

Surname											Other Names										
Centre Number											Candidate Number										
Candidate Signature																					

For Examiner's Use
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General Certificate of Secondary Education  
January 2008

**BIOLOGY**  
**Unit Biology B3**

**Foundation Tier**

**BLY3F**  
**F**



Tuesday 15 January 2008 1.30 pm to 2.15 pm

<p><b>You will need no other materials.</b> You may use a calculator.</p>
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Time allowed: 45 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 to be marked.

**Information**

- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- 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			
Question	Mark	Question	Mark
1		7	
2		8	
3		9	
4			
5			
6			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			



J A N O 8 B L Y 3 F O 1

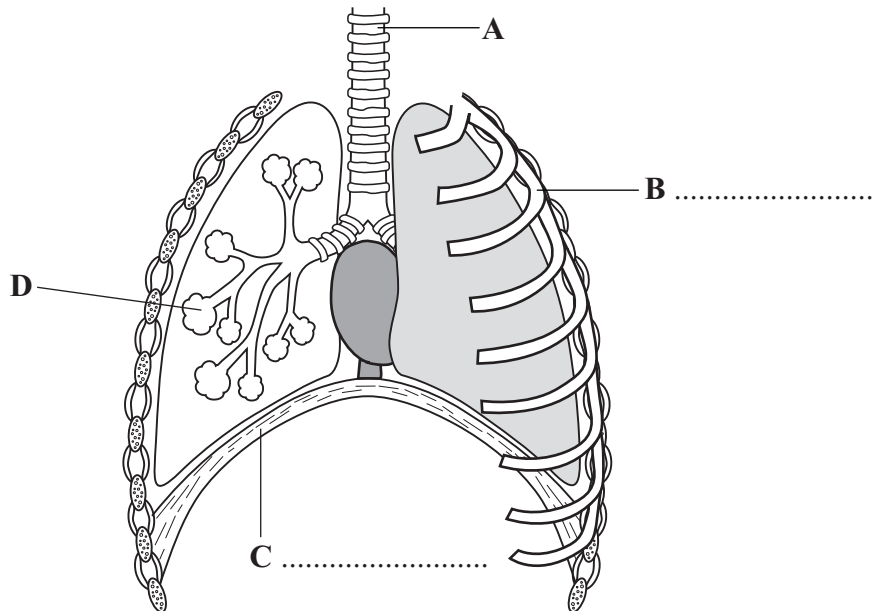
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Answer **all** questions in the spaces provided.

1 The diagram shows the human breathing system.



(a) On the diagram, label structures **B** and **C**.

Choose your answers from the list in the box.

<b>alveoli</b>	<b>diaphragm</b>	<b>rib</b>	<b>trachea</b>
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(2 marks)

(b) (i) Which letter, **A**, **B**, **C** or **D**, shows the site of gas exchange? .....  
(1 mark)

(ii) Which **one** of the following gases has a higher concentration in exhaled air than in inhaled air?

Draw a circle around **one** answer.

**carbon dioxide**

**nitrogen**

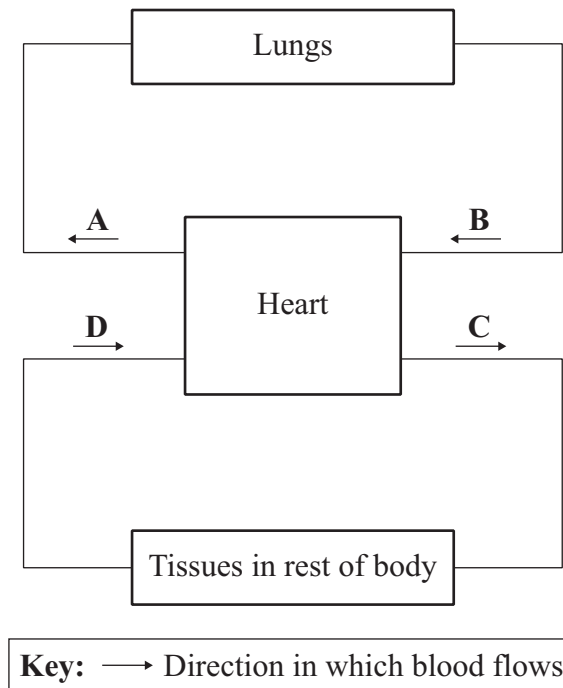
**oxygen**

(1 mark)

Turn over ►



2 The diagram represents the human blood circulation system.



(a) **A**, **B**, **C** and **D** are blood vessels.

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

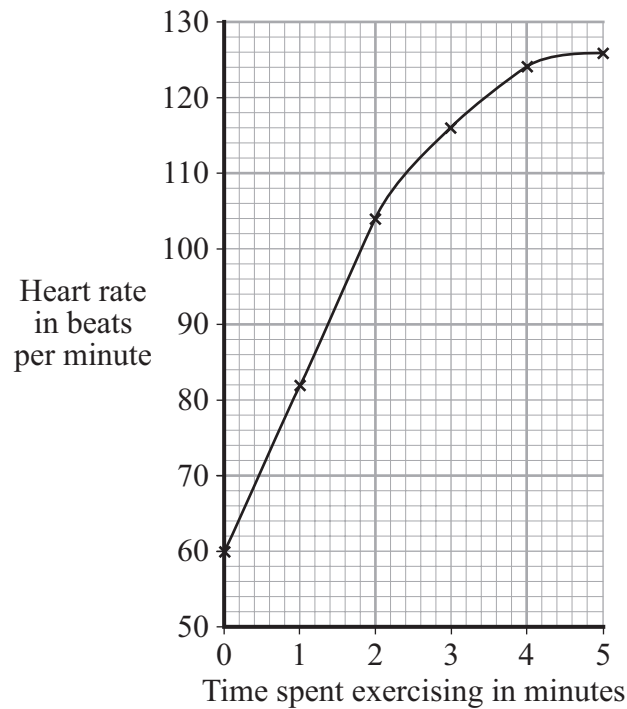
.....  
(1 mark)

(ii) Give the letter of **one** blood vessel that is a vein.

.....  
(1 mark)



- (b) A student pedalled an exercise cycle at constant speed for 5 minutes. The student's heart rate was recorded at one-minute intervals during the exercise. The results are shown in the graph.



- (i) What was the student's heart rate before the exercise began?
- ..... per minute  
(1 mark)
- (ii) How long was it before the student's heart rate reached 124 beats per minute?
- ..... minutes  
(1 mark)
- (c) Which of the following parts of the blood carries most oxygen?

Draw a circle around **one** answer.

**plasma**

**red blood cells**

**white blood cells**

(1 mark)

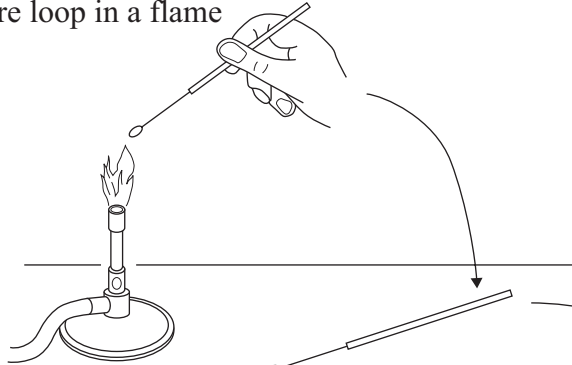
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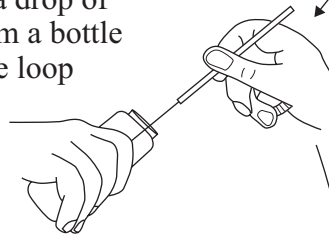
- 3 The diagram shows how a student transferred some sour milk from a bottle to a Petri dish of nutrient agar.

- 1 The student heated a wire loop in a flame

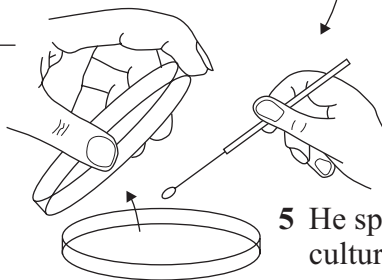


- 2 He placed the wire loop on the bench to cool

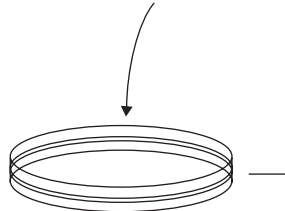
- 3 He removed a drop of sour milk from a bottle using the wire loop



- 4 He raised the lid a little from a Petri dish of sterilised nutrient agar



- 5 He spread the sample of bacterial culture across the nutrient agar



- 6 He replaced the lid and put the Petri dish in an incubator at 25°C for 2 days



List **A** gives four actions carried out by the student.

List **B** gives five possible effects of these actions.

Draw a straight line from each action in List **A** to its effect in List **B**.

Draw only **one** line from each action.

**List A – Action**

Heating loop in flame

Placing loop on bench to cool

Only lifting lid of Petri dish a little

Placing Petri dish in incubator at 25 °C rather than 35 °C

**List B – Effect**

Risk of contamination with bacteria increased

Risk of bacteria entering decreased

Kills bacteria

Prevents air entering

Risk of growth of pathogens decreased

(4 marks)

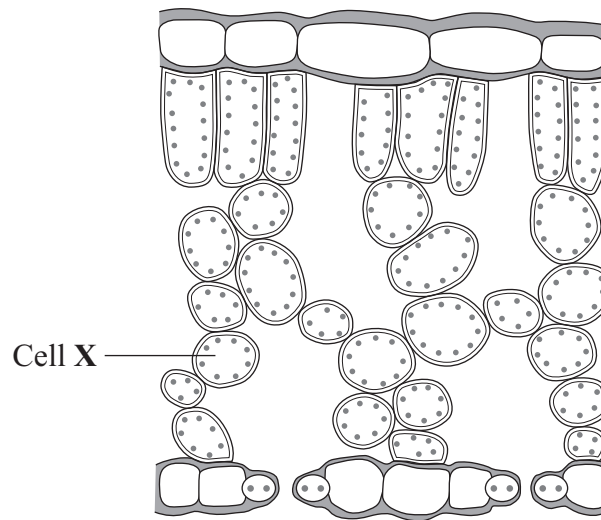
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**Turn over for the next question**

**Turn over ►**



- 4 (a) The diagram shows a section through a plant leaf.  
Water evaporates from cell X.



- (i) **On the diagram**, draw an arrow to show how water vapour from cell X gets out of the leaf.

(1 mark)

- (ii) Name the process by which water vapour is lost from a leaf.

Draw a circle around **one** answer.

osmosis

transpiration

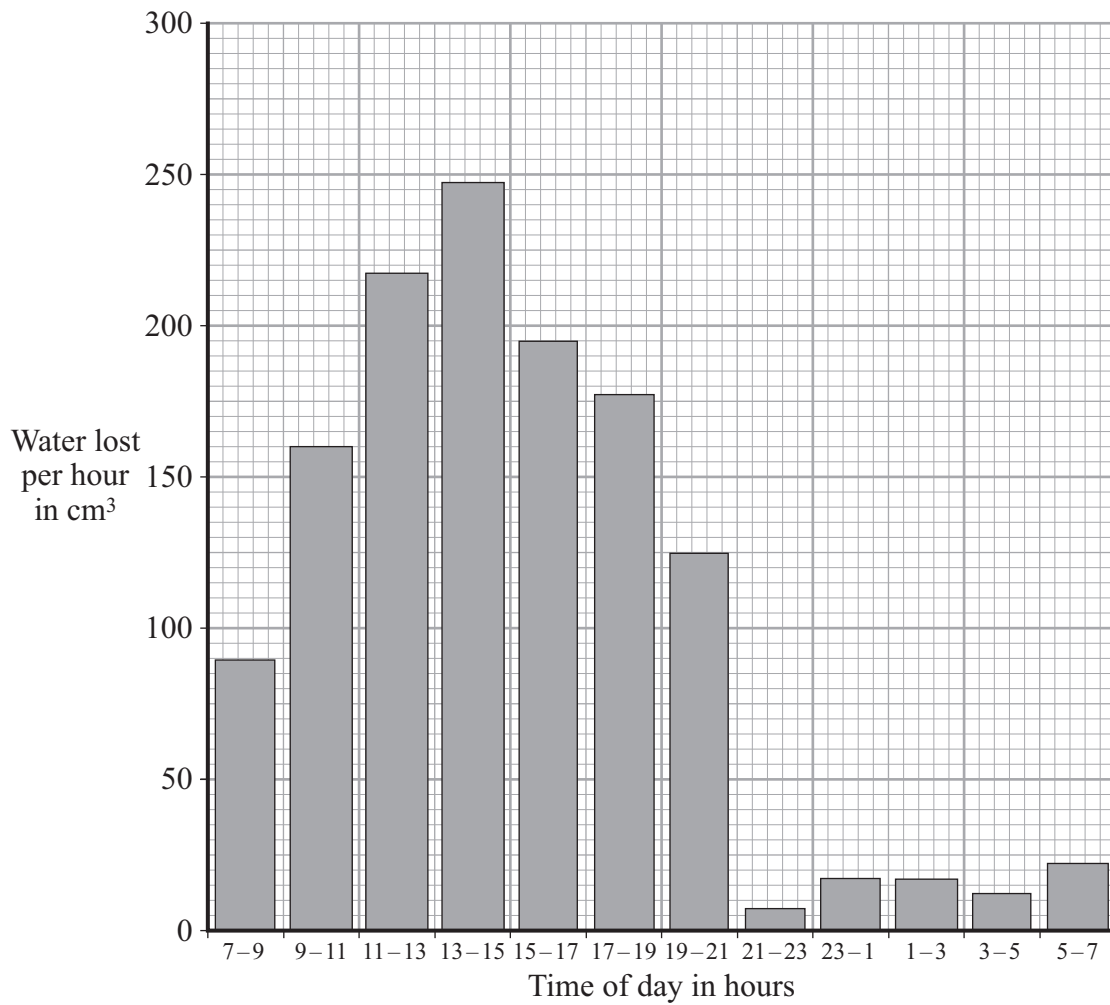
wilting

(1 mark)





- (b) The graph shows how much water was lost from a plant at different times of the day.



- (i) During which 2-hour period was water lost most quickly?

.....  
(1 mark)

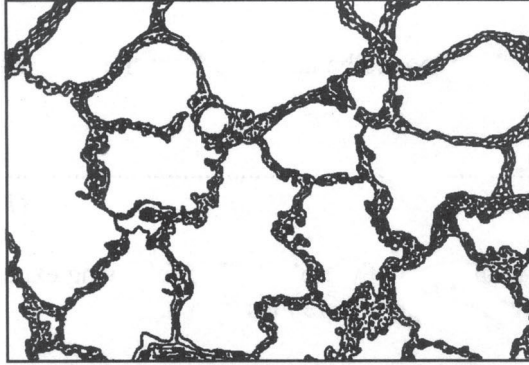
- (ii) Give **one** possible explanation why water was lost most quickly at this time.

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

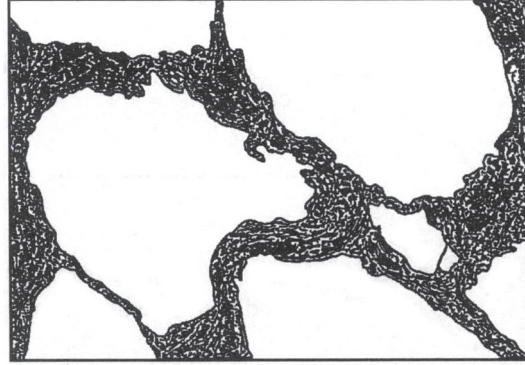


5 Emphysema is a lung disease.

- (a) The drawings show sections through the lung of a healthy person and through the lung of a person with emphysema. The drawings are drawn to the same scale.



Section through the lung of a  
healthy person



Section through the lung of a  
person with emphysema

Use information from the drawings to answer the questions.

What effect does emphysema have on:

- (i) the thickness of the surface used for gas exchange

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

- (ii) the total area available for gas exchange?

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



- (b) Two men did the same amount of exercise.  
One man was in good health. The other man had emphysema.

The results are shown in the table.

	Man with good health	Man with emphysema
Oxygen entering blood in $\text{dm}^3$ per minute	2.1	1.1
Air flow into lungs in $\text{dm}^3$ per minute	90.7	46.0

The man in good health was able to take more oxygen into his blood than the man with emphysema.

Calculate how much more oxygen was taken into the blood per minute by the man in good health. Show your working.

.....  
.....

Answer = .....  $\text{dm}^3$  per minute  
(2 marks)

4

**Turn over for the next question**

**Turn over ►**



- 6 (a) (i) Urine is made in the kidneys and stored for a few hours before being released from the body.

In which organ of the body is urine stored? Draw a circle around **one** answer.

**bladder**

**large intestine**

**liver**

(1 mark)

- (ii) Which **two** of the following substances are **not** found in the urine of a healthy person?

Tick (✓) **two** boxes.

glucose

☐

mineral ions

☐

protein

☐

urea

☐

(2 marks)

- (b) A person with kidney disease may be treated by dialysis or by having a kidney transplant.

Read the information about dialysis and kidney transplants.

- A person needs 3 dialysis sessions a week, each lasting about 8 hours.
- Intake of protein and salt in the food is kept low between dialysis sessions.
- For each patient, dialysis costs £30 000 per year.
- The use of a general anaesthetic can sometimes cause brain damage.
- Drugs to suppress the immune system are given after a kidney transplant.
- A transplant costs £20 000 in the first year plus £6500 in each of the following years for drugs.



Use this information to answer the questions.

- (i) Give **two** advantages of treatment by having a kidney transplant rather than treatment by dialysis.

1 .....

.....

2 .....

.....

(2 marks)

- (ii) Give **one** disadvantage of treatment by having a kidney transplant.

.....

.....

(1 mark)

- (c) The table shows the amounts of some substances in the blood of one patient before dialysis and after dialysis.

Substance	Concentration in blood plasma in grams per dm <sup>3</sup>	
	Before dialysis	After dialysis
Sodium ions	2.88	3.00
Potassium ions	0.22	0.14
Urea	4.50	0.30

During dialysis, substances are removed from the blood.

- (i) Which substance in the table decreased in concentration the most during dialysis?

.....

(1 mark)

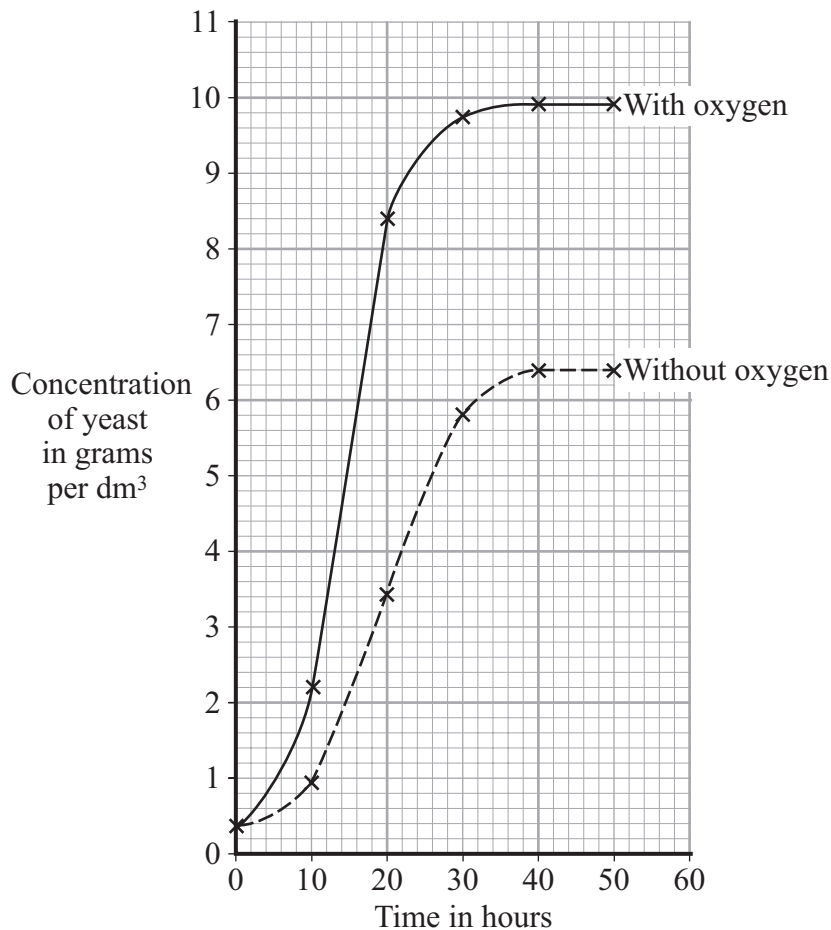
- (ii) By how much did the concentration of this substance decrease?

..... grams per dm<sup>3</sup>  
(1 mark)



- 7 A student grew two batches of yeast in separate flasks. The conditions in each flask were the same except that one flask had a supply of oxygen and the other was without oxygen.

The results are shown in the graph.



- (a) Calculate the average hourly increase in mass of the yeast between 10 hours and 20 hours in the presence of oxygen. Show your working.

.....

.....

Answer ..... grams per dm<sup>3</sup> per hour  
(2 marks)



- (b) Explain why the yeast grew better in the presence of oxygen.

.....

.....

.....

.....

(2 marks)

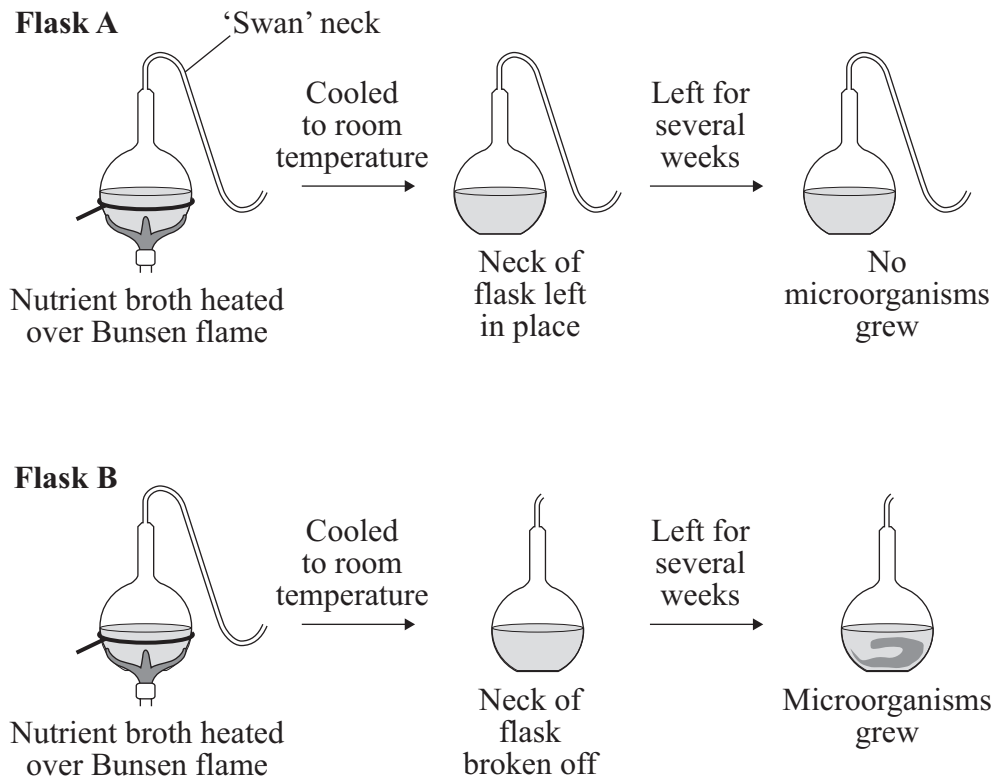
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**Turn over for the next question**

**Turn over ►**



8 In 1862, Louis Pasteur carried out the following experiments.



- (a) (i) Why was each flask heated over a Bunsen flame?

.....

.....

(1 mark)

- (ii) Why was each flask then cooled to room temperature?

.....

.....

(1 mark)

- (iii) Suggest the function of the 'swan' neck in **Flask A**.

.....

.....

(1 mark)





- (b) Do the results of the experiments support the theory of biogenesis?

Explain your answer.

.....

.....

.....

.....

(2 marks)

5
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**Turn over for the next question**

**Turn over ►**



- 9 Read the passage below about biogas production in Sri Lanka, which is a country with a much warmer climate than the UK.

Mr Ratnayake is a farmer. Using nothing more than cow dung, he has enough power to cook and provide heat and light for his home without using a single piece of wood. He collects the manure from his cows in their cattle shed. He then mixes the manure with water and leaves it to ferment in a large concrete pit. The gas produced is collected in a simple storage tank and is piped into his house for use.

The dried manure left after this biogas is generated is richer than ordinary manure. It makes a good organic fertiliser for Mr Ratnayake's crops. He can then sell his crops at a higher price as they are organic produce.

- (a) (i) What is the fuel gas present in biogas?

.....  
(1 mark)

- (ii) Name the process which produces biogas.

.....  
(1 mark)

- (b) (i) Give **two** ways in which Mr Ratnayake benefits from making biogas as described in the passage.

1 .....

.....

2 .....

.....

(2 marks)



- (ii) This design of biogas generator works well in Sri Lanka. It would not work so well in the UK.

Explain why.

.....

.....

.....

.....

*(2 marks)*

<b>6</b>

**END OF QUESTIONS**



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