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Oxford Cambridge and RSA

Accredited

GCSE (9–1) Combined Science (Biology) A (Gateway Science)

H

J250/08 Paper 8 (Higher Tier)

Sample Question Paper

Date – Morning/Afternoon

Time allowed: 1 hour 10 minutes

You may use:
- a scientific or graphical calculator
- a ruler

First name	
Last name	
Centre number	
Candidate number	

INSTRUCTIONS
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**.
- Quality of extended responses will be assessed in questions marked with an asterisk (*).
- This document consists of **24** pages.

SECTION A

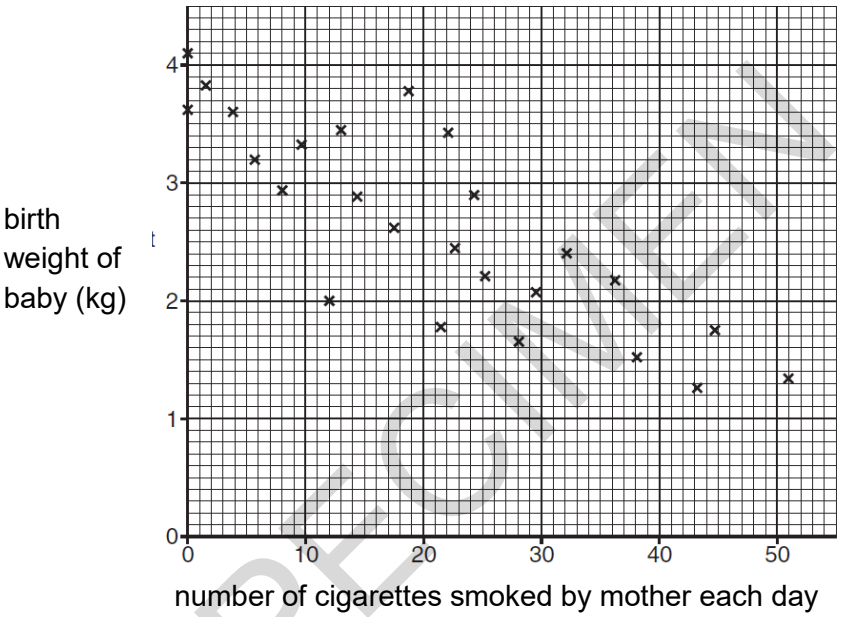
You should spend a maximum of 20 minutes on this section.

Answer **all** the questions.

1 Scientists recorded the birth weights of some babies.

They also recorded how many cigarettes each baby's mother smoked each day.

The results are shown on the graph.



Which of these statements is true?

A All mothers who smoke 12 cigarettes a day will have babies that weigh 2 kg.

B Birth weight increases as the number of cigarettes smoked increases.

C The data only represents a small percentage of births per year.

D The trend in the data shows a positive correlation.

Your answer ☐

[1]

2 The number of daisies on a school field is investigated.

A square frame is used to count the number of daises in six different areas of the field.

The table shows the results.

frame	number of daisies counted in each square
1	10
2	22
3	14
4	7
5	12
6	7
mean	

Calculate the **mean** number of daises.

A 7

B 12

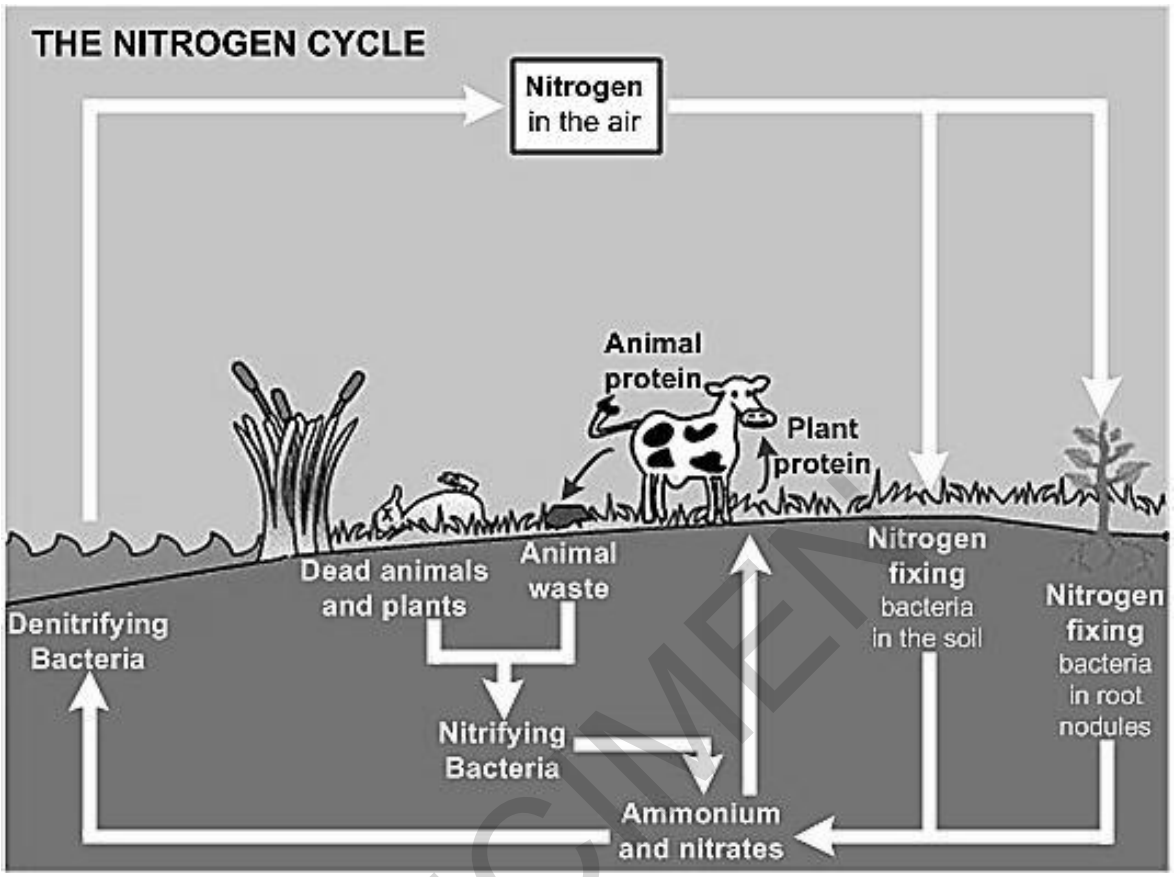
C 36

D 72

Your answer ☐

[1]

3 Look at the diagram of the nitrogen cycle.



Which statement explains why large numbers of **denitrifying bacteria** in the soil results in poor plant growth?

A Denitrifying bacteria convert nitrates into nitrogen.

B Denitrifying bacteria produce ammonium compounds.

C Denitrifying bacteria produce nitrates needed for growth.

D Denitrifying bacteria release nitrates into the soil.

Your answer ☐

[1]

4 Which statement best describes an ecosystem?

A A community of organisms and the abiotic factors affecting them.

B A group of organisms of the same species living together in the same habitat.

C The position occupied by an organism within a community.

D The total population of organisms living in a habitat.

Your answer ☐

[1]

5 Which of the following is the best way to **estimate** the population of mammals in a habitat?

A count individuals seen in 1 m^2 of habitat use

B use pitfall traps to collect all the animals

C the method of capture-recapture

D use the method of random sampling

Your answer ☐

[1]

6 Huntington's disorder is caused by a dominant allele (H).

John has a 75% chance of inheriting the disorder.

This is based on the genotypes of his parents.

Which of the following combinations could be the genotype of his parents?

A HH x Hh

B Hh x hh

C Hh x Hh

D HH x hh

Your answer ☐

[1]

7 Which of the following uses DNA sequencing to obtain information about an organism's evolutionary relationships?

A artificial classification

B gene mapping

C homozygous test cross

D molecular phylogenetics

Your answer ☐

[1]

8 New drugs are sometimes tested using a double blind trial.

Which statement describes a double blind trial?

A All patients are given placebos.

B Patients and their doctors do not know who is getting the new drug.

C Drugs are tested on animals and humans at the same time.

D Some patients are given placebos with the knowledge of their doctor.

Your answer ☐

[1]

9 What is the advantage of using an electron microscope compared to a light microscope.

A can be used on living tissue

B increased resolution

C inexpensive

D portable

Your answer ☐

[1]

10 In guinea pigs, the allele for black fur is dominant to the allele for white fur.

Fred has two black male guinea pigs and two female guinea pigs.

Fred decides to mate his guinea pigs.

He wants half the offspring to be black and half to be white.

Which cross would result in half the offspring to be black, and half to be white?

A female bb x male Bb

B female Bb x male Bb

C female bb x male BB

D female BB x male Bb

Your answer ☐

[1]

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PLEASE TURN OVER FOR THE NEXT QUESTION

SECTION B

Answer **all** the questions.

11 **(a)** White blood cells produce antibodies.

Describe the role of white blood cells and antibodies in the defence against pathogens.

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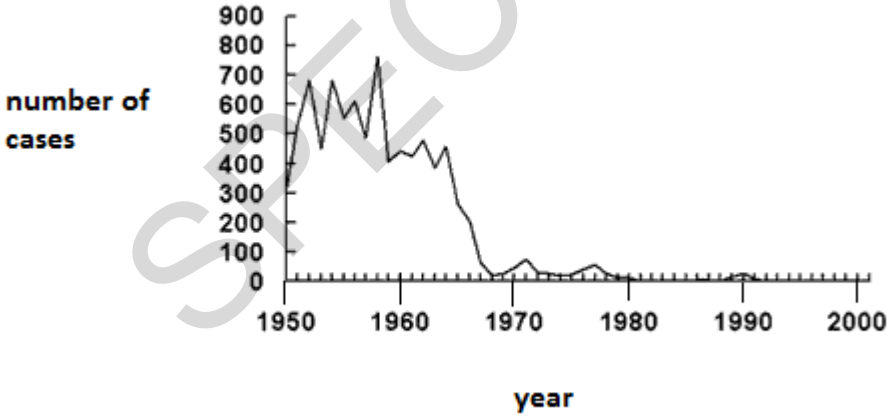
(b) Measles is a disease caused by a pathogen.

The graph shows the number of measles cases in one country between 1950 and 2001.



Suggest which year a measles vaccination was introduced to the country.

Explain your answer.

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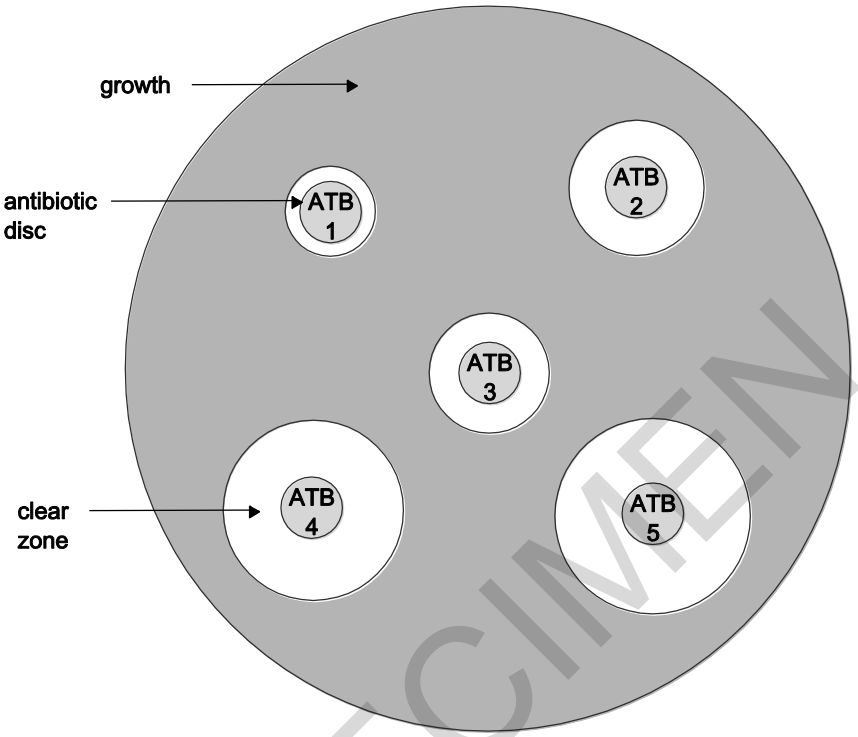
(c) Jay investigates different antibiotics.

- He puts antibiotic discs onto agar containing bacteria.
- The bacteria are left to grow.
- The diagram shows his results.
- The larger the clear zone around the antibiotic disc the more effective the antibiotic.



The table shows the cross sectional areas for the antibiotic discs tested.

antibiotic	cross sectional area (mm^2)
ATB1	79
ATB2	154
ATB3	122
ATB4	
ATB5	314

(i) Calculate the cross sectional area of the clear zone for ATB4.

Show your working.

Answer = ……mm^2 **[3]**

(ii) Jay concludes that ATB5 is the best antibiotic for treating bacterial infections.

Evaluate his conclusion.

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…… **[3]**

12 Kate and Tom investigate the effect of light intensity on plant growth.

They collect leaves from nettle plants growing in two different light intensities.

They then measure the surface area of each leaf.

The tally chart shows their results.

Surface area (cm^2)	**Light intensities (lux)**	
	989	**1249**
<6.1	///	/
6.1-7.0	/	///
7.1-8.0	/	//
8.1-9.0	////	/
9.1-10.0	///	/
10.1-11.0	////	/
11.1-12.0	/	/
>12.0	/	/

(a) Which type of variation is shown by the results?

Explain your answer.

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…… **[2]**

(b) Tom concludes that there are two varieties of nettle plants.

Those with large leaves and those with small leaves and that this may be due to both the genome and the environment.

(i) Explain how the genome and the environment could account for the differences in the measured leaf sizes observed.

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(ii) Looking at the results, there might be **no** relationship between light intensity and leaf size.

Suggest why.

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(iii) Explain **two** ways in which the method could be improved to provide more evidence for a relationship between light intensity and leaf size.

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13 Two students investigate the species living on a rocky shore.

(a) The students use a belt transect as part of their investigation.

They start the belt transect near the cliff and work their way towards the sea.

Explain how they should set up and collect data from the belt transect.

Include the apparatus they will need and how they could record abundance of species.

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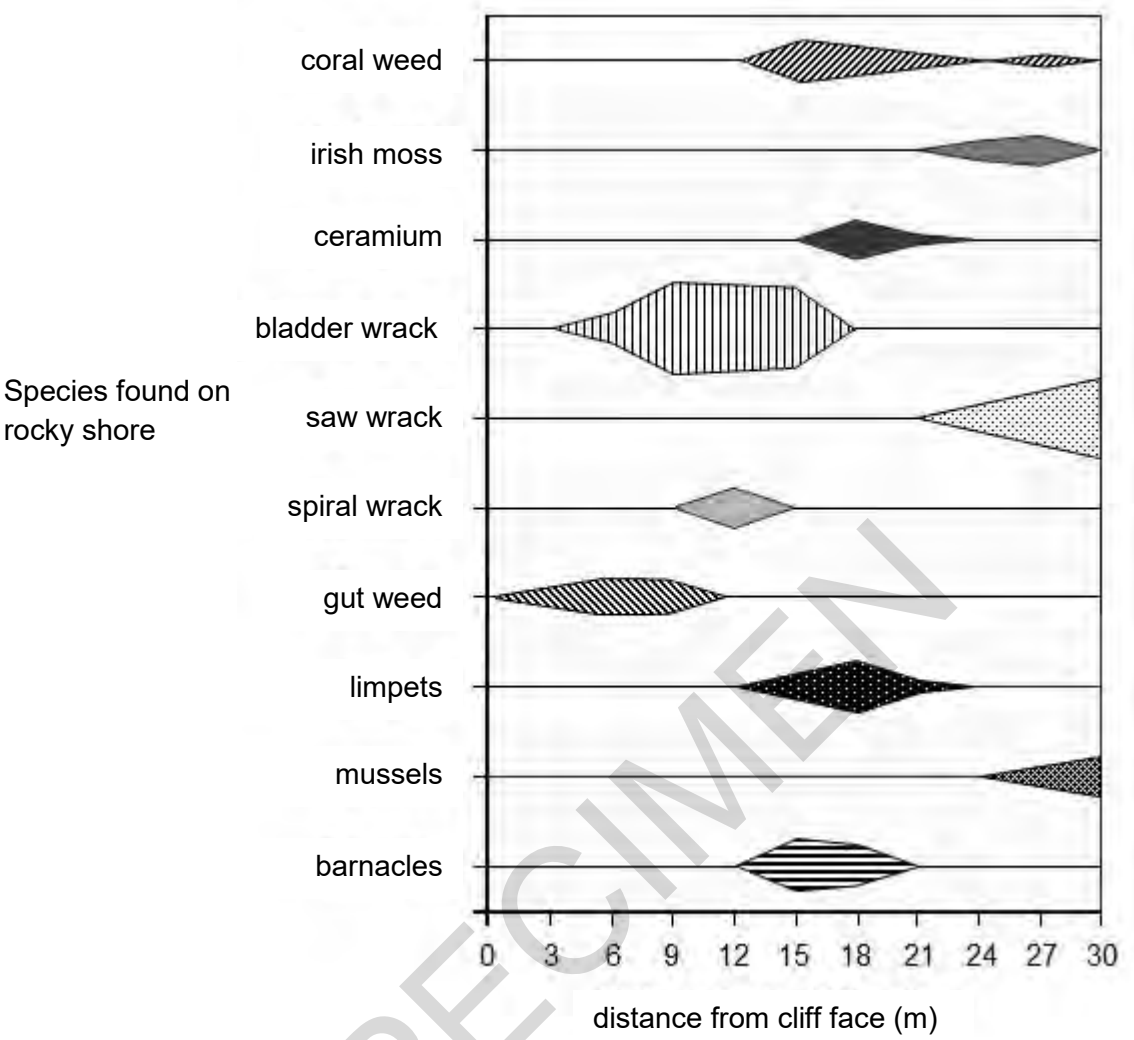
(b) The kite diagram shows their results.



(i) Which species is **most** abundant 12 m from the cliff face?

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(ii) Compare the distribution of limpets, mussels and barnacles.

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(c) Explain how **abiotic** factors may affect the distribution of the organisms on a rocky shore.

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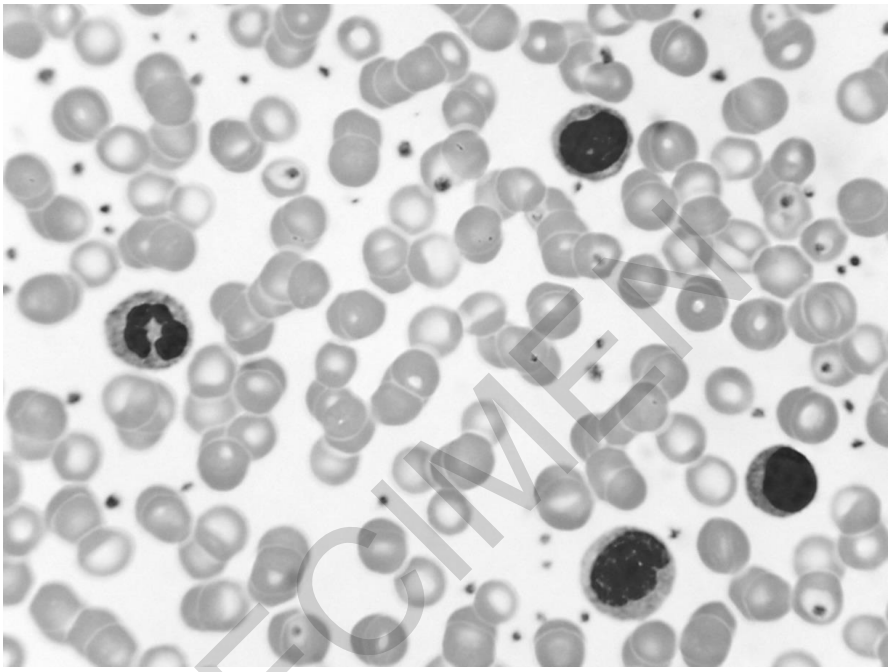
14 A complete blood count (CBC) is a common blood test used to help diagnose some blood cancers.

The CBC provides information about the number of white blood cells, red blood cells and platelets.

Blood counts are done by looking at the cells using a microscope.

The picture shows blood cells seen using a light microscope.

The darker areas have been stained.



(a) Describe how you would use a light microscope and stains to view **white blood cells.**

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(b) The magnification of the cells is x200.

Explain how magnification is calculated when using a microscope.

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(c) The table shows the acceptable ranges for the different blood cells in women.

	Number of cells per litre of blood
Red blood cells	3.8 to 5 x 10^{12}
White blood cells	4 to 11 x 10^{9}
platelets	150 to 440 x 10^{9}

Some cancers can cause a decrease in white blood cell count.

Look at the information. It shows the blood count results for a female patient.

	Number of cells per litre of blood
Red blood cells	4.2 x 10^{12}
White blood cells	
platelets	300 x 10^{9}
complete blood count	4.503x10^{12}

Do the results suggest that the patient has a cancer that causes a low **white blood cell** count?

Calculate the result for **white blood cells** to help you explain your answer.

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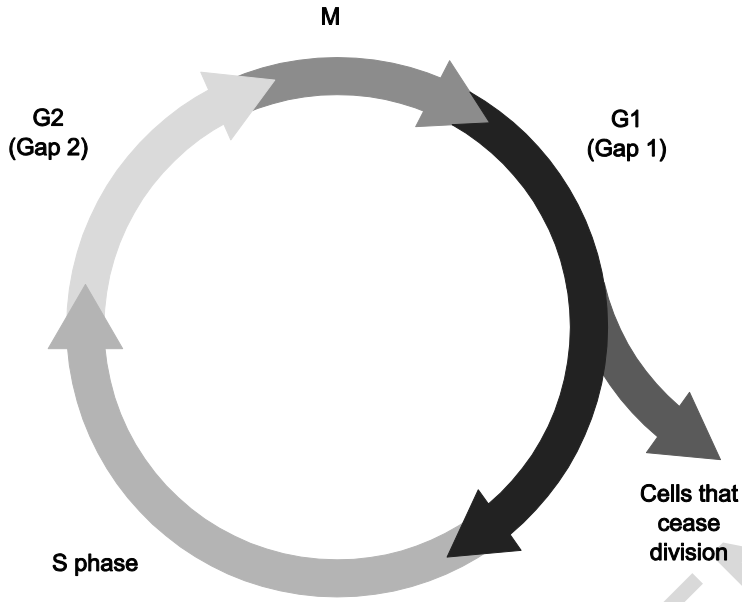
…… **[2]**

(d) The diagram shows an image of the cell cycle.



Explain how the cell cycle would be different for cancer cells.

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15 Read the information about one example of GM crops.

Bt-corn

Bt-corn is a genetically modified sweet corn plant. The plant produces a poison which kills insects. This means the farmer no longer needs to use insecticides. The genetically modified sweet corn is called Bt-corn because the insect-killing gene in the plant comes from the bacteria *Bacillus thuringiensis.*

(a) (i) Which two types of enzymes are used in genetic engineering?

1……..

2…… **[2]**

(ii) Describe how these enzymes are used to produce genetically engineered Bt-corn.

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(b)* Some people are concerned insects may become resistant to the poison.

Explain how the insects may become resistant and discuss if Bt-corn should be produced or not.

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…… **[6]**

END OF QUESTION PAPER