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F

Monday 10 June 2013 – Afternoon

GCSE GATEWAY SCIENCE
BIOLOGY B

B732/01 Biology modules B4, B5, B6 (Foundation Tier)

B736960613

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)

Duration: 1 hour 30 minutes

B732201

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- 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 **85**.
- This document consists of **28** pages. Any blank pages are indicated.

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Answer **all** the questions.

SECTION A – Module B4

1 Humans treat food in different ways to stop decay.

(a) Some examples of traditional methods are shown in the table.

Name of food	Country	Treatment
bummalo	India	fish are hung up in the open air for five days
atchara	Philippines	papaya fruit are mixed with vinegar and spices
blatjang	South Africa	apricots are put into pots with other fruit, water and sugar
adobo	Philippines	meat is mixed with vinegar, garlic and bay leaves

(i) When adobo is made, which substance is added to the meat to stop decay?

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

(ii) A modern way of preserving milk is to remove all the water.

One food in the table is preserved using the same idea.

Write down the name of the food.

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

(b) Most methods of food preservation stop microorganisms from working.

Write down **one** type of microorganism that decays food.

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

(c) How are microorganisms useful in treating human waste?

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

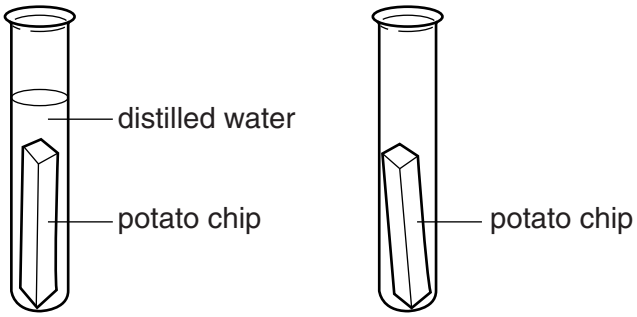
[Total: 4]

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2 Katie cuts two chips from a potato.

She puts one of the chips into a test tube of distilled water.

Katie puts the other chip into an empty test tube.



(a) Water enters the cells of the potato chip that has been left in the distilled water.

Explain how.

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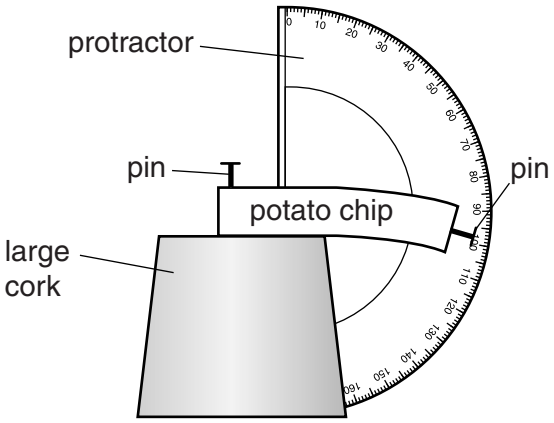
..... **[2]**

(b) Katie takes the potato chip out of the empty test tube.

She measures how much it bends.

To do this, she pins the chip to a cork.

Katie then measures how much it bends, using a protractor.



Katie then measures how much the chip from the distilled water bends.

The chip that has been in distilled water does **not** bend.

Explain why.

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

[Total: 4]

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3 **(a)** Chris is an **organic** farmer.

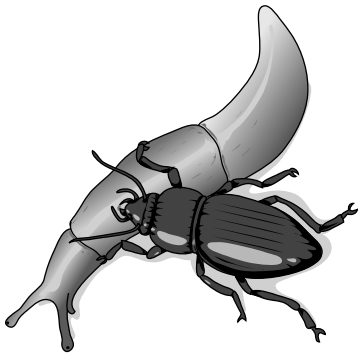
He is growing swedes in a field.

There are many slugs in the field.

The slugs move over the surface of the soil and eat his swede plants.

Chris decides to buy some beetles to release into the field.

These beetles eat slugs.



(i) What name is given to this type of pest control?

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

(ii) Chris can **not** use pesticides to kill the slugs.

Write down the reason why.

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

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(b) Before releasing the beetles, Chris wants to know how many slugs are in the field.

He does a capture-recapture experiment.

Chris catches some slugs, marks them and releases them.

A few days later, he catches some slugs again.

Chris works out that there are about **900** slugs in the field.

He does the experiment again, several weeks **after** releasing the beetles.

Here are the results of his second experiment:

Number of slugs in 1st sample	Number of slugs in 2nd sample	Number of marked slugs in 2nd sample
50	45	5

This is the formula he uses to analyse the results.

$$\text{population size} = \frac{\text{number in 1st sample} \times \text{number in 2nd sample}}{\text{number in 2nd sample previously marked}}$$

Describe a collecting method Chris could have used to sample the slugs and explain what his results show about how successful he has been in controlling the slugs.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 8]

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4 Carbon dioxide and water are needed for photosynthesis.

(a) Finish the **word** equation for photosynthesis.

carbon dioxide + water → ..... + ...

[1]

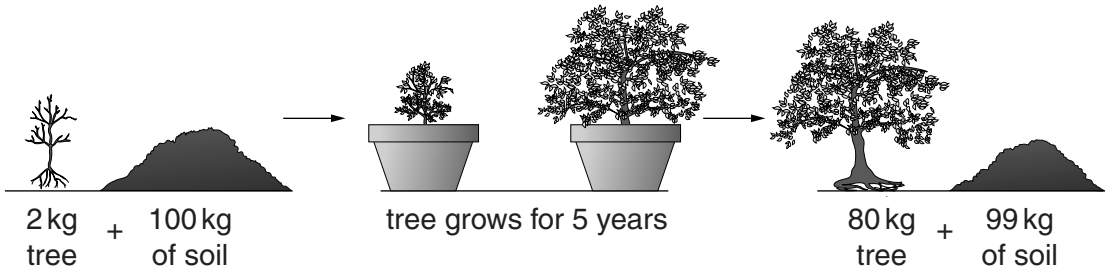
(b) In 1649, scientists thought that plants grew by **only** taking in solid materials from the soil.

A scientist called van Helmont did an experiment to test this idea.

He grew a tree in a large pot of soil.

He measured the mass of the soil and the tree before the experiment.

He measured them again, five years later.



(i) Explain how van Helmont's experiment proved the scientists wrong.

.....

.....

.....

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

(ii) During the five years, van Helmont watered the soil.

Describe how water enters the tree and what happens to the water once it has entered.

.....

.....

.....

..... **[3]**

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(c) Van Helmont thought that the tree gained mass only from water.

Fifty years later, another scientist tested this by growing plants in water, without soil.

(i) What name is given to growing plants in water, without soil?

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

(ii) The scientist grew one set of plants in distilled water.

He grew another set in distilled water that had a small amount of soil added to it.

The plants grew better in the water that had some soil.

Explain why.

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

[Total: 9]

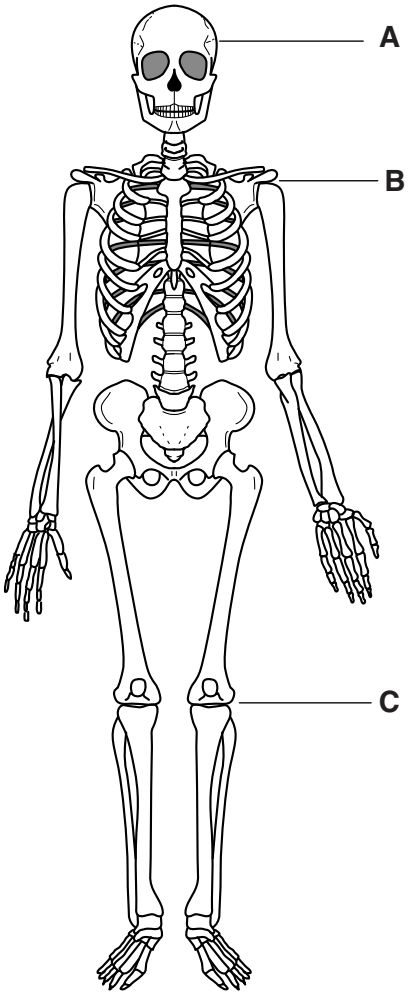
SECTION B begins on page 8

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SECTION B – Module B5

5 Look at the diagram of a skeleton.

It shows three types of joint, labelled **A**, **B** and **C**.



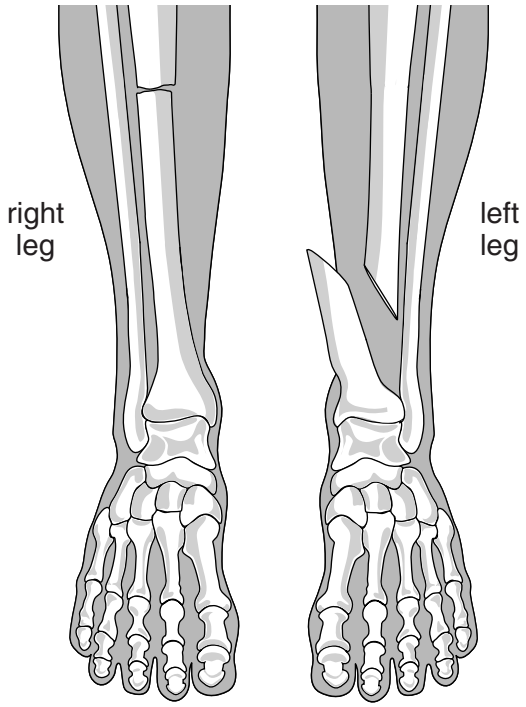
(a) Write the correct letter, **A**, **B** or **C**, in the boxes next to the type of joint found in the skeleton.

ball and socket joint	
fixed joint	
hinge joint	

[2]

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(b) Look at the picture showing fractured bones.



Describe the types of fractures shown in the **right** and **left** legs.

.....

.....

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

(c) In some fractures, large blood vessels are damaged.

This can cause harmful blood clots inside the body.

What type of drug is used to reduce blood clotting?

Choose your answer from the list.

antibodies

anti-coagulants

anti-depressants

antigens

answer ..... **[1]**

[Total: 5]

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6 This question is about human reproduction.

(a) Look at the diary.

It shows the notes a woman has made in February, about her menstrual cycle.

Diary

February 2013

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
28	29	30	31	01 bleeding started →	02	03
04 →	05 bleeding stopped	06	07	08	09	10
11	12	13 most fertile ↔	14 most fertile	15 most fertile →	16	17
18	19	20	21	22	23	24
25	26	27	28	01 bleeding started	02	03

Describe what is happening in the woman's body during her menstrual cycle.

Use dates from the diary in your answer.

.....

.....

.....

.....

..... **[3]**

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(b) Gavin and Janet are a couple who want to have children.

Gavin and Janet visit the doctor.

The doctor finds out that:
- Janet has very irregular periods
- many of Gavin's sperm are damaged.

How might each of these issues affect their chances of having children?

Explain your answer.



The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 9]

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7 This question is about circulation.

(a) Look at the graph.

It shows the changes in pressure as blood leaves the heart and passes through blood vessels.



(i) Blood leaving the heart has a pressure of 93 mm Hg.

The blood pressure drops by 84 mm Hg.

Calculate the percentage drop in blood pressure.

percentage drop in blood pressure .....% **[1]**

(ii) Use the graph to name the type of blood vessels at point **A** and point **B**.

blood vessel at point **A** .....

blood vessel at point **B** .....

[2]

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(b) The valves inside someone's heart can become damaged.

(i) How can damaged heart valves affect a person's circulatory system?

.....

.....

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

(ii) The damaged valves may need to be replaced.

Put ticks (✓) in the boxes next to the **two** types of replacement valves that can be used.

biological	☐
chemical	☐
ethical	☐
mechanical	☐
physical	☐

[1]

[Total: 6]

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8 This question is about digestion.

(a) Explain why enzymes are needed for digestion.

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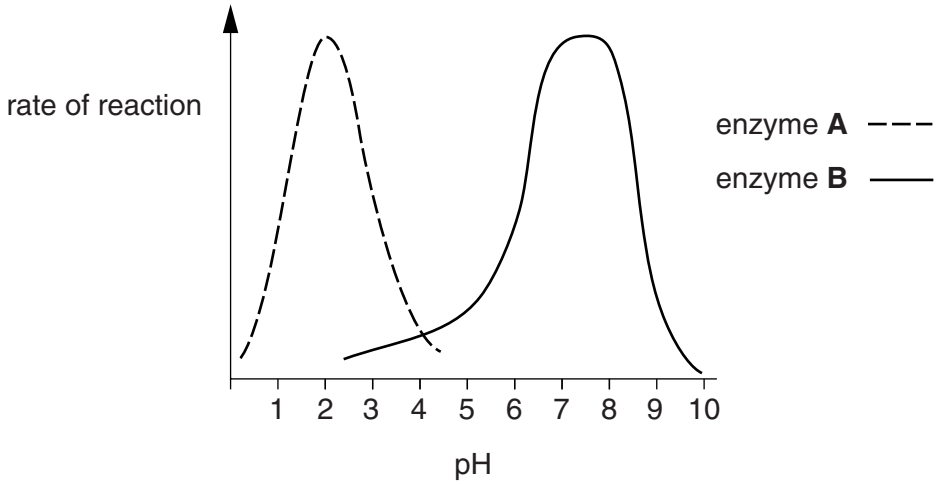
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..... **[2]**

(b) Scientists investigate two enzymes and pH levels in the digestive system.

Look at the graph.

It shows the rate of reaction of enzyme **A** and enzyme **B** in different pH conditions.



Look at the table.

It shows the pH in different parts of the digestive system.

Part of digestive system	pH
mouth	6.5
stomach	2.0
small intestine	7.5
large intestine	7.0

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(i) The scientists claim their results show enzyme **A** is a protease enzyme and is found in the stomach.

Do the results back up their claim?

Explain your answer.

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

(ii) In which part of the digestive system is enzyme **B** found?

Choose your answer from the table.

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

[Total: 5]

SECTION C begins on page 17

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SECTION C – Module B6

9 Look at the picture of a biogas plant.



(a) Biogas is a biofuel.

Finish the sentences about biogas.

Use words from the list.

argon **burns** **digester** **distiller**

gasohol **methane** **rots**

Biogas is made when organic matter ..... .

Biogas is a mixture of gases that includes ..... .

The large container used to make biogas is called a ..... .

[3]

(b) Yeast can be used to make biofuels.

Describe how.

.....

.....

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

[Total: 5]

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10 Read the information about 'spontaneous generation'.

Until the late 19th century, people thought life could be created from non-living matter.

The process was called 'spontaneous generation'.

For example, people thought that stale bread would turn into mould and meat would turn into maggots.

In 1668, Francesco Redi believed that maggots developed from eggs laid by flies.

To test his idea, he put meat into three flasks, one open to the air, one sealed completely, and the other covered with cloth. As he expected, maggots only appeared in the open flask.



(a) Explain how Redi's results suggest that the theory of 'spontaneous generation' is wrong.

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

(b) Even after Redi published his results, many people still believed in 'spontaneous generation'.

Suggest why.

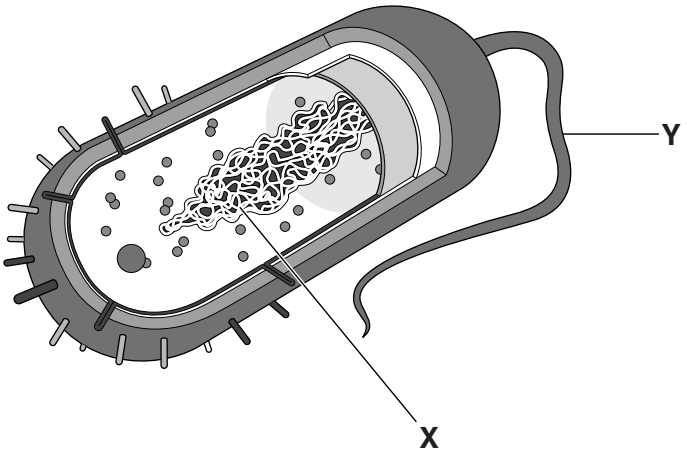
..... **[1]**

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(c) In 1674, a scientist named Leeuwenhoek, described bacteria.

He invented a microscope that was powerful enough to see microorganisms.

Look at the diagram of a bacterial cell.



Write down the names of part **X** and part **Y**.

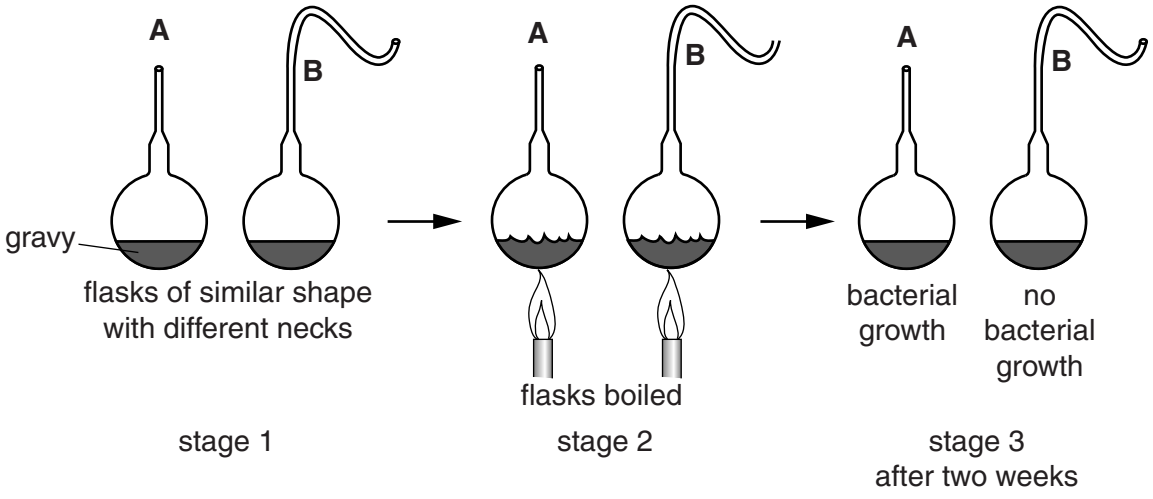
part **X** .....

part **Y** .....

[2]

(d) The theory of 'spontaneous generation' was finally disproved in 1859, by Louis Pasteur.

Look at the diagram. It shows part of his experiment.



Use your scientific knowledge to explain the results in flasks **A** and **B** after two weeks.

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..... **[3]**

[Total: 8]

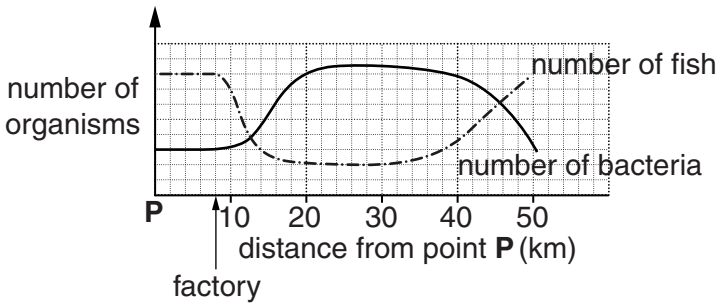
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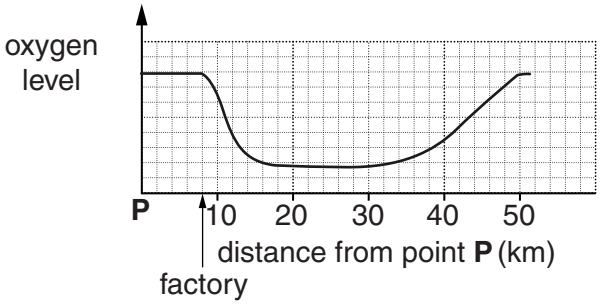
11 A factory accidently releases fertiliser into a river.

The numbers of fish and bacteria, and the levels of oxygen in the river are measured.

The measurements start at a place called **point P**.

The graphs show the levels at different distances from point **P**.





(a) Write down the distance the factory is from point **P** .....km **[1]**

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(b) Describe and explain any patterns shown by the graphs opposite.



The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 7]

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12 Deidre has diabetes.

The table shows acceptable levels of glucose in the blood.

	Glucose level before a meal in mmol per litre	**Glucose level 2 hours after a meal in mmol per litre**
Without diabetes	4.0–5.9	< 7.8
Type 2 diabetes	4.0–7.0	< 8.5
Type 1 diabetes	4.0–7.0	< 9.0

She uses a meter to test her blood glucose level two hours after eating a meal.

Look at the picture. It shows the reading Deidre has taken.



(a) The reading tells Deidre that her glucose level is acceptable for her type of diabetes.

Use the data to explain what this tells you about the type of diabetes Deidre has.

.....

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

(b) The meter uses immobilised enzymes.

What ways can enzymes be immobilised?

.....

.....

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

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(c) Deidre needs to have insulin injections.

A process is used to change bacteria so that they can make human insulin.

Put a tick in the box (✓) next to the name of this process.

cloning	☐
genetic engineering	☐
fermentation	☐
sterilisation	☐

[1]

[Total: 5]

SECTION D begins on page 25

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SECTION D

13 Look at the table about people in five different countries.

It shows their mean blood cholesterol and mean BMI (body mass index).

Country	Mean blood cholesterol in mmol per litre		Mean BMI in kg per m^2	
	Females	**Males**	**Females**	**Males**
China	5.5	5.7	23.4	24.6
Cyprus	5.8	6.1	26.7	25.5
Ethiopia	4.3	4.6	19.9	20.7
India	5.3	5.2	21.4	22.0
Uruguay	6.1	6.2	27.2	27.3

(a) (i) Which country has females with the **lowest** mean blood cholesterol?

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

(ii) Which country has males with the **highest** mean BMI?

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

(b) Rakesh uses the information in the table to make two conclusions:

- in most of the countries, females have a higher mean blood cholesterol than males
- in most of the countries, males have a higher mean BMI than females.

Do you agree with these conclusions?

Use the data to explain your answer.

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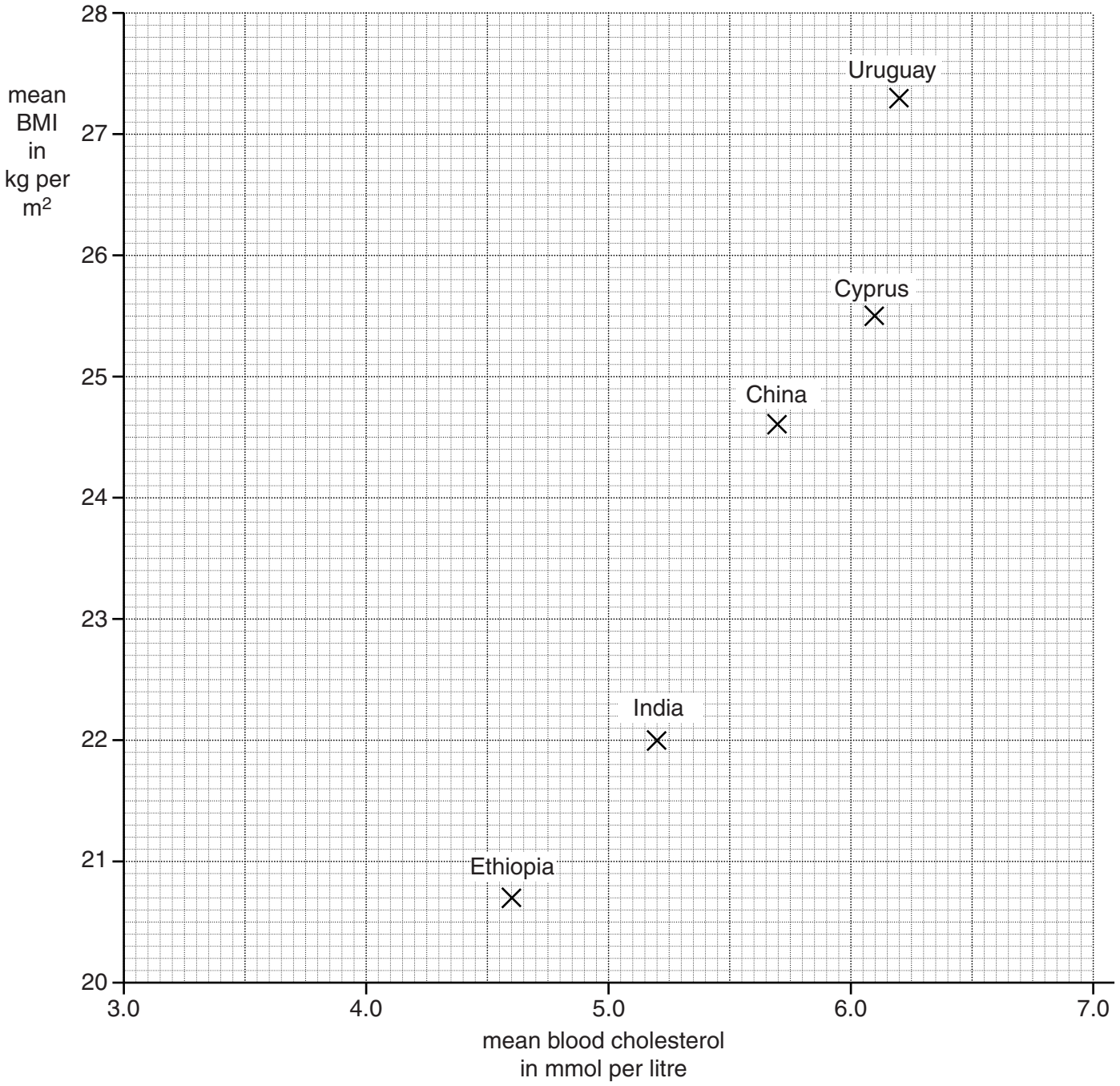
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..... **[3]**

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(c) Rakesh wants to see if there is a link between blood cholesterol levels and BMI.

He uses the data about males to plot a graph.



What pattern does the graph show?

.....

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

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(d) Rakesh finds information about five other countries.

Country	Mean blood cholesterol in mmol per litre	Mean BMI in kg per m^2
	Males	**Males**
Cameroon	3.2	24.5
Greece	4.7	28.0
Netherlands	4.7	25.2
Nigeria	3.6	22.6
United Kingdom	5.0	27.0

(i) **Add** this data to Rakesh's graph.

Use crosses (✕) to plot the points. **[2]**

(ii) What does the graph **now** show about a link between blood cholesterol levels and BMI?

Explain your answer.

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

[Total: 10]

END OF QUESTION PAPER

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