

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
January 2010

Biology

Unit Biology B3

Written Paper

Thursday 14 January 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. Answers written in margins or on blank pages will not be marked.
- 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.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

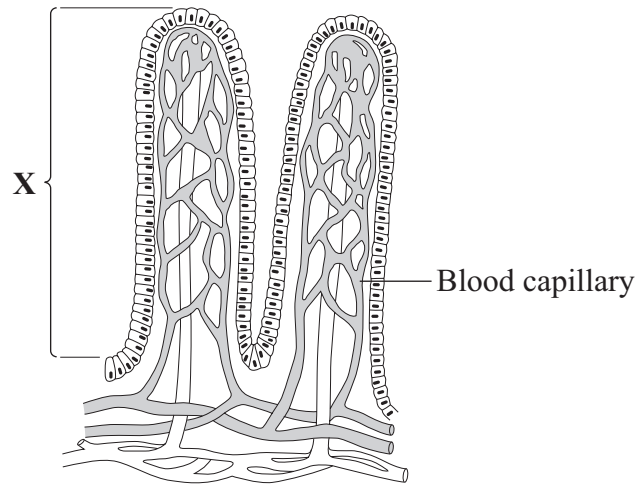
BLY3F
F



J A N 1 0 B L Y 3 F 0 1

Answer **all** questions in the spaces provided.

- 1 The diagram shows part of the lining of the small intestine.



- 1 (a) (i) Name structure **X**.

Draw a ring around **one** answer.

alveolus

thorax

villus

(1 mark)



- 1 (a) (ii) Choose **three** ways in which structure **X** is adapted to help the absorption of soluble food.

Tick (✓) **three** boxes.

It is ventilated.

☐

Its outer surface is one cell thick.

☐

It has a large surface area.

☐

It contains a layer of muscle.

☐

It has a good blood supply.

☐

Its cells contain haemoglobin.

☐

(3 marks)

- 1 (b) Name the process by which soluble food enters the blood.

Draw a ring around **one** answer.

diffusion

fermentation

transpiration

(1 mark)

5

Turn over for the next question

Turn over ►



- 2 (a) It is important to prevent contamination when growing microorganisms.

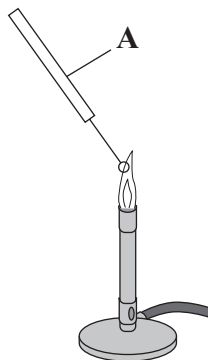
The diagram shows the transfer and culturing of microorganisms.

Stage V

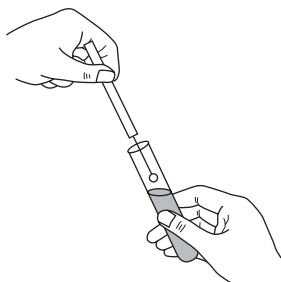


A Petri dish with agar is heated to 120 °C for 20 minutes, then cooled

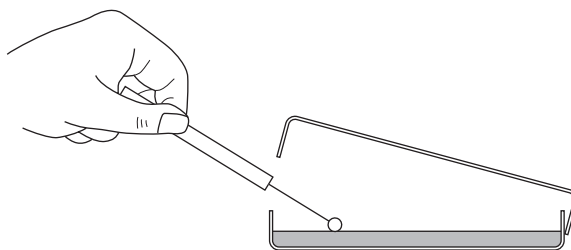
Stage W



Stage X



Stage Y



Stage Z



Petri dish kept at 25 °C for 48 hours

- 2 (a) (i) Name the apparatus labelled **A** in stage **W**.

Draw a ring around **one** answer.

inoculating loop

pipette

thermometer

(1 mark)



- 2 (a) (ii) Give the letters of the **two** stages from **V**, **W**, **X**, **Y** and **Z**, which are carried out to kill microorganisms.

Stages and

(2 marks)

- 2 (a) (iii) Give the letter of the stage, **V**, **W**, **X**, **Y** or **Z**, where incubation takes place.

Stage

(1 mark)

- 2 (b) A culture medium used for growing microorganisms contains various nutrients.

Which nutrient is the main source of energy for the microorganisms?

Draw a ring around **one** answer.

carbohydrates

mineral ions

vitamins

(1 mark)

5

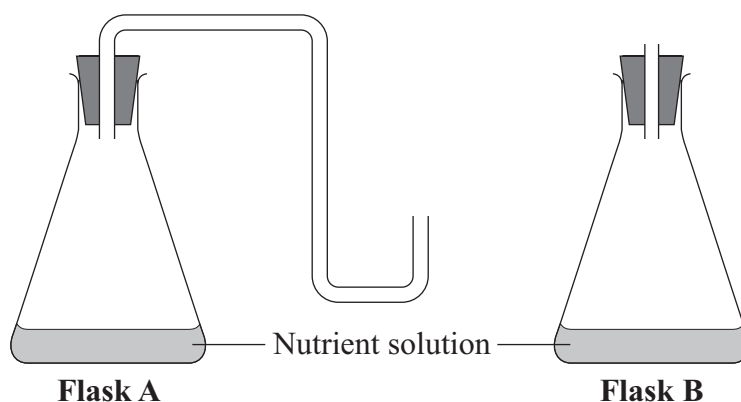
Turn over for the next question

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3 Some students investigated biogenesis.

They set up three flasks like **Flask A** and three flasks like **Flask B**, as shown in the diagram.



- The students boiled the nutrient solution in each flask for 40 minutes.
- They left the flasks to cool to room temperature.
- They then kept all six flasks at room temperature for one week.

3 (a) Why did the students set up three flasks like **Flask A** rather than just one?

.....

.....

(1 mark)

3 (b) After one week, the students looked at one drop of liquid from each flask under a microscope.

Their results are given in the table.

Repeat number	Flask A	Flask B
1	No bacteria	Bacteria visible
2	No bacteria	Bacteria visible
3	No bacteria	Bacteria visible



Explain the results for **Flask A** and **Flask B**.

Flask A

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Flask B

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(3 marks)

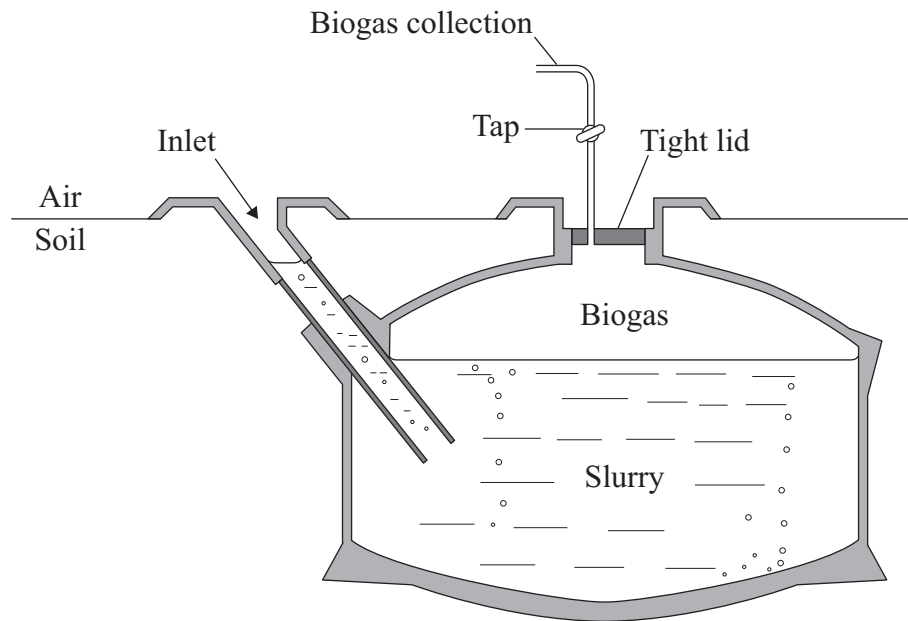
4

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4 The diagram shows one type of biogas generator.



4 (a) Give **two** advantages of having the biogas generator underground.

Tick (✓) **two** boxes.

It allows the digested slurry to soak into the soil.

☐

The biogas produced will be at a lower pressure.

☐

Very little of the biogas generator will be seen.

☐

It prevents unpleasant smells escaping.

☐

The temperature inside will not change much.

☐

(2 marks)



- 4 (b) The table shows the percentages of the different gases found in this biogas.

Gas	Percentage
Carbon dioxide	35.0
Hydrogen sulfide	1.5
Ammonia	1.5
Water vapour	2.0
Gas X	

Gas X is the main fuel gas found in biogas.

- 4 (b) (i) What is the name of gas X?

Draw a ring around **one** answer.

hydrogen

methane

oxygen

(1 mark)

- 4 (b) (ii) What is the percentage of gas X in the biogas?

Show clearly how you work out your answer.

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Percentage of gas X =

(2 marks)

5

Turn over for the next question

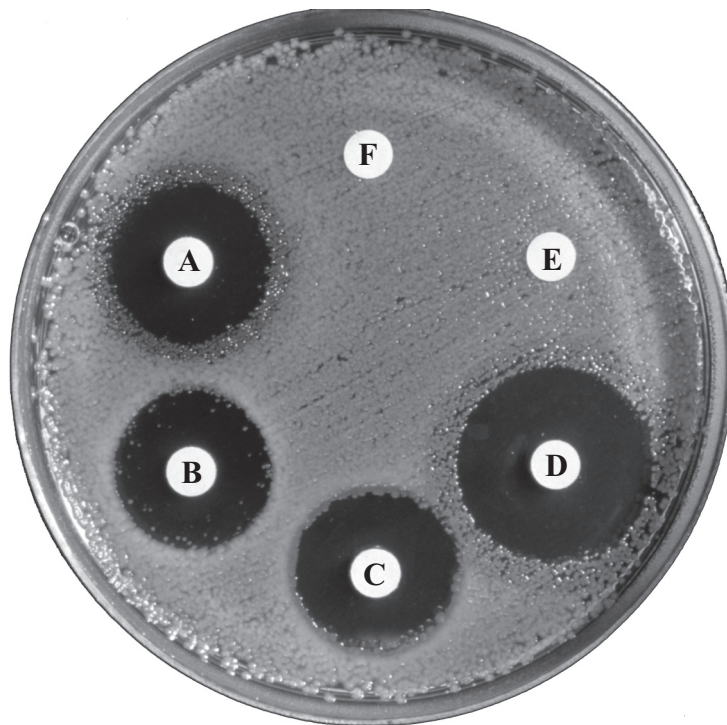
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5 Some scientists tested the effectiveness of six new antibiotics, **A**, **B**, **C**, **D**, **E** and **F**.

- They mixed a culture of one species of bacterium with nutrient agar in a Petri dish.
- They then prepared separate discs of filter paper, each soaked in a different antibiotic.
- They placed the filter paper discs on the surface of the agar.
- The Petri dish was kept at 35°C for 2 days.

The results are shown in the photograph.



5 (a) (i) Which **two** antibiotics from **A**, **B**, **C**, **D**, **E** and **F**, did **not** kill this species of bacterium?

and

(1 mark)

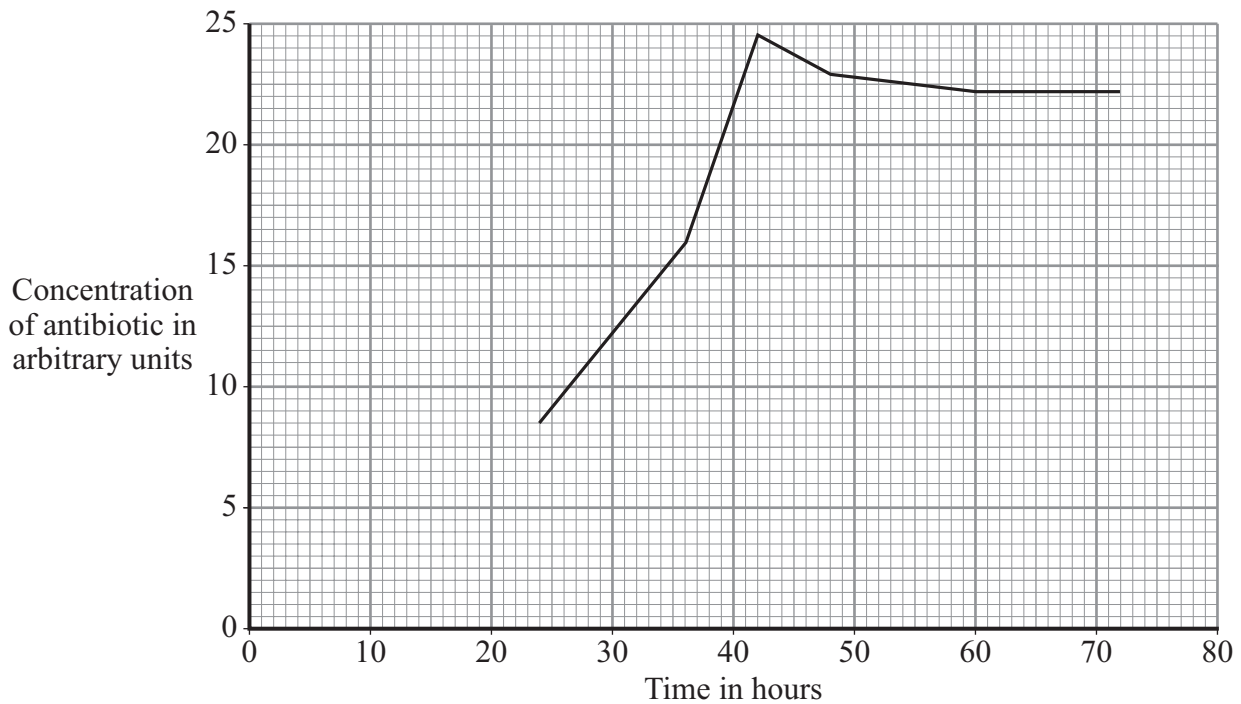
5 (a) (ii) Which would be the best antibiotic, **A**, **B**, **C**, **D**, **E** or **F**, to treat an infection caused by this species of bacterium?

(1 mark)



- 5 (b) The scientists measured the production of an antibiotic by a mould.

The graph shows their results.



- 5 (b) (i) Describe what happened to the concentration of antibiotic between 24 and 72 hours.

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(2 marks)

- 5 (b) (ii) The scientists decided to grow the mould for 42 hours in future.

Why did they choose this time?

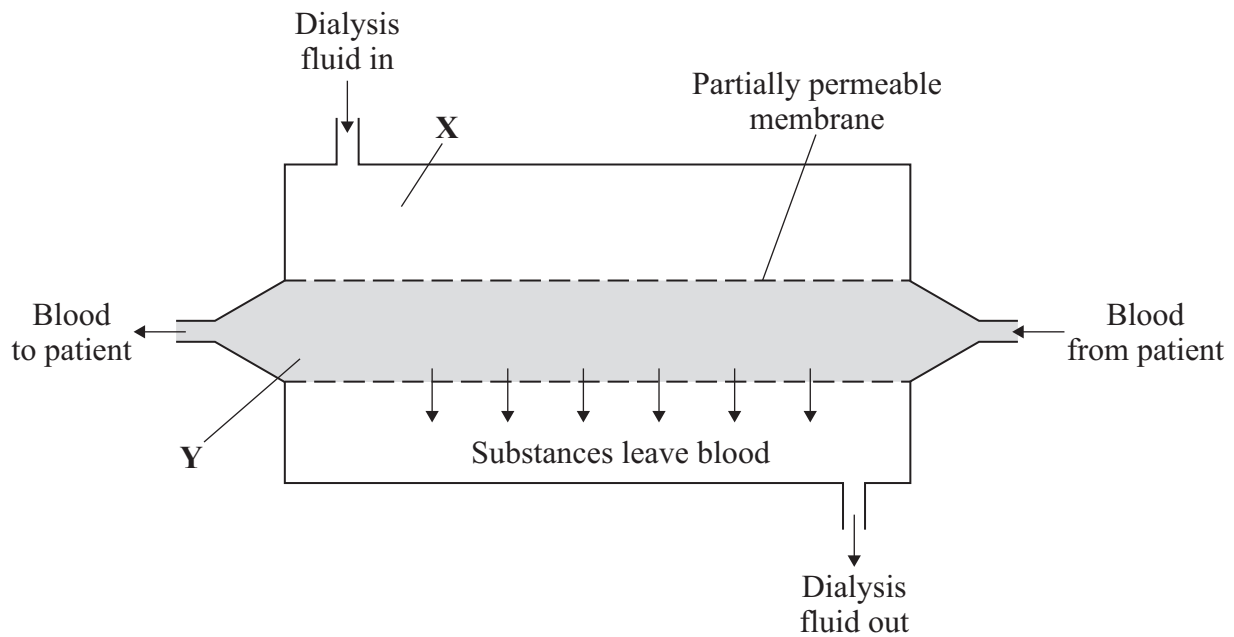
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(1 mark)



- 6 People with kidney disease may be treated by dialysis. The diagram shows a dialysis machine.



- 6 (a) Draw a ring around the correct answer to complete each sentence.

A person loses mass during dialysis. One patient lost 2.2 kilograms during a dialysis session.

- 6 (a) (i) This person lost mass mainly because the substance

salt
urea
water

was removed from

(1 mark)

- 6 (a) (ii) This substance was able to pass through the partially permeable membrane

large.

because its molecules are

round.

small.

(1 mark)



- 6 (a) (iii) The concentration of sodium ions at **X** is 3.15 grams per dm³.

At the end of a dialysis session, the most likely concentration of sodium ions

at **Y** would be

0.00
3.15
6.30

 grams per dm³.

(1 mark)

- 6 (b) The table shows the cost, in the UK, of treating one patient who has kidney disease.

Treatment	Cost per year in pounds
Dialysis	30 000
Kidney transplant:	
operation + first year's medical care	51 000
medical care in each further year	5 000

- 6 (b) (i) During the first year, dialysis treatment is cheaper than a kidney transplant.

How much cheaper is dialysis treatment? pounds
(1 mark)

- 6 (b) (ii) After some time, the cost of treating a patient by a transplant operation would be cheaper than continual treatment by dialysis.

How many years would it take?

Draw a ring around **one** answer.

2 years

3 years

4 years

(1 mark)

- 6 (b) (iii) A transplant patient needs to take drugs for the rest of his life to suppress the immune system.

Why is this necessary?

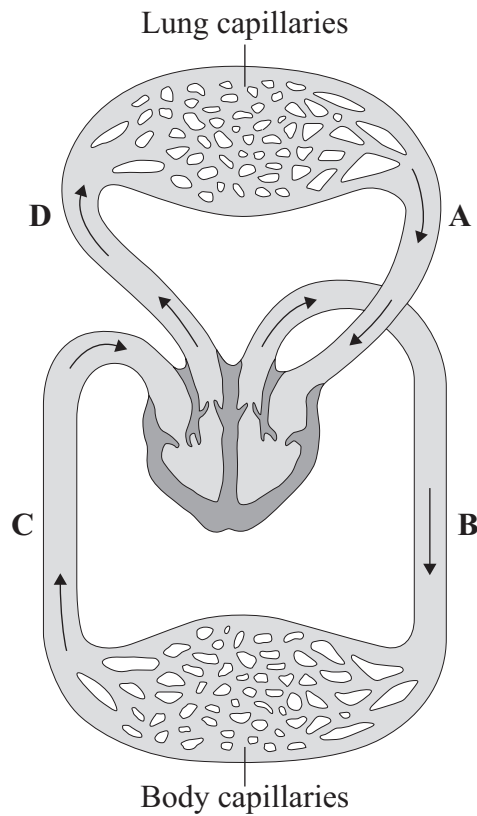
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(1 mark)



7 The diagram shows the human circulation system.



7 (a) (i) Give the letter of **one** blood vessel that is an artery.

(1 mark)

7 (a) (ii) Give the letter of **one** blood vessel that carries oxygenated blood.

(1 mark)



- 7 (b) During exercise, the heart rate increases.

Explain, as fully as you can, why this increase is necessary.

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(4 marks)

6

Turn over for the next question

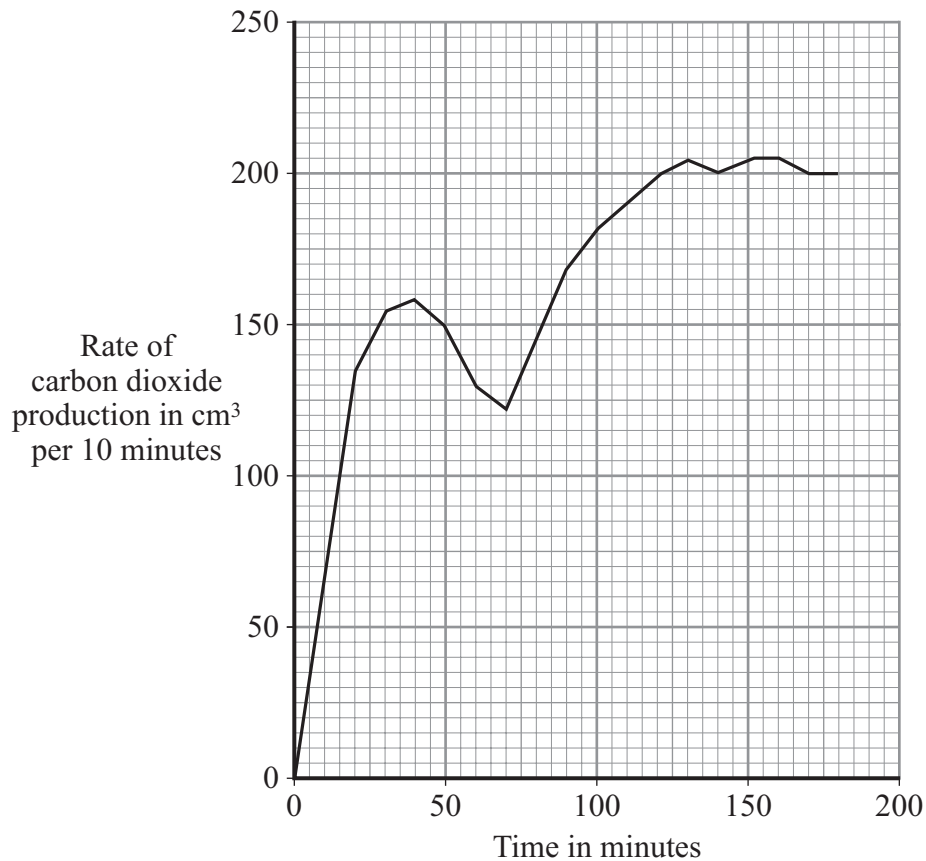
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- 8 Bread dough contains flour, sugar, water and yeast. Yeast makes the dough rise.

Some scientists measured the production of carbon dioxide by yeast in bread dough at 35 °C.

The results are shown in the graph.



- 8 (a) Over the first 70 minutes, the rate of carbon dioxide production increased at first and then decreased.

Explain why the rate decreased towards the end of this period.

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(2 marks)



- 8 (b) The flour contains starch and enzymes similar to those in germinating barley grains.

Use this information to suggest an explanation for the increase in the rate of carbon dioxide production after 70 minutes.

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(3 marks)

5

Turn over for the next question

Turn over ►



- 9 A student removed three similar leaves from a plant. The student spread petroleum jelly (a waterproofing substance) on some of the leaves, as follows:

Leaf A: on the lower surface

Leaf B: on the upper surface

Leaf C: none.

The student placed each leaf in a separate beaker. He weighed each beaker at intervals. The results are shown in the table.

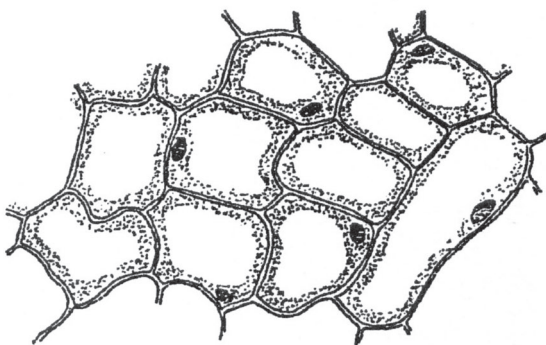
Time in hours	Mass of leaf + beaker in grams		
	Leaf A	Leaf B	Leaf C
0	50.00	55.01	51.99
1	49.99	54.95	51.90
3	49.97	54.90	51.85
5	49.95	54.86	51.80

- 9 (a) Which leaf, **A**, **B** or **C**, lost most water?

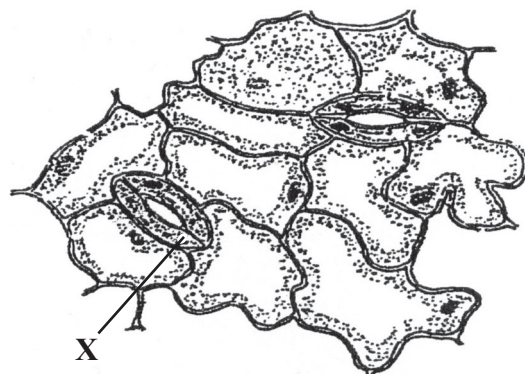
(1 mark)

- 9 (b) The diagram shows the appearance of the upper and lower surfaces of one of the leaves under a microscope.

Upper surface of leaf



Lower surface of leaf



- 9 (b) (i) Name cell **X**.....

(1 mark)



- 9 (b) (ii) The petroleum jelly had a greater effect when it was spread on the lower surface than when it was spread on the upper surface.

Use information from the diagram to explain why.

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(2 marks)

4

END OF QUESTIONS



There are no questions printed on this page

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