AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE BIOLOGY

H

Higher Tier Paper 1H

Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

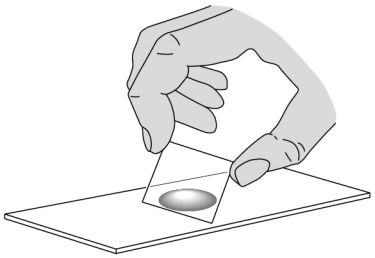
Answer **all** questions in the spaces provided.

Do not write outside the box

0 1 A student prepared some animal cells to view using a microscope.

Figure 1 shows the student preparing the cells.

Figure 1



0 1 . 1 Name **two** pieces of laboratory equipment the student could have used to **prepare** cells to view using a microscope.

[2 marks]

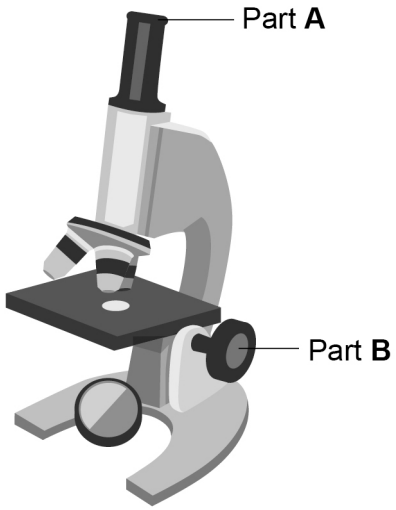
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Figure 2 shows the student's light microscope.

Figure 2



0 1 . 2 Name part **A**.

[1 mark]

0 1 . 3 What is the function of part **B**?

[1 mark]

0 1 . 4 The student tried to look at the cells using the microscope.

Suggest **one** reason why the student could **not** see any cells when looking through part **A**.

[1 mark]

Question 1 continues on the next page

Do not write outside the box

0 1 . 5 Red blood cells are specialised animal cells.

Compare the structure of a red blood cell with the structure of a plant cell.

[6 marks]

0 1 . 6 When placed into a beaker of water:

- a red blood cell bursts
- a plant cell does **not** burst.

Explain why the red blood cell bursts but the plant cell does **not** burst.

[2 marks]

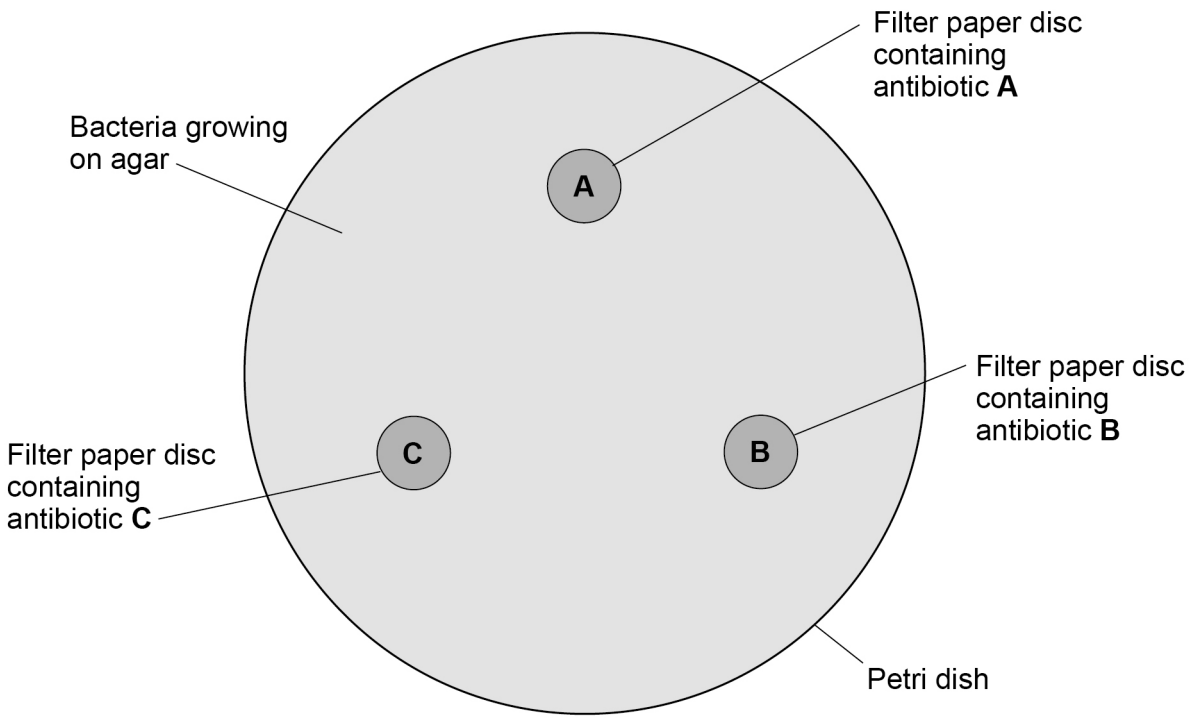
13

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0 2 A student investigated the effectiveness of three different antibiotics.

Figure 3 shows how the student set up an agar plate.

Figure 3



The student used aseptic techniques to make sure that only one type of bacterium was growing on the agar.

0 2 . 1 Describe **two** aseptic techniques the student should have used.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

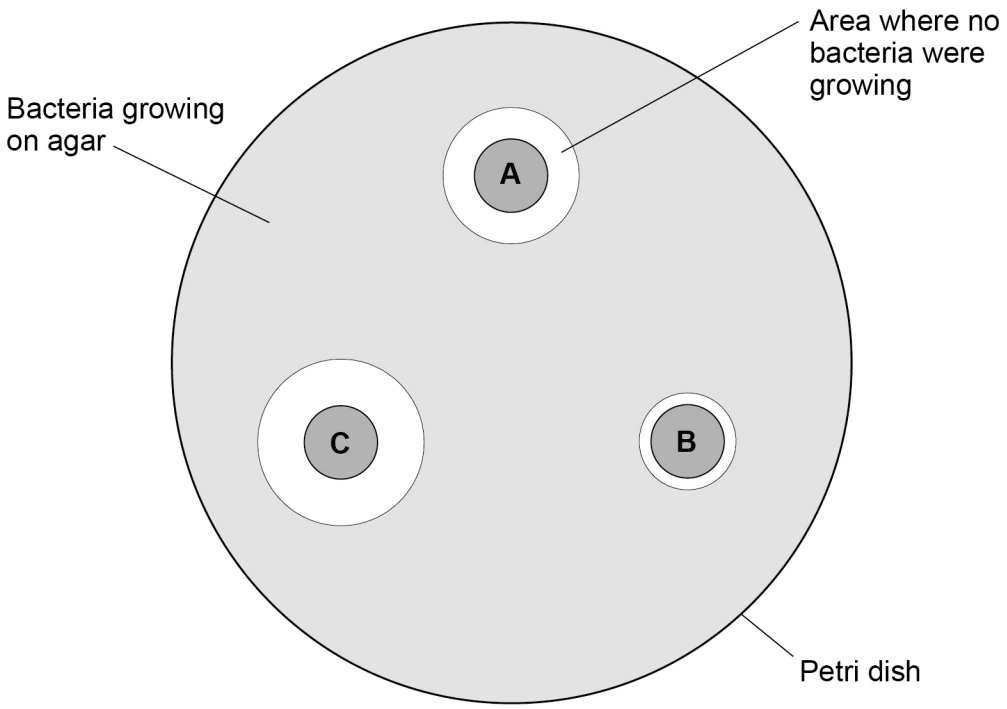
Question 2 continues on the next page

Do not write outside the box

The student placed the agar plate in an incubator at 25 °C for 48 hours.

Figure 4 shows the agar plate after 48 hours.

Figure 4



0 2 . 2 Which antibiotic is the **least** effective?

Give a reason for your answer.

[1 mark]

Least effective antibiotic _____

Reason _____

_____

_____

Do not write outside the box

0 2 . 3 Calculate the area where no bacteria were growing for antibiotic **C**.

Use $\pi = 3.14$

Give the unit.

[5 marks]

Area = _____ Unit _____

0 2 . 4 Suggest **one** way the student could improve the investigation.

[1 mark]

_____

_____

9

Turn over for the next question

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0 3 Body Mass Index (BMI) is a way of finding out if a person's body mass falls within a healthy range for their height.

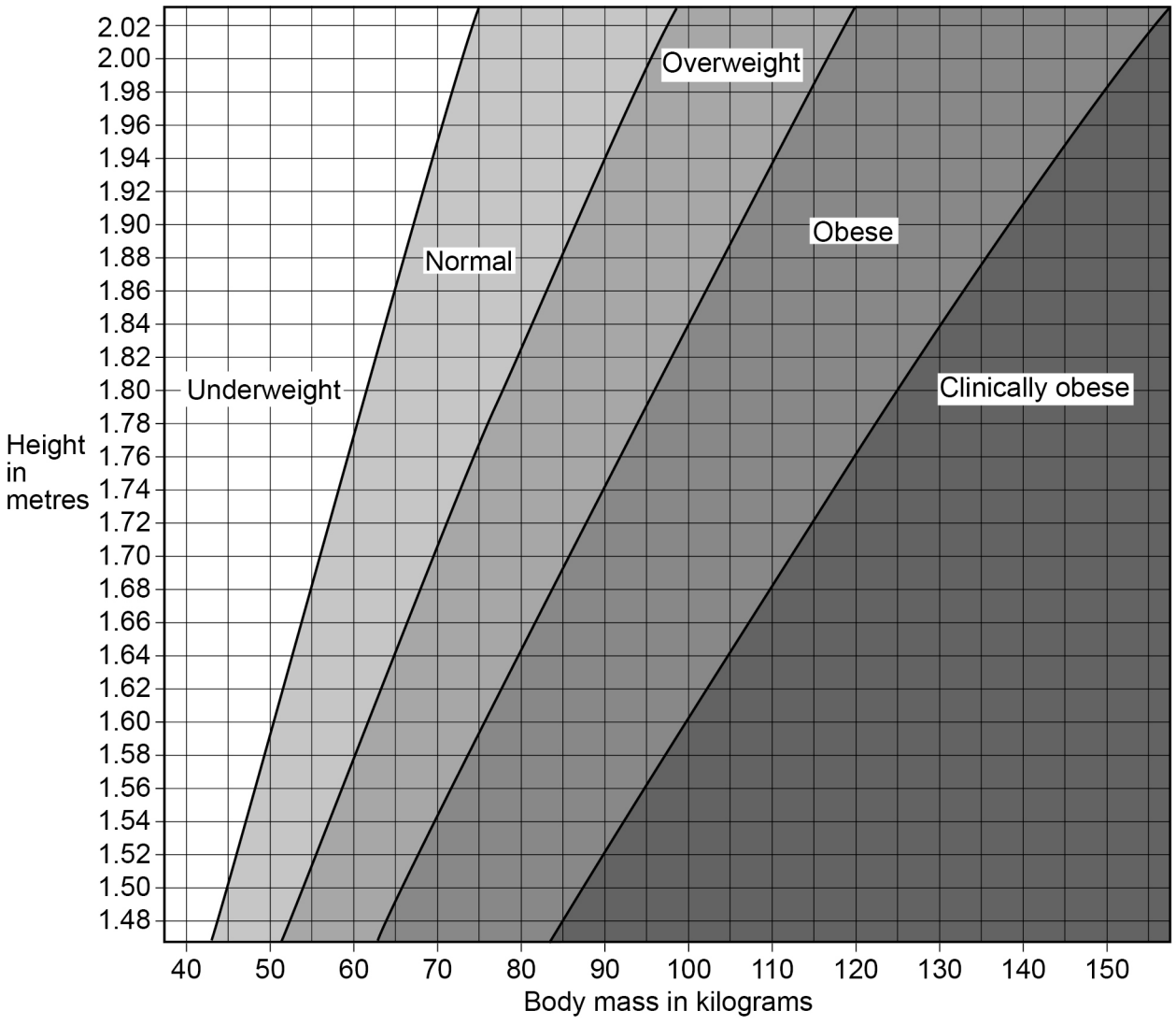
Table 1 shows information about two people.

Table 1

Person	Body mass in kg	Height in m	BMI in kg/m^2
A	63	1.65	23.1
B	92	1.71	**X**

Figure 5 shows five BMI categories for adults.

Figure 5



Do not write outside the box

0 3 . 1 Which is the BMI category of person **A** in **Table 1**?

[1 mark]

Tick (✓) **one** box.

Clinically obese ☐

Normal ☐

Obese ☐

Overweight ☐

Underweight ☐

0 3 . 2 Calculate value **X** in **Table 1**.

Use the equation:

$$\text{BMI} = \frac{\text{body mass}}{\text{height}^2}$$

Give your answer to 3 significant figures.

[3 marks]

X = _____ kg/m^2

Question 3 continues on the next page

Do not write outside the box

Scientists think there is a link between BMI and life expectancy.

Table 2 shows information about predicted life expectancy of men after the age of 50.

Table 2

BMI Category	Predicted number of years living in good health after the age of 50	Predicted number of years living in bad health after the age of 50
Normal	19.06	4.98
Overweight	18.68	5.32
Obese	16.37	7.08
Clinically obese	13.07	10.10

0 3 . 3 Describe **two** patterns shown in **Table 2** about the effects of BMI category.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

Do not write outside the box

The number of people who are obese in the UK is increasing.

0 3 . 4 Explain the financial impact on the UK economy of an increasing number of people who are obese.

[2 marks]

0 3 . 5 A person who is obese is more at risk of arthritis.

Arthritis is a condition that damages joints.

Suggest how arthritis could affect a person's lifestyle.

[1 mark]

0 3 . 6 A person who eats a diet high in saturated fat might become obese.

Name **two** health conditions that might develop if a person eats a diet high in saturated fat.

Do **not** refer to arthritis in your answer.

[2 marks]

1 _____

2 _____

11

Turn over for the next question

Do not write outside the box

0 4 All living organisms respire.

0 4 . 1 What is the chemical equation for aerobic respiration?

[1 mark]

Tick (✓) **one** box.

$6\,O_2 + 6\,CO_2 \rightarrow 6\,H_2O + C_6H_{12}O_6$ ☐

$6\,H_2O + C_6H_{12}O_6 \rightarrow 6\,H_2O + 6\,CO_2$ ☐

$6\,H_2O + 6\,CO_2 \rightarrow 6\,O_2 + C_6H_{12}O_6$ ☐

$6\,O_2 + C_6H_{12}O_6 \rightarrow 6\,H_2O + 6\,CO_2$ ☐

0 4 . 2 Name the sub-cellular structures where aerobic respiration takes place.

[1 mark]

_____

0 4 . 3 Energy is released in respiration.

Give **two** uses of the energy released in respiration.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

0 4 . 4 Describe **two** differences between aerobic and anaerobic respiration in humans.

Do **not** refer to oxygen in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 5 What are the **two** products of anaerobic respiration in plant cells?

[2 marks]

Tick (✓) **two** boxes.

Carbon dioxide ☐

Ethanol ☐

Glucose ☐

Lactic acid ☐

Water ☐

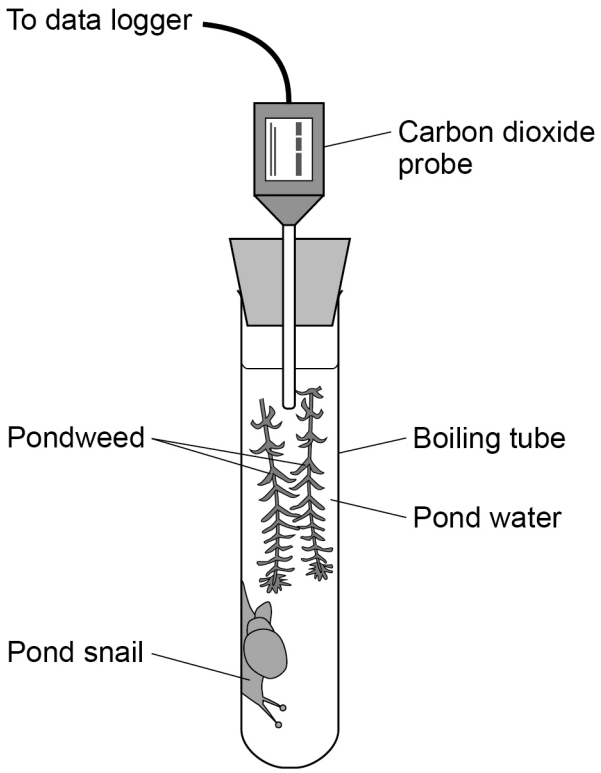
Question 4 continues on the next page

Do not write outside the box

A scientist investigated respiration and photosynthesis using some pondweed and a pond snail.

Figure 6 shows the apparatus used.

Figure 6



The apparatus was left in a well-lit room for 5 days.

The data logger recorded the concentration of carbon dioxide continuously.

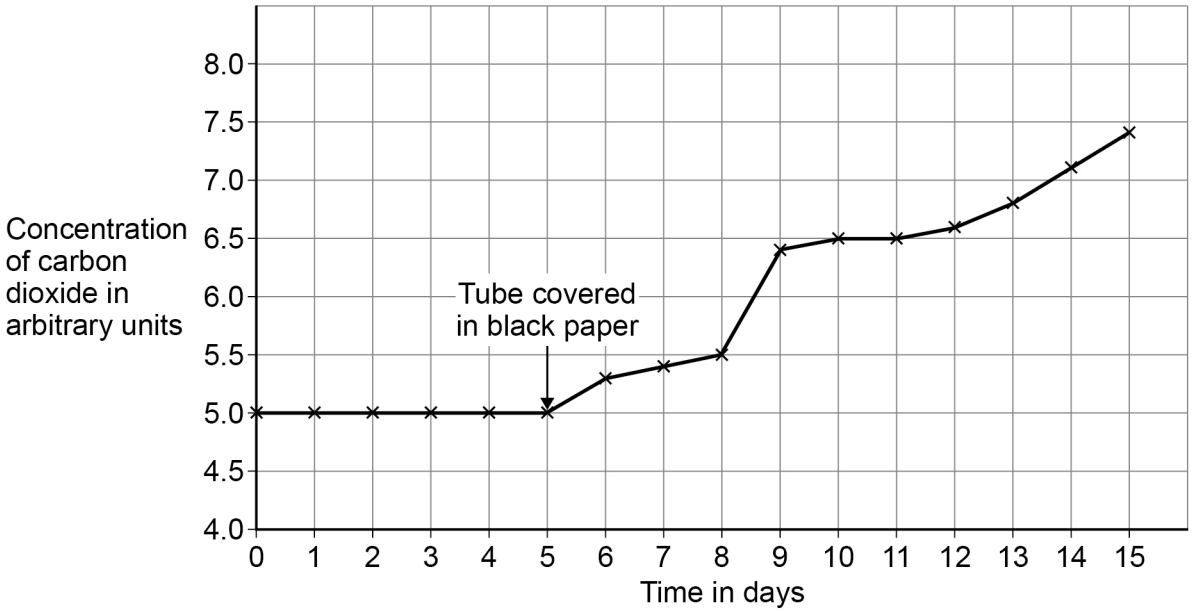
After 5 days, the scientist completely covered the boiling tube with black paper.

The data logger continued to record the concentration of carbon dioxide.

Do not write outside the box

Figure 7 shows the concentration of carbon dioxide inside the boiling tube over 15 days.

Figure 7



0 4 . 6 Explain why the concentration of carbon dioxide in the tube stayed the same between day 0 and day 5.

[2 marks]

0 4 . 7 Suggest why the concentration of carbon dioxide increased between day 5 and day 10.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

0 4 . 8 On day 10, the pond snail died.

Explain why the death of the pond snail caused the concentration of carbon dioxide to increase after day 10.

[3 marks]

14

Do not write outside the box

0 5 Amylase is an enzyme that breaks down starch.

0 5 . 1 Amylase is a polymer of smaller molecules.

Name the type of smaller molecule.

[1 mark]

_____

0 5 . 2 Name the **three** parts of the human digestive system that produce amylase.

[2 marks]

1 _____

2 _____

3 _____

0 5 . 3 Explain how amylase breaks down starch.

Answer in terms of the 'lock and key theory'.

[3 marks]

_____

_____

_____

_____

_____

_____

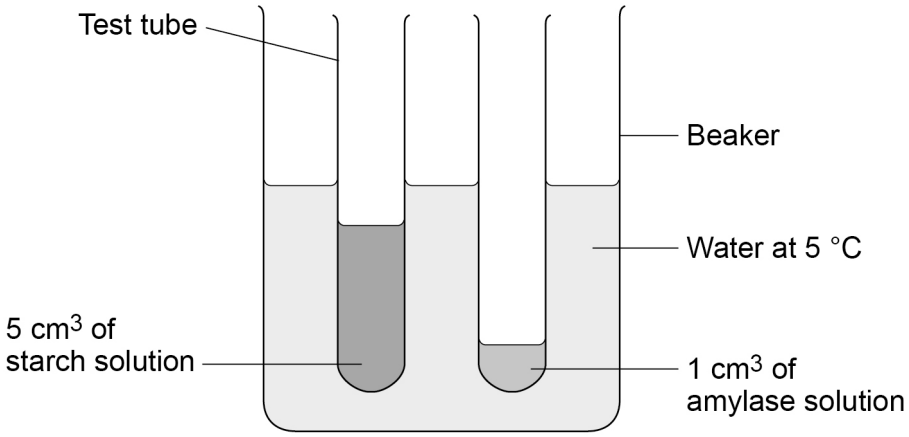
Question 5 continues on the next page

Do not write outside the box

A student investigated the effect of temperature on the activity of amylase.

Figure 8 shows the apparatus used.

Figure 8



This is the method used.

1. Set up the apparatus as shown in **Figure 8**.
2. After 5 minutes, pour the starch solution into the amylase solution and mix.
3. Remove one drop of the starch-amylase mixture and place onto a spotting tile.
4. Immediately add two drops of iodine solution to the starch-amylase mixture on the spotting tile.
5. Record the colour of the iodine solution added to the starch-amylase mixture.
6. Repeat steps 3 to 5 every minute until the iodine solution stays yellow-brown.
7. Repeat steps 1 to 6 using water at different temperatures.

Do not write outside the box

0 5 . 4 Name **two** control variables the student used in the investigation.

[2 marks]

1 _____

2 _____

0 5 . 5 Why did the student leave the starch solution and amylase solution for 5 minutes before mixing them?

[1 mark]

_____

_____

Question 5 continues on the next page

Do not write outside the box

Table 3 shows the results of the investigation.

Table 3

Temperature in °C	Time taken until iodine solution stays yellow-brown in minutes
5	did not become yellow-brown
20	5
35	2
50	7
65	14
80	did not become yellow-brown

0 5 . 6 What conclusion can be made about the effect of temperature on amylase activity between 20 °C and 65 °C?

[1 mark]

Do not write outside the box

0 5 . 7 Explain the results at 5 °C and at 80 °C.

Use **Table 3**.

[5 marks]

0 5 . 8 The student investigated the effect of temperature on amylase activity.

Describe how the student could extend the investigation to determine the effect of a different factor on amylase activity.

[2 marks]

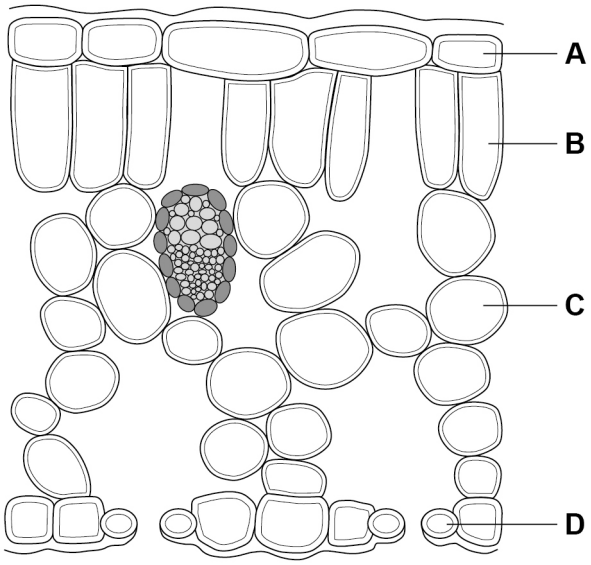
17

Turn over for the next question

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0 6 **Figure 9** shows a cross section of a leaf.

Figure 9



0 6 . 1 Which cell is most transparent?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 Which cell structure in a leaf mesophyll cell is **not** found in a root hair cell?

[1 mark]

Do not write outside the box

Plants lose water through their leaves.

0 6 . 3 Name the cells in a leaf that control the rate of water loss.

[1 mark]

0 6 . 4 Water is taken in by the roots, transported up the plant and lost from the leaves.

Which scientific term describes this movement of water?

[1 mark]

0 6 . 5 Which change would decrease the rate of water loss from a plant's leaves?

[1 mark]

Tick (✓) **one** box.

- Increased humidity ☐
- Increased light intensity ☐
- Increased density of stomata ☐
- Increased temperature ☐

Question 6 continues on the next page

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0 6 . 6 Compare the structure and function of xylem tissue and phloem tissue.

[6 marks]

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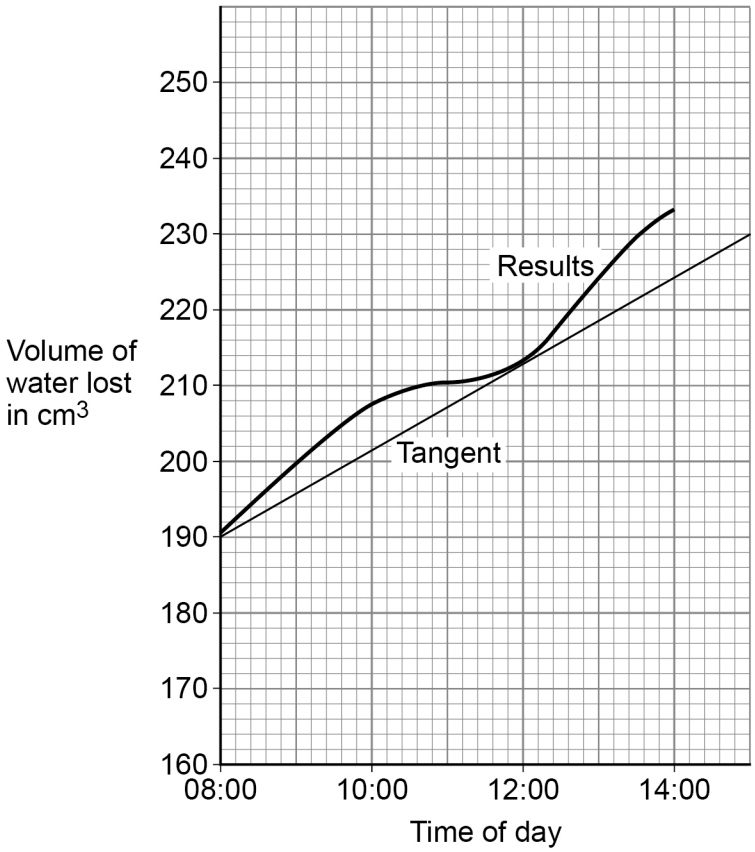
Question 6 continues on the next page

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ANSWER IN THE SPACES PROVIDED

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Figure 10 shows the total volume of water lost from a plant over 6 hours.

Figure 10



Do not write outside the box

0 6 . 7 Determine the rate of water loss at 12:00

Use the tangent on **Figure 10**.

Give your answer:

- in cm^3 per minute
- in standard form.

[4 marks]

Rate of water loss = _____ cm^3 per minute

0 6 . 8 The rate of water loss at midnight was much lower than at 12:00

Explain why.

[2 marks]

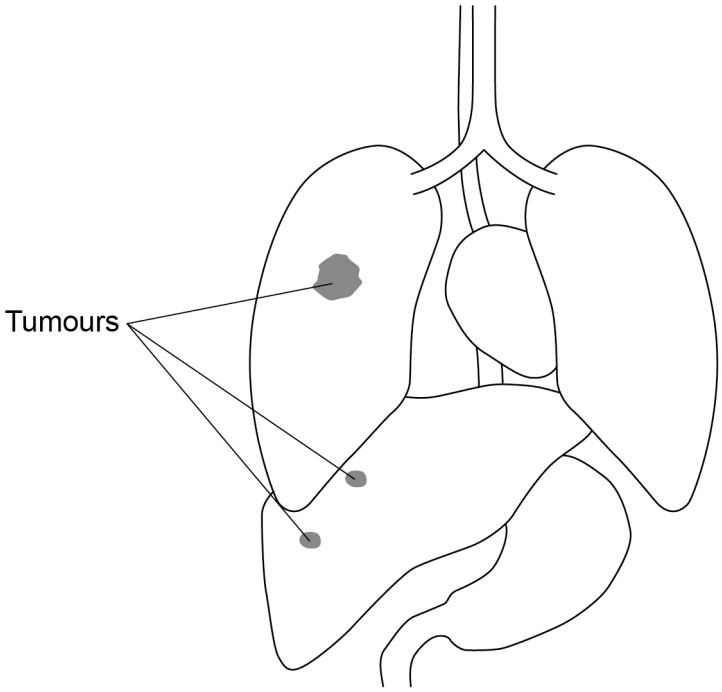
17

Turn over for the next question

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0 7 **Figure 11** shows where three of the same type of tumour were found in a patient.

Figure 11



Malignant tumours are cancers.

0 7 . 1 Describe what happens to cells when a tumour forms.

[1 mark]

0 7 . 2 What evidence is there in **Figure 11** to suggest that the tumour in the lung is malignant?

[1 mark]

Do not write outside the box

0 7 . 3 Some types of cancer can cause the numbers of blood components in a person's body to fall to a dangerously low level.

A person with one of these types of cancer may experience symptoms such as:

- tiredness
- frequent infections
- bleeding that will not stop after the skin is cut.

Explain how a very low number of blood components in the body can cause these symptoms.

[6 marks]

Question 7 continues on the next page

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Some patients with a very low number of blood cells may be given a blood transfusion.

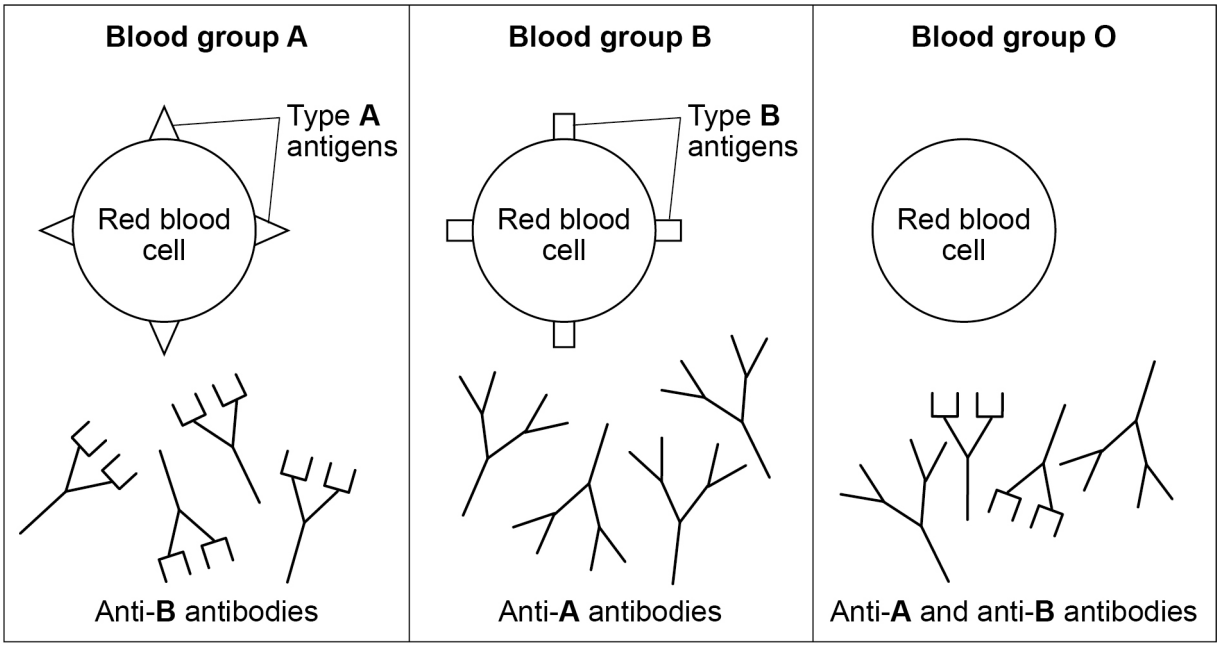
A blood transfusion is where a patient receives blood from a donor.

Different people have different blood groups.

Figure 12 shows:

- the red blood cells found in people with different blood groups
- the antibodies that can be made by people with different blood groups.

Figure 12



Antibodies can bind to antigens that have complementary shapes.

When antibodies bind to the antigens on red blood cells, many red blood cells begin to clump together.

Each red blood cell is about 8 μm in diameter.

Many capillaries have an internal diameter of about 10 μm.

Do not write outside the box

In one type of blood transfusion, **only** red blood cells from a donor are transferred to the patient.

0 7 . 4 It is dangerous for a patient with blood group **A** to receive red blood cells from a donor with blood group **B**.

Explain why.

[3 marks]

0 7 . 5 Explain why blood group **O** red blood cells can be given to patients with any blood group.

[2 marks]

Question 7 continues on the next page

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0 7 . 6 **Table 4** shows some of the risks associated with blood transfusions.

Table 4

Risk	Probability of risk occurring
Allergic reaction	0.9 %
Hepatitis B infection	1 in (3×10^5)
Hepatitis C infection	6.7×10^{-7}
Kidney damage	1 in 70 000

Which risk has the **lowest** probability of occurring?

[1 mark]

Tick (✓) **one** box.

Allergic reaction ☐

Hepatitis B infection ☐

Hepatitis C infection ☐

Kidney damage ☐

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0 7 . 7 A person has a tumour blocking the tube leading from the gall bladder to the small intestine.

Explain why this person would have difficulty digesting fat.

[5 marks]

19

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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