

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2006



BIOLOGY (MODULAR) SPECIFICATION A
Written Paper
Foundation Tier

3413/F
F

Wednesday 7 June 2006 1.30 pm to 3.00 pm

<p>For this paper you must have:</p> <ul style="list-style-type: none"> a ruler <p>You may use a calculator.</p>
--

Time allowed: 1 hour 30 minutes

Instructions

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

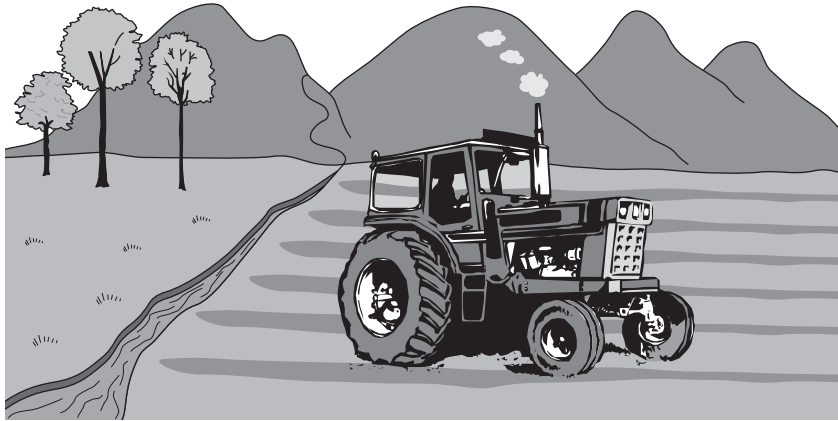
Information

- The maximum mark for this paper is 90.
- The marks for questions 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			

ENVIRONMENT

1 Tractors are used on farms to put chemicals on the crops and on the soil.



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

carbon dioxide	fertiliser	mercury
nitrogen oxide	oxygen	pesticide

The tractor engine produces waste gases such as and which pollute the air.

On the farm, toxic chemicals such as and may pollute nearby streams.

(4 marks)

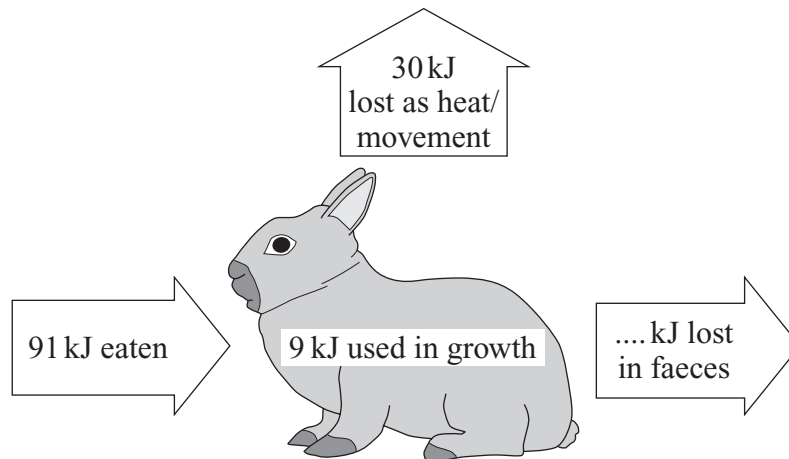
(b) Herbicides are used on the farm to kill weeds.

Explain why the crop will grow faster when the weeds are killed.

.....
.....

(2 marks)

2 The diagram shows how a rabbit uses the energy in its food.



(a) Calculate how many kilojoules are lost in the faeces. Show your working.

.....

.....

..... kJ
(2 marks)

(b) What will happen to the materials in the faeces?

.....

.....

(2 marks)

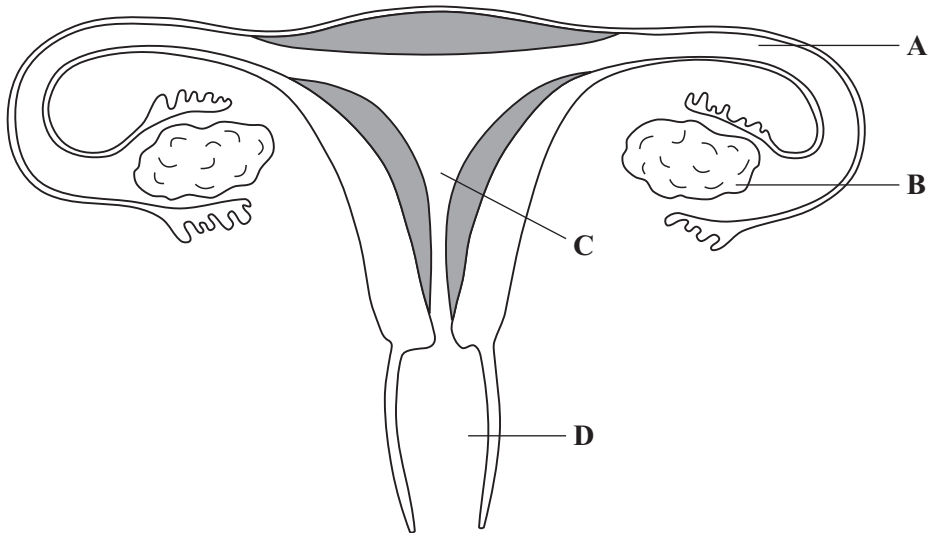
4

Turn over for the next question

Turn over ►

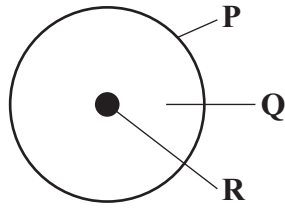
INHERITANCE AND SELECTION

- 3 (a) The diagram shows the reproductive system of an adult human female.



- (i) Give the letter of the organ which produces eggs.
(1 mark)
- (ii) Give the name of this organ.
(1 mark)
- (iii) How often are eggs produced? Circle the correct answer.
every day weekly monthly every 9 months
(1 mark)
- (iv) Which chemical controls the egg release? Circle the correct answer.
chromosomes DNA enzymes hormones
(1 mark)

(b) The diagram shows a human egg cell.



- (i) Give the letter of the part that contains the genetic information.
(1 mark)
- (ii) Which chemical stores the genetic information?
(1 mark)

6

Turn over for the next question

Turn over ►

- 4 (a) The table shows the number of brown and yellow snails found in two different habitats.

Colour of snail	Number of snails found in each habitat	
	Grassland	Woodland
Yellow	264	84
Brown	176	146
Total	440	230

- (i) What percentage of the snails living in the grassland are yellow? Show your working.

.....

.....

(2 marks)

- (ii) Suggest why there are more brown snails than yellow ones living in the woodland.

.....

.....

(2 marks)

- (b) Trees were planted in the grassland. The grass died and the ground became covered in dead leaves.

Using your knowledge of natural selection, explain why the number of brown snails would increase.

.....

.....

.....

(2 marks)

BIOLOGY IN ACTION

5 Draw a line from each word to the correct description.

antibody

A substance produced by white blood cells to destroy bacteria

antibiotic

A microbe that causes disease

antigen

A drug that kills bacteria inside the body

pathogen

A protein found in a vaccine that stimulates the immune response

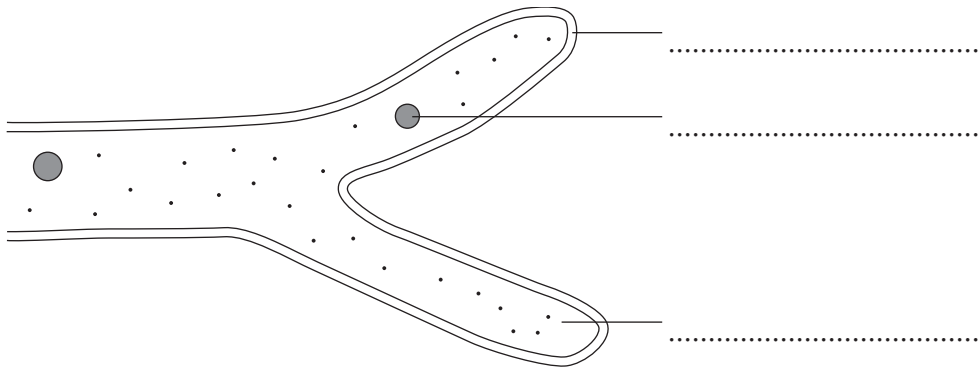
(4 marks)

4

Turn over for the next question

Turn over ►

6 (a) Label the diagram of a hypha from a fungus.



(3 marks)

(b) Fungi can be grown on a solid culture medium in a petri dish.

(i) Name **one** substance that should be in the culture medium for the fungus to grow well.

.....
(1 mark)

(ii) The following advice is given to people who prepare cultures of microbes.

<p>The nutrient agar must be heated to a high temperature before it is used.</p> <p>The petri dishes should be sealed with tape.</p> <p>The culture should not be incubated above 25 °C.</p>
--

Explain why each of these instructions is important.

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

.....
.....
.....
.....
.....
.....
.....

(4 marks)

QUESTIONS FROM PREVIOUSLY TESTED MODULES

7 Athletes often have a sports drink when they are exercising.

(a) The drink contains water and sugar.

Explain how each substance is used in the athlete's body.

(i) water
.....
(2 marks)

(ii) sugar
.....
(2 marks)

(b) When the athlete exercises, his muscles respire anaerobically and make lactic acid.

(i) What is meant by *anaerobic* respiration?
.....
(1 mark)

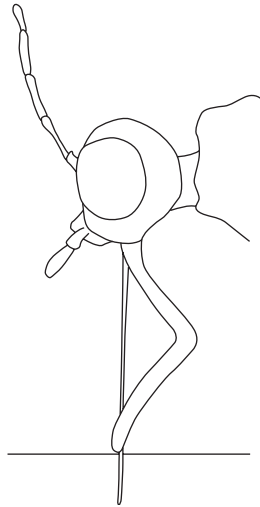
(ii) How will his body get rid of this lactic acid?
.....
(1 mark)

6

Turn over for the next question

Turn over ►

8 The diagram shows the head of a mosquito.



(a) Label the proboscis. (1 mark)

(b) How is the proboscis adapted to feed on blood?

.....
.....
.....

(2 marks)

(c) Explain why the blood does not clot when the mosquito is feeding.

.....
.....

(2 marks)

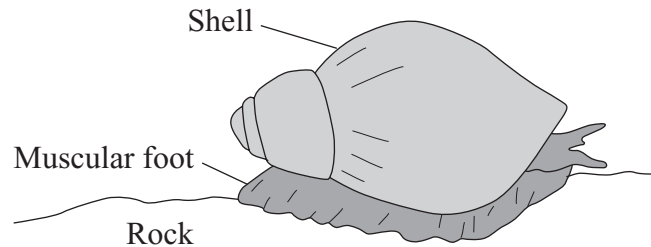
5

Turn over for the next question

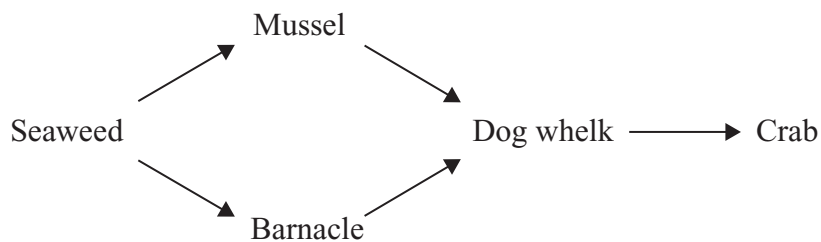
Turn over ►

ENVIRONMENT

- 9 The diagram shows a picture of a dog whelk. Dog whelks live on rocky beaches. When the tide goes out, they can be seen holding onto the rocks using a muscular foot.



The diagram below shows part of a food web from a rocky beach.



Some students wanted to compare the number of dog whelks on two different beaches.

They counted the number of dog whelks on each beach.

The table shows how many dog whelks were found on each beach.

	Windy beach	Sheltered beach
Number of dog whelks	110	79

- (a) Give **two** factors that should be controlled in this investigation.

1

2

(2 marks)

(b) The students concluded that more dog whelks are found on windy beaches.

(i) Use the information given in the food web to suggest **two** reasons why there are more dog whelks on windy beaches.

1.....

2.....

(2 marks)

(ii) Suggest a reason why the students' conclusion may not be valid.

.....

.....

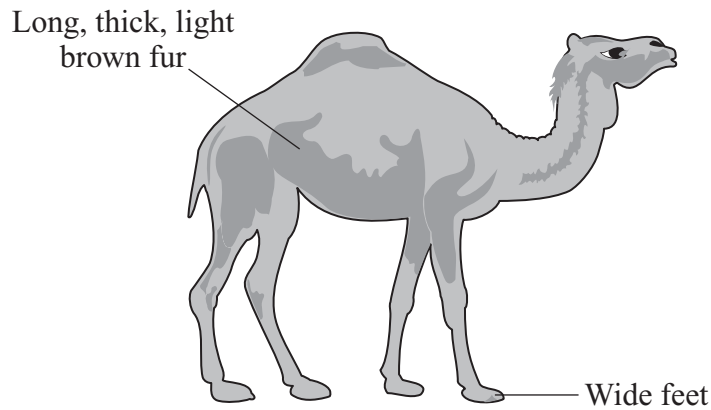
(1 mark)

5

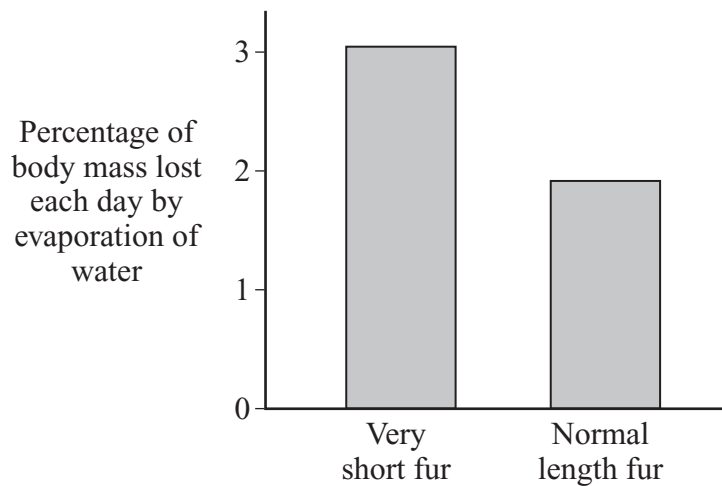
Turn over for the next question

Turn over ►

10 The camel lives in a desert where it is very hot during the day and cold at night.



The graph shows the effect of cutting the fur very short.



(a) Use the information from the graph to explain how the fur helps the camel to survive in the desert.

.....

 (1 mark)

(b) Suggest **two** other ways in which the thick fur helps the camel.

1
 2
 (2 marks)

- (c) Explain how the features shown in the table help the camel to survive in the desert.

Feature	Explanation
Light brown fur	
Wide feet	

(2 marks)

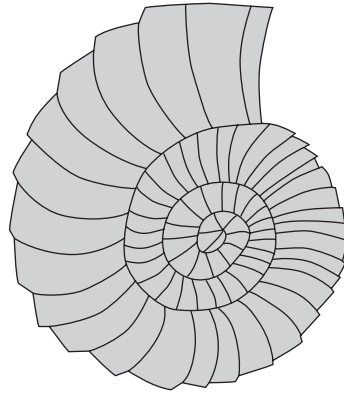
5

Turn over for the next question

Turn over ►

INHERITANCE AND SELECTION

- 11** The diagram shows a fossil of an ammonite. Ammonites were animals with hard shells that lived in the sea about 100 million years ago.



- (a) Suggest how this fossil may have been formed.

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

.....

.....

.....

.....

.....

.....

(4 marks)

- (b) Ammonites became extinct around 65 million years ago.

Suggest **three** reasons why organisms die out.

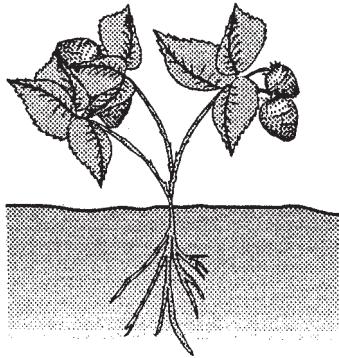
1

2

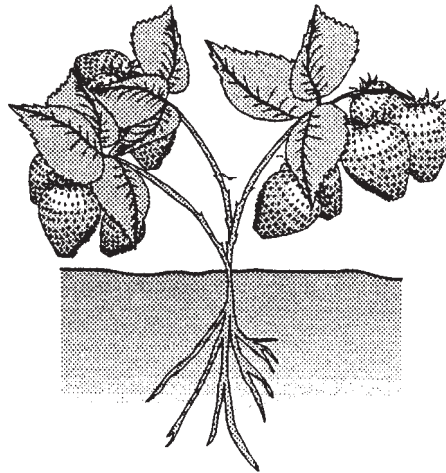
3

(3 marks)

12 Cultivated strawberries have been produced by selectively breeding wild strawberries.



Wild strawberry



Cultivated strawberry

(a) Explain in detail how this would have been done.

.....

.....

.....

.....

(3 marks)

(b) Strawberries can reproduce both sexually and asexually.

Explain why a strawberry grower might choose *asexual* reproduction to breed his crop.

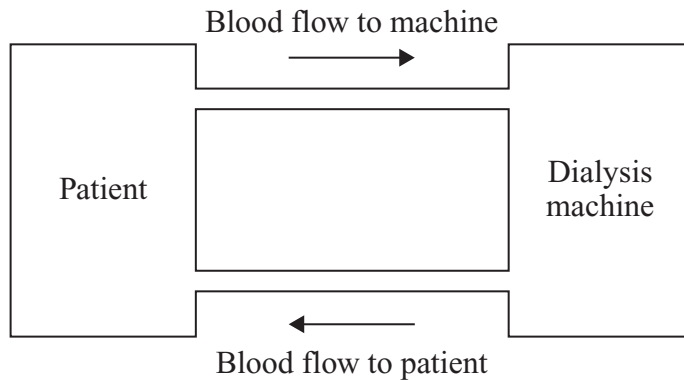
.....

.....

(1 mark)

BIOLOGY IN ACTION

13 People whose kidneys do not work well may be treated by dialysis.



(a) Which waste substance is removed from the blood by dialysis?

.....
(1 mark)

(b) Explain how the dialysis machine removes waste substances from the blood.

.....
.....
.....
.....
(3 marks)

(c) A kidney transplant is a more permanent treatment for kidney failure.

Give **two** reasons why a patient with kidney failure may be treated with dialysis instead of a transplant.

1
2
(2 marks)

Turn over for the next question

Turn over ►

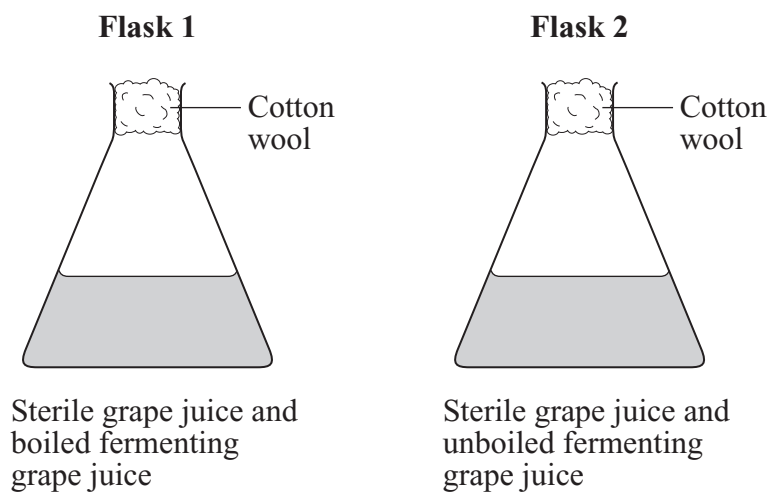
- 14** In the nineteenth century, scientists had different views about the cause of fermentation. Louis Pasteur suggested that living yeast cells caused fermentation in grape juice. Another scientist called Liebig disagreed, because fermenting milk does not contain yeast cells.

- (a) A student tested Pasteur's idea. He treated two samples of fermenting grape juice.

In Sample 1, the fermenting grape juice was boiled before being added to sterile grape juice in **Flask 1**.

In Sample 2, the fermenting grape juice was **not** boiled before being added to sterile grape juice in **Flask 2**.

He then left both mixtures for two weeks.



- (i) What would you expect to **see** in the flasks if fermentation were taking place?

.....
(1 mark)

- (ii) During the two weeks, there was no evidence that fermentation had taken place in **Flask 1**.

Explain how this agrees with Pasteur's suggestion.

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

- (iii) Explain what happens during fermentation in **Flask 2**.

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

(b) Liebig had shown that milk will ferment without any yeast.

(i) Suggest why.

.....
(1 mark)

(ii) Name one type of food that can be made by fermenting milk.

.....
(1 mark)

7

Turn over for the next question

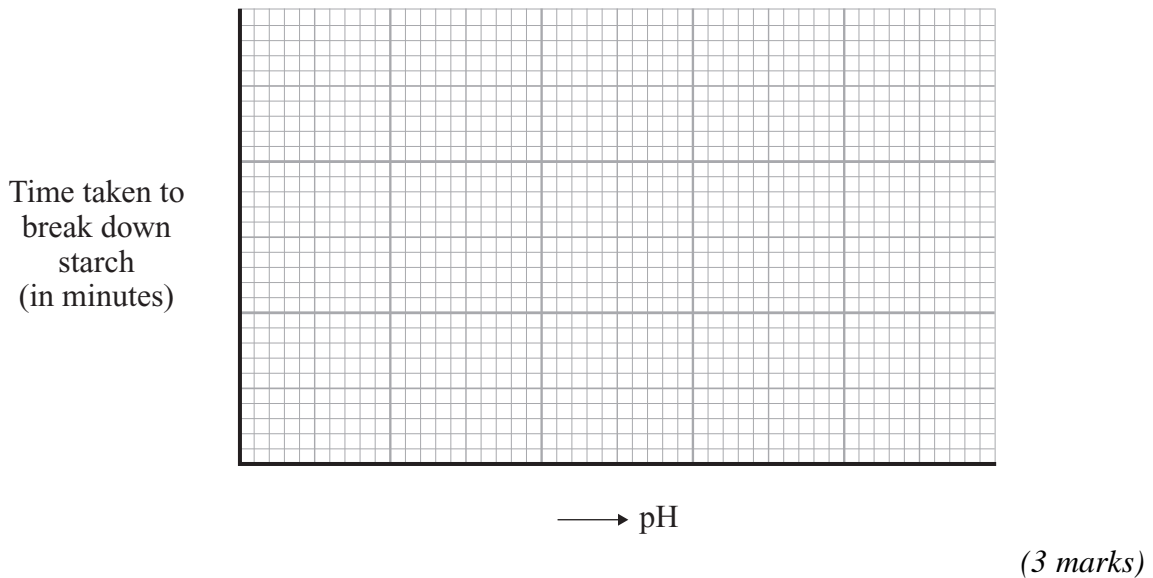
Turn over ►

QUESTIONS FROM PREVIOUSLY TESTED MODULES

15 The table shows the effect of pH on the activity of an enzyme which breaks down starch.

pH	4	5	6	7	8	9
Time taken to break down starch (in minutes)	30	18	8	2	3	7

(a) Draw a graph of the data in the table.

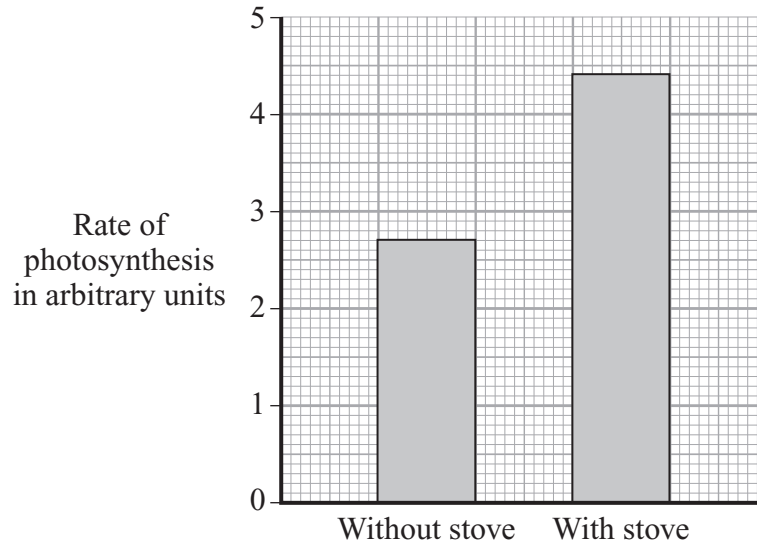


(b) At what pH does this enzyme work the fastest?
(1 mark)

(c) Explain why starch needs to be digested.
.....
.....
.....
.....
(3 marks)

- 16 A farmer wanted to find out whether heating his greenhouses would improve his crop. He put an oil-burning stove in one greenhouse. He then measured the rate of photosynthesis in two greenhouses on the same day in April.

His results are shown in the graph.



- (a) By how much did the rate of photosynthesis increase in the greenhouse with the stove?

.....
(1 mark)

- (b) Give **two** possible explanations for this increase in the rate of photosynthesis.

1

.....

2

.....
(2 marks)

- (c) The farmer repeated his investigation the following year. This time he took his measurements a month earlier, in March. He found that heating the greenhouse did not change the rate of photosynthesis.

Explain why.

.....

.....
(1 mark)

4

END OF QUESTIONS

There are no questions printed on this page