AQA

GCSE
BIOLOGY

H

Higher Tier   Paper 1H

Specimen 2018 (set 2)   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.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- 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.

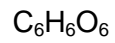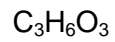| For Examiner's Use	
Question	Mark
1	
2	
3	
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6	
7	
8	
TOTAL	

0 1 In respiration, glucose is broken down.

0 1 . 1 What is the chemical formula for glucose?

[1 mark]

Tick **one** box.

$C_6H_6O_6$ ☐

$C_3H_6O_3$ ☐

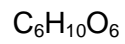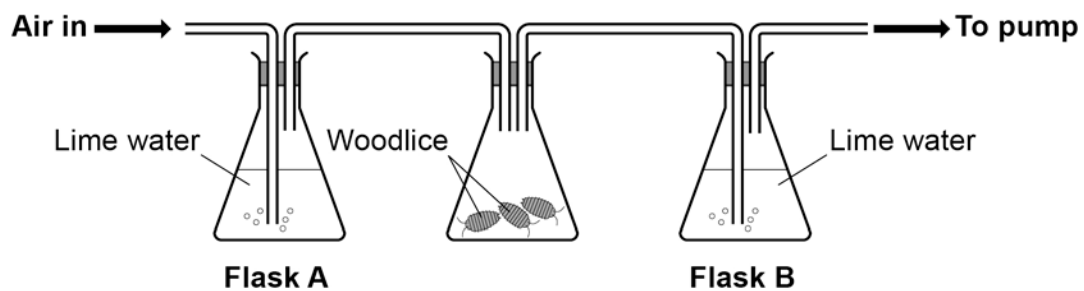$C_6H_{12}O_6$ ☐

$C_6H_{10}O_6$ ☐
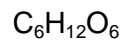
Figure 1 shows the apparatus a student used to investigate aerobic respiration.

Figure 1

Limewater goes cloudy when carbon dioxide is added to it.

0 1 . 2 After 10 minutes the limewater in flask **B** was cloudy, but the limewater in flask **A** remained colourless.

Explain why.

[2 marks]

_____

_____

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_____

0 1 . 3 Flask **A** acts as a control in this investigation.

What is the purpose of a control?

[1 mark]

_____

_____

_____

0 1 . 4 The student repeated the investigation with no woodlice.

Describe what you would see in flask **A** and flask **B** after 10 minutes.

[2 marks]

Flask **A** _____

_____

Flask **B** _____

_____

Question 1 continues on the next page

Turn over ▶

Anaerobic respiration is another form of respiration in living organisms.

0 1 . 5 What is produced during anaerobic respiration in humans?

[1 mark]

Tick **one** box.

Carbon dioxide ☐

Carbon dioxide and lactic acid ☐

Lactic acid ☐

Oxygen and water ☐

0 1 . 6 Complete the equation for anaerobic respiration in yeast.

[1 mark]

glucose ⟶ carbon dioxide + _____

___
8

0 2 | **Figure 2** shows part of a root from a cress plant.

Figure 2

x 200
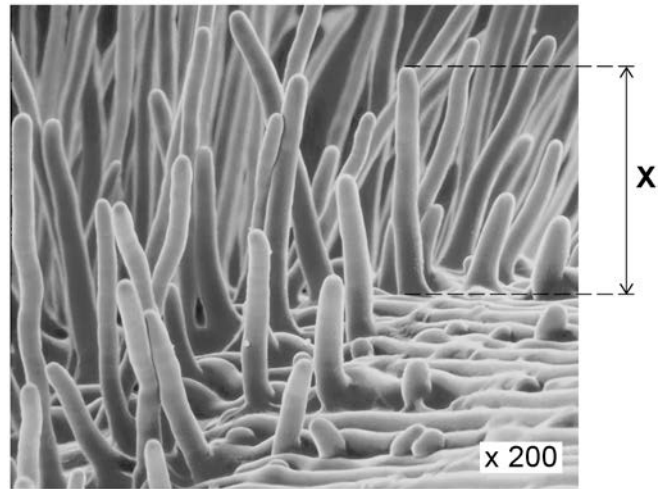
0 2 . **1** | What type of microscope was used to create the image in **Figure 2**?

[1 mark]

0 2 . **2** | The magnification of the cress root in **Figure 2** is ×200.

There are 1000 micrometres (µm) in a millimetre (mm).

Calculate the real length of the root hair, **X**.

[2 marks]

Give your answer in micrometres (µm).

Real length **X** = _____ µm

Question 2 continues on the next page

Turn over ►

0 2 . 3 Root hair cells take up water from the soil.

Explain **one** way in which the root hair cell is adapted to this function.

[2 marks]

_____

_____

_____

_____

Table 1 shows the water uptake by a plant's roots on two different days.

Table 1

	Mean water uptake in cm³ per hour
Cold day	1.8
Hot day	3.4

0 2 . 4 Explain why the mean rate of water uptake is higher on a hot day than on a cold day.

[3 marks]

_____

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0 2 . 5 The concentration of mineral ions in the soil is lower than in root hair cells.

Root hair cells take up mineral ions from the soil.

Root hair cells contain mitochondria.

Explain why root hair cells contain mitochondria.

[4 marks]

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12

Turn over for the next question

Turn over ▶

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**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

0 3 Rose black spot is a disease of roses.

0 3 . 1 What type of microorganism causes rose black spot?

[1 mark]

Tick **one** box.

A bacterium ☐

A fungus ☐

A protist ☐

A virus ☐

0 3 . 2 Explain how different **types of organism** defend themselves against microorganisms.

[6 marks]

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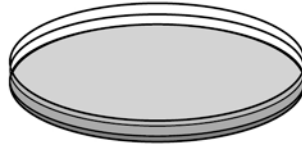**Question 3 continues on the next page**

Turn over ►

0 3 . 3 A student tried to grow some bacteria in the laboratory.
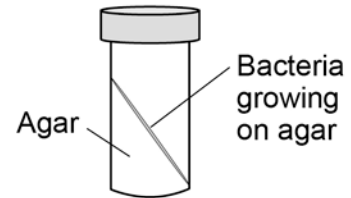
Figure 3 shows some of the apparatus used.

Figure 3

Inoculating loop

Petri dish
containing agar

Agar

Bacteria
growing
on agar

Bottle containing
the bacteria

This is the method used.

1. Remove the lid of the Petri dish.

2. Remove the lid of the bottle containing the bacteria.

3. Use the inoculating loop to remove some of the bacteria from the bottle.

4. Spread the bacteria over the agar using the inoculating loop.

5. Put the lid back on the Petri dish.

6. Put the Petri dish into an incubator at 25 °C for 24 hours.

Steps 1−5 could cause the sample of the bacteria to be contaminated.

Give **three** improvements to the method to prevent contamination.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

| 0 | 3 | . | 4 | Why did the student grow the bacteria at 25 °C rather than at 40 °C?

[1 mark]

Tick **one** box.

So the bacteria grew more quickly ☐

So the bacteria grew more slowly ☐

To prevent the growth of a harmful pathogen ☐

To save money ☐

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Turn over for the next question

Turn over ▶

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ANSWER IN THE SPACES PROVIDED

0 4 Stem cells can be used to treat some diseases.

0 4 . 1 What is a stem cell?

[2 marks]

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Figure 4 shows a malignant tumour in the trachea of a patient.

Figure 4
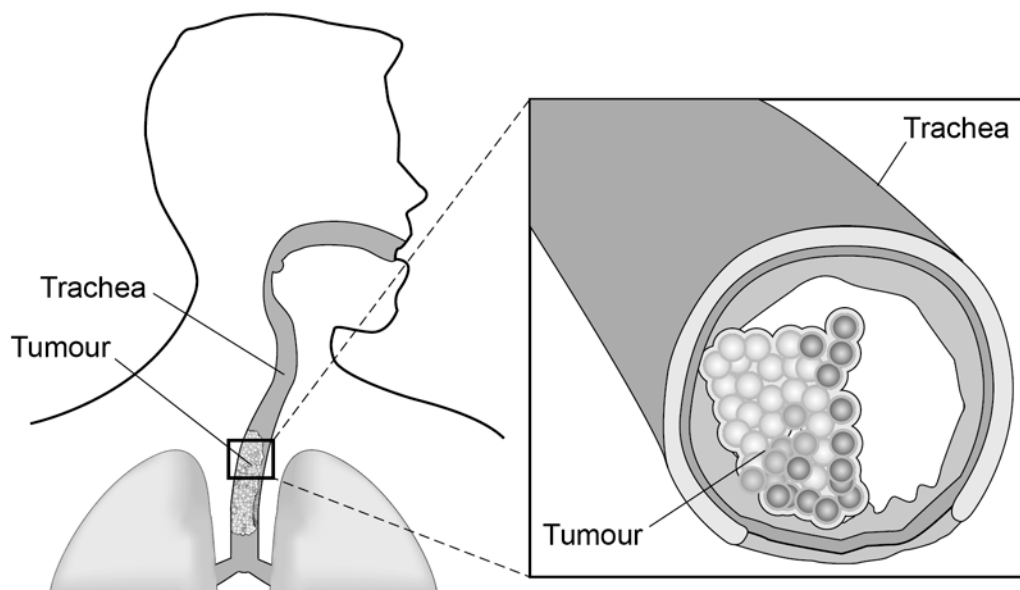
0 4 . 2 Give **one** way a malignant tumour differs from a benign tumour.

[1 mark]

_____
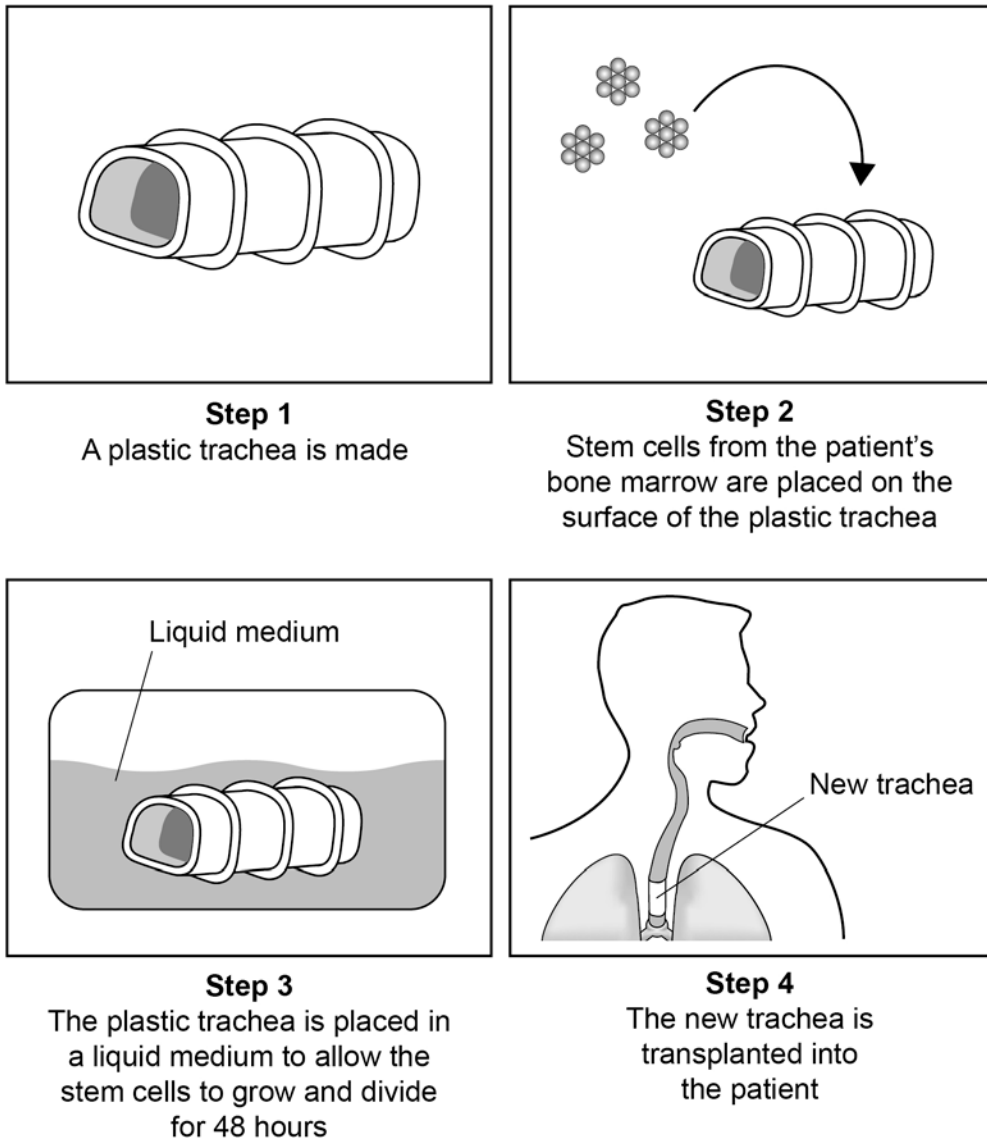
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Question 4 continues on the next page

Turn over ▶

Scientists can treat the patient's tumour by replacing the trachea with a plastic trachea.

The plastic trachea has a layer of the patient's own stem cells covering it.

Figure 5 shows the procedure.

Figure 5

Step 1
A plastic trachea is made

Step 2
Stem cells from the patient's bone marrow are placed on the surface of the plastic trachea

Liquid medium

New trachea

Step 3
The plastic trachea is placed in a liquid medium to allow the stem cells to grow and divide for 48 hours

Step 4
The new trachea is transplanted into the patient

0 4 . 3 In **Step 3** the cells are left for 48 hours to divide.

Name the type of cell division in **Step 3**.

[1 mark]

_____

0 4 . 4 In **Step 3** the cells are given oxygen and water.

Name **two** other substances the cells need so they can grow and divide.

[2 marks]

1 _____

2 _____

0 4 . 5 Give **two** advantages of using the stem cell trachea compared with a trachea from a dead human donor.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 6 Sometimes the stem cell trachea is not strong enough.

Doctors can put a stent into the trachea.

Suggest how a stent in the trachea helps to keep the patient alive.

[2 marks]

_____

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Question 4 continues on the next page

Turn over ▶

0 4 . 7 Stem cells can also be obtained from human embryos.

Evaluate the use of stem cells from a patient's own bone marrow instead of stem cells from an embryo.

Give a conclusion to your answer.

[6 marks]

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16

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

Turn over ▶

0 5 A student carried out an investigation using leaf epidermis.

This is the method used.

1. Peel the lower epidermis from the underside of a leaf.

2. Cut the epidermis into six equal sized pieces.

3. Place each piece of lower epidermis into a different Petri dish.

4. Add 5 cm^3 of salt solution to the six Petri dishes. Each Petri dish should have a different concentration of salt solution.

5. After 1 hour, view each piece of epidermis under a microscope at ×400 magnification.

6. Count and record the total number of stomata present and the number of open stomata that can be seen in one field of view.

The student's results are shown in **Table 2.**

Table 2

Concentration of salt solution in mol / dm^3	Number of stomata in field of view	Number of open stomata in field of view	Percentage (%) of open stomata in field of view
0.0	7	7	100
0.1	8	8	100
0.2	7	6	**X**
0.3	9	6	67
0.4	10	4	40
0.5	9	2	22

0 5 . 1 Calculate value **X** in **Table 2**.

[1 mark]

_____

_____

X = _____ %

0 5 . 2 Give **one** conclusion from the results in **Table 2**.

[1 mark]

_____

_____

0 5 . 3 How could the student find out what concentration of salt solution would result in half of the stomata being open?

[1 mark]

_____

_____

0 5 . 4 The student measured the real diameter of the field of view to be 0.375 mm.

Calculate the number of open stomata per mm^2 of leaf for the epidermis placed in 0.4 mol/dm^3 salt solution.

Use information from **Table 2**.
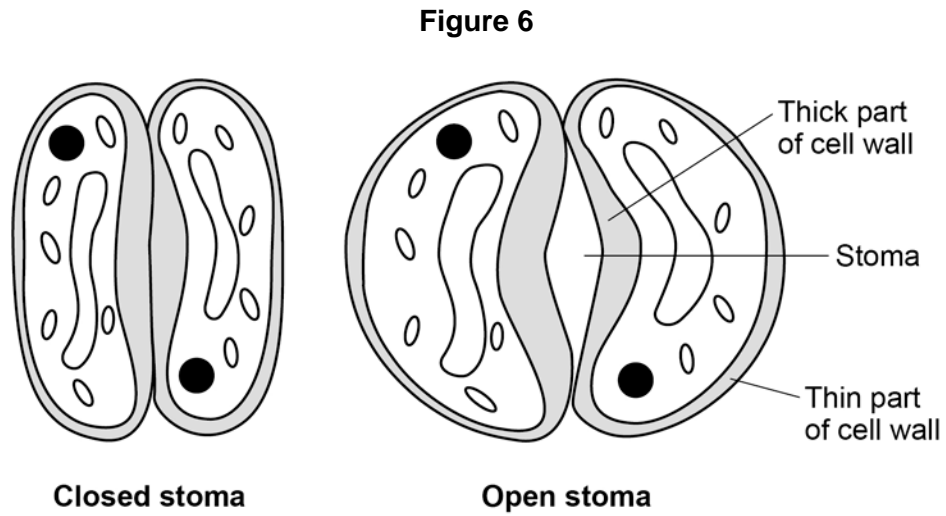
Take π to be 3.14

[3 marks]

_____

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_____

Number of open stomata = _____ per mm^2

Question 5 continues on the next page

Turn over ▶

0 5 . 5 **Figure 6** shows two guard cells surrounding a closed stoma and two guard cells surrounding an open stoma.

Figure 6

Closed stoma   Open stoma

When light intensity is high potassium ions are moved into the guard cells.

Describe how the movement of potassium ions into the guard cells causes the stoma to open.

[4 marks]

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10

0 6   A virus called RSV causes severe respiratory disease.

0 6 . 1   Suggest **two** precautions that a person with RSV could take to reduce the spread of the virus to other people.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 2   One treatment for RSV uses monoclonal antibodies which can be injected into the patient.

Scientists can produce monoclonal antibodies using mice.

The first step is to inject the virus into a mouse.

Describe the remaining steps in the procedure to produce monoclonal antibodies.

[3 marks]

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Question 6 continues on the next page

Turn over ▶

0 6 . 3 Describe how injecting a monoclonal antibody for RSV helps to treat a patient suffering with the disease.

[2 marks]

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A trial was carried out to assess the effectiveness of using monoclonal antibodies to treat patients with RSV.

Some patients were given a placebo.

0 6 . 4 Why were some patients given a placebo?

[1 mark]

_____

_____

A number of patients had to be admitted to hospital as they became so ill with RSV.

The results are shown in **Table 3**.

Table 3

Treatment received by patient	% of patients within each group admitted to hospital with RSV
Group **A**: Monoclonal antibody for RSV	4.8
Group **B**: Placebo	10.4

The trial involved 1 500 patients.

- Half of the patients (group **A**) were given the monoclonal antibodies.
- Half of the patients (group **B**) were given the placebo.

| 0 | 6 | . | 5 | Calculate the total number of patients admitted to hospital with RSV during the trial.

[2 marks]

Total number of patients admitted to hospital = _____

| 0 | 6 | . | 6 | Evaluate how well the data in **Table 3** supports the conclusion:

'monoclonal antibodies are more effective at treating RSV than a placebo'.

[2 marks]

12

Turn over ▶

0 7 The heart pumps blood to the lungs and to the cells of the body.

0 7 . 1 Name the blood vessel that transports blood from the body to the right atrium.

[1 mark]

0 7 . 2 The aorta transports blood from the heart to the body.

In a person at rest:

- blood travels at a mean speed of 10 cm/s in the aorta
- blood travels at a mean speed of 0.5 mm/s in the capillaries
- the speed of blood decreases at a rate of 0.4 cm/s^2 as blood travels from the aorta to the capillaries.

Calculate the time it takes for blood to travel from the aorta to the capillaries.

Assume that the speed of blood decreases at a constant rate.

Use the equation:

$$\text{rate of decrease in speed} = \frac{\text{change in speed}}{\text{time}}$$

[4 marks]

Give your answer to 2 significant figures.

Time = _____ s

0 7 . 3 Describe the route taken by oxygenated blood from the lungs to the body cells.

[4 marks]

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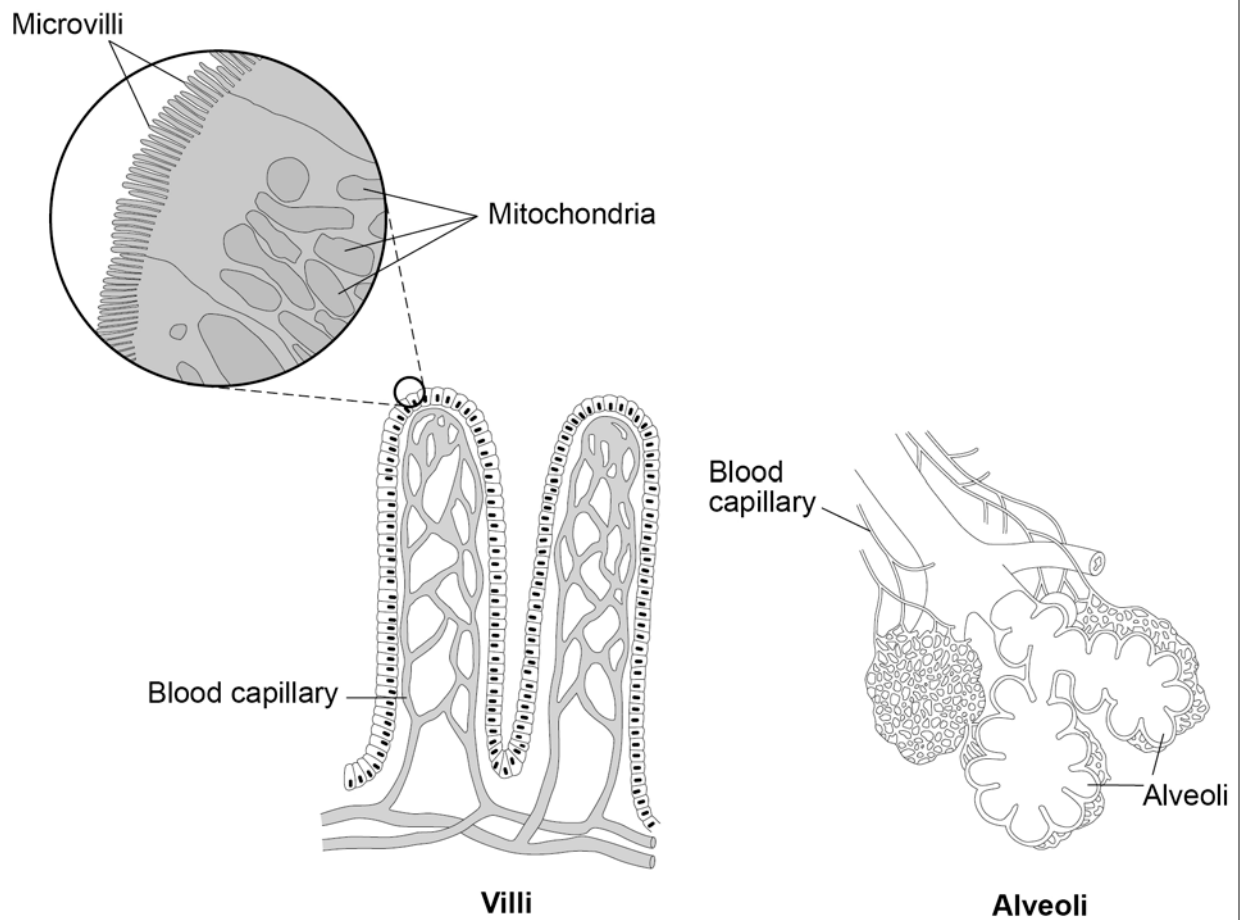**Question 7 continues on the next page**

Turn over ▶

0 7 . 4 The digestive system and the breathing system both contain specialised exchange surfaces.

- In the digestive system, digested food is absorbed into the blood stream in structures called villi.

- In the breathing system, gases are absorbed into the blood stream in the alveoli.

Figure 7 shows the structure of villi and alveoli.

Figure 7

| 0 | 7 | . | 4 |

Explain how the villi and the alveoli are adapted to absorb molecules into the bloodstream.

[6 marks]

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15

Turn over for the next question

Turn over ▶

0 8 Amylase is an enzyme found in the human body.

Amylase breaks down starch into sugars.

0 8 . 1 Where is amylase produced in the human body?

[1 mark]

Tick **one** box.

Liver and pancreas ☐

Liver and stomach ☐

Salivary glands and pancreas ☐

Salivary glands and stomach ☐

0 8 . 2 Enzymes speed up chemical reactions.

Explain how amylase breaks down starch.

[3 marks]

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_____

_____

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_____

0 8 . 3 One sugar in the body is glucose.

Glucose is used for respiration.

Give **one** other use for glucose in the body.

[1 mark]

_____

Question 8 continues on the next page

Turn over ▶

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

This is the method used.

1. Put 2 cm^3 of 1% starch solution into a boiling tube.

2. Put 2 cm^3 of amylase solution into a second boiling tube.

3. Put both boiling tubes into a water bath at 20 °C.

4. After 5 minutes, mix the amylase and the starch together in one boiling tube.

5. After 30 seconds, add a drop of the starch and amylase mixture to a drop of iodine solution in one well of a spotting tile.

6. Repeat step 5 until the iodine solution no longer changes colour.

7. Repeat steps 1–6 at 40 °C and at 60 °C and at 80 °C

| 0 | 8 | . | 4 | Why did the student leave the starch and amylase solutions in the water bath for 5 minutes in step **3**?
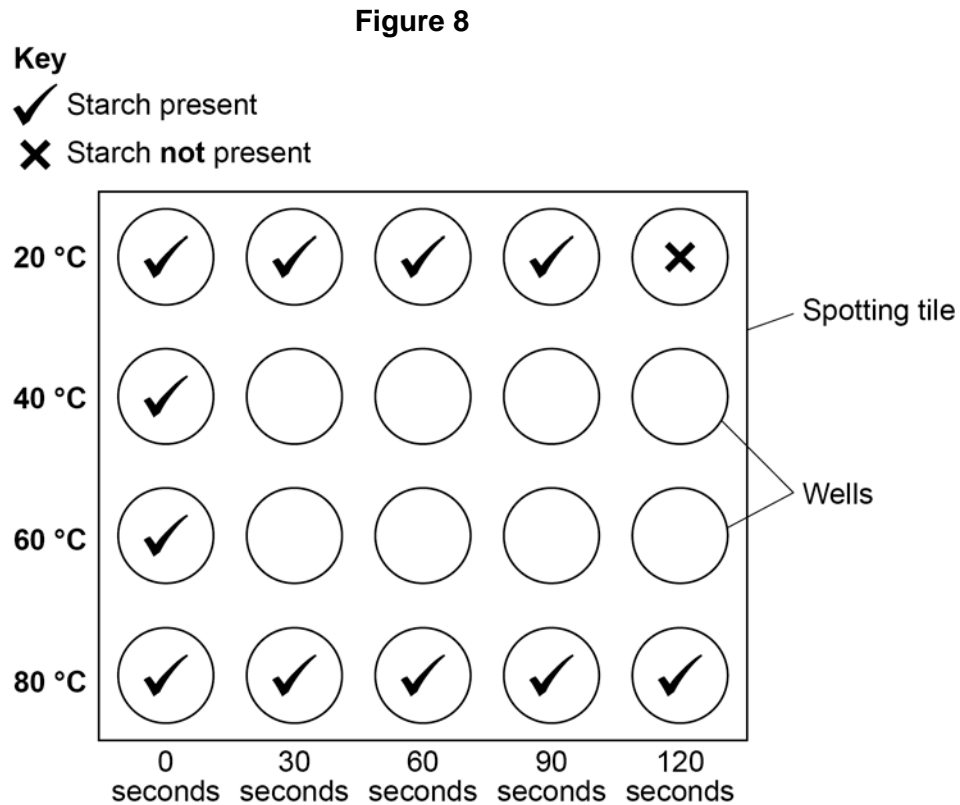
[1 mark]

_____

_____

0 8 . 5 The temperature of the human body is 37 °C

Figure 8 shows the results of the investigation at 20 °C and at 80 °C

Complete **Figure 8** to show the results you would expect at 40 °C and at 60 °C

You should write a tick or a cross in each well of the spotting tile.

[2 marks]

Figure 8

0 8 . 6 There are different ways to investigate the breakdown of starch by amylase.

One other method is to measure the **concentration** of starch present in the solution every 30 seconds.

Why is this method better than the method the student used?

[2 marks]

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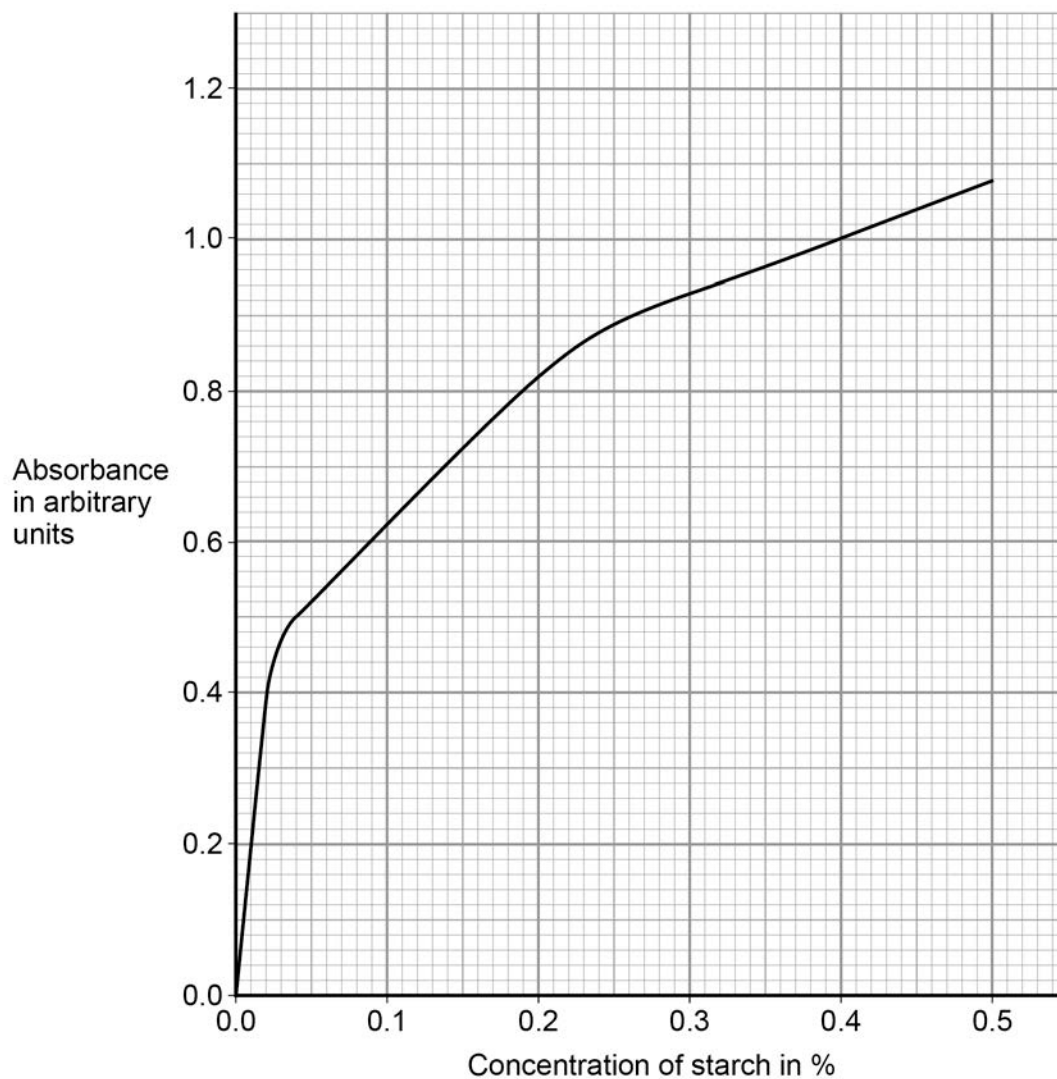**Question 8 continues on the next page**

Turn over ▶

A colorimeter can be used to measure the concentration of starch present in the solution every 30 seconds.

A colorimeter measures the amount of light that **cannot** pass through a solution.

This is known as absorbance.

Figure 9 shows a graph of absorbance against concentration of starch.

Figure 9

0 8 . 7 The absorbance of the solution at 40 °C was 0.56 arbitrary units after 30 seconds.

What was the concentration of starch in this solution?

[1 mark]

Concentration of starch = _____ %

0 8 . 8 The concentration of starch in the solution at 20 °C after 1 minute is different from the concentration at 40 °C after 1 minute.

Explain why.

[2 marks]

0 8 . 9 Predict the absorbance for the solution at 80 °C after 30 seconds.

Give a reason for your answer.

[3 marks]

Absorbance = _____ arbitrary units

Reason _____

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END OF QUESTIONS

Turn over ▶

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