Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2010

Biology

BLY3F

Unit Biology B3

F

Written Paper

Friday 21 May 2010 9.00 am to 9.45 am

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

Time allowed
- 45 minutes

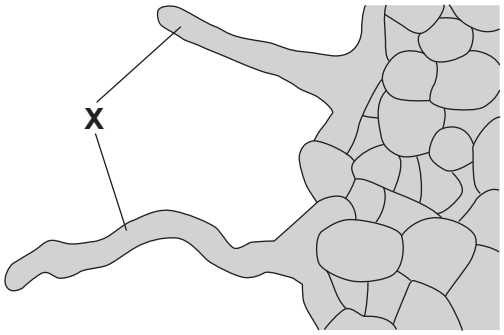
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work 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.

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**?

Draw a ring around **one** answer.

root hair **stoma** **villus**

(1 mark)

1 (a) (ii) Name **two** substances which structure **X** absorbs from the soil.

1 .....

2 .....

(2 marks)

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 (b) (i) Carbon dioxide enters leaves through

alveoli.

stomata.

villi.

(1 mark)

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

active transport.

diffusion.

reabsorption.

(1 mark)

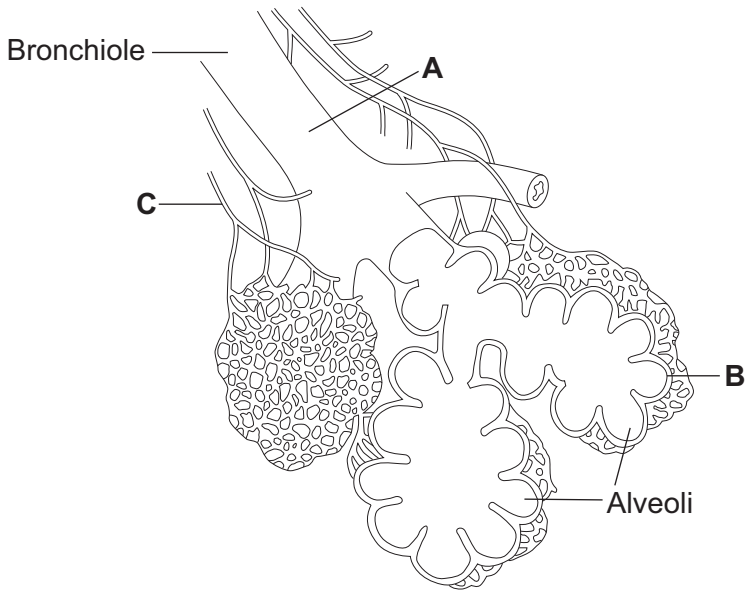
5

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.

Diagram 1

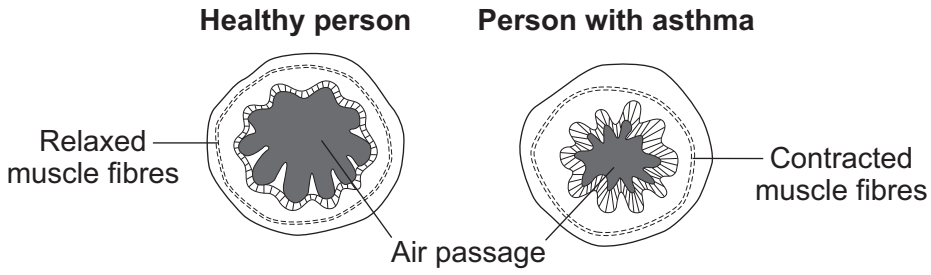


2 (a) Which letter, **A**, **B** or **C**, shows where oxygen enters the blood? ☐

(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



The person with asthma may find it difficult to breathe.

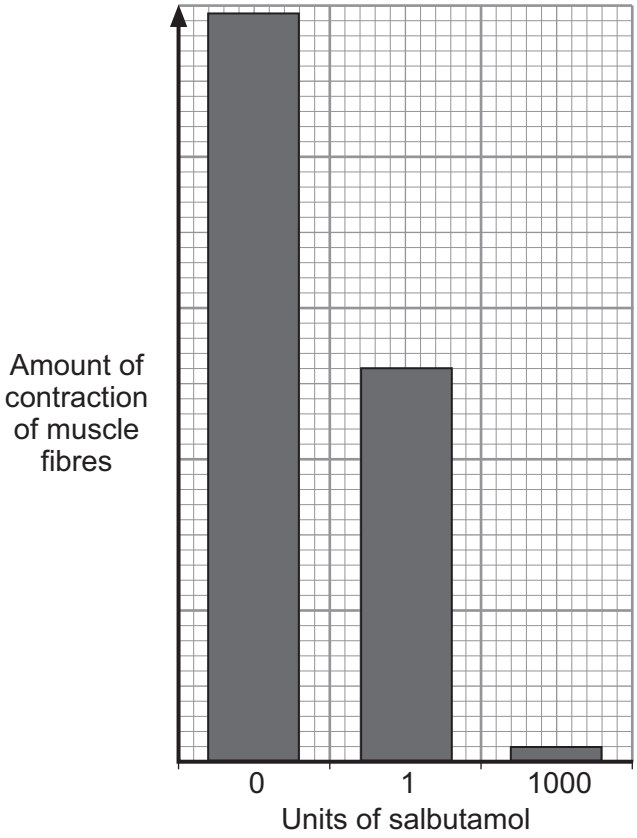
Use information from **Diagram 2** to give the reason for this.

.....

.....

(1 mark)

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?

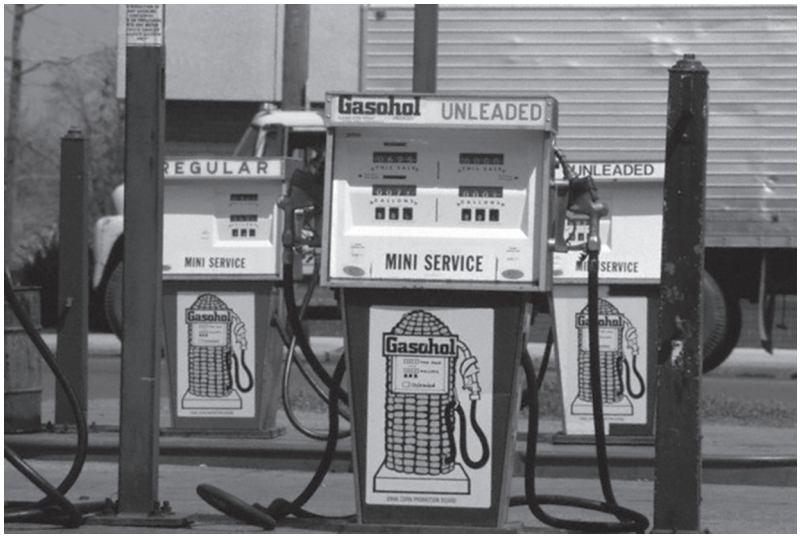
.....

.....

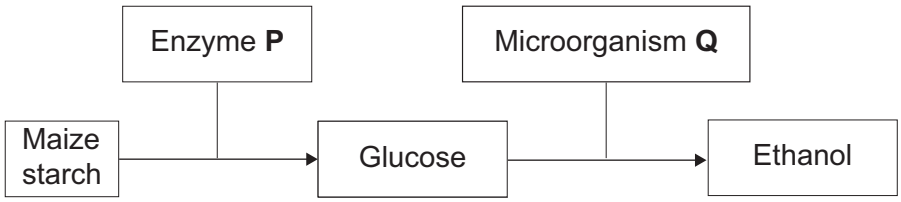
(1 mark)

4

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**?

carbohydrase **lipase** **protease**

(1 mark)

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

What type of microorganism is **Q**?

bacterium **mould** **yeast**

(1 mark)

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

Ethanol is separated from the mixture by

distillation **fermentation** **filtration**

(1 mark)

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.

.....

.....

.....

.....

.....

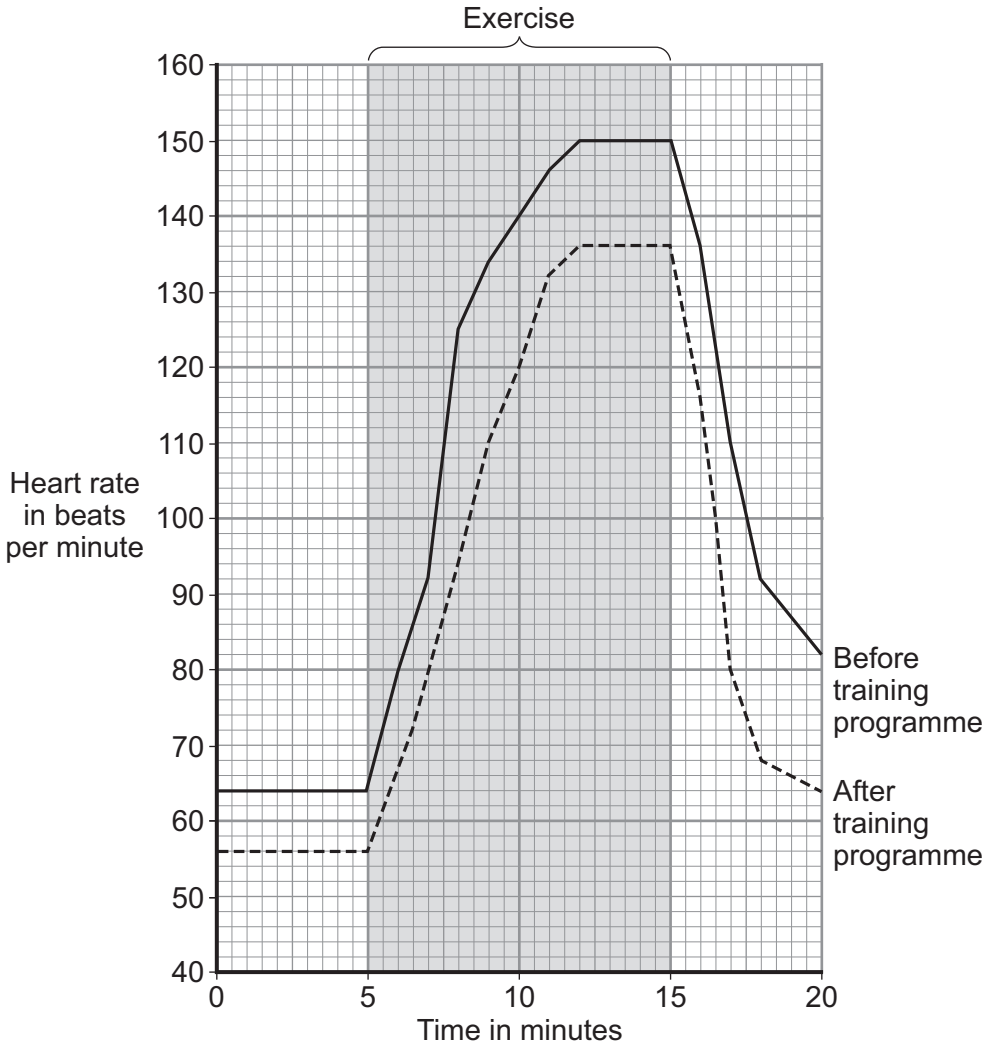
(2 marks)

5

Turn over for the next question

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?

..... beats per minute
(1 mark)

4 (a) (ii) Give **two** differences between the heart rate of the athlete before and after the training programme.

After the training programme

Difference 1 .....

.....

Difference 2 .....

.....

(2 marks)

4 (b) Which **two** substances need to be supplied to the muscles in larger amounts during exercise?

Tick (✓) **two** boxes.

Carbon dioxide ☐

Glucose ☐

Lactic acid ☐

Oxygen ☐

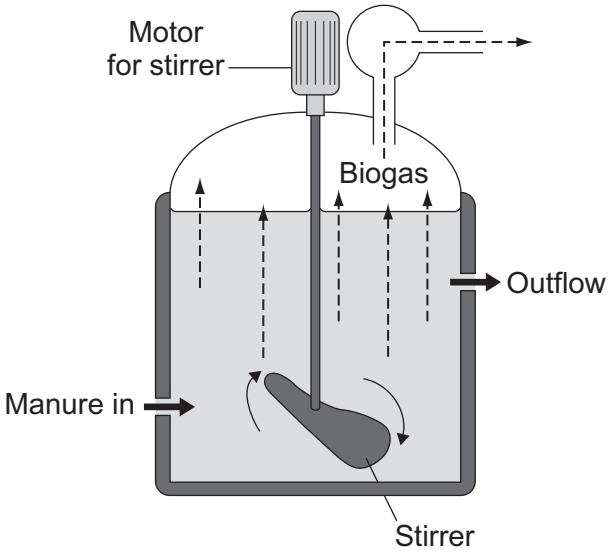
Urea ☐

(2 marks)

5

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.

Tick (✓) **one** box.

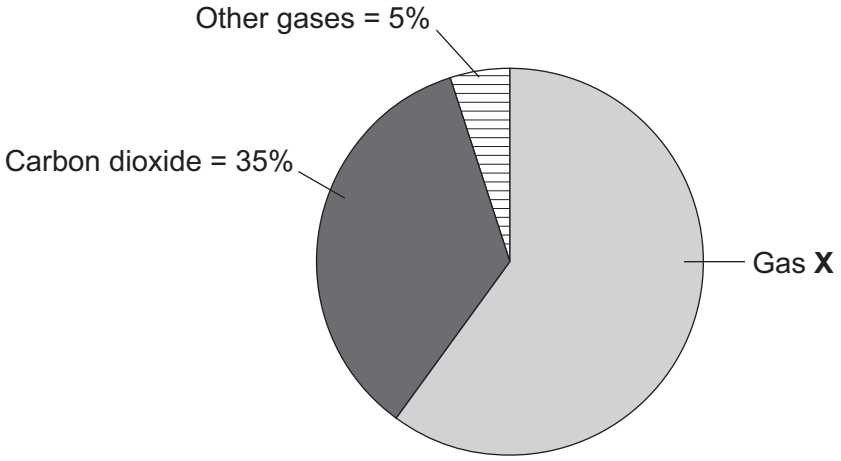
A higher concentration contains too little oxygen. ☐

A higher concentration would be difficult to stir. ☐

A higher concentration contains too much carbon dioxide. ☐

(1 mark)

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**?

Draw a ring around **one** answer.

methane **nitrogen** **oxygen**

(1 mark)

5 (b) (ii) What is the percentage of gas **X** in the biogas?

Show clearly how you work out your answer.

.....

.....

.....

Percentage of gas **X** = ...

(2 marks)

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.

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

aerobic respiration.
anaerobic respiration.
fermentation.

(1 mark)

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

ammonia.
nitrogen.
oxygen.

(1 mark)

6

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.

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.

(1 mark)

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.

(1 mark)

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.

(1 mark)

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.

(1 mark)

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.

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

- more urine.
- less urine.
- the same amount of urine.

(1 mark)

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

- more concentrated.
- less concentrated.
- the same concentration.

(1 mark)

6

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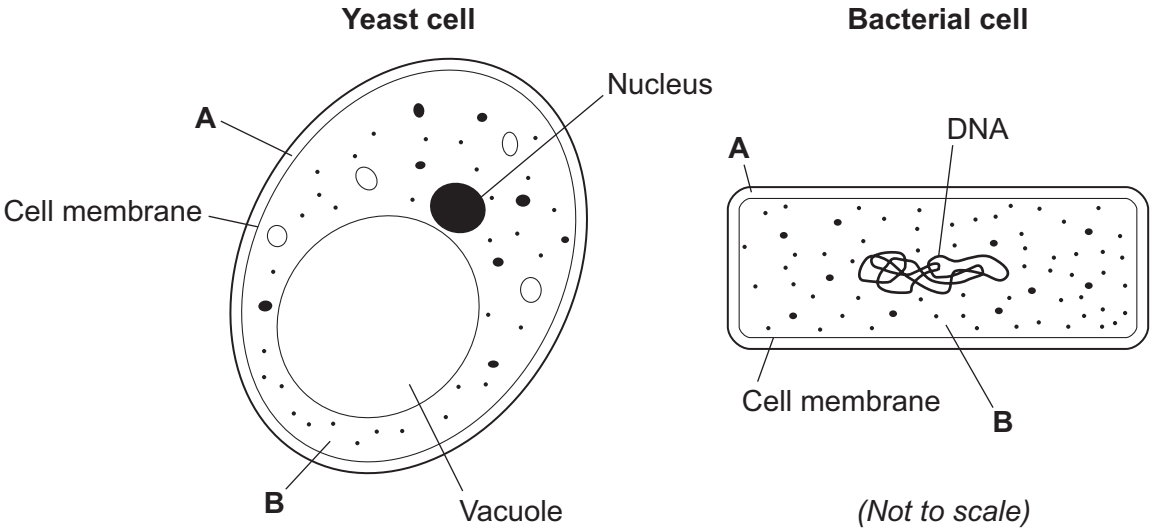
7 Sourdough bread is light in texture and tastes slightly sour. It is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. This acid makes the bread taste sour.

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



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

Name structures **A** and **B**.

A .....

B .....

(2 marks)

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.

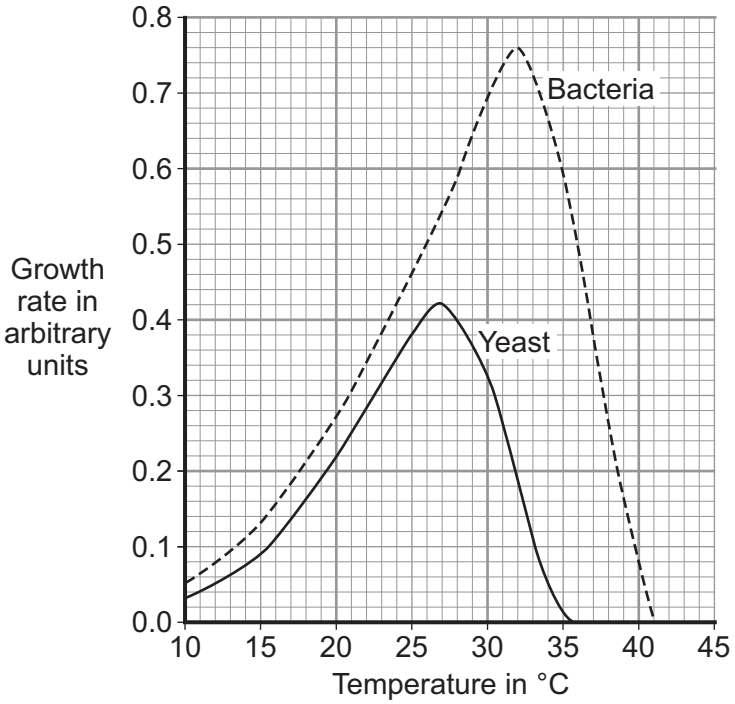
.....

.....

(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.



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?

.....

.....

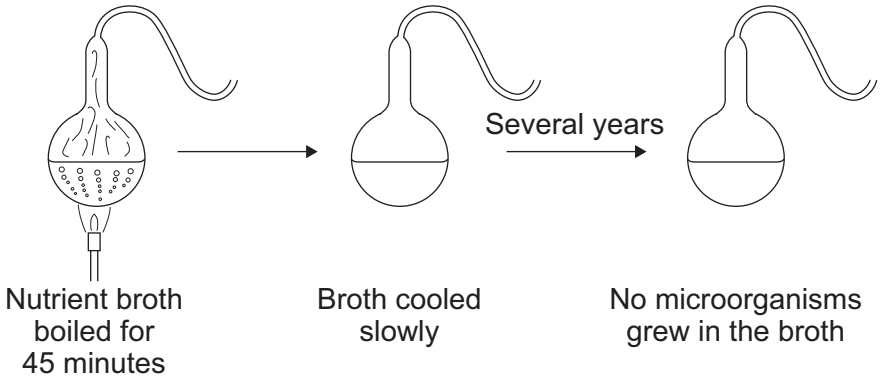
(1 mark)

8

Turn over for the next question

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?

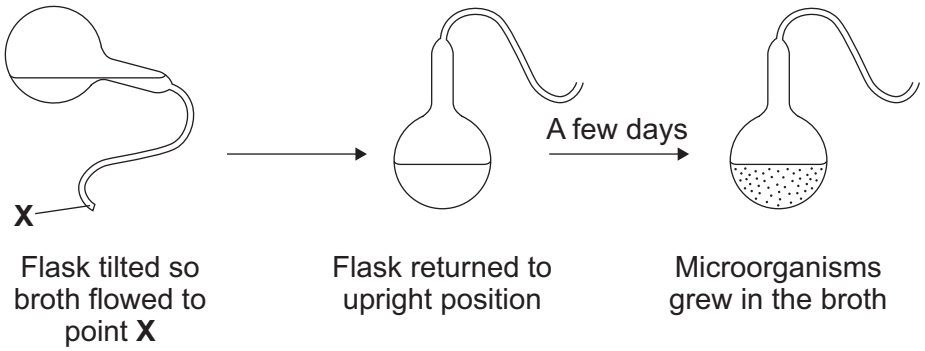
.....

.....

(1 mark)

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.

This investigation provides evidence for the theory of ..... .

(1 mark)

6

END OF QUESTIONS

There are no questions printed on this page

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