

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

B732/02
GATEWAY SCIENCE
BIOLOGY B

Biology modules B4, B5, B6
(Higher Tier)

MONDAY 10 JUNE 2013: Afternoon

DURATION: 1 hour 30 minutes
plus your additional time allowance

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes on the first page. 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).

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.
- Any blank pages are indicated.

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

adobo

bummalo

blatjang

METHOD

drying the food stops enzymes working

acid provides the wrong pH for enzymes to work

a concentrated solution draws water out of the microbes

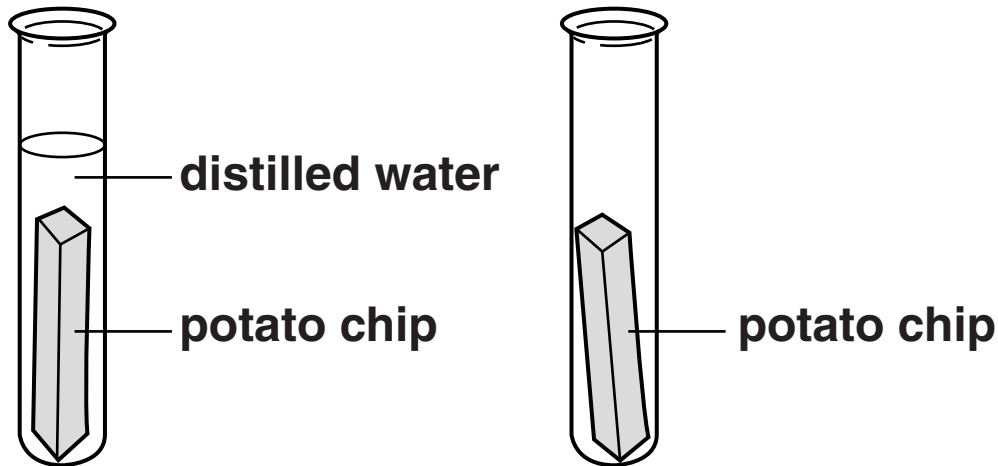
[1]

[TOTAL: 3]

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.

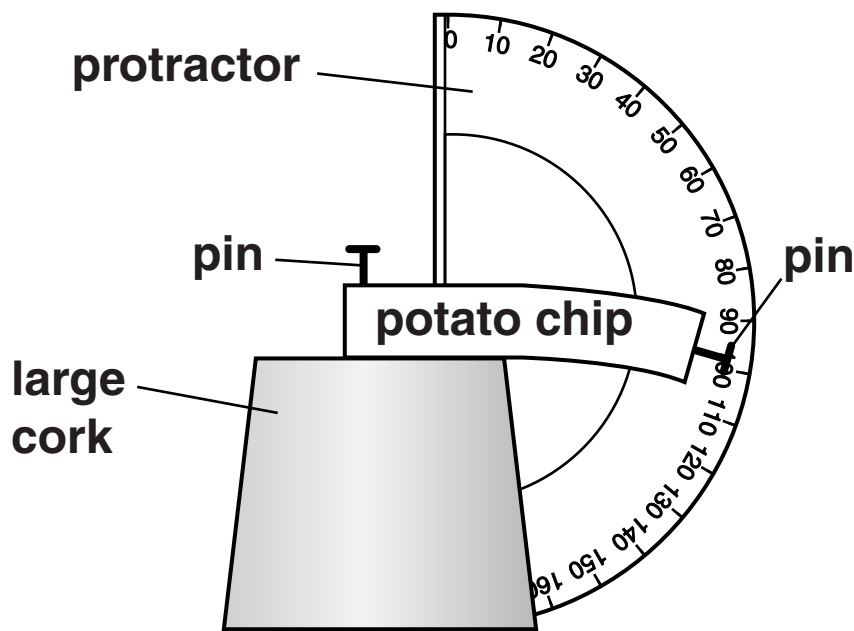
[2]

(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.

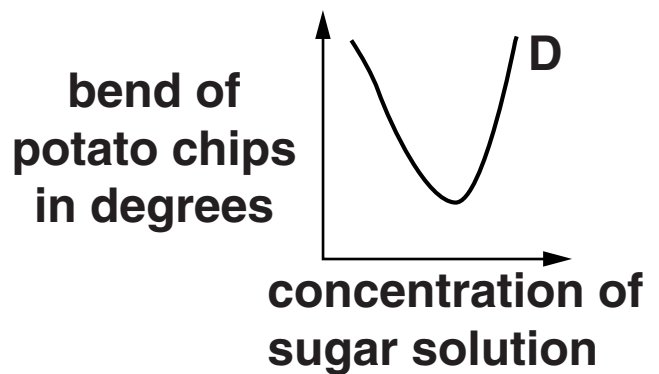
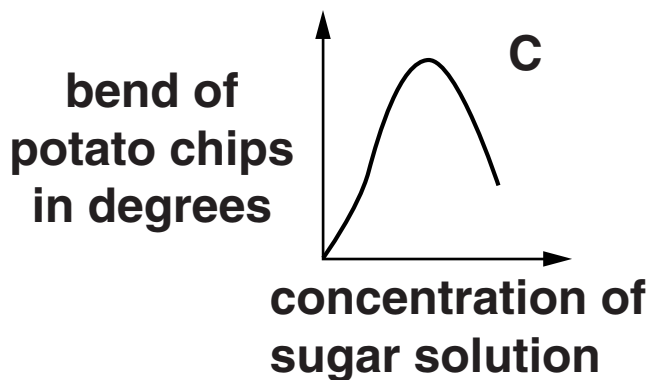
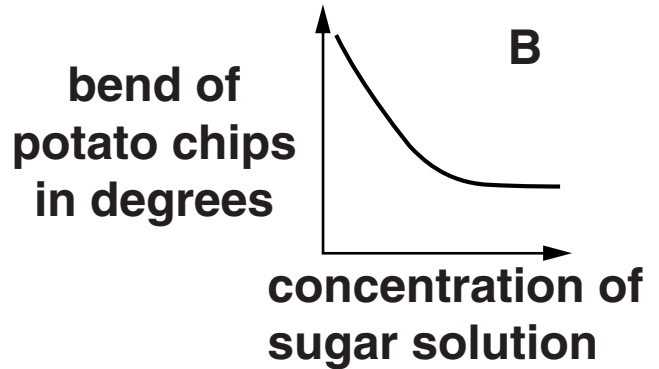
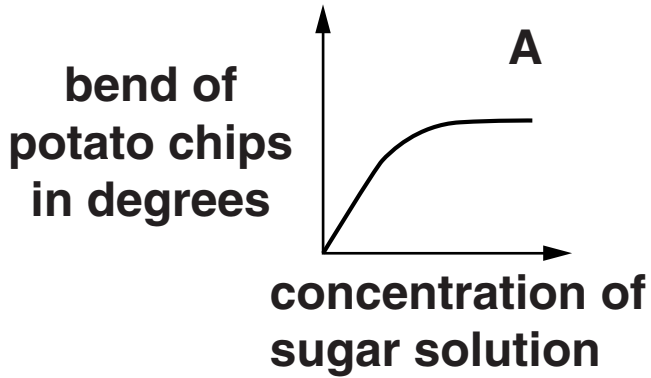
The chip that has been in distilled water does NOT bend.

Explain why.

[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.

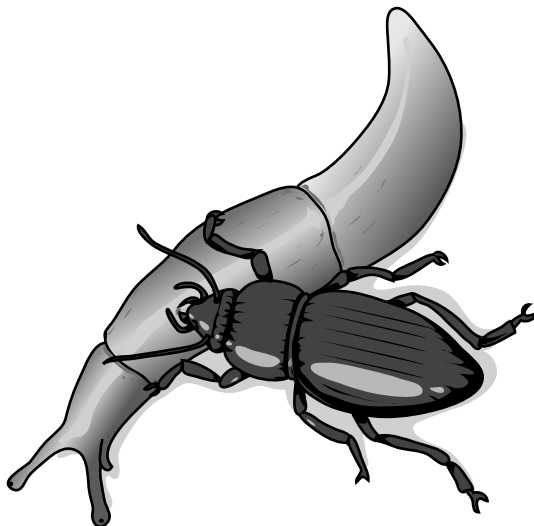
He is growing swedes in a field.

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.

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

Write about the assumptions Chris has to make in estimating the number of slugs and what his results tell him about how successful his control method has been.



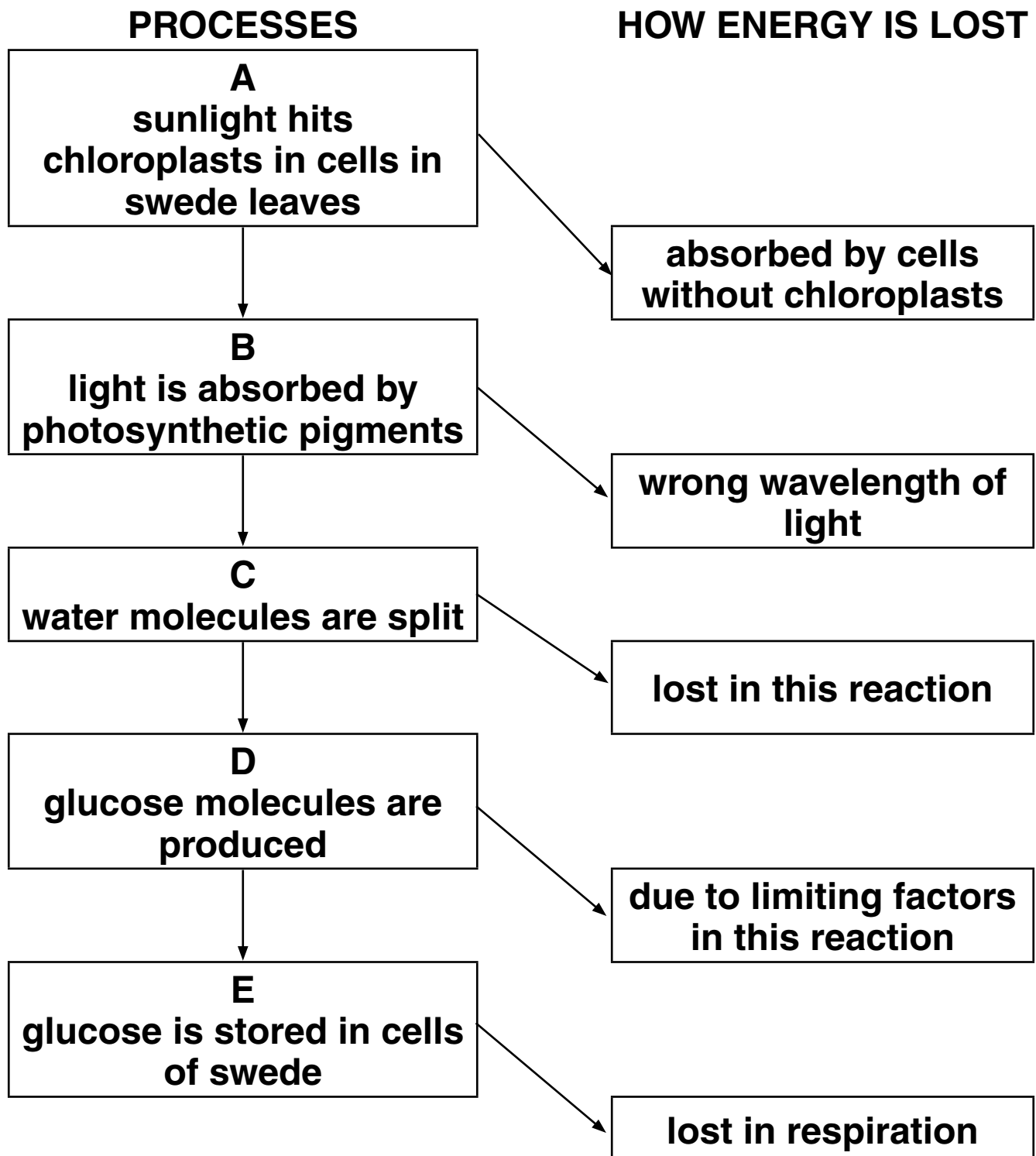
The quality of written communication will be assessed in your answer to this question.

[6]

(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.

_____ [2]

[TOTAL: 10]

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TURN OVER FOR QUESTION 4

4 Carbon dioxide and water are needed for photosynthesis.

(a) Finish the BALANCED SYMBOL EQUATION for photosynthesis.



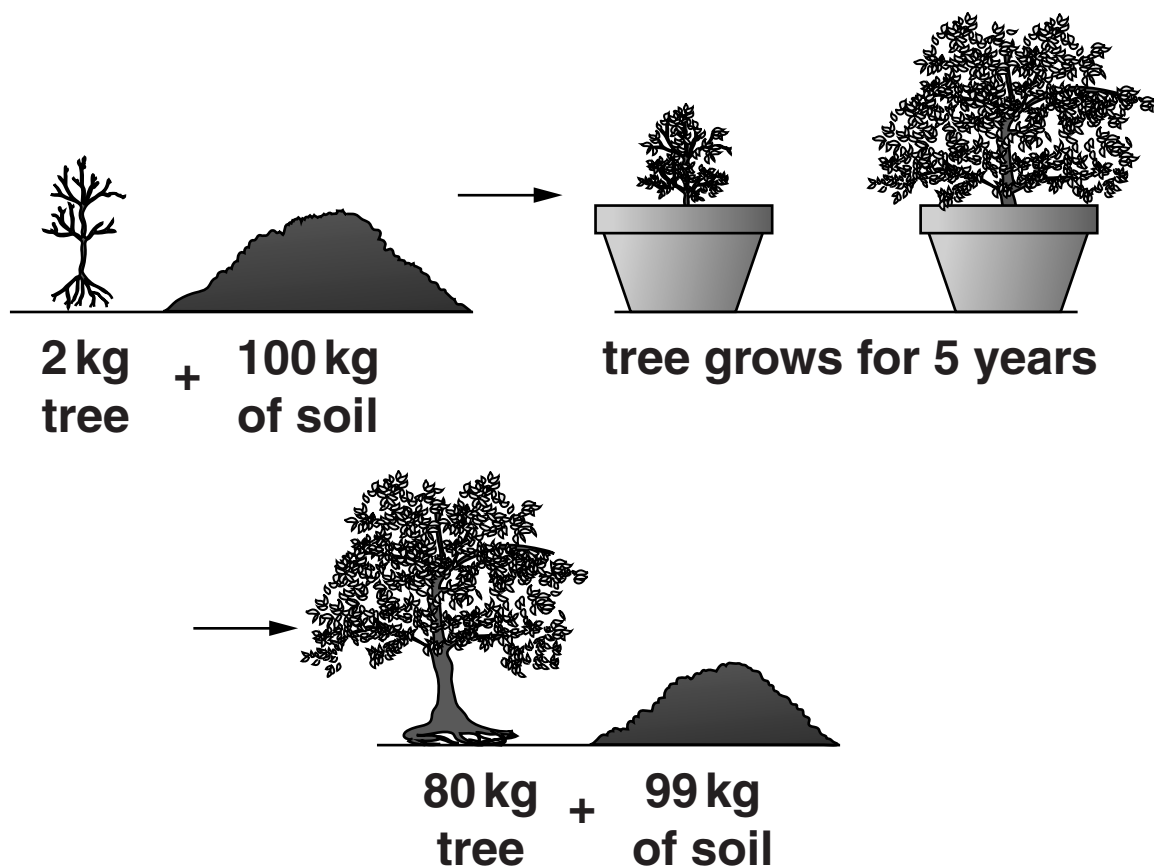
(b) In 1649, scientists thought that plants grew by ONLY taking in solid materials from the soil.

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.

[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.

[2]

[TOTAL: 7]

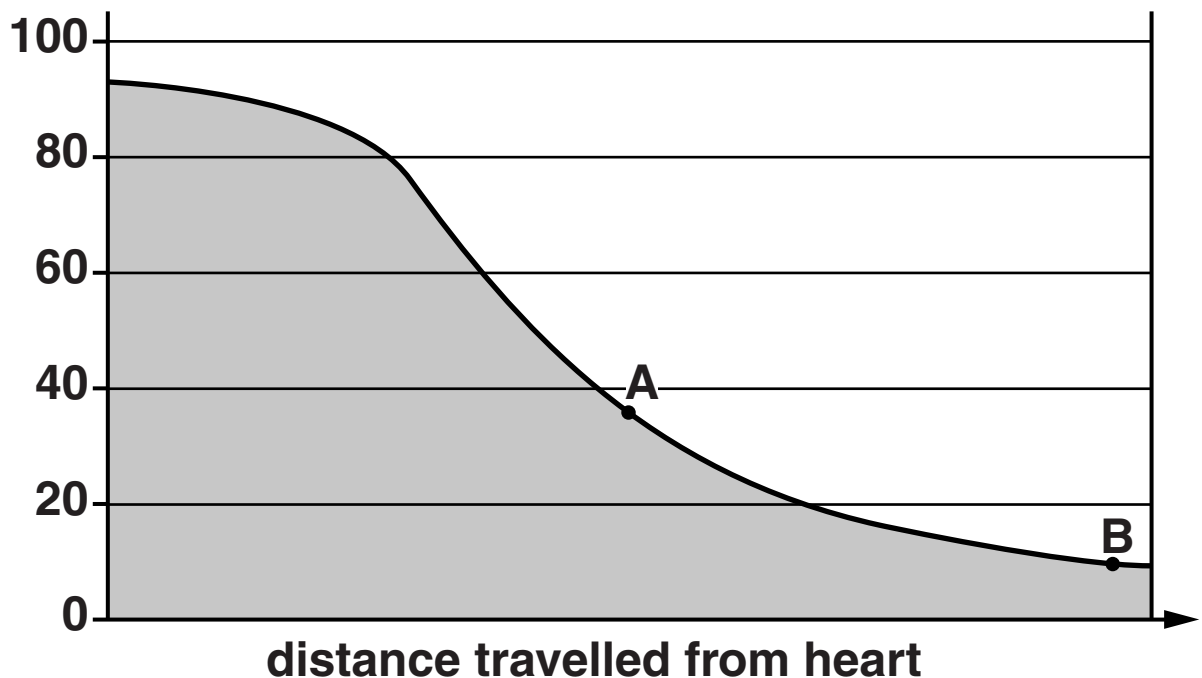
SECTION B – MODULE B5

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.

mean blood pressure
in mm Hg



(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.

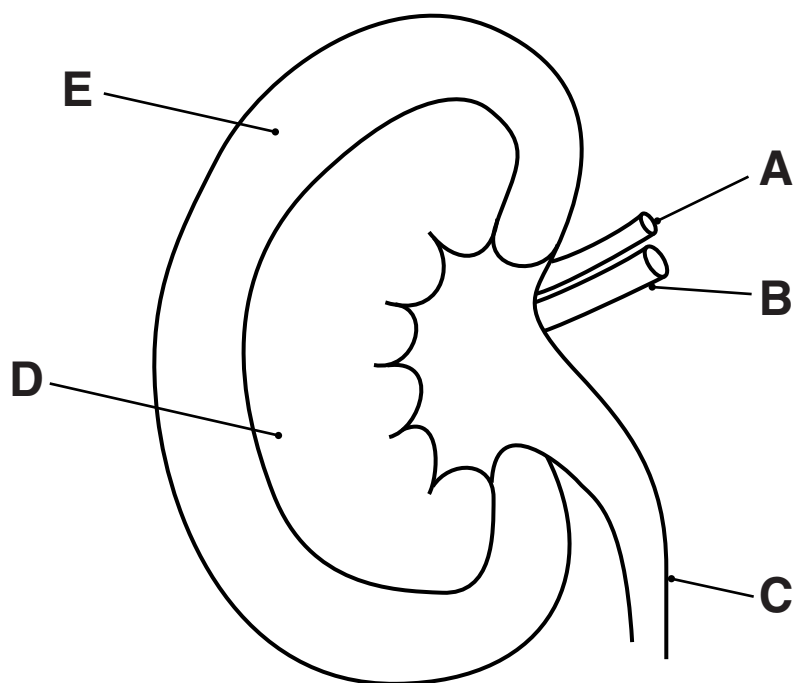
How can damaged heart valves affect a person's circulatory system?

_____ [2]

[TOTAL: 5]

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.

[2]

Part of the kidney	Letter
cortex	
medulla	
renal artery	A
renal vein	
ureter	

(b) Water intake affects urine concentration.

Alcohol reduces the amount of anti-diuretic hormone (ADH) released.

Drinking 2 litres of either water or alcoholic beer will make the urine more dilute.

However, the urine concentration is different in each case.

Explain how drinking 2 litres of water or alcoholic beer makes urine more dilute and why the concentrations would be different.



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

[6]

(c) David and Jonathon are identical twins.

David has a faulty kidney and needs a transplant.

Explain why Jonathon would be the best possible donor.

[2]

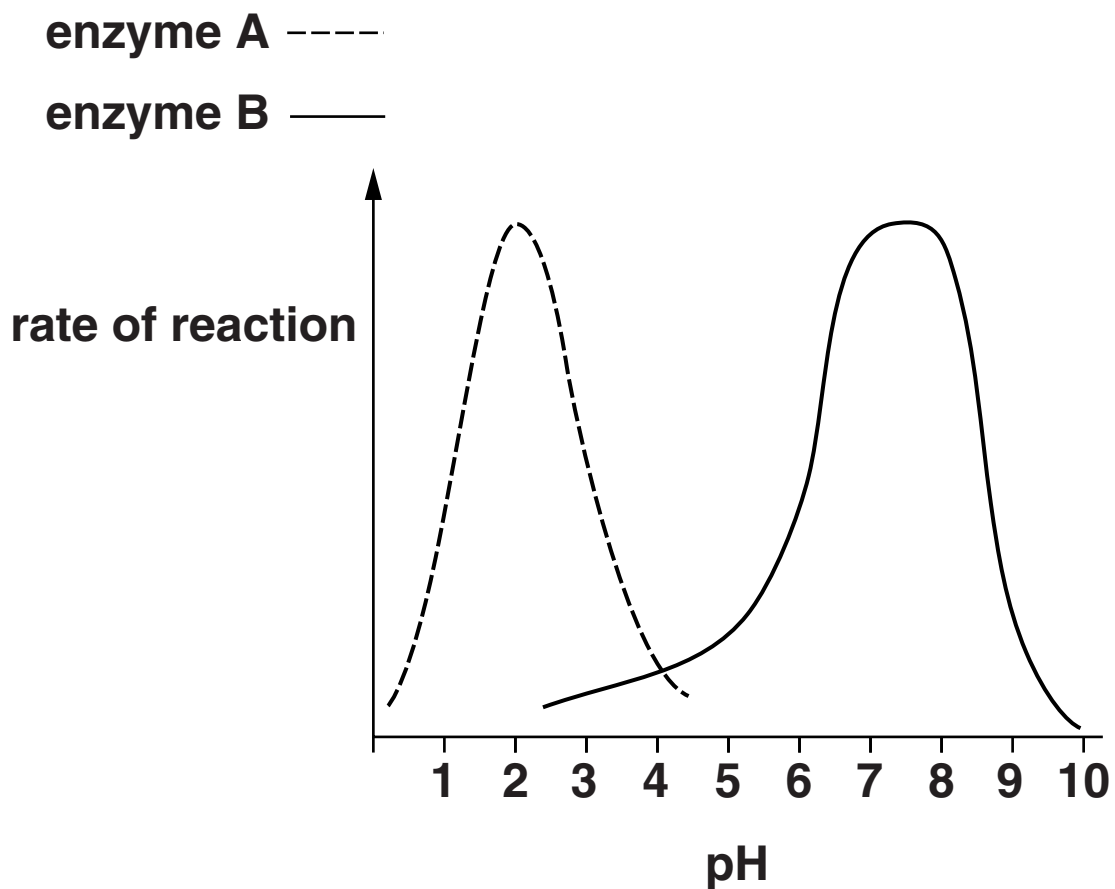
[TOTAL: 10]

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.

[2]

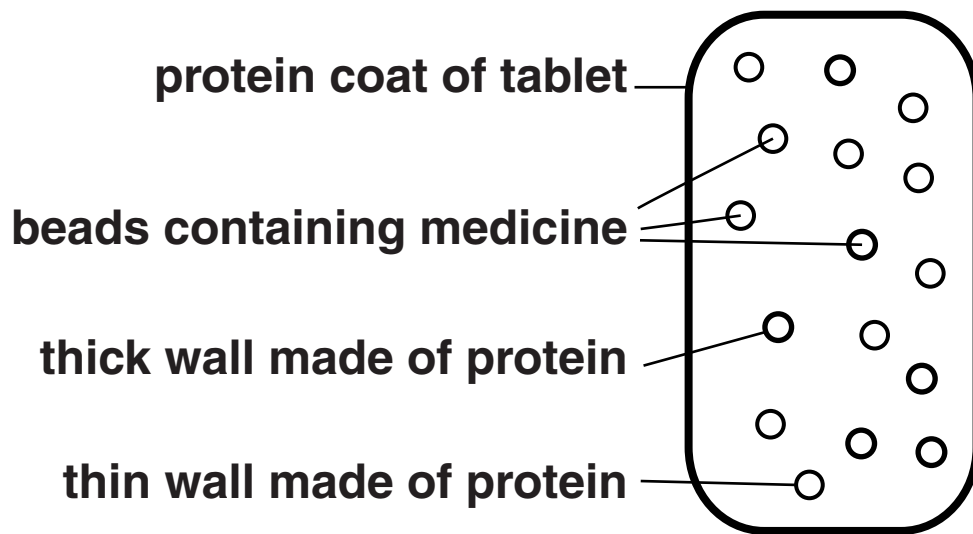
(b) Jemma's stomach is not working properly.

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.



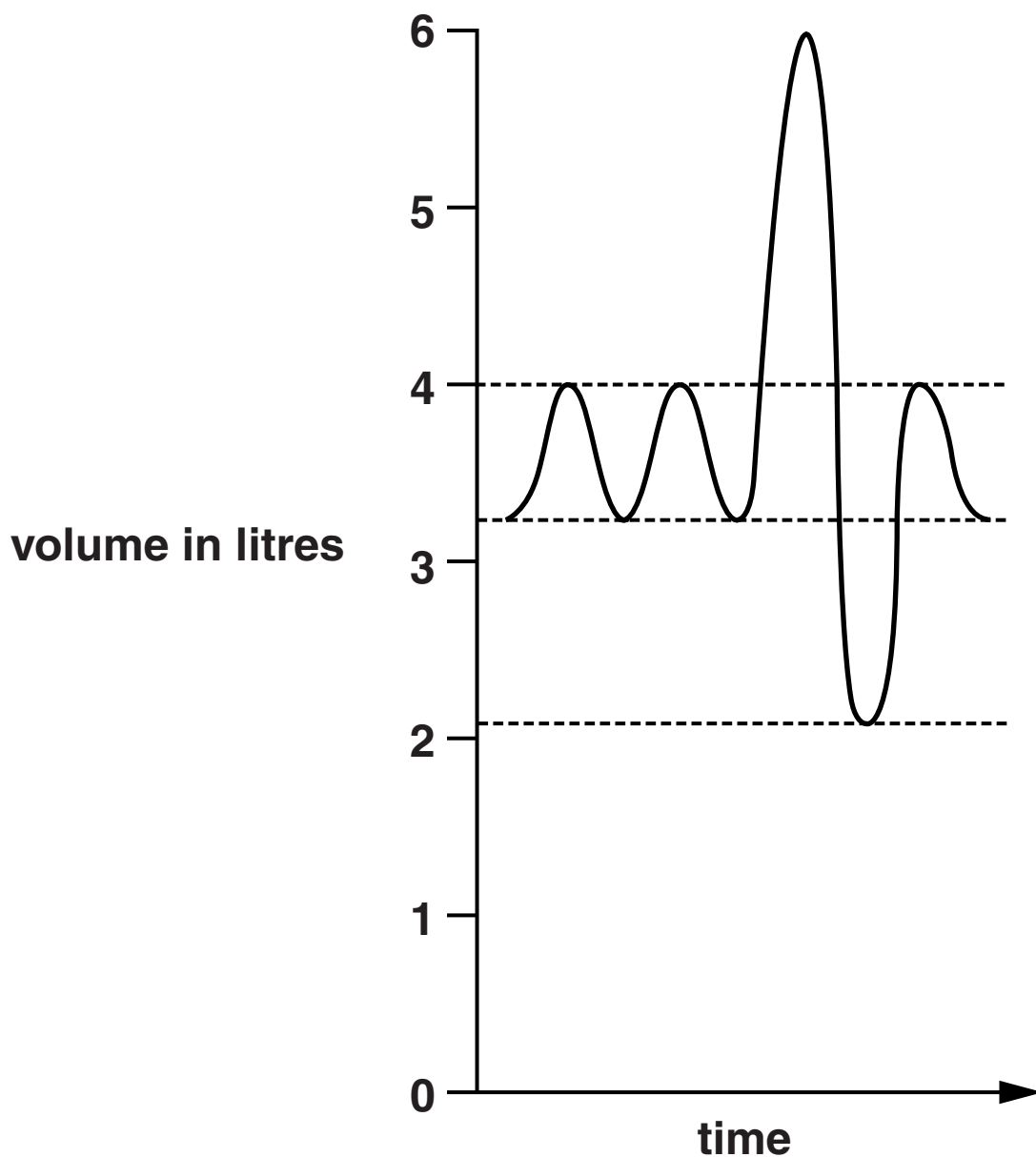
Explain why the medicine is NOT released until it reaches the stomach and why it is released over a long period of time.

[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.

[2]

[TOTAL: 4]

SECTION C – MODULE B6

9 (a) Biogas is a biofuel.

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

Explain how.

[2]

(b) Biogas is normally 50% methane.

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

[1]

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

[1]

[TOTAL: 4]

10 Read the information about ‘spontaneous generation’.

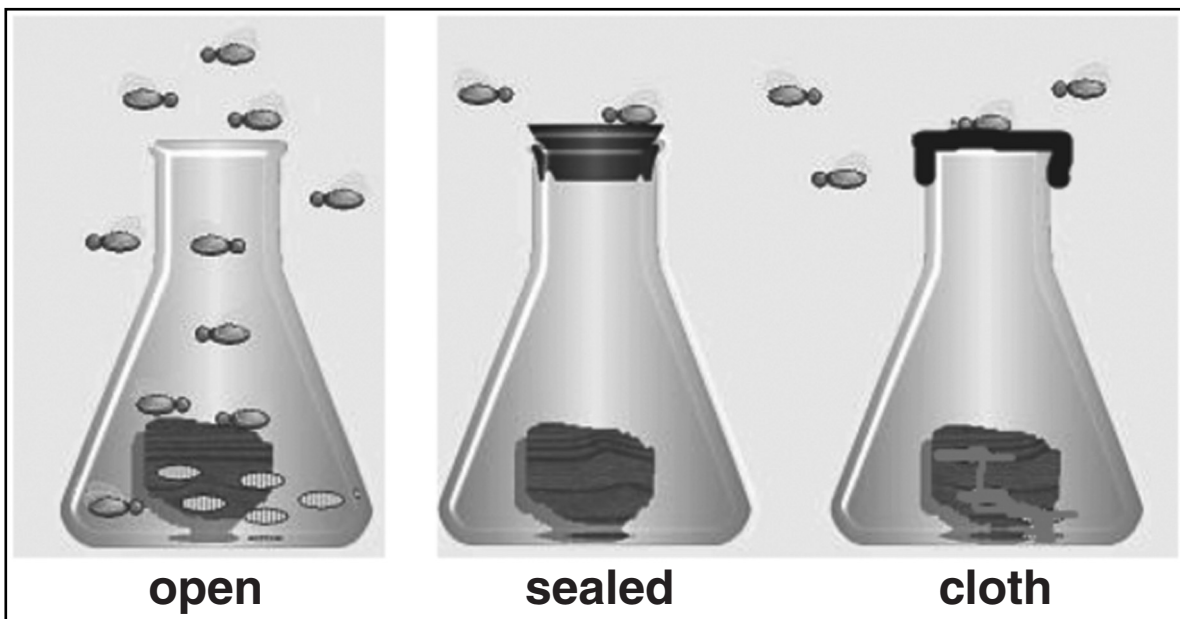
Until the late 19th century, people thought life could be created from non-living matter.

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.

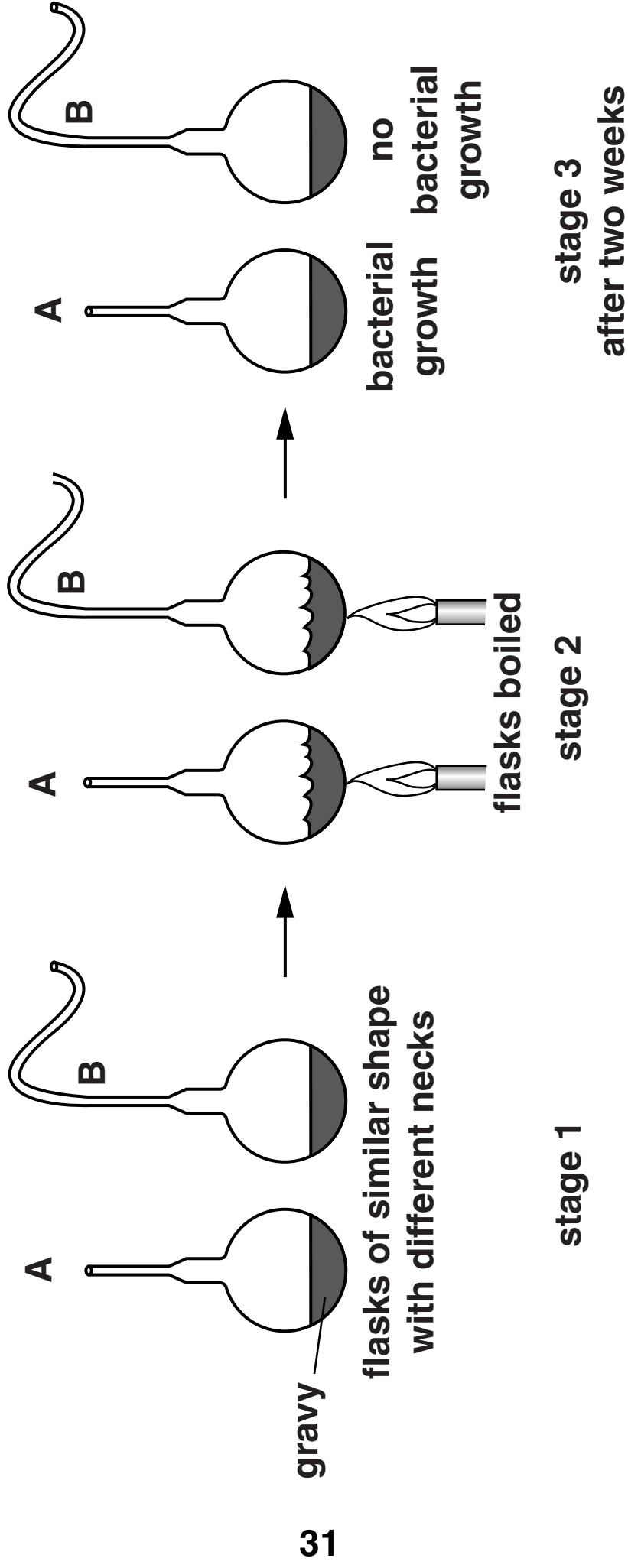


- (a) Explain how Redi's results suggest that the theory of 'spontaneous generation' is wrong.**

[2]

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

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



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

[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.

[2]

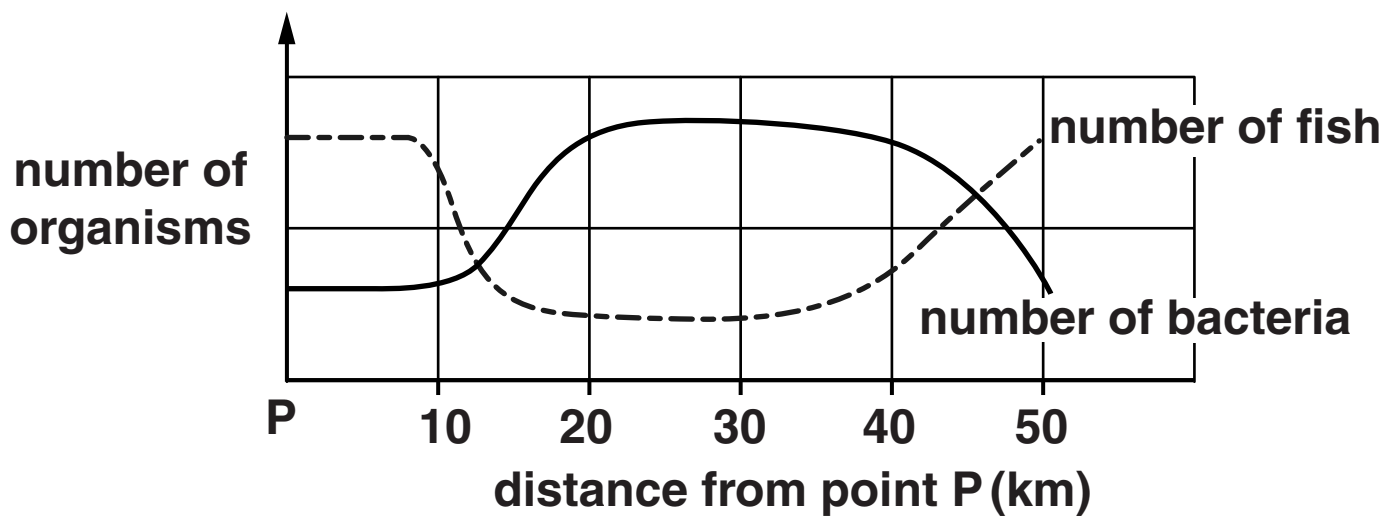
[TOTAL: 9]

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]

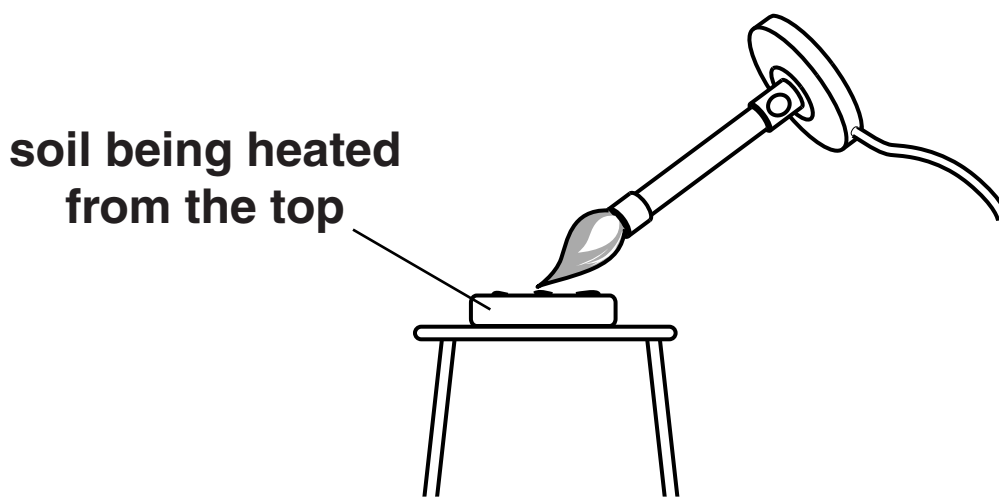
[TOTAL: 6]

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

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) Does the information in the table show any overall differences between males and females?

Use the data to explain your answer.

[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.

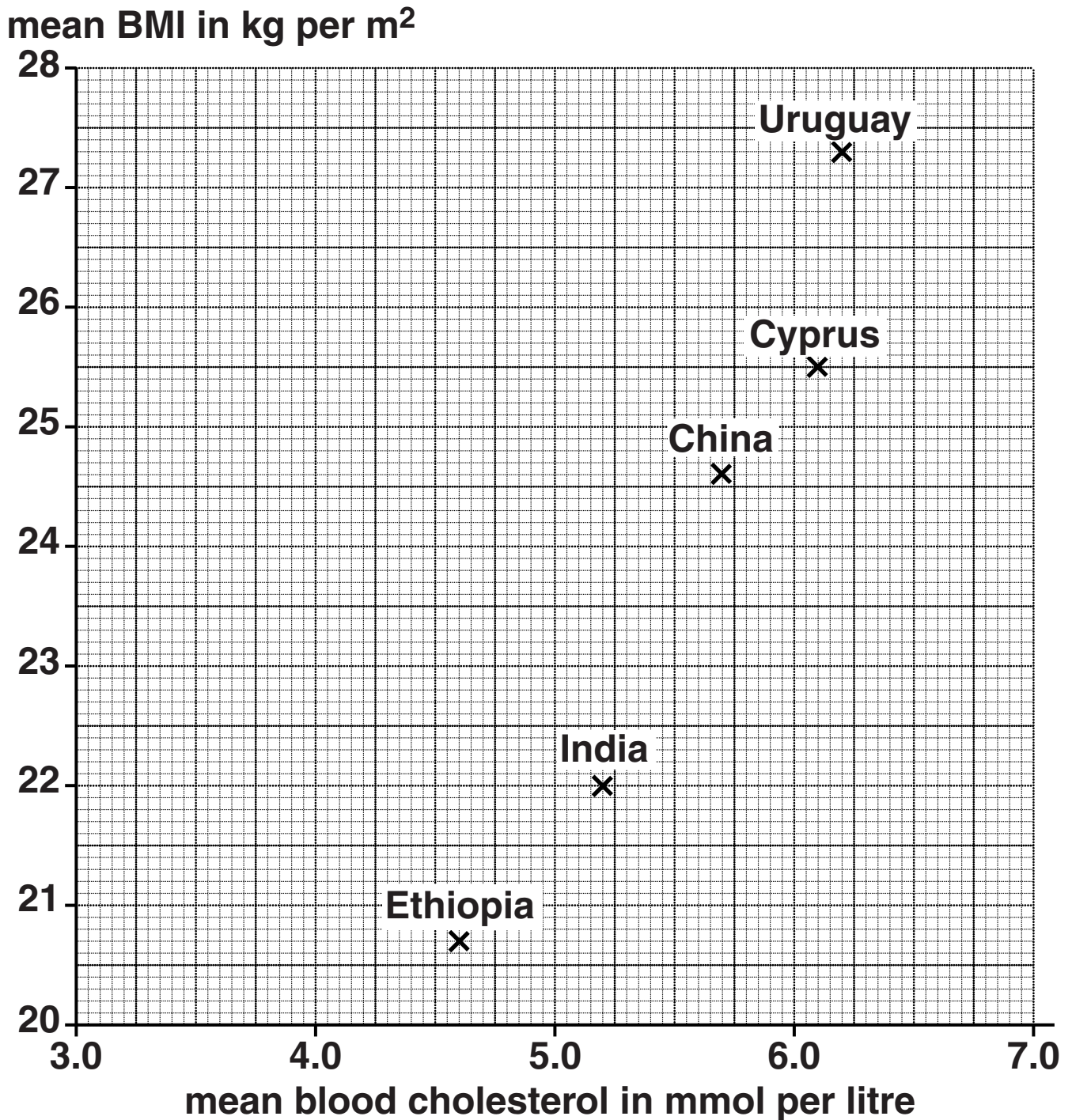
BMI is NOT included in the table for children younger than 15 years.

Suggest why.

[2]

(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 in mmol per litre	Mean BMI in kg per m²
	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]

- (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 in mmol per litre	
	Females	Males
Cyprus	5.8	6.1
India	5.3	5.2
Average mean of the figures 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.

[2]

[TOTAL: 10]

END OF QUESTION PAPER

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