

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
BIOLOGY B

Unit 2 Modules B4 B5 B6 (Higher Tier)

WEDNESDAY 23 JANUARY 2008

Afternoon
 Time: 1 hour

Candidates answer on the question paper.

Additional materials (enclosed):
 None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)



Candidate Forename

Candidate Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 60.

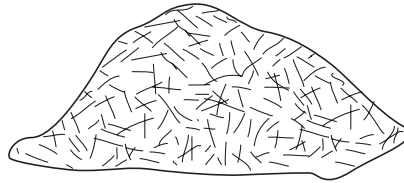
| FOR EXAMINER'S USE | | |
|--------------------|-----------|------|
| Section | Max. | Mark |
| A | 20 | |
| B | 20 | |
| C | 20 | |
| TOTAL | 60 | |

This document consists of **22** printed pages and **2** blank pages.

Answer **all** the questions.

Section A – Module B4

- 1 When Eileen cuts her grass, she puts the cuttings in a heap at the end of her garden.



The grass cuttings decay to form compost.

Eileen adds the compost to the soil in her garden.

- (a) Decay is caused by decomposers.

The decomposers release carbon dioxide. This is part of the carbon cycle.

Put **rings** around **two** processes that release carbon dioxide.

combustion

diffusion

photosynthesis

respiration

translocation

transpiration

[2]

- (b) Decomposers are also examples of **saprophytes**.

What does saprophyte mean?

.....[1]

(c) The grass grows and decays.

This is part of the nitrogen cycle.

Look at the list.

Put a **ring** around the **one** that releases nitrogen gas.

denitrifying bacteria

lightning

nitrifying bacteria

nitrogen-fixing bacteria

respiration

[1]

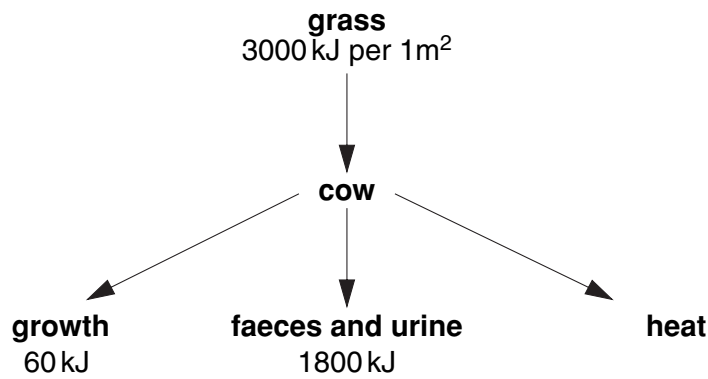
(d) Grass needs nitrogen compounds to grow.

Explain why.

.....[1]

[Total: 5]

2 Look at the energy flow through a cow.



(a) (i) For every 1 m² of grass that a cow eats, how much energy is transferred as heat?

answer kJ [1]

(ii) What process in the cow's cells releases heat?

.....[1]

(b) What percentage of the energy in 1 m² of grass is used for the cow's **growth**?

answer % [1]

(c) If humans use the milk and meat from a cow, what is the maximum amount of energy they can get for every 1 m² of grass?

Put a (ring) around the best answer.

- 30 kJ
- 300 kJ
- 1200 kJ
- 1860 kJ
- 3000 kJ

[1]

[Total: 4]

3 Chris is a farmer.

He grows cabbages in one of his fields.

He uses pesticides to kill the caterpillars that eat his cabbages.

(a) (i) Chris's neighbour, Matt, tells Chris he should **not** use pesticides.

Suggest the reasons why he should **not** use pesticides.

.....
.....
.....[2]

(ii) Chris tries another way to kill the caterpillars.

He puts up nesting boxes for birds.

He hopes the birds will eat the caterpillars.

Suggest why this might **not** work.

.....
.....[1]

(b) (i) Chris notices that his cabbages have yellow leaves.

He adds fertiliser containing magnesium.

After a few weeks he notices that his cabbages grow green leaves.

Explain why.

.....[1]

(ii) Cabbages grow faster with green leaves than yellow leaves.

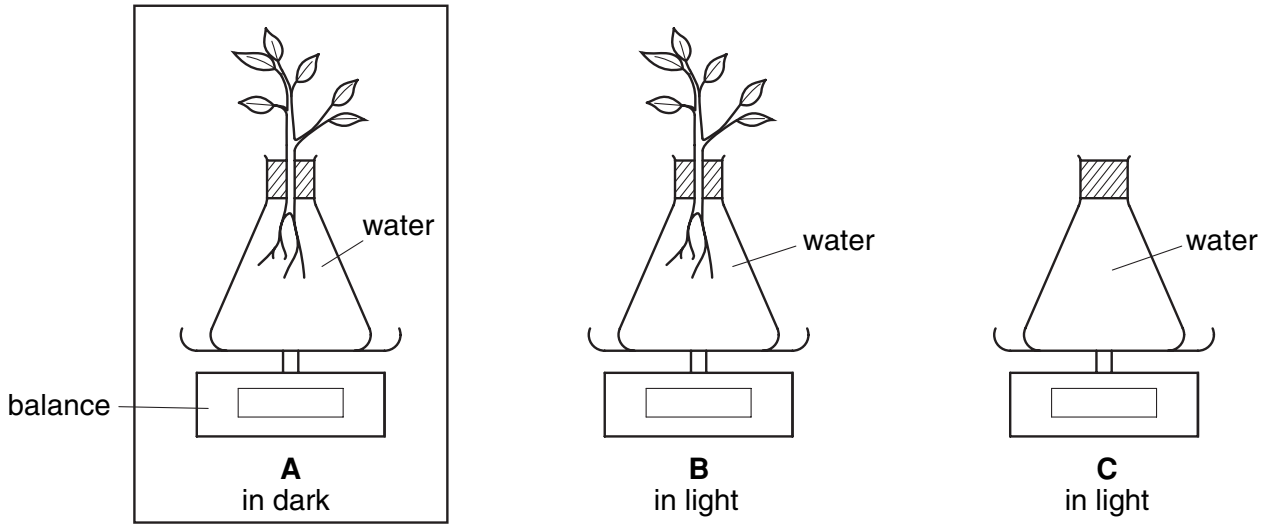
Explain why.

.....[1]

[Total: 5]

4 Kate is investigating water loss in plants.

She sets up three flasks, **A**, **B** and **C**.



The plants in **A** and **B** are identical.

All three flasks are left in the same room, at the same temperature, for 24 hours.

A is kept in a cupboard in the dark.

B and **C** are below a light.

Look at Kate's results.

| | mass at start in g | mass after 24 hours in g |
|----------|-----------------------|-----------------------------|
| A | 810 | 790 |
| B | 810 | 740 |
| C | 720 | 720 |

(a) Explain the difference between the results for **A** and **B**.

.....

[2]

(b) Why did Kate set up flask **C**?

.....
[1]

(c) Kate repeats the experiment, but in a **warmer** room.

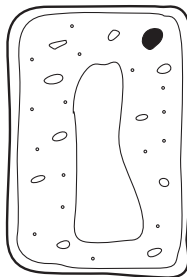
Here are her results.

| | mass at start in g | mass after 24 hours in g |
|----------|-----------------------|-----------------------------|
| A | 810 | 770 |
| B | 810 | 720 |
| C | 720 | 720 |

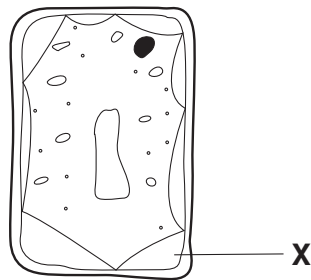
Explain the difference between these results and her first set of results.

.....
[1]

(d) The diagram shows a cell from one of the plants.



After the experiment, the plants are left until there is no water in the flasks. The diagram below shows the same cell when there is no water left in the flasks.



(i) What word describes the cell now?

.....[1]

(ii) What is in the area marked **X**?

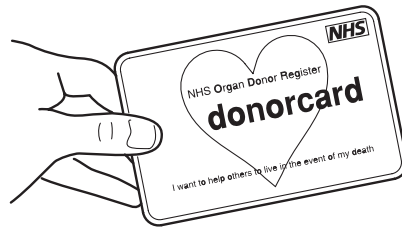
.....[1]

[Total: 6]

Section B – Module B5

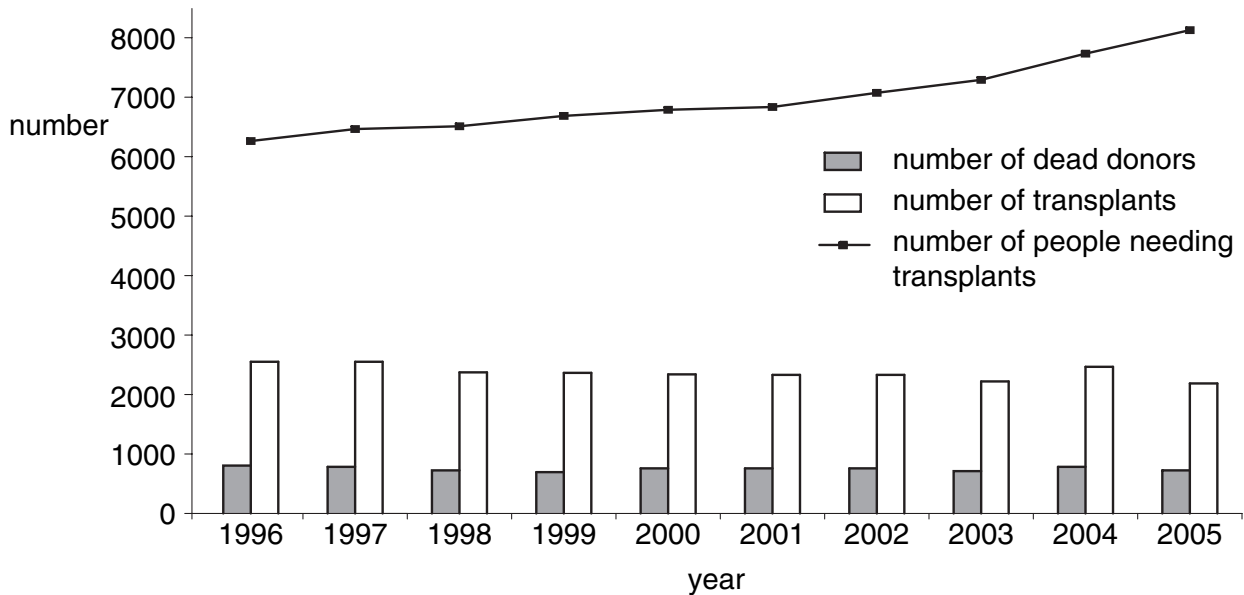
5 Some people carry a donor card.

This means that they wish their organs to be used for transplants if they die.



The graph shows the number of dead donors and the number of transplants carried out from 1996 to 2005.

It also shows the number of people needing transplants.



(a) The Government is keen to encourage more people to be donors.

Use the information in the graph to explain why.

.....

.....

.....[2]

(b) The number of transplants carried out each year is greater than the number of dead donors.

How can this be possible?

.....
.....[1]

(c) Once a person has received a transplant it may **not** be successful.

Write down **one** common problem that may occur after a transplant is received.

.....[1]

[Total: 4]

6 Many couples may need treatment for infertility.

(a) The boxes show some **causes** of infertility and some possible **treatments**.

Draw straight lines to link each **cause** with the most suitable **treatment**.

| cause | treatment |
|------------------------------|------------------------------|
| blocked oviducts | surrogacy |
| ovulation is irregular | use of FSH |
| uterus cannot support a baby | in vitro fertilisation (IVF) |

[2]

(b) A couple may wish to use surrogacy as an infertility treatment.

Write about **two** of the issues they need to consider.

- 1.....
.....
- 2.....
.....[2]

[Total: 4]

7 Scientists have been studying the body of an Egyptian king who died 3000 years ago.

Statues of the king show that he had very long arms.



The scientists have taken X-rays of the king's bones.

They did this to see if he was still growing when he died.

(a) How can scientists tell if a person is still growing by looking at bone X-rays?

.....
.....
.....[2]

(b) The scientists think that the king has long bones because his pituitary gland was making too much of a certain hormone.

Suggest which hormone this is.

.....[1]

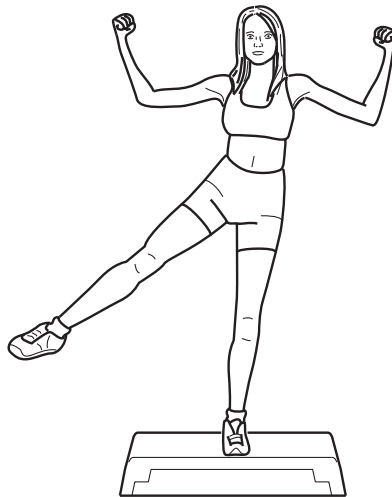
(c) Statues of the king's relatives also show signs of extra long bones.

What does this suggest about the cause of this condition?

.....[1]

[Total: 4]

8 When Sharon exercises, many changes happen in her body.



(a) The exercise releases extra heat energy.

Sharon's sweat glands help to control her body temperature.

Write about how the sweat glands help to control the temperature of the body.

.....

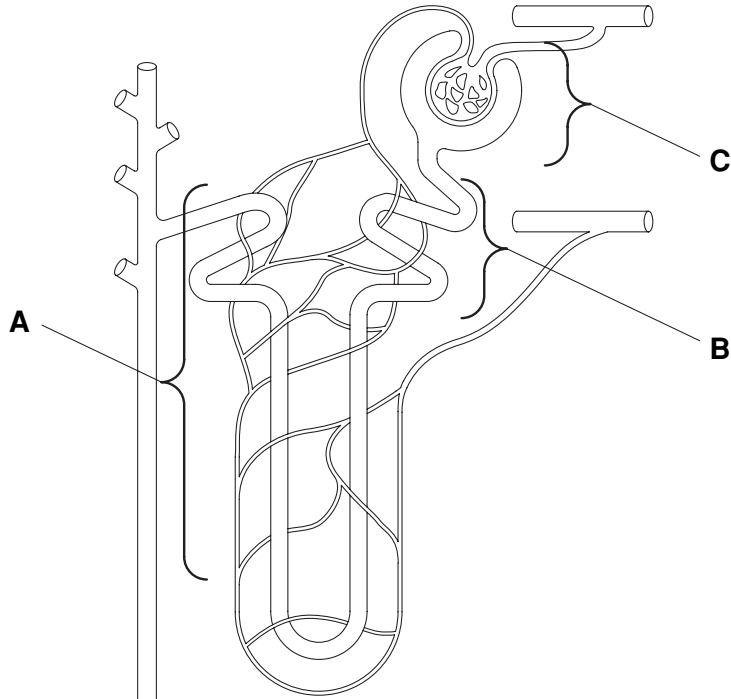
.....

.....[2]

(b) When exercising, Sharon can lose a lot of salt from her body in sweat.

The level of salt is regulated by the kidney.

The diagram shows a kidney tubule.



Which region of the kidney tubule, **A**, **B** or **C**, is responsible for regulating salt levels in the body?

..... [1]

(c) To supply Sharon’s muscles with enough oxygen, her heart rate is increased.

(i) Write down the name of the area of the heart that controls the heart beat.

.....[1]

(ii) Write down the name of **one** hormone that can alter the heart rate.

.....[1]

[Total: 5]

9 Read the following article about asthma.

Is asthma becoming more common?

Asthma affects all age groups but appears to be more common in children.

It has been estimated that 1 in 7 children in the UK have asthma and about 1 in 30 adults.

No one really knows why some people get asthma but different things can trigger an attack in different people.

Common causes of asthma attacks are dust mites, pollen, cat and dog hairs and even certain foods such as peanuts.

(a) There are about 14 million children and 45 million adults in the UK.

Use the information in the article to work out how many people have asthma in the UK.

answer = [2]

(b) Describe **one** treatment of asthma.

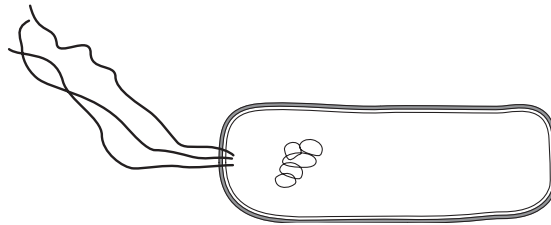
.....
.....[1]

[Total: 3]

Section C – Module B6

10 Look at the diagram.




It shows a bacterial cell.



(a) Bacteria can be classified by their shape.

Finish the table by writing in the shape of each type of bacterium.

The first one has been done for you.

| type of bacterium | shape |
|---|------------|
|  | <i>rod</i> |
|  | |
|  | |

[2]

(b) (i) Bacteria such as *Nitrobacter* are important in the nitrogen cycle.

Describe what *Nitrobacter* do.

.....
[1]

(ii) The nitrogen cycle also involves nitrogen-fixing bacteria.

Write down the name of **one** type of nitrogen-fixing bacterium.

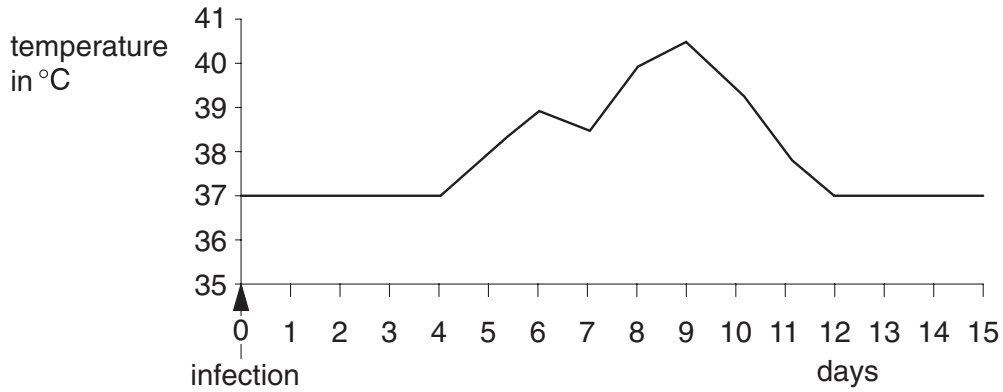
.....[1]

[Total: 4]

11 Microorganisms can cause disease.

(a) Look at the graph.

It shows the temperature of someone suffering from a bacterial disease.



(i) How many days did the incubation period last?

..... days [1]

(ii) Why do large numbers of bacteria cause the increase in temperature?

..... [1]

(b) Penicillin can be used to treat bacterial infections.

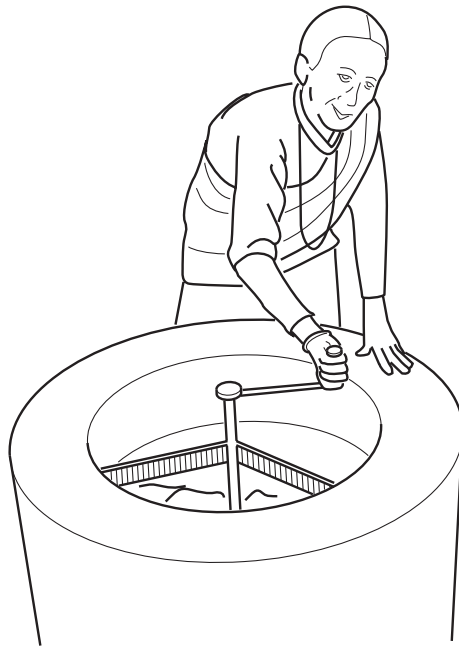
Write down the **name** of the scientist who discovered penicillin.

.....[1]

[Total: 3]

12 Look at the picture.

It shows Mitha with her biogas digester.



(a) Mitha uses the biogas to heat her home.

Write down **one other** use of biogas.

.....[1]

(b) Describe **one** advantage of using biogas instead of using fossil fuels.

.....
.....[1]

(c) As the digester produces biogas it gets hot.

Mitha needs to check that the digester does **not** get too hot.

Explain why.

.....
.....[2]

[Total: 4]

13 Robert has diabetes.

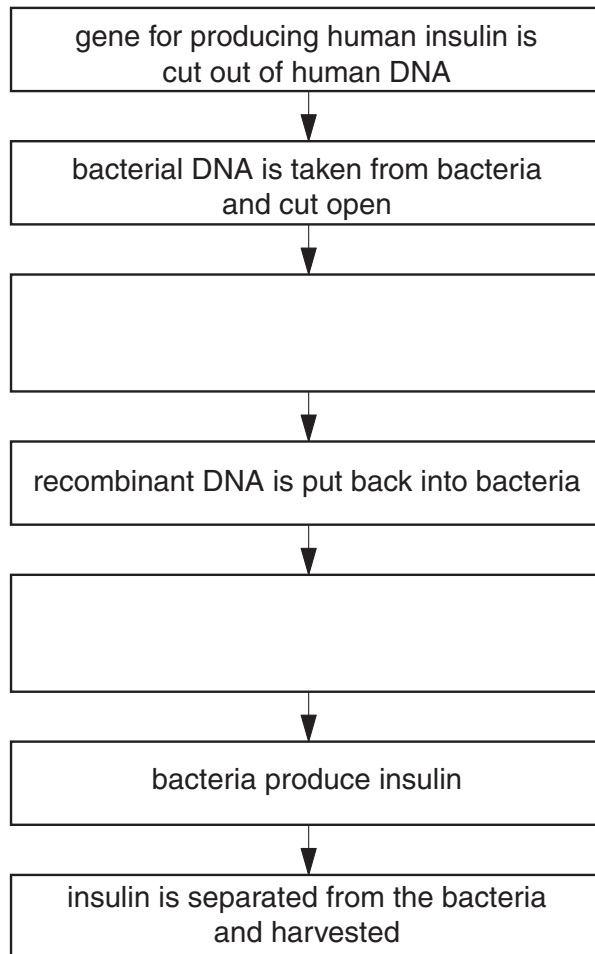
He has to inject insulin into his body to control his blood sugar level.

Bacteria have had their DNA changed so that they make human insulin.

(a) Look at the flow diagram.

It shows the stages in the production of human insulin.

Finish the diagram by writing in the missing stages.



[2]

(b) Write down the name of the type of enzyme used to cut DNA.

.....[1]

(c) Diet is important to Robert.

He eats food with a low sugar content.

The food industry uses the enzyme sucrase to produce food that Robert can eat.

Explain how sucrase produces a sweet food with a low sugar content.

In your answer include

- what sucrase does
- why the food is still sweet even though it has a low sugar content.

.....
.....
.....
.....[2]

[Total: 5]

14 Kim investigates the effect of temperature on yeast activity.

She measures the time it takes to make 5 cm^3 of carbon dioxide.

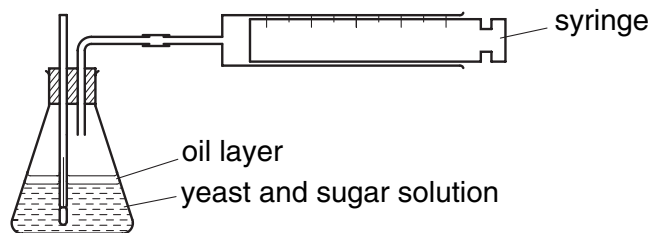
Each experiment is done at a different temperature.

Kim makes sure she does a fair test.

She always uses

- 200 cm^3 of sugar solution
- 1 g of yeast.

This is the apparatus she uses.



Look at Kim's results.

| temperature in $^{\circ}\text{C}$ | time to make 5 cm^3 of carbon dioxide in minutes |
|--------------------------------------|--|
| 10 | 24 |
| 20 | 38 |
| 30 | 5 |
| 40 | 2 |
| 50 | 15 |
| 60 | 56 |

- (a) Kim identifies 20 °C as an anomalous result.

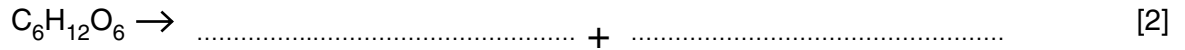
She repeats the experiment at this temperature and gets a result that fits the pattern.

Suggest a time for this result.

.....[1]

- (b) The yeast in Kim’s experiment respire anaerobically.

Finish the balanced equation for anaerobic respiration.



- (c) Kim knows that yeast is used in the brewing industry to make beer.

She finds out more about the brewing industry and discovers that after the beer is brewed it is pasteurised.

Explain why beer is pasteurised.

.....
.....[1]

[Total: 4]

END OF QUESTION PAPER

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