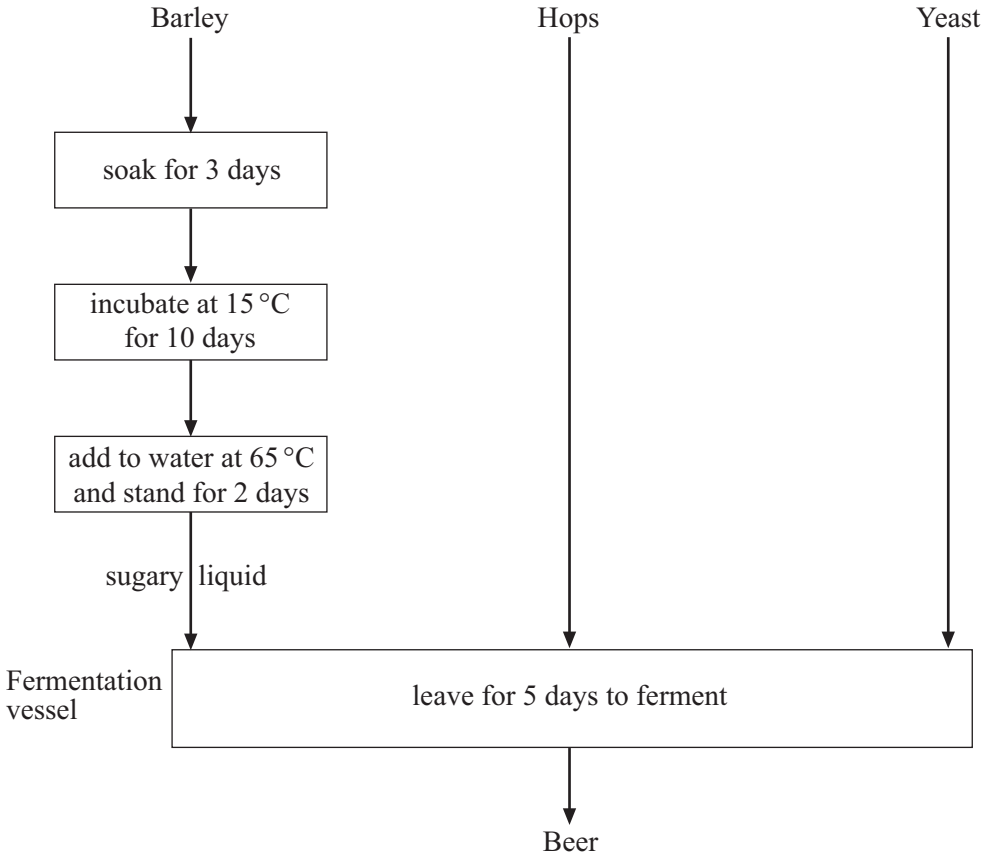
.....

(2 marks)

4

BIOLOGY IN ACTION

13 Beer is made from malted barley.



The sugary liquid is produced by malting the barley.

(a) Which substance in the barley grain is broken down to produce these sugars?

.....

(1 mark)

(b) Why should the germinating barley be kept at 15°C?

.....

(1 mark)

(c) Why are hops added to the beer?

.....

(1 mark)

(d) The yeast then ferments the mixture.
Complete the equation to summarise this process.

sugar	→		+	

(2 marks)

5

Turn over ▶

14 A virus causes the disease rabies. Rabies is rare in Britain but more common in France.

A dog with rabies bites a British man on holiday in France. He asks the doctor to vaccinate him against rabies. The doctor explains that a vaccination would not be helpful.

(a) Explain, in detail, why a vaccination would not prevent the disease from developing.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

(b) The doctor gives him an injection to stop the disease from developing.

(i) What would this injection contain?

.....

(1 mark)

(ii) Explain how it would stop the disease from developing.

.....

.....

.....

.....

(2 marks)

6

QUESTIONS RELATING TO PREVIOUSLY TESTED MODULES

15 Bats are mammals that eat mainly insects, such as moths.
The diagram shows the skull of a bat.

Diagram of the skull of a bat – not reproduced here, due to third-party copyright constraints.

(a) On the diagram, draw labelling lines to show the position of:

(i) an incisor tooth;

(ii) a canine tooth. *(2 marks)*

(b) Explain, as fully as you can, how the teeth of the bat are suited to its diet.

.....

.....

.....

.....

.....

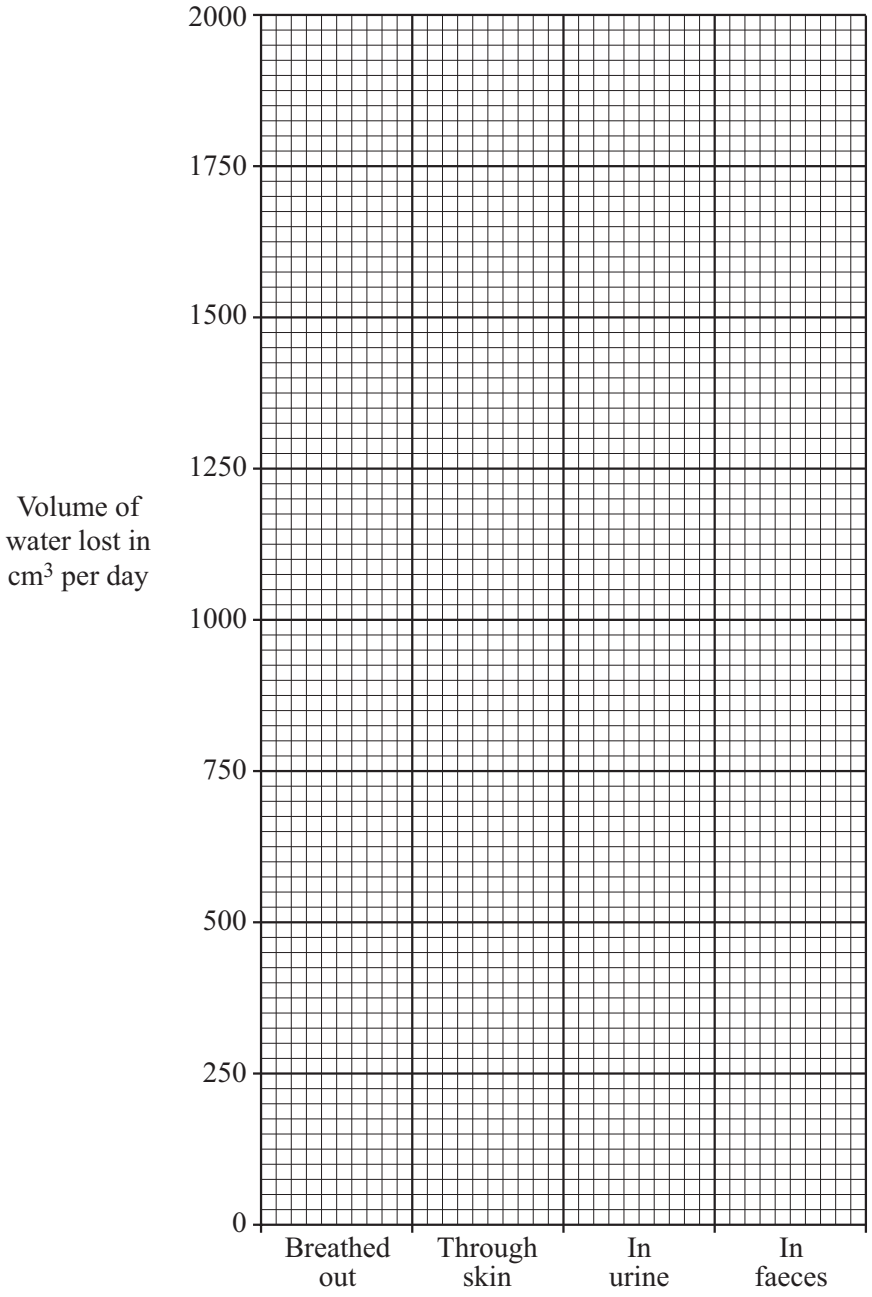
(4 marks)

6

16 A man loses water from his body in several ways.
The table shows the amount of water lost in each way during a single day.

	Volume of water in cm^3 per day
Breathed out	350
Through skin	500
In urine	1500
In faeces	150

(a) Draw a bar chart of the data.



(2 marks)

(b) Calculate the percentage of water lost through the skin.
Show your working.

..... %
(2 marks)

(c) The percentage of water lost through the skin increases when the man exercises.
Explain why.

.....

.....

.....

.....
(2 marks)

(d) Name **one** substance, other than water, which is lost in urine.

.....
(1 mark)

7

END OF QUESTIONS

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