

**Monday 10 June 2013 – Afternoon**

**GCSE GATEWAY SCIENCE  
BIOLOGY B**

**B732/02** Biology 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)

**Duration:** 1 hour 30 minutes



|                       |  |                      |  |
|-----------------------|--|----------------------|--|
| Candidate<br>forename |  | Candidate<br>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 This question is about food preservation.

(a) Food preservation is important in hot countries.

This is because food decays faster in warm conditions.

Explain why.

.....

.....

..... [2]

(b) Humans treat food in different ways to stop decay.

Some examples of traditional methods from hot countries are shown in the table.

| Name of food | Country      | Treatment  |
|--------------|--------------|--|
| bummalo      | India        | fish are hung up in the open air for five days               |
| 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            |

Draw lines to join each **food** with the **method** that is used to stop decay.

| Food     | Method  |
|----------|---|
| adobo    | drying the food stops enzymes working                   |
| bummalo  | acid provides the wrong pH for enzymes to work          |
| blatjang | a concentrated solution draws water out of the microbes |

[1]

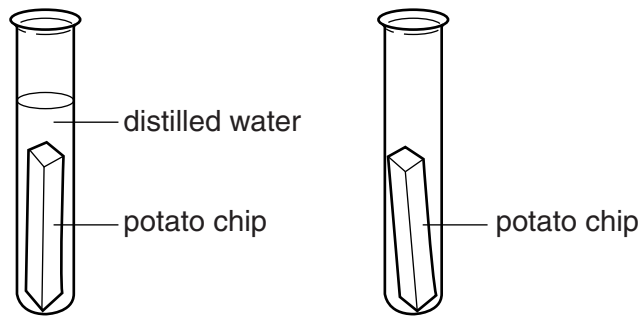
[Total: 3]

Turn over

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 distilled water by osmosis.

Explain why.

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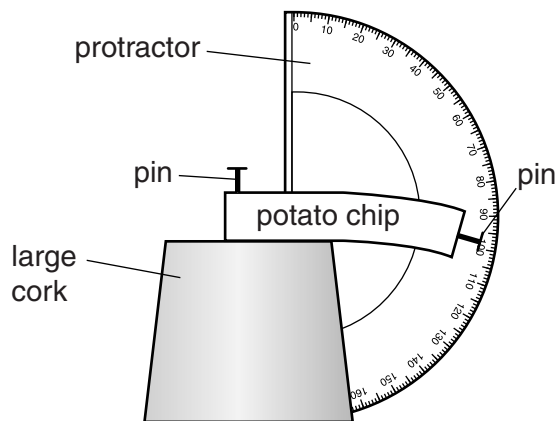
..... [2]

(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.



(i) 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.

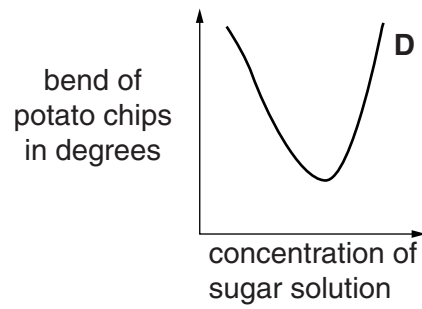
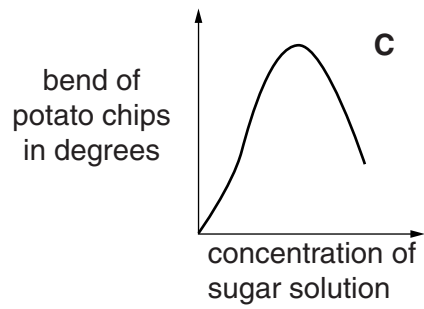
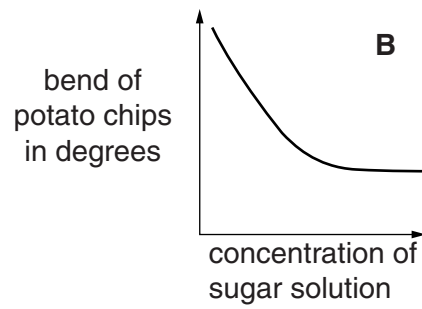
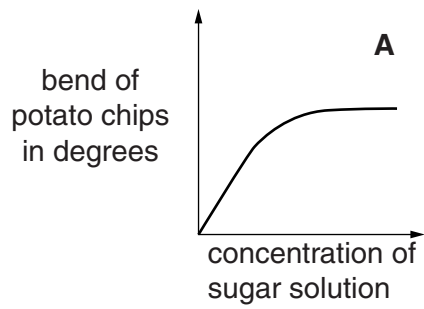
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..... [2]

- (ii) Katie repeats her experiment, but puts potato chips in different concentrations of sugar solution.

Look at the graphs.



Write down the letter of the graph that shows Katie's expected results.

answer .....

[1]

[Total: 5]

3 (a) Chris is a farmer.

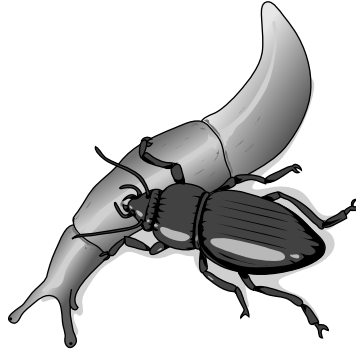
He is growing swedes in a field.

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.



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.

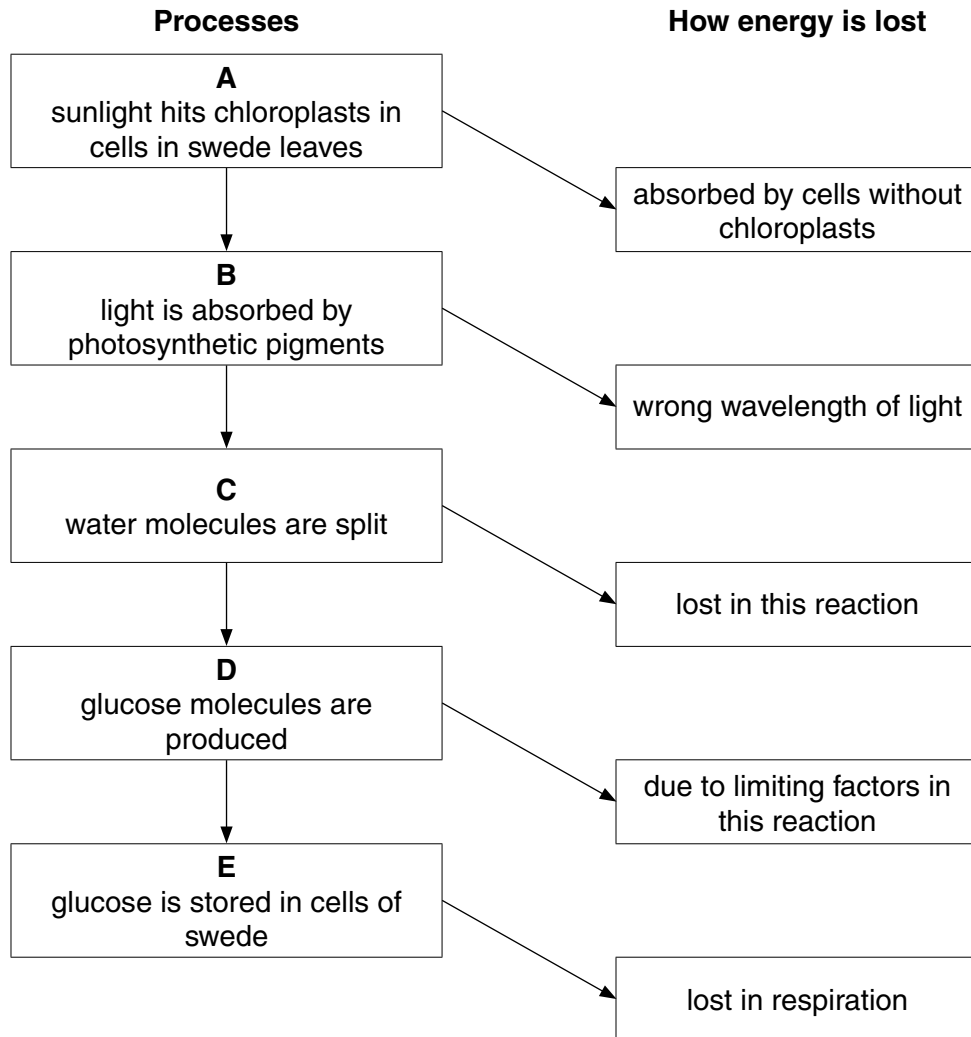
$$\text{population size} = \frac{\text{number in 1st sample} \times \text{number in 2nd sample}}{\text{number in 2nd sample previously marked}}$$



(b) A scientist investigates glucose production in swede plants.

He looks at five processes, **A** to **E**, that are involved in sugar production.

He finds out how energy is lost in each process.



(i) Which process, **A**, **B**, **C**, **D** or **E**, produces oxygen gas?

answer .....

[1]

(ii) How does the structure of a plant leaf help to reduce the loss in process **A**?

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

(iii) Carotene and xanthophyll help to reduce the energy lost in process **B**.

Explain how they do this.

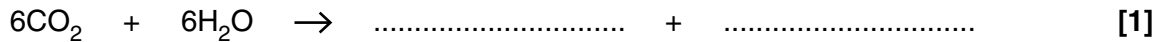
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 ..... [2]

[Total: 10]



4 Carbon dioxide and water are needed for photosynthesis.

(a) Finish the **balanced symbol equation** for photosynthesis.



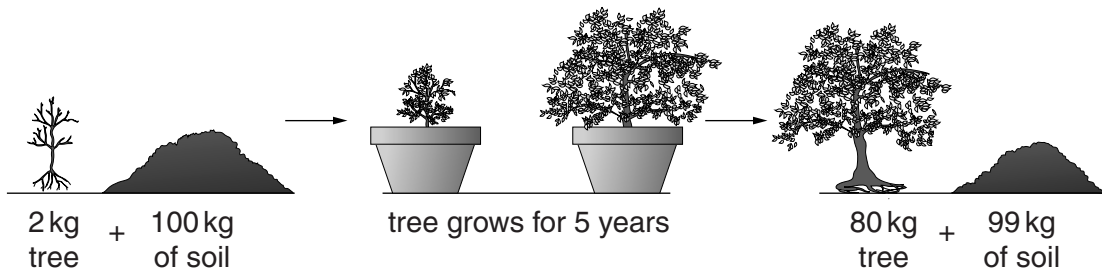
(b) In 1649, scientists thought that plants grew by **only** taking in solid materials from the soil.

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.



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

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..... [2]

(c) Van Helmont wanted to find out if the tree gained mass from water.

He watered the soil during the experiment.

He covered the soil so that water could not evaporate from the soil.

(i) The mass of the water that he added during the five years, was **much more** than the increase in mass of the plant.

Suggest why.

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

(ii) He needed to water the soil much more on windy days.

Explain why.

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..... [2]

[Total: 7]

Turn over

**10**  
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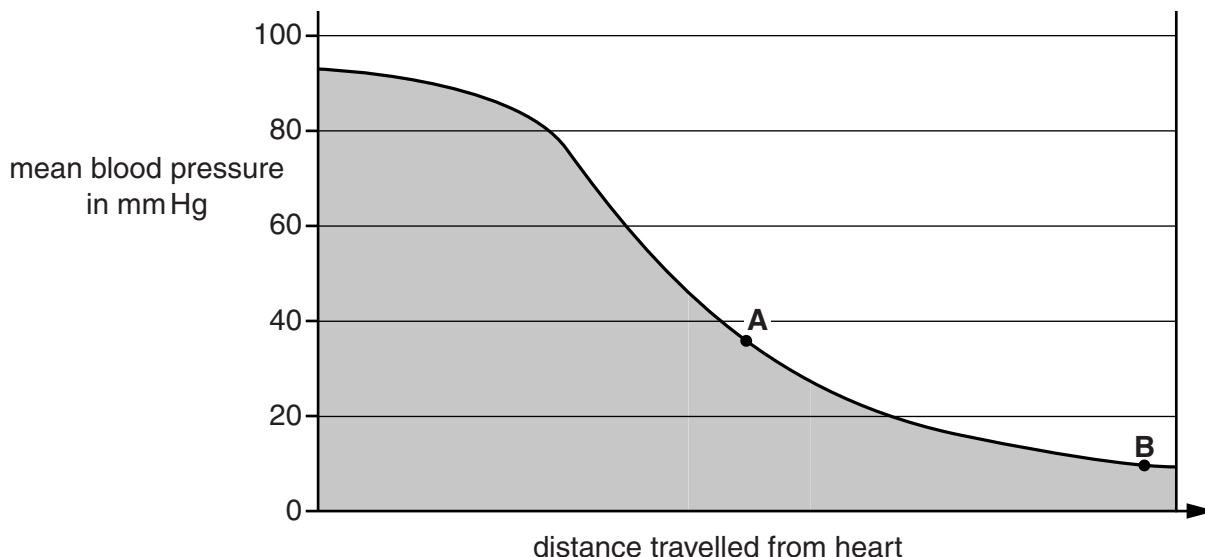
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SECTION B – Module B5

5 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]

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

How can damaged heart valves affect a person’s circulatory system?

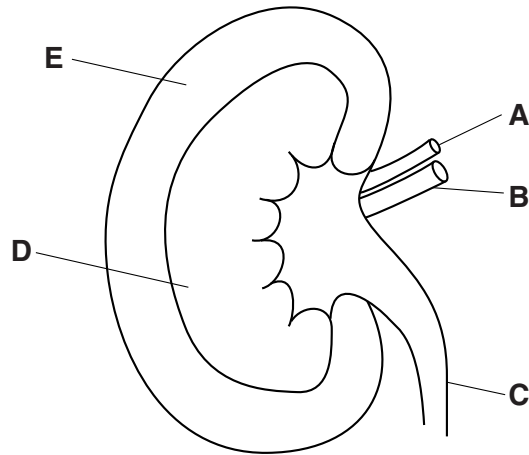
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 ..... [2]

[Total: 5]

Turn over

6 This question is about how the body controls urine concentration.

(a) Look at the diagram of a kidney.



Match each letter to the correct part of the kidney.

One has been done for you.

| Part of the kidney | Letter   |
|--------------------|----------|
| cortex             |          |
| medulla            |          |
| renal artery       | <b>A</b> |
| renal vein         |          |
| ureter             |          |

[2]

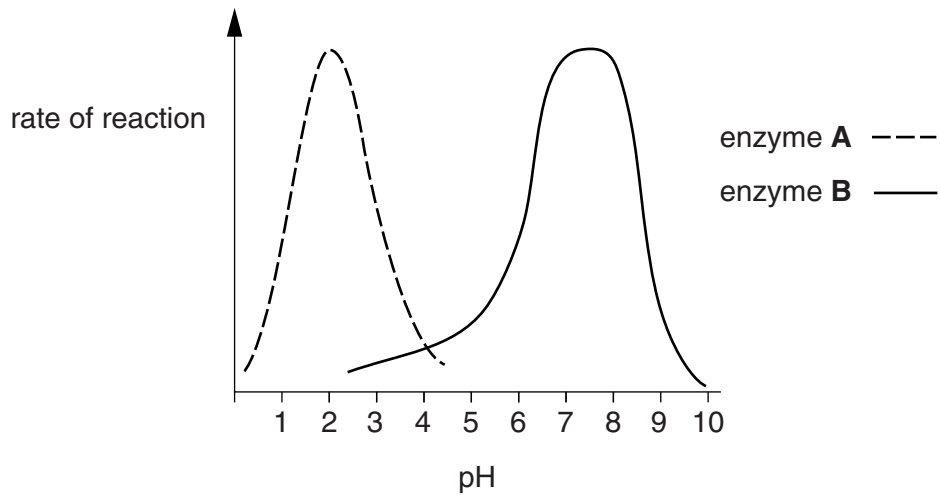


7 This question is about digestion.

(a) 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 |

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]

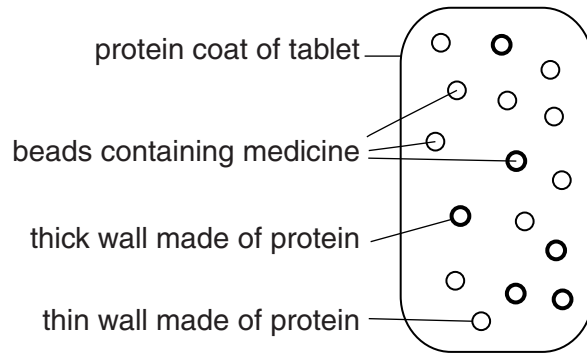
(b) Jemma's stomach is not working properly.

She needs to take some medicine.

A tablet is developed containing the medicine.

It releases the medicine in the stomach over a long period of time.

The diagram shows the structure of the tablet.



Explain why the medicine is **not** released until it reaches the stomach and why it is released over a long period of time.

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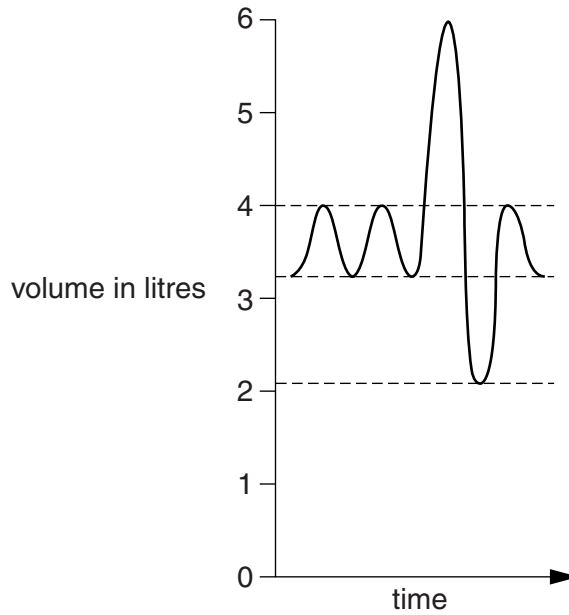
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..... [4]

[Total: 6]

8 (a) Look at the graph.

It shows the lung capacity of a healthy male.



Calculate the vital capacity of this male.

vital capacity ..... litres

[2]

(b) Some people have asthma.

Describe how an asthma attack would affect the lungs.

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..... [2]

[Total: 4]



SECTION C – Module B6

9 Look at the picture of a biogas plant.



(a) Biogas is a biofuel.

Biofuels can be produced and used without causing a **net** increase in greenhouse gas levels.

Explain how.

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

(b) Biogas is normally 50% methane.

Why is it important to keep the percentage of methane in biogas above 10%?

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..... [1]

(c) Write down **one** disadvantage of using biogas instead of natural gas.

..... [1]

[Total: 4]

10 Read the information about 'spontaneous generation'.

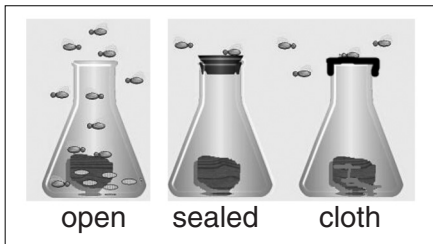
Until the late 19th century, people thought life could be created from non-living matter.

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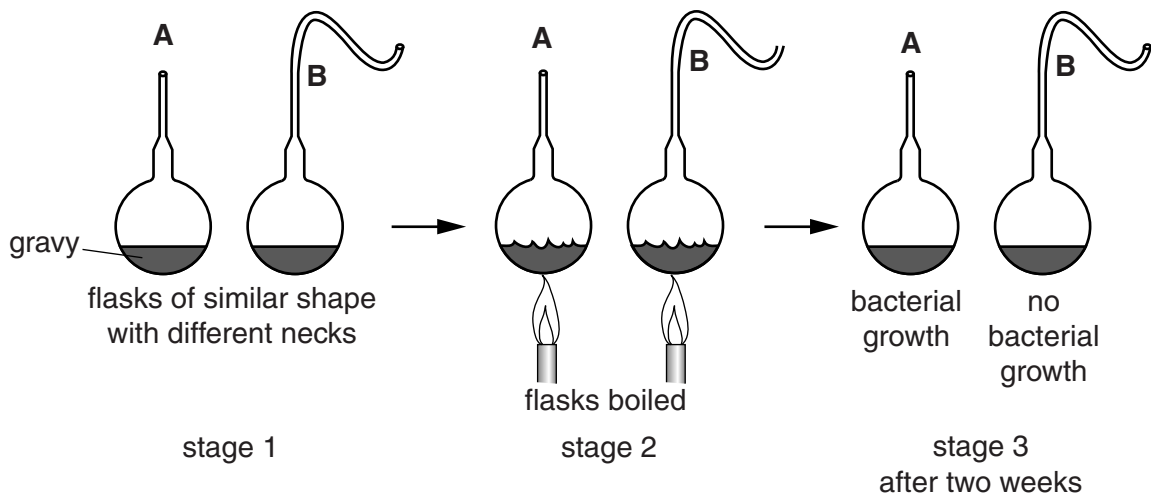
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(b) The theory of 'spontaneous generation' was finally disproved in 1859, by Louis Pasteur.

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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.....

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..... [3]

**(c)** Louis Pasteur also developed the process of pasteurisation.

Most milk in the UK is pasteurised before it is sold.

Some people want to buy unpasteurised milk. This milk is called 'raw' milk.

Other people want to ban the sale of raw milk because they think it is harmful.

Should the sale of raw milk be banned? .....

Explain your answer.

.....

.....

.....

..... [2]

**(d)** Some bacteria can be found living near vents on the ocean floor where there is no light.

The water near the vents can be 400°C and full of the poisonous gas hydrogen sulfide.

Suggest how the bacteria are able to survive these extreme conditions.

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..... [2]

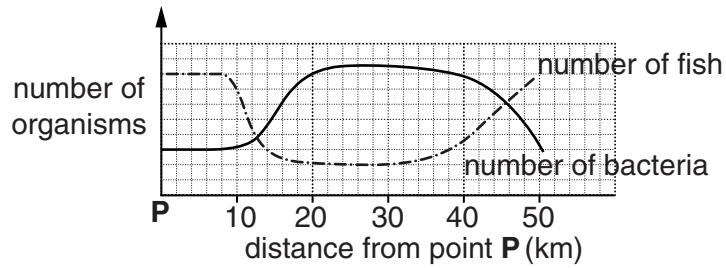
[Total: 9]

11 A factory accidentally releases fertiliser into a river.

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

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

The graph shows the levels at different distances from point **P**.



Suggest how far the factory was from point **P** and **explain** any patterns shown by the graph.



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

..... [6]

[Total: 6]

21  
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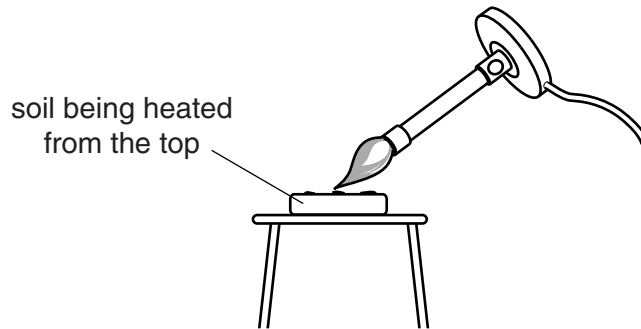
**Question 12 begins on page 22**  
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12 Deidre investigates the humus content of soil.

She weighs different soil samples that have been dried in an oven.

Deidre then burns each soil sample using a Bunsen burner.

She continues to burn them until there is no change in mass.



Deidre records her results in a table.

| Soil sample | Mass before burning in g | Mass after burning in g | Change in mass in g | Percentage change in mass |
|-------------|--------------------------|-------------------------|---------------------|---------------------------|
| A           | 56.65                    | 48.52                   | 8.13                | 14.35                     |
| B           | 55.34                    | 54.32                   | 1.02                | 1.84                      |
| C           | 56.10                    | 54.36                   |                     |                           |
| D           | 55.42                    | 51.98                   | 3.44                | 6.21                      |

(a) The soils needed to be dry before they were burnt.

Suggest why.

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

(b) Calculate the percentage humus content of soil C.

answer .....%

[2]

(c) Which soil would be the best for growing vegetables? .....

Explain your answer.

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

(d) The water content of soils can be affected by the size of the soil particles.

Explain how.

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

[Total: 6]

**SECTION D begins on page 25**

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25  
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<br>in mmol per litre |       | Mean BMI<br>in kg per m <sup>2</sup> |       |
|----------|---|-------|--------------------------------------|-------|
|          | 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) Does the information in the table show any overall differences between males and females?

Use the data to explain your answer.

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.....

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..... [2]

(b) The information in the table was collected from people aged 15 years and over.

BMI is calculated using a person's mass and height.

BMI is **not** included in the table for children younger than 15 years.

Suggest why.

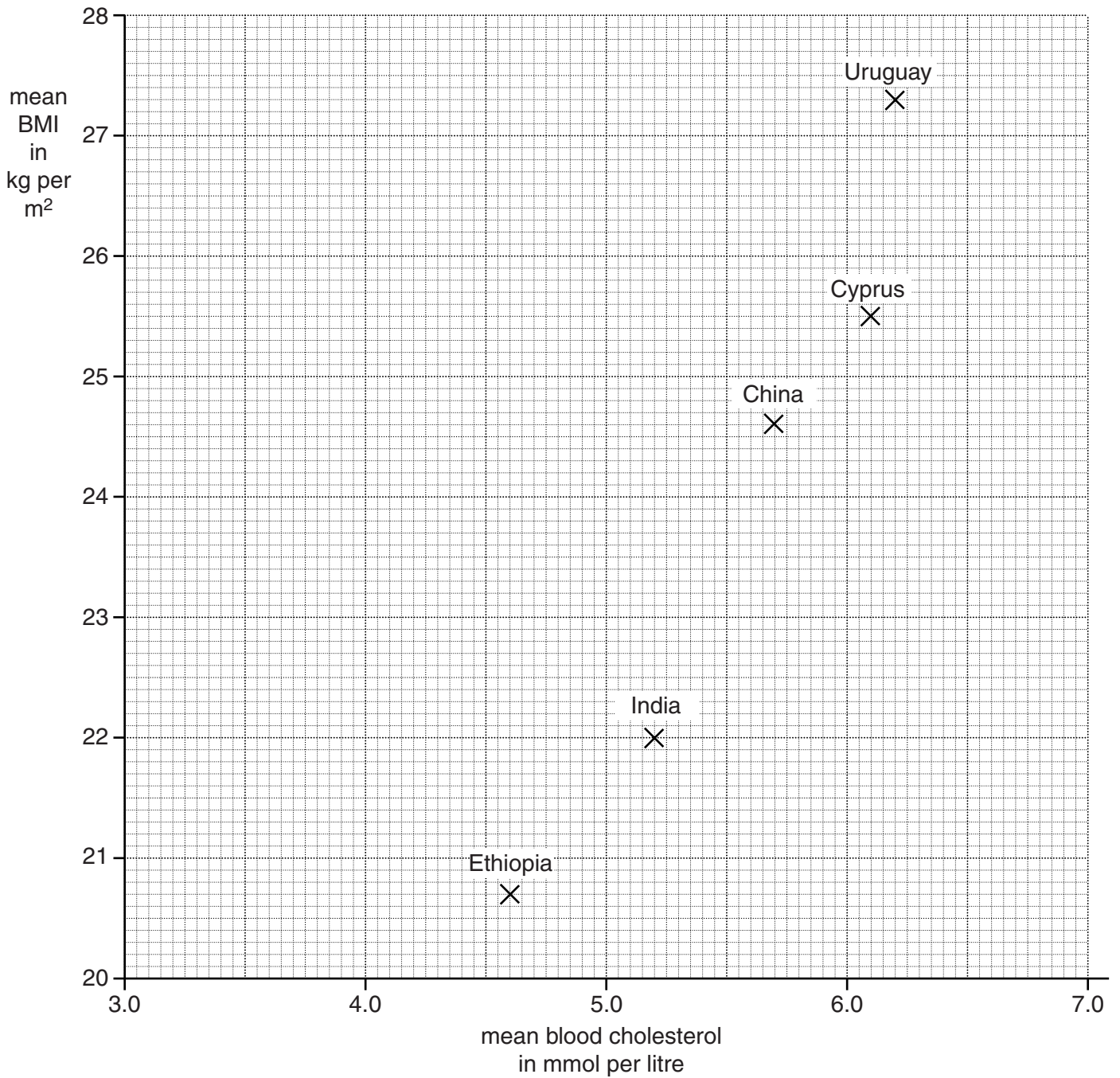
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(c) Rakesh wants to see if there is a link between blood cholesterol levels and BMI.

He uses the data about males to plot a graph.



Rakesh concludes that his graph shows that the higher the blood cholesterol level, the higher the BMI.

Rakesh finds information about five other countries.

| Country        | Mean blood cholesterol<br>in mmol per litre | Mean BMI<br>in kg per m <sup>2</sup> |
|----------------|---|--------------------------------------|
|                | 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 (X) to plot the points.

[2]

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

Explain your answer.

.....

.....

.....

..... [2]

Question 13 continues on page 28

- (d) Rakesh compares blood cholesterol in two countries, Cyprus and India, Cyprus is a small country and India is a large country.

He does a calculation using some of the data from the table.

|   | Mean blood cholesterol<br>in mmol per litre |       |
|---|---|-------|
|   | Females                                     | Males |
| Cyprus  | 5.8   | 6.1   |
| India   | 5.3   | 5.2   |
| Average mean of the figures<br>from the two countries | 5.55  | 5.65  |

Rakesh concludes that in the two countries put together, males have higher blood cholesterol levels than females.

Explain why Rakesh’s conclusion is **not** valid.

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.....

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..... [2]

[Total: 10]

**END OF QUESTION PAPER**



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