

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B632/02

BIOLOGY B

Unit 2 Modules B4 B5 B6 (Higher Tier)

Candidates answer on the question paper.
A calculator may be used for this paper.

OCR supplied materials:

None

Other materials required:

- Pencil
- Ruler (cm/mm)

Tuesday 7 June 2011

Afternoon

Duration: 1 hour



Candidate forename						Candidate surname					
Centre number						Candidate number					

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

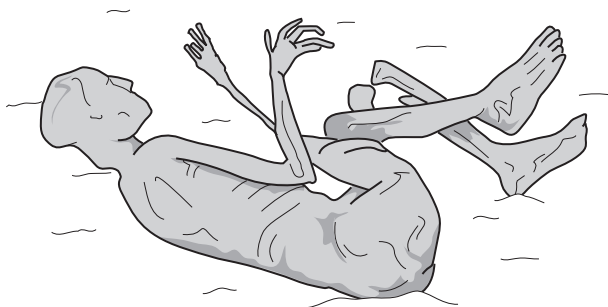
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module B4

- 1** Scientists have found ancient bodies buried in bogs (swamps).



Some bodies are more than 2000 years old but have only partly decayed.

One reason is the low temperature in the bogs slows down the rate of decay by decomposers.

- (a)** Suggest **one other** reason why the bodies have only partly decayed.

..... [1]

- (b)** Low temperatures slow down the rate of decay by decomposers.

Explain why.

.....
 [1]

- (c)** When the bog bodies are dug up they usually start to decay more quickly.

- (i)** As dead bodies decay, nitrogen compounds in the bodies break down into nitrates.

This is part of the nitrogen cycle.

Write down **one** nitrogen compound that breaks down into nitrates.

..... [1]

- (ii)** As dead bodies decay, gases are released.

Write down the name of **one** gas that is released.

..... [1]

3

- (d) The bogs in which the bodies are found are low in nitrates.

One reason for this is the slow decay of dead animal and plant remains.

Another reason is the presence of one type of bacteria that removes nitrates from the bog and converts them to another substance.

- (i) What **type** of bacteria would remove nitrates from the bog?

..... [1]

- (ii) What substance are the nitrates converted to?

..... [1]

- (e) Many of the bodies have been discovered when the bogs have been dug up to remove peat.

Peat is made of partly decayed plant remains.

Peat can take thousands of years to form.

After it is dug up it is dried and then burnt as a fuel.

Is peat an example of a biofuel?

Give **one** reason for your answer.

.....

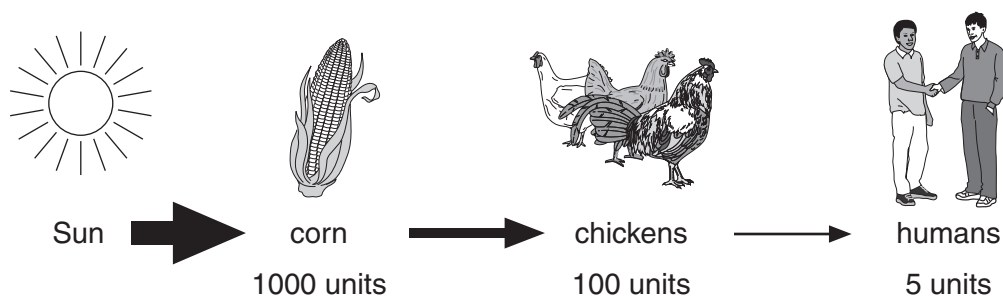
..... [1]

[Total: 7]

4

- 2 The diagram shows energy flow along a food chain.

The numbers show the amount of energy at each stage.



- (a) Not all the energy at one stage of the food chain is transferred to the next stage.

Write down **one** reason why some energy is lost from the food chain.

..... [1]

- (b) (i) What percentage of the energy in the corn is transferred to the chickens?

.....

answer% [1]

- (ii) What percentage of the energy in the corn is transferred to the humans?

.....

answer% [1]

- (c) As well as eating chickens, humans can also eat corn.

Explain **one** advantage to humans of eating corn compared with eating chickens.

Use information from the diagram to help you answer.

.....
 [1]

5

(d) Some chickens are battery farmed. They are kept in small cages.

Other chickens are kept in bigger cages and have more room to move around.

Some people think it is more ethical for chickens to have more room to move around.

Explain **one disadvantage** of letting chickens move around more.

.....

.....

.....

..... [2]

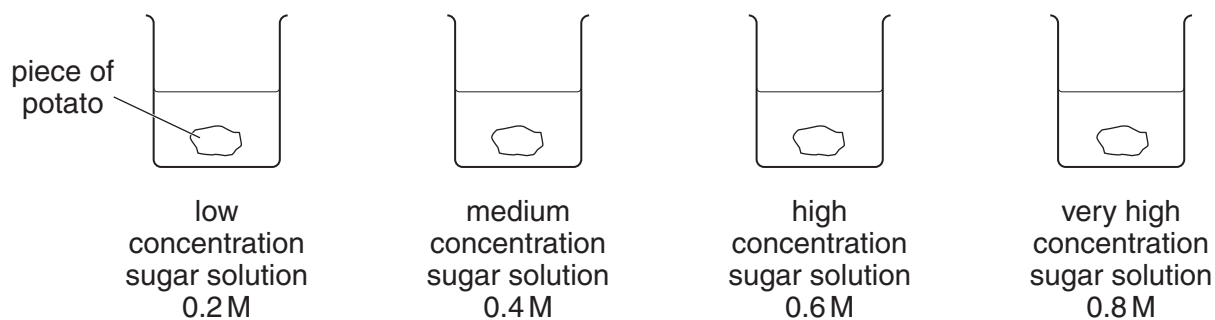
[Total: 6]

3 Cathy is investigating osmosis.

She measures the mass of four pieces of potato.

She leaves each piece in a different sugar solution for 24 hours.

She then measures the mass of each piece again.



The table shows her results.

concentration in M	0.2	0.4	0.6	0.8
mass at start in g	10.1	9.9	10.0	10.1
mass after 24 hours in g	10.4	10.1	9.7	9.6

(a) In which solution does the potato **increase** in mass the most? M

In which solution does the potato **decrease** in mass the most?..... M [1]

(b) Explain why some pieces of potato **increase** in mass.

Use ideas about osmosis in your answer.

.....

.....

..... [2]

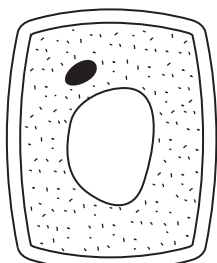
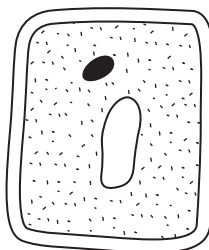
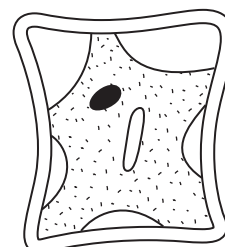
7

- (c) Cathy puts another piece of potato in pure water for 24 hours.

She uses a microscope to look at some of the cells from the potato.

- (i) What would the cells look like?

Choose **A**, **B** or **C**.

**A****B****C**

answer

[1]

- (ii) What word describes the cells she sees?

Put a ring around the answer.

crenated**flaccid****plasmolysed****turgid****wilted**

[1]

- (iii) Leaf palisade cells contain structures which are **not** found in these potato cells.

Write down the name of these structures.

..... [1]

- (iv) The structure of a xylem cell is different from the structure of these potato cells.

Write down **one** way in which the structure of a xylem cell is different.

.....
 [1]

[Total: 7]

Section B – Module B5

- 4 Look at the picture.

It shows Winston donating blood.



- (a) The blood Winston donates can be given to someone with haemophilia.

Haemophilia is a blood disorder.

One important function of blood is affected.

What is this function?

..... [1]

- (b) Winston's blood is transported by a **double** circulatory system.

What is meant by a double circulatory system?

.....
 [1]

- (c) In about 200AD Galen developed ideas about the circulatory system.

Describe **one** of Galen's ideas about blood circulation.

.....
 [1]

- (d) The heart pumps blood around the body.

The heartbeat is controlled by a group of nerve cells in the heart.

Write down the name of this group of nerve cells.

..... [1]

(e) Look at the table.

It shows the percentage of the UK population with each blood group.

blood group	percentage of UK population
O positive	37
O negative	7
A positive	35
A negative	7
B positive	8
B negative	2
AB positive	3
AB negative	1

The different blood groups depend on the presence or absence of agglutinins.

Agglutinins include

- antigen A and antigen B
- antibody a and antibody b.

(i) What is the total percentage of the UK population with **no antibodies a** or **b** in their blood?

.....

answer % [1]

(ii) Part of the population also has another antigen called the rhesus antigen.

What is the total percentage of the UK population **with** the rhesus antigen?

.....

answer % [1]

(f) If someone with blood group O is given blood that is blood group A, their blood cells will clump together.

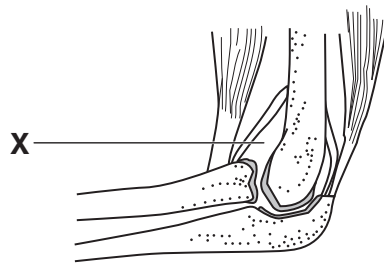
Explain why.

.....

..... [1]

[Total: 7]

- 5 Look at the picture of an elbow joint.



- (a) Part **X** contains a liquid.

- (i) Write down the name of this liquid.

..... [1]

- (ii) What is the function of this liquid?

..... [1]

- (b) Finish the sentences about the elbow joint by writing one word in each space.

The human body contains different types of joints.

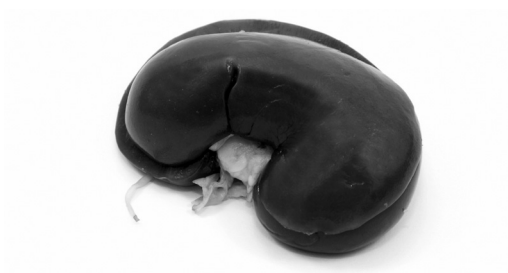
The elbow joint is an example of a joint.

The joint is moved by **two** muscles called the biceps and the

These two muscles pull the arm in opposite directions. Muscles that pull in opposite directions are called muscles. [3]

[Total: 5]

6 Look at the picture of a kidney.



(a) The kidney removes urea from the blood.

Urea is made in the body when a substance is broken down.

Write about how urea is made.

In your answer include

- where urea is made
- which substance urea is made from.

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

(b) Ecstasy is a drug that can affect the release of anti-diuretic hormone (ADH).

Ecstasy can result in the blood becoming too dilute.

Explain why.

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

(c) A living person can donate a kidney.

Explain why this is possible.

..... [1]

[Total: 5]

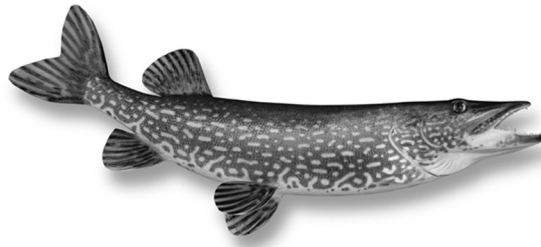
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- 7 Humans have organs called lungs to take oxygen into the blood.

Look at the picture of a pike.



- (a) If a pike is taken out of water it cannot get oxygen into its blood.

Explain why.

..... [1]

- (b) Pike have gills.

Their gills are adapted for efficient gas exchange.

Write down **two** adaptations and explain how each adaptation makes the gills efficient.

adaptation 1

explanation

.....

adaptation 2

explanation

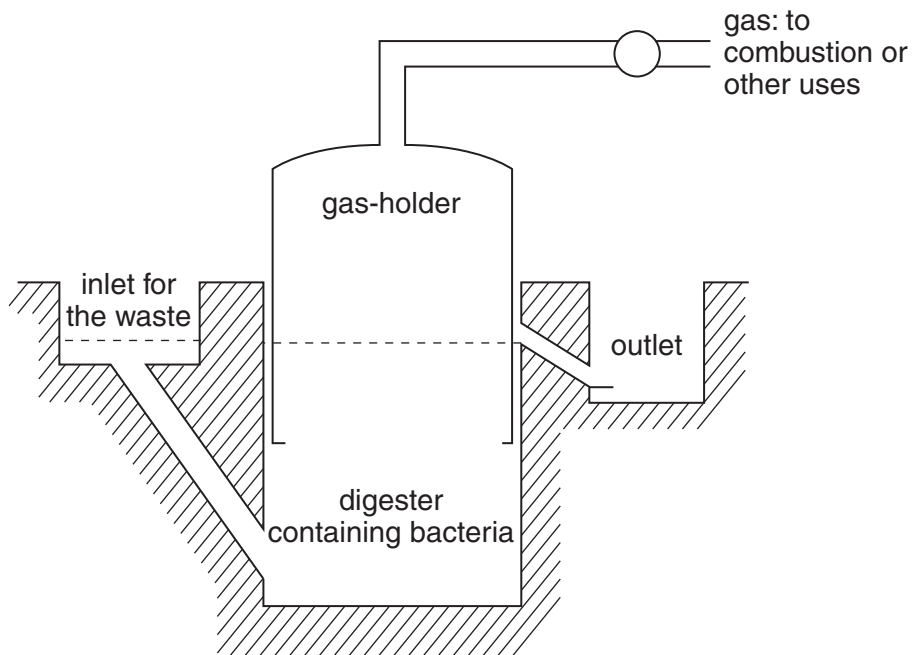
..... [2]

[Total: 3]

Section C – Module B6

- 8 Look at the diagram of a digester.

The digester turns waste into fuel.



- (a) The digester produces a mixture of gases.

The main gas in this mixture is methane.

One use of methane is to generate electricity.

Write down **one other** use.

..... [1]

- (b) It is important that the concentration of methane in this mixture is above 50%.

Write down **two** reasons why this is important.

1

2 [2]

15

- (c) The digester contains bacteria.

Bacterial cells are different from both plant and animal cells.

Look at the table.

It shows features found in three different cells, **A**, **B** and **C**.

cell A	cell B	cell C
cell wall	cell wall	no cell wall
chloroplasts	no chloroplasts	no chloroplasts
cytoplasm	cytoplasm	cytoplasm

Which of these three cells could be a bacterial cell?

cell

[1]

- (d) Chicken dung is waste that is used in digesters.

On average, a chicken produces 0.15 kg of dung per day.

A fridge would use the energy from 4.5 kg of chicken dung per day to run for 24 hours.

How many chickens would be needed to make 5 fridges work for 24 hours?

Show your working out.

answer

[2]

[Total: 6]

- 9 (a) Richard owns a brewery making alcoholic drinks.

The alcoholic drinks are made by fermentation.

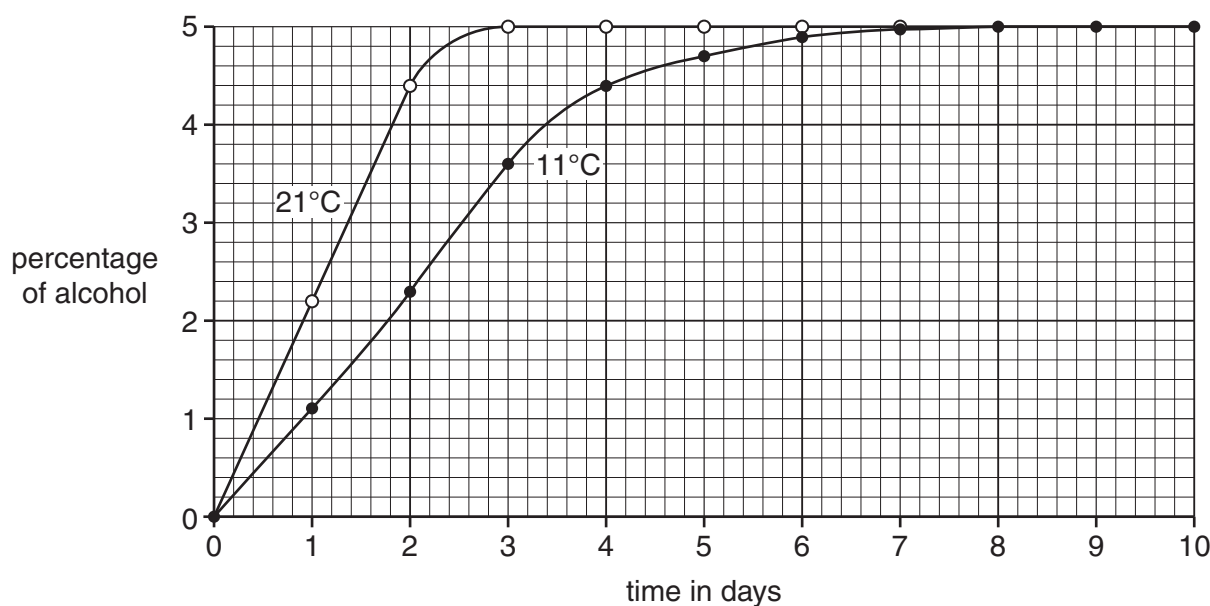
Fermentation uses yeast.

Write down the **balanced** chemical equation for the fermentation of glucose.

..... [2]

- (b) Look at the graph.

It shows how the percentage of alcohol changes when beer is brewed at two different temperatures.



- (i) The graph shows that alcohol is produced more quickly at 21 °C than at 11 °C.

Suggest how **temperature** affects yeast reproduction.

..... [1]

- (ii) Use data from the first two days on the graph to suggest how the rate of yeast reproduction changes when the temperature increases from 11 °C to 21 °C.

..... [1]

17

(c) In Brazil, alcohol made using yeast is used as a **biofuel**.

Write down **one** advantage of using biofuels.

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

[Total: 5]

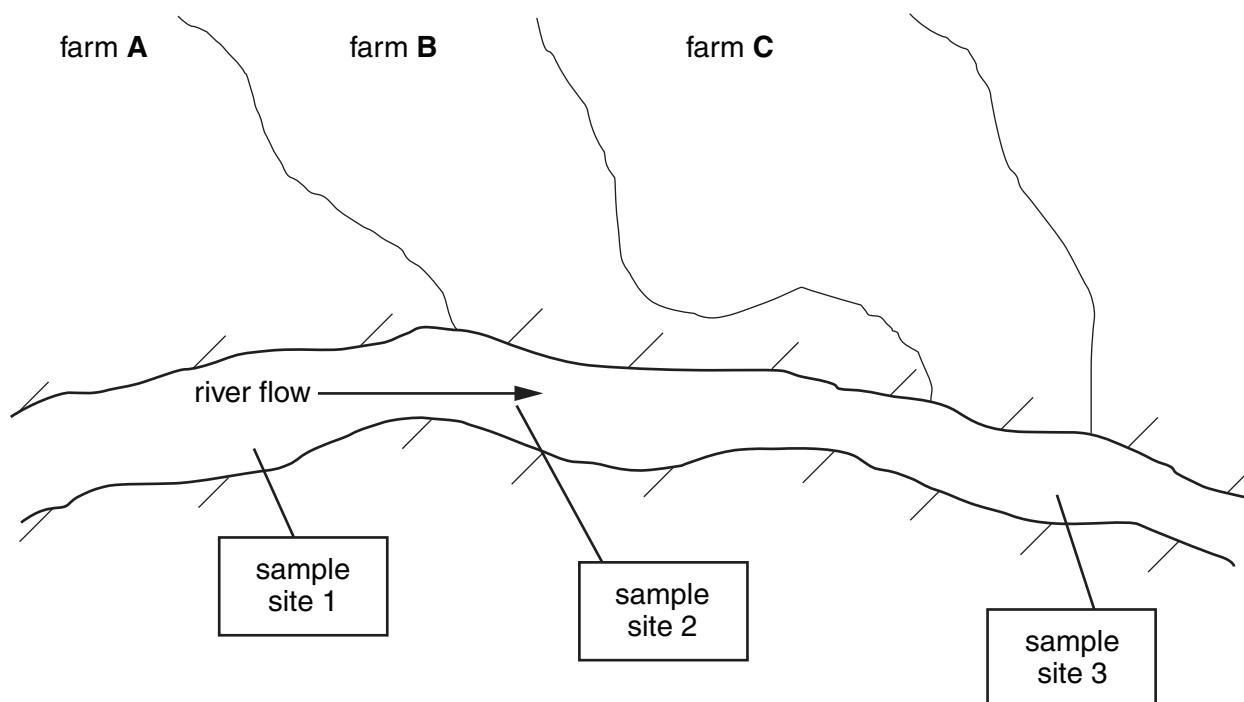
10 Cotton is a crop grown in many parts of the world.

Several types of insect can damage cotton plants.

Some farmers use insecticides to prevent damage to their crops.

Some farmers use fertilisers to improve the growth of their crops.

Look at the diagram. It shows three neighbouring farms.



- (a)** Scientists measure the amounts of insecticide and oxygen in the water at three sample sites, 1, 2 and 3.

Farm **B** uses insecticides, farm **A** does not.

Farm **A** uses fertilisers.

- (i)** Sample site 3 has low levels of oxygen.

The scientists believe that farm **A** is responsible for this.

Describe how farm **A** could be responsible for the low levels of oxygen at sample site 3.

.....

.....

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

19

- (ii) Sample site 3 has high levels of insecticide.

The river eventually flows into the Atlantic Ocean 500 miles away from the farms.

Humpback whales live in the Atlantic Ocean.

In the short term the concentration of insecticide in the water will not kill whales.

Scientists believe in the long term the whales could be seriously harmed by these insecticides.

Explain how.

In your answer write about

- why the insecticide accumulates inside the humpback whales
- how this accumulation harms the humpback whales.

.....

.....

.....

..... [2]

- (b) Farm A grows genetically engineered cotton to resist insect pests.

The cotton plant has been genetically engineered to make a substance which is poisonous to insects.

What is the name of the new type of organism formed in this way?

Put a tick (✓) in the box next to the correct name.

chromosome

☐

generation

☐

pathogen

☐

plasmid

☐

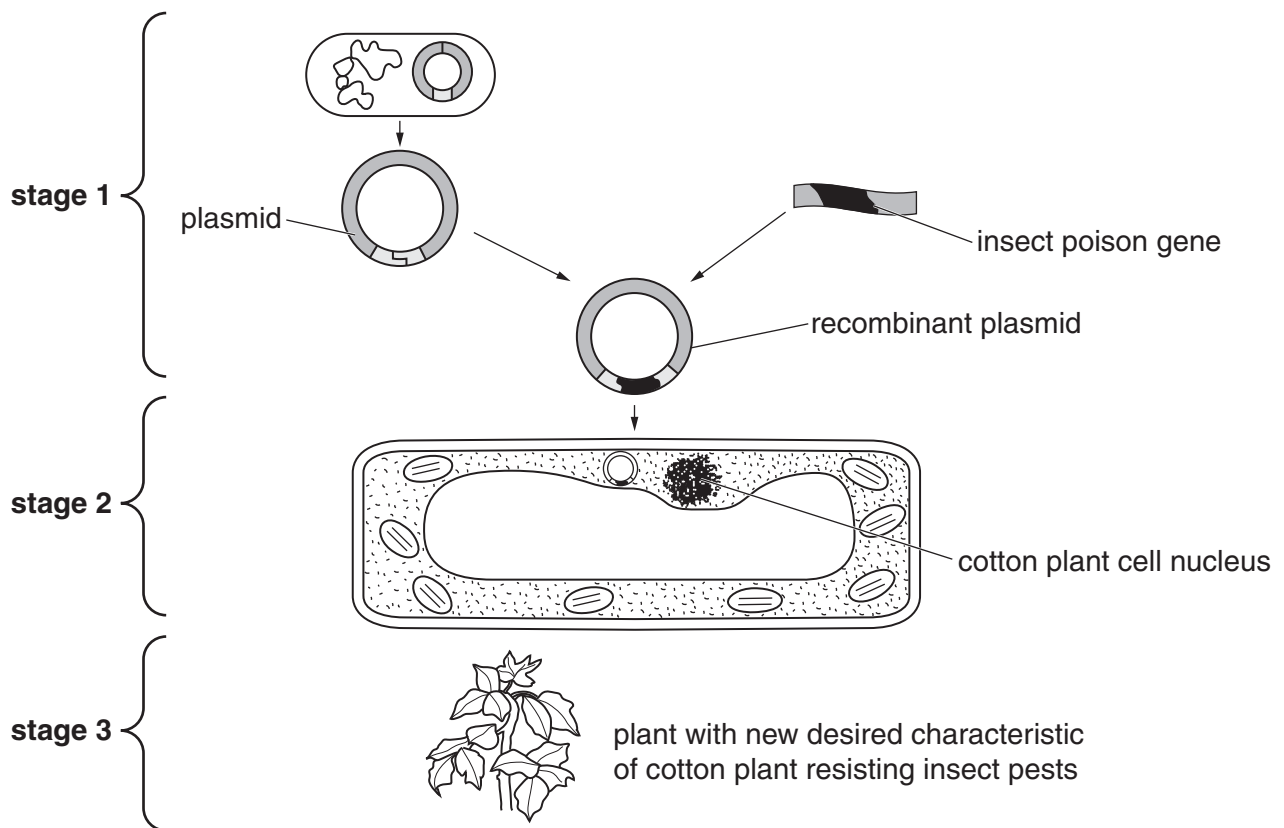
transgenic

☐

[1]

(c) Look at the diagram.

It shows how a genetically engineered cotton plant is produced.



In **stage 1** two different enzymes are needed to form the recombinant plasmid.

Complete the table by naming each type of enzyme and describing what it does to the DNA.

type of enzyme	what it does to the DNA
1	
2	

[2]

[Total: 7]

11 MRSA is a bacterial 'superbug'.

Hospitals take strict measures to reduce the spread of MRSA.

They have antiseptic gel on each ward to use on hands.

Patients who have a MRSA infection are given antibiotics.

Antiseptics and **antibiotics** are both used to kill micro-organisms that cause disease.

Write down **two** ways antibiotics are different from antiseptics.

1

.....

2

..... [2]

[Total: 2]

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