

Surname _____

Other Names _____

Centre Number _____

For Examiner's Use

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Candidate Signature _____

ASSESSMENT AND QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Foundation Tier

June 2010

Biology

Unit Biology B3

Written Paper

BLY3F

Friday 21 May 2010 9.00 am

**You will need no other materials.
You may use a calculator.**

TIME ALLOWED

- **45 minutes plus your additional time allowance.**

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

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INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

INFORMATION

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 45.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

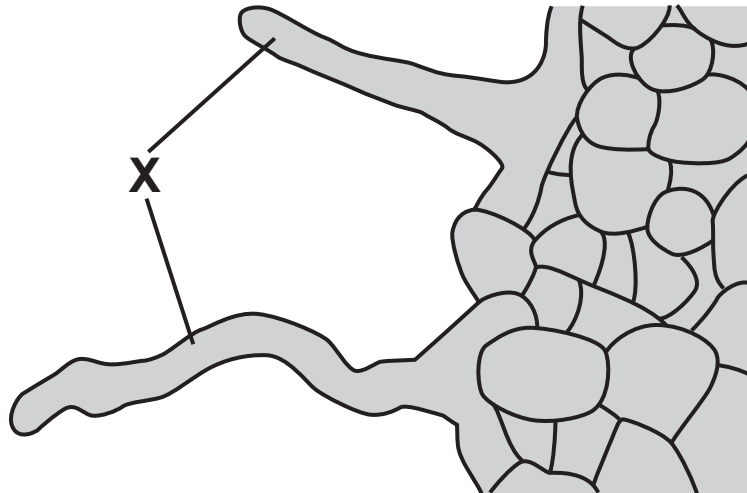
ADVICE

- **In all calculations, show clearly how you work out your answer.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

- 1 The diagram shows part of a plant root.
A large number of structures like the ones
labelled X grow out of the surface of the root.



- 1 (a) (i) What is the name of structure X? [1 mark]

Draw a ring around ONE answer.

root hair

stoma

villus

- 1 (a) (ii) Name TWO substances which structure X
absorbs from the soil. [2 marks]

1 _____

2 _____

1 (b) The substances in (a)(ii) are transported from the roots to the leaves.
Carbon dioxide also enters the leaves.

Draw a ring round the correct answer to complete each sentence. [1 mark + 1 mark]

1 (b) (i) Carbon dioxide enters leaves through

- alveoli.
- stomata.
- villi.

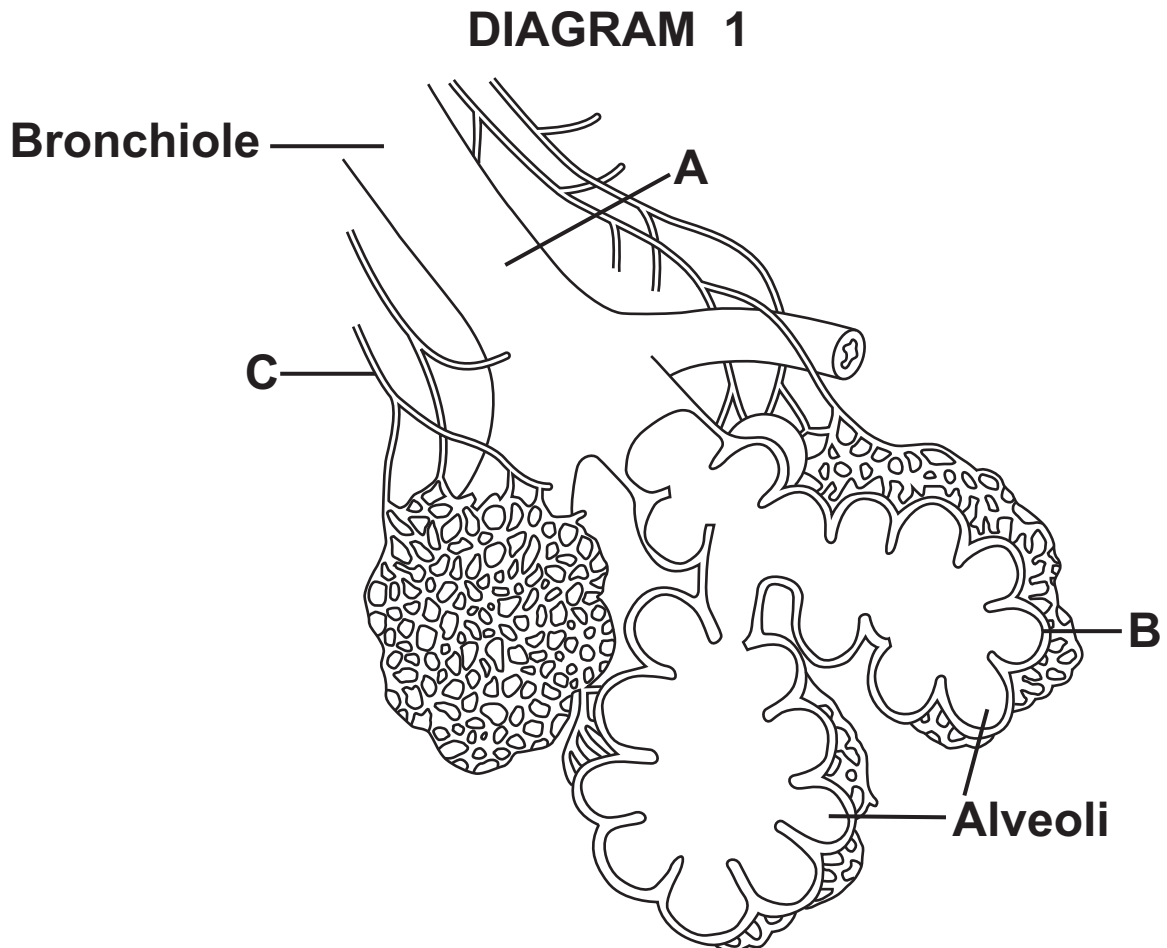
1 (b) (ii) Carbon dioxide enters leaf cells by

- active transport.
- diffusion.
- reabsorption.

[Turn over for the next question]

- 2 People with asthma sometimes find it difficult to breathe.

DIAGRAM 1 shows part of a human lung. Bronchioles are tubes that carry air to the alveoli.

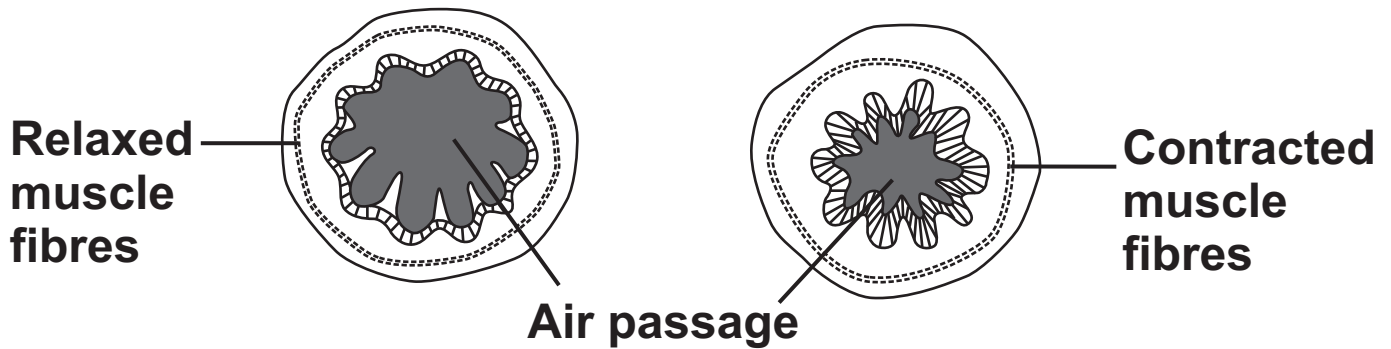


- 2(a) Which letter, A, B or C, shows where oxygen enters the blood? [1 mark]

- 2 (b) **DIAGRAM 2** shows a section through a bronchiole of a healthy person and of a person suffering from asthma.

DIAGRAM 2

Healthy person Person with asthma

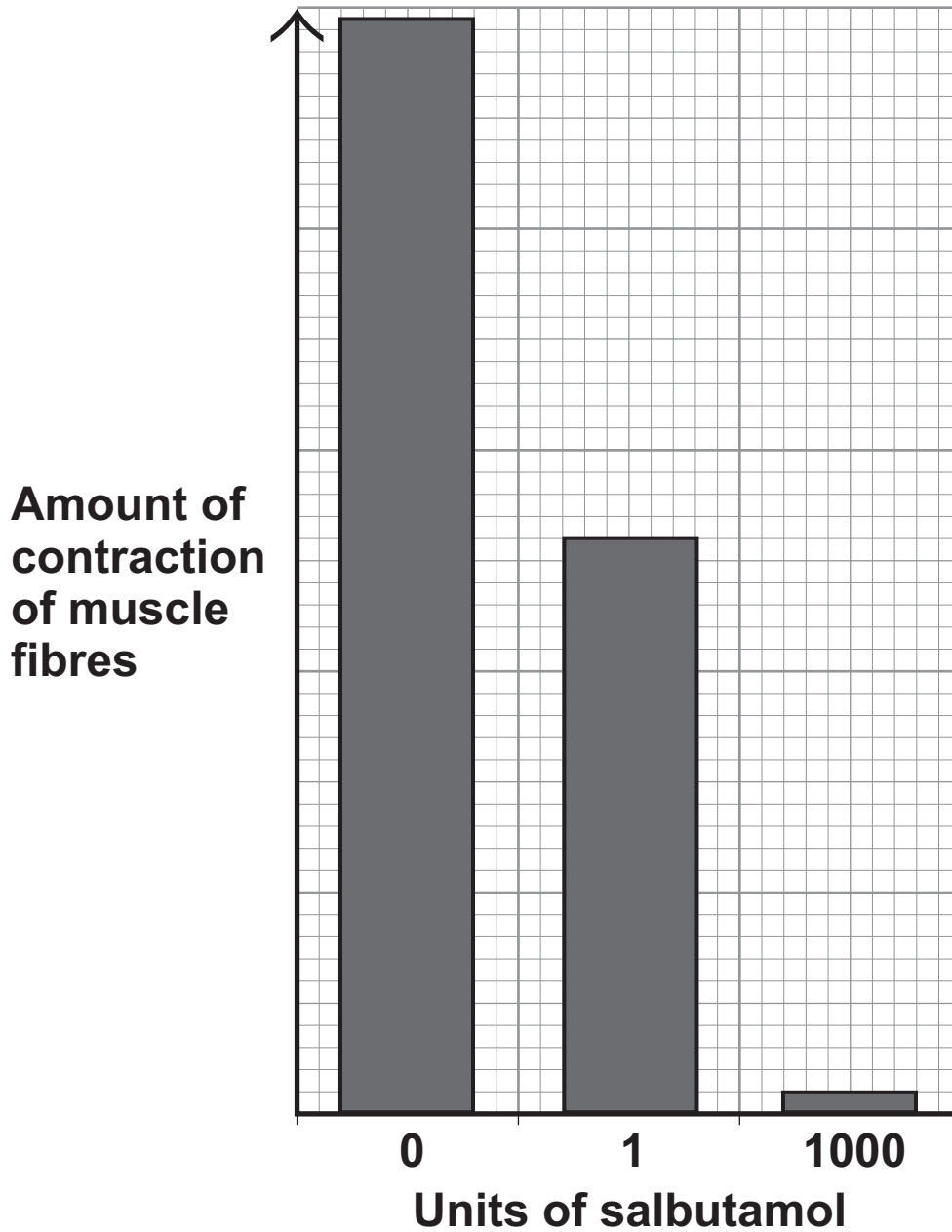


The person with asthma may find it difficult to breathe.

Use information from DIAGRAM 2 to give the reason for this. [1 mark]

[Turn over for the next question]

- 2(c) A person has asthma. The bar graph shows the effect of the drug salbutamol on the contraction of the muscle fibres in the wall of this person's bronchioles.



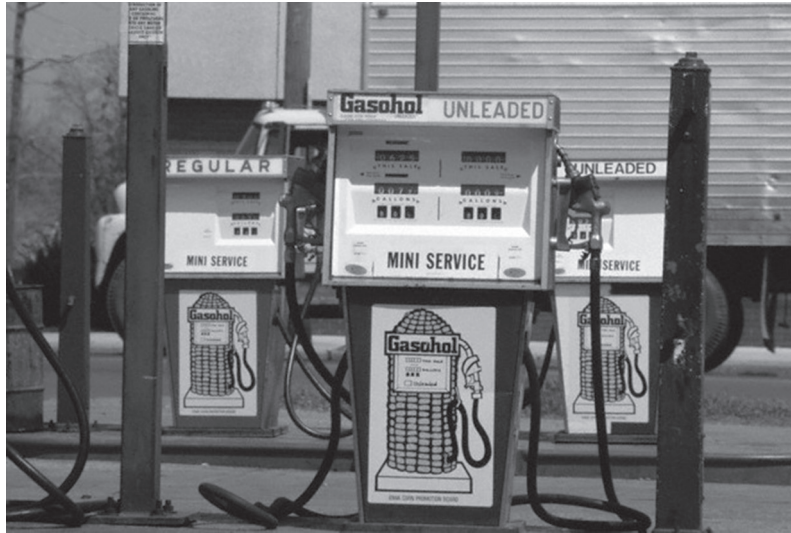
2 (c) (i) Describe the effect of salbutamol on the person's muscle fibres. [1 mark]

2 (c) (ii) How does salbutamol help this person? [1 mark]

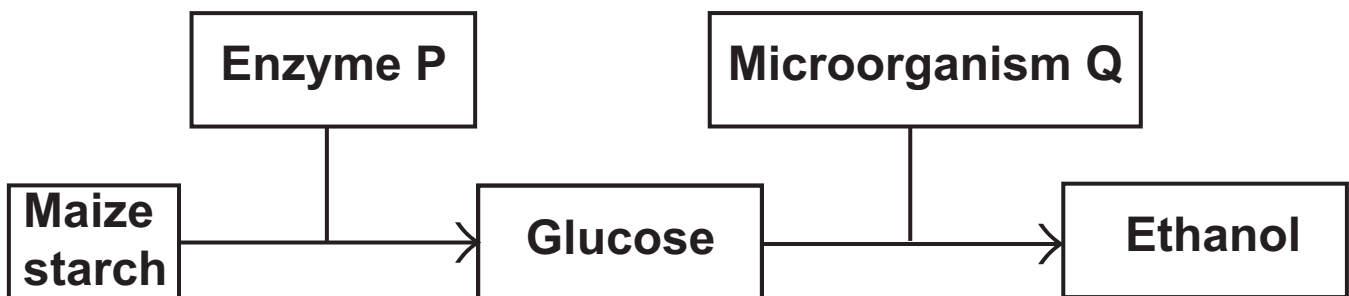
4

[Turn over for the next question]

- 3 Ethanol (alcohol) can be mixed with petrol to make gasohol.
The photograph shows three gasohol pumps at a service station.



The flowchart shows one way of manufacturing ethanol.



- 3 (a) Draw a ring around the correct answer to each question.
- 3 (a) (i) Enzyme P changes starch into glucose.

What type of enzyme is P? [1 mark]

carbohydrase

lipase

protease

3 (a) (ii) Microorganism Q changes glucose into ethanol.

What type of microorganism is Q? [1 mark]

bacterium

mould

yeast

3 (a) (iii) The ethanol produced by microorganism Q is contaminated with water.

Ethanol is separated from the mixture by [1 mark]

distillation

fermentation

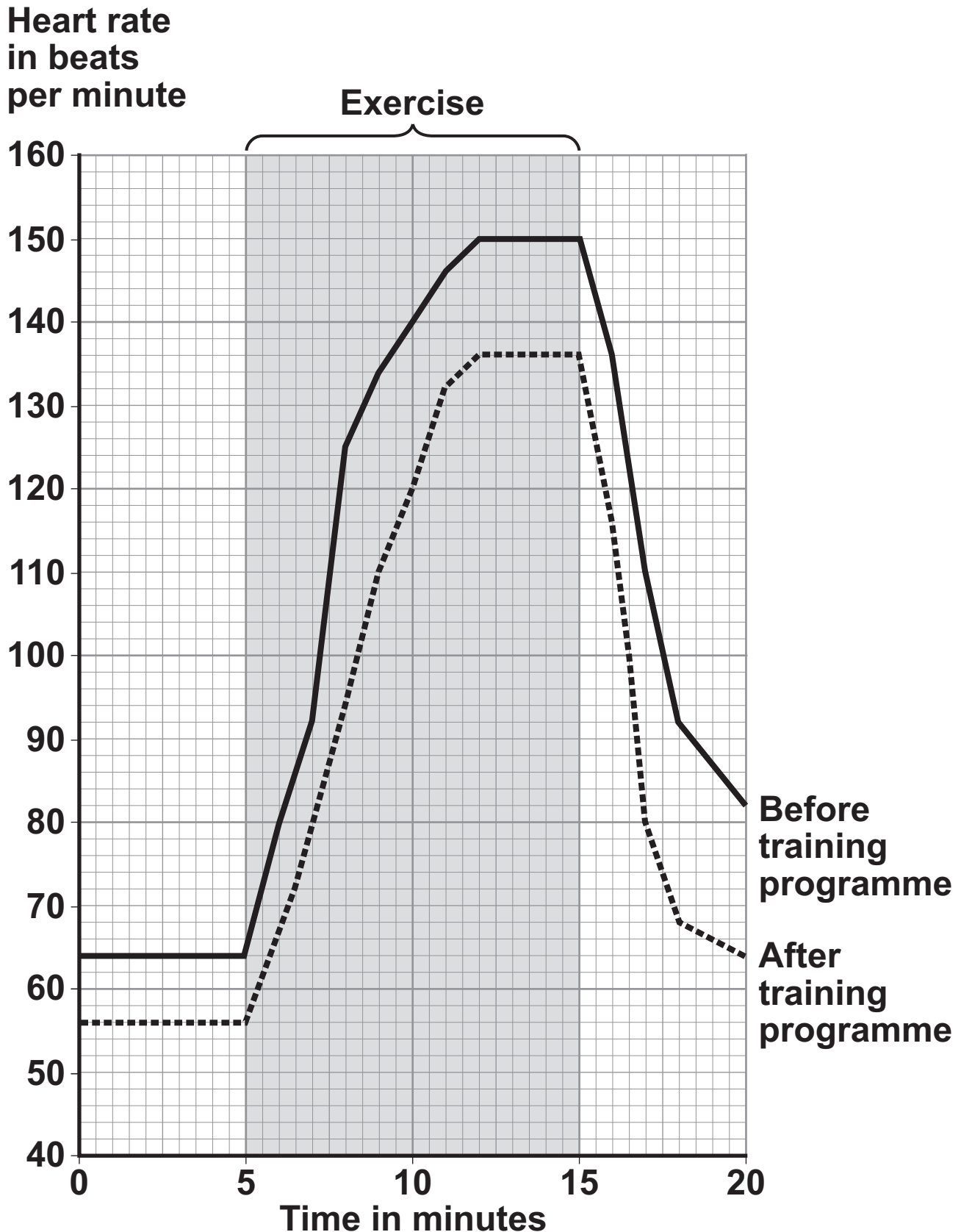
filtration

3 (b) In the long term, it may be better to use ethanol made from maize crops as a fuel for cars rather than petrol.

Explain why. [2 marks]

4 An athlete did a 6-month training programme.

The graph shows the effect of the same amount of exercise on his heart rate before and after the training programme.



4 (a) (i) What was the maximum heart rate of the athlete during exercise before the training programme? [1 mark]

_____ beats per minute

4 (a) (ii) Give TWO differences between the heart rate of the athlete before and after the training programme. [2 marks]

After the training programme

Difference 1 _____

Difference 2 _____

[Question 4 continues on the next page]

4 (b) Which TWO substances need to be supplied to the muscles in larger amounts during exercise? [2 marks]

Tick (✓) TWO boxes.

Carbon dioxide

Glucose

Lactic acid

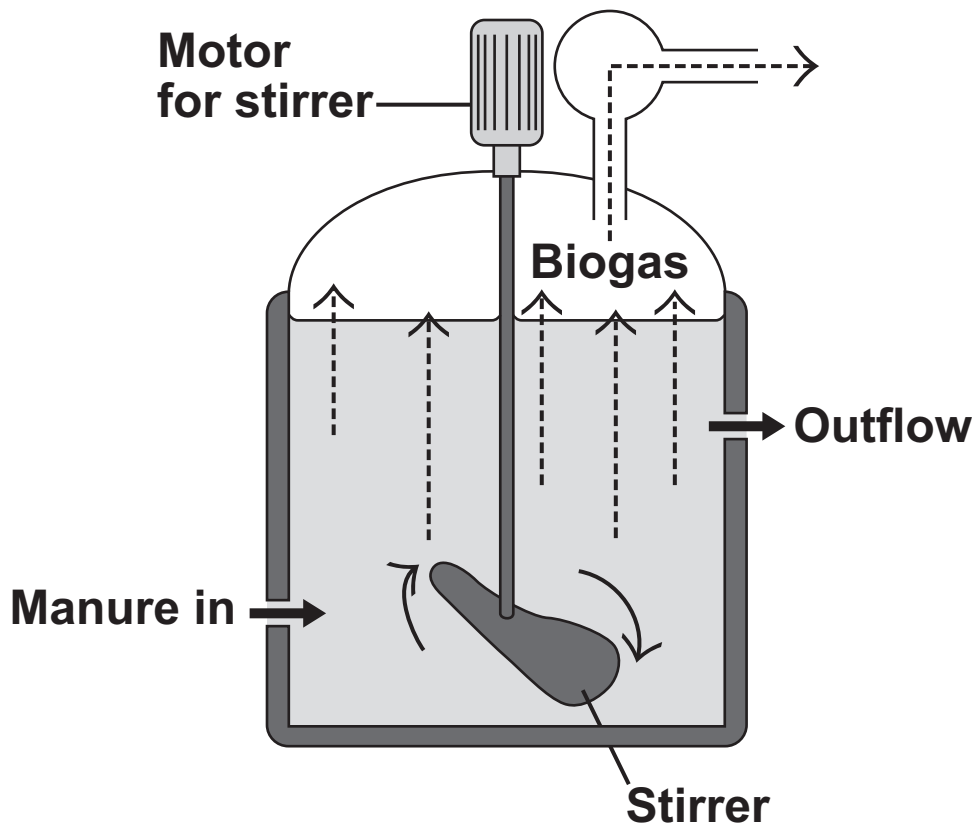
Oxygen

Urea

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TURN OVER FOR THE NEXT QUESTION

- 5 The diagram shows one type of biogas generator.



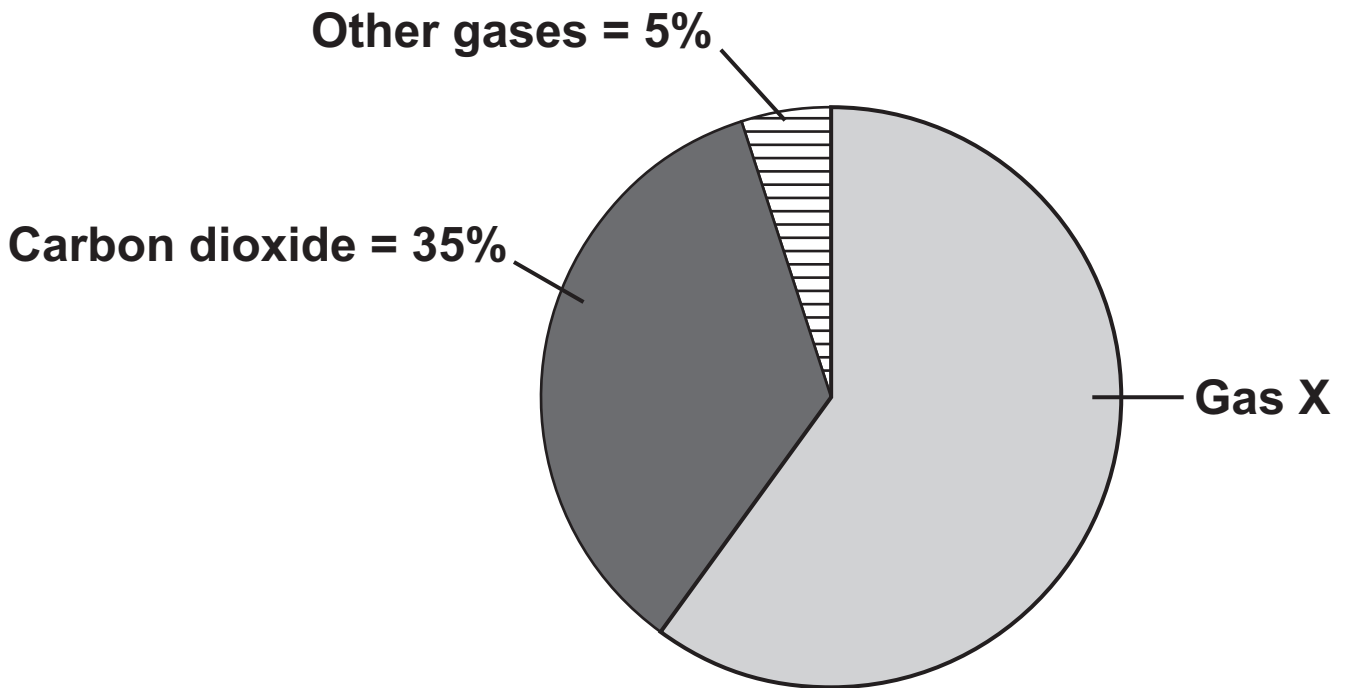
- 5 (a) With this type of biogas generator, the concentration of solids fed into the reactor must be kept very low.

Suggest ONE reason for this. [1 mark]

Tick (✓) ONE box.

- A higher concentration contains too little oxygen.
- A higher concentration would be difficult to stir.
- A higher concentration contains too much carbon dioxide.

- 5 (b) The pie chart shows the percentages of the different gases found in this biogas.



Gas X is the main fuel gas found in this biogas.

- 5 (b) (i) What is the name of gas X? [1 mark]

Draw a ring around ONE answer.

methane

nitrogen

oxygen

[Question 5 continues on the next page]

5 (b) (ii) What is the percentage of gas X in the biogas?
[2 marks]

Show clearly how you work out your answer.

Percentage of gas X = _____

5 (c) If the biogas generator is not airtight, the biogas will contain a much higher percentage of carbon dioxide.

Draw a ring around the correct answer to complete each sentence. [1 mark + 1 mark]

5 (c) (i) The air that leaks in will increase the rate of

aerobic respiration.
anaerobic respiration.
fermentation.

5 (c) (ii) The process in part (c)(i) occurs because the

air contains	ammonia.
	nitrogen.
	oxygen.

- 6 The table shows the concentrations of some substances in the blood plasma, kidney filtrate and urine of one person.

SUBSTANCE	CONCENTRATION IN GRAMS PER dm ³		
	PLASMA	FILTRATE	URINE
Protein	78·0	0·0	0·0
Glucose	0·8	0·8	0·0
Urea	0·3	0·3	20·0
Sodium ions	2·8	2·8	3·5

- 6 (a) Draw a ring around the correct answer to complete each sentence.
[1 mark + 1 mark + 1 mark + 1 mark]

- 6 (a) (i) Protein is NOT found in the filtrate.

This is because protein molecules are

too large to pass through the filter.

used up in respiration.

reabsorbed into the blood.

[Question 6 continues on the next page]

6 (a) (ii) Glucose is found in the filtrate but not in the urine.

This is because glucose is

too large to pass through the filter.

used up in respiration.

passed through the filter, then reabsorbed into the blood.

6 (a) (iii) The concentration of urea is much higher in the urine than in the filtrate.

This is because

urea is made by the kidney.

water is reabsorbed from the filtrate into the blood.

glucose and salts are reabsorbed from the filtrate into the blood.

6 (a) (iv) The fluid entering the bladder will contain

water, protein, glucose, urea and sodium ions.

water, urea and sodium ions.

water, glucose, urea and sodium ions.

6 (b) An athlete ran a 10-kilometre race on a cold day. He then ran the same race on a hot day. He ate and drank the same on each day.

Draw a ring round the correct answer to complete each sentence. [1 mark + 1 mark]

6 (b) (i) On the HOT day this athlete will produce

more urine.

less urine.

the same amount of urine.

6 (b) (ii) On the HOT day the athlete's urine will be

more concentrated.

less concentrated.

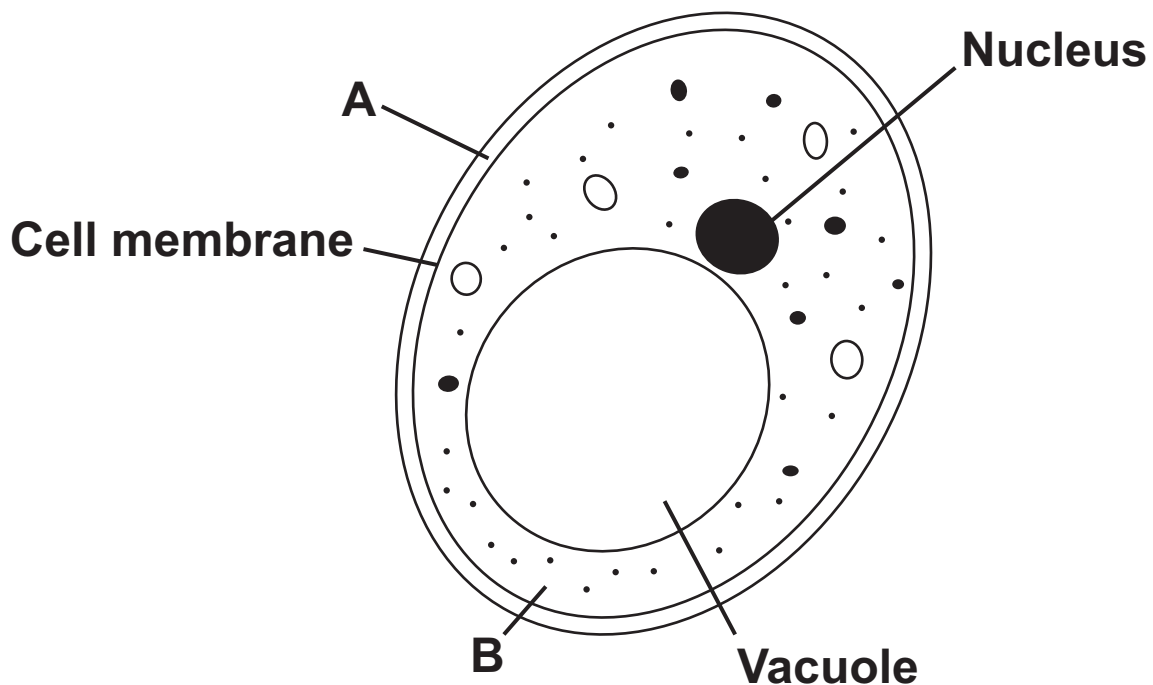
the same concentration.

- 7 Sourdough bread is light in texture and tastes slightly sour. It is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. This acid makes the bread taste sour.

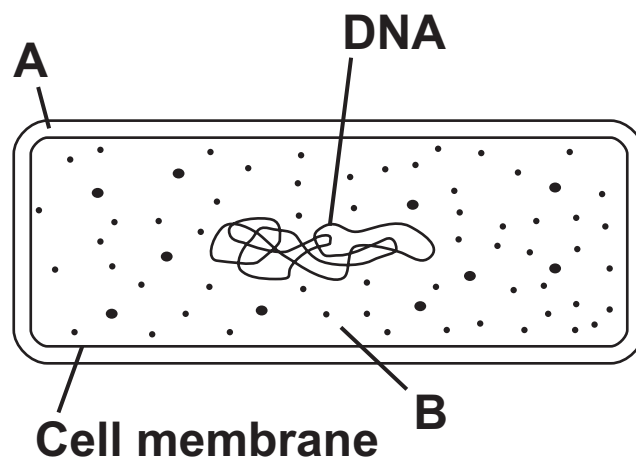
- 7 (a) The diagrams show the structures of the yeast cell and the bacterial cell.

(Not to scale)

YEAST CELL



BACTERIAL CELL



7 (a) (i) Both the yeast cell and the bacterial cell have structures A and B.

Name structures A and B. [2 marks]

A _____

B _____

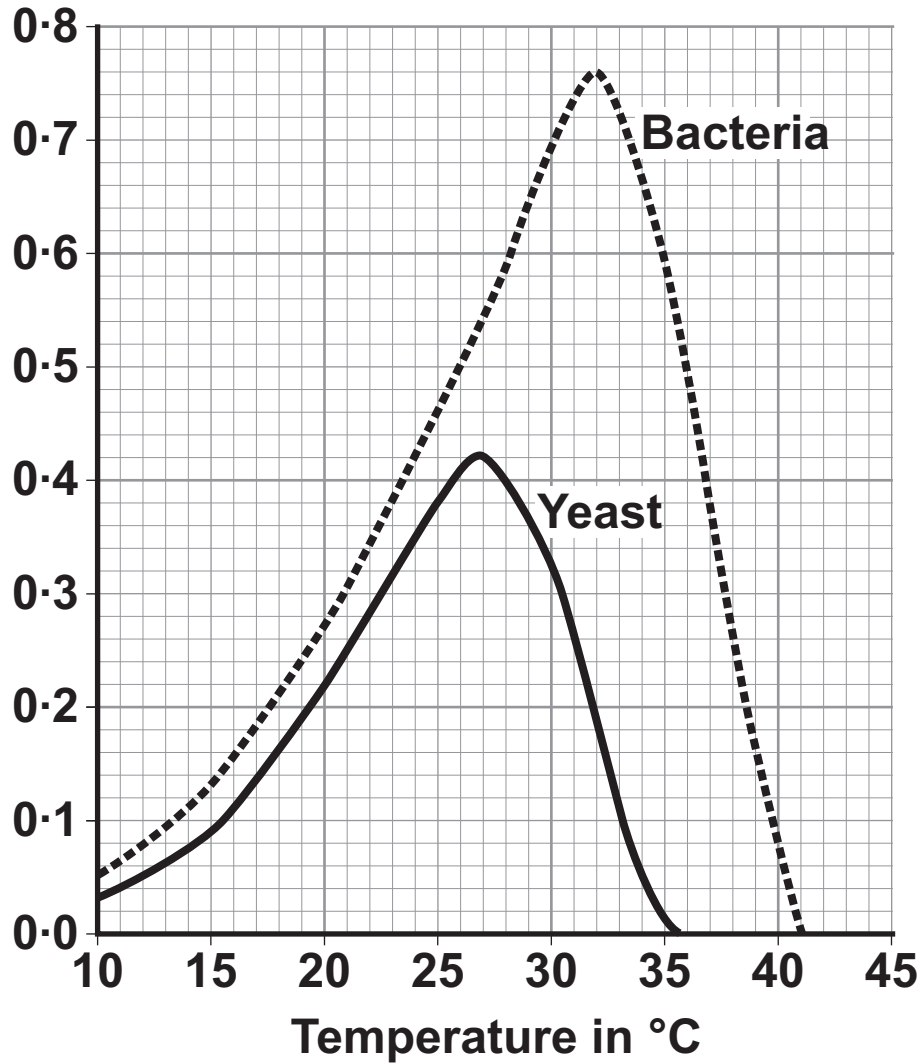
7 (a) (ii) The yeast cell and the bacterial cell have different shapes.

Give ONE other way in which the structure of the bacterial cell is different from the structure of the yeast cell. [1 mark]

[Question 7 continues on the next page]

- 7 (b) The graph shows how the growth rates of the yeast and the bacteria change with temperature.

Growth rate in
arbitrary
units



7 (b) (i) Sourdough bread rises fastest at 27 °C.

Explain why. [2 marks]

7 (b) (ii) The bread has a sourer taste if it rises at 32 °C.

Explain why. [2 marks]

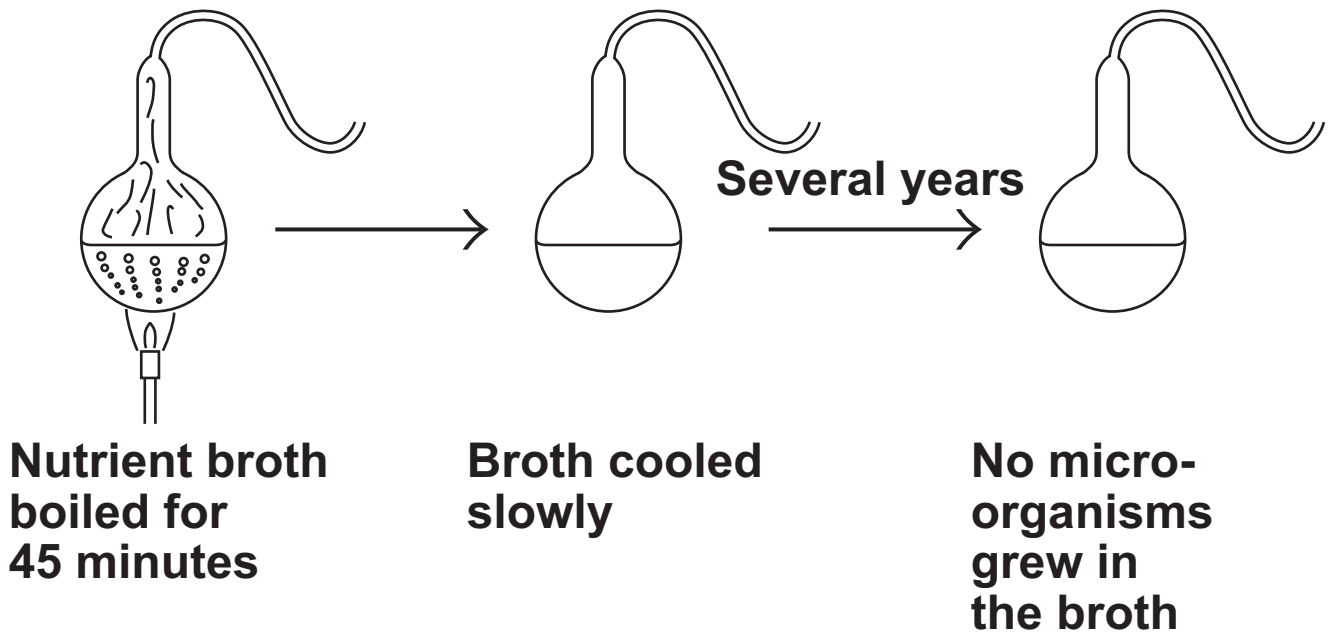
7 (b) (iii) The growth rate of the yeast is unaffected by pH in the range 3.5 to 7.0 pH units.

Why is this useful in the production of sourdough bread? [1 mark]

[Turn over]

- 8 **DIAGRAM 1** shows some details of an investigation carried out by Louis Pasteur.

DIAGRAM 1



- 8 (a) (i) **Why did Pasteur boil the nutrient broth?**
[1 mark]

- 8 (a) (ii) **Because of the shape of the flask, no microorganisms grew even after several years.**

Explain why. [1 mark]

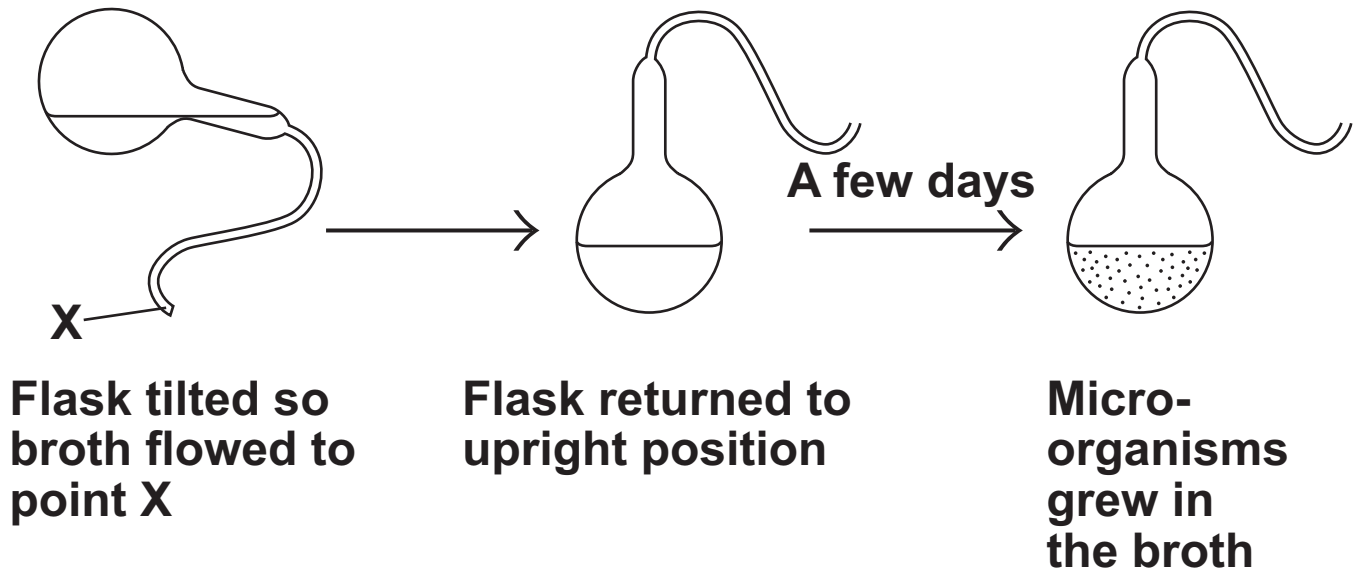
8 (b) Pasteur repeated the investigation several times.

Why is it useful to repeat a scientific investigation several times? [1 mark]

[Question 8 continues on the next page]

8 (c) After several years, some of Pasteur's flasks were tilted so that the broth flowed to point X, as shown in DIAGRAM 2. The flasks were then returned to the upright position and left for a few days.

DIAGRAM 2



Microorganisms grew in the broth.

Explain why. [2 marks]

8 (d) Complete the sentence. [1 mark]

This investigation provides evidence for the

theory of _____ .

6

END OF QUESTIONS

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Examiner's Initials	
Question	Mark
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4	
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6	
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