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

Tuesday 13 May 2025 Afternoon 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	
8	
TOTAL	

Do not write outside the box

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

0 1 Measles is an infectious disease caused by a pathogen.

0 1 . 1 What type of pathogen causes measles?

[1 mark]

_____

0 1 . 2 Give **one** way measles is spread from one person to another person.

[1 mark]

_____

_____

0 1 . 3 One symptom of measles is pain.

In adults, aspirin can be used to treat the pain.

Which plant did aspirin originate from?

[1 mark]

_____

0 1 . 4 Give **one** other symptom of measles.

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

[1 mark]

_____

Do not write outside the box

The spread of measles can be reduced by vaccination.

0 1 . 5 Explain why vaccinating large numbers of children helps to reduce the spread of the measles pathogen in the population.

[2 marks]

Question 1 continues on the next page

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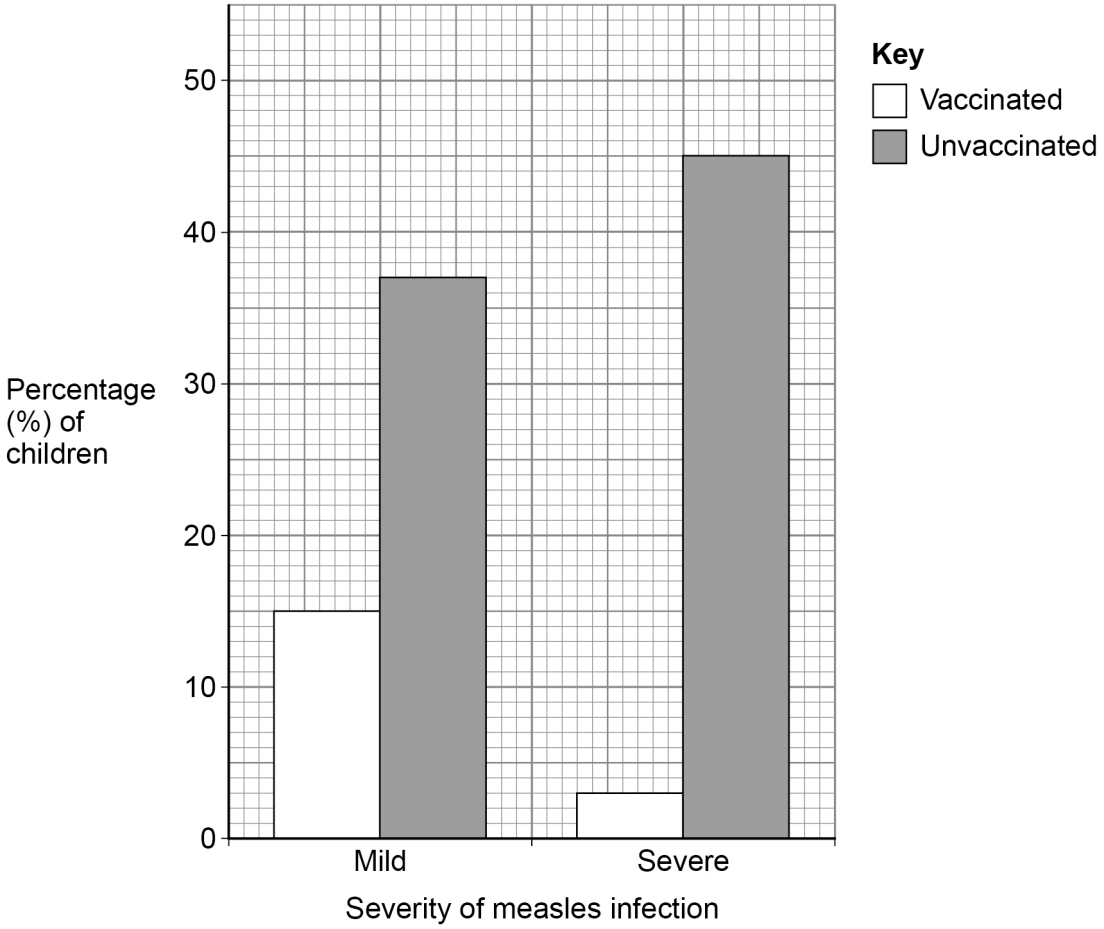
Figure 1 shows information about the severity of measles infection in vaccinated and unvaccinated children.

Figure 1



0 1 . 6 There were 240 children in the survey.

Calculate how many **unvaccinated** children had a severe measles infection.

Use **Figure 1**.

[3 marks]

Number of unvaccinated children = _____

Do not write outside the box

0 1 . 7 It is recommended that all children are given a measles vaccination.

Give evidence from **Figure 1** to support the recommendation.

Include data from **Figure 1** in your answer.

[2 marks]

_____

_____

_____

_____

11

Turn over for the next question

Do not write outside the box

0 2 Eating too much carbohydrate can cause obesity.

0 2 . 1 Name **one** disease that obesity is a risk factor for.

[1 mark]

_____

Table 1 shows information about sugar intake and obesity in different countries.

Table 1

Country	Mean sugar intake per person per day in grams	Mean obesity rate in arbitrary units
A	122	18
B	80	9
C	172	25
D	150	23
E	110	15
F	144	19
G	192	32

Do not write outside the box

0 2 . 2 Complete **Figure 2**.

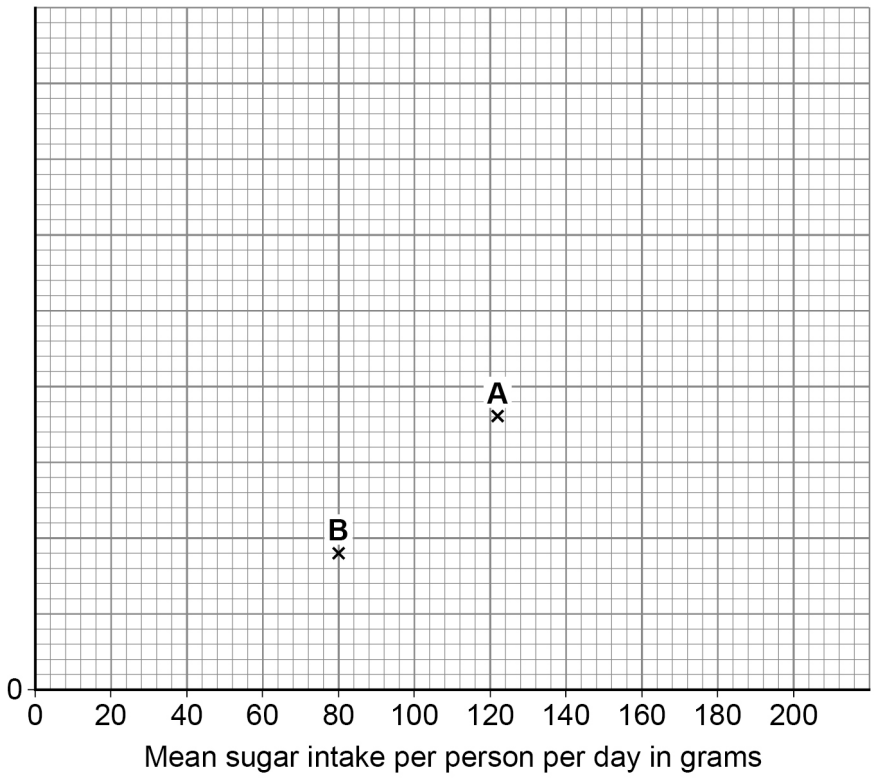
You should:

- label the *y*-axis
- add the scale for the *y*-axis
- plot the data for countries **C**, **D**, **E**, **F** and **G** from **Table 1**
- draw a line of best fit.

Countries **A** and **B** have been completed for you.

[4 marks]

Figure 2

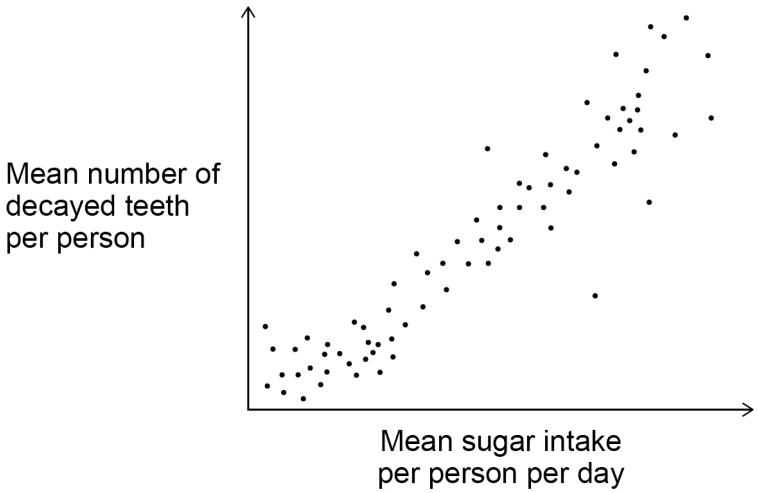


Question 2 continues on the next page

Do not write outside the box

Figure 3 shows information about the relationship between sugar intake and tooth decay.

Figure 3



0 2 . 3 Name the type of graph shown in **Figure 3**.

[1 mark]

---

0 2 . 4 What relationship is shown between the two variables in **Figure 3**?

[1 mark]

Tick (✓) **one** box.

Inversely proportional ☐

No correlation ☐

Positive correlation ☐

Do not write outside the box

Question 2 continues on the next page

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ANSWER IN THE SPACES PROVIDED

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Sugars and starch are carbohydrates.

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

For each temperature, the student:

- mixed starch and amylase together
- added iodine solution after 5 minutes.

The iodine solution was yellow-brown before it was added to the mixture.

Table 2 shows the results.

Table 2

Temperature in °C	Colour of iodine solution
10	blue-black
30	yellow-brown
60	blue-black
90	blue-black

0 2 . 5 Explain the results at 30 °C and at 90 °C.

[4 marks]

30 °C _____

_____

_____

_____

90 °C _____

_____

_____

_____

Do not write outside the box

0 2 . 6 How could the student change the investigation to find a more precise temperature that amylase works best at?

[1 mark]

Tick (✓) **one** box.

Test more temperatures between 10 °C and 30 °C. ☐

Test more temperatures between 10 °C and 60 °C. ☐

Test more temperatures between 30 °C and 60 °C. ☐

Test more temperatures between 30 °C and 90 °C. ☐

0 2 . 7 Protease enzymes are involved in protein digestion.

Different types of protease enzyme are active in different organs of the digestive system.

Complete **Table 3** to identify the organ where each protease enzyme is active.

[2 marks]

Table 3

Protease enzyme	Optimum pH	Organ where enzyme is active
Pepsin	2	
Trypsin	8	

14

Turn over for the next question

Do not write outside the box

0 3 A student investigated osmosis in pieces of potato.

This is the method used.

1. Cut a piece of potato into a cube.
2. Record the mass of the cube.
3. Place the cube into a beaker containing 0.4 mol/dm^3 salt solution.
4. After some time, remove the cube and record the mass.
5. Calculate the change in the mass of the cube.
6. Repeat steps 1 to 5 using two more different concentrations of salt solution.

0 3 . 1 Evaluate the student's method.

You should include how the student could improve the validity of their results.

[6 marks]

Do not write outside the box

0 3 . 2 Why would a potato cube placed into distilled water increase in mass?

[1 mark]

Tick (✓) **one** box.

- The solution in the potato cells was less concentrated than the distilled water. ☐
- The solution in the potato cells was more concentrated than the distilled water. ☐
- The volume of water in the potato cells was greater than the volume of distilled water. ☐
- The volume of water in the potato cells was less than the volume of distilled water. ☐

0 3 . 3 Active transport is another process used by potato cells.

Give **one** way active transport is different from osmosis.

[1 mark]

_____

_____

8

Turn over for the next question

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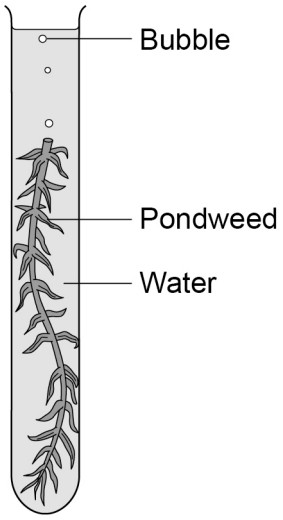
0 4 A student investigated the effect of temperature on the rate of photosynthesis in pondweed.

Figure 4 shows how the student set up the apparatus.

Figure 4



This is the method used.

1. Prepare five tubes of pondweed as shown in **Figure 4**.
2. Place one tube into each of five water baths set at different temperatures.
3. Wait two minutes.
4. Measure the time taken for each piece of pondweed to release 10 bubbles.

0 4 . 1 What is the independent variable in the investigation?

[1 mark]

_____

Question 4 continues on the next page

Do not write outside the box

Table 4 shows the results.

Table 4

Temperature in °C	Time taken for pondweed to release 10 bubbles in seconds
10	84
20	43
30	27
40	25
50	33

0 4 . 2 Calculate the rate of photosynthesis at **20 °C**.

Give your answer to 3 significant figures.

Give the unit.

[4 marks]

Rate (3 significant figures) = _____

Unit = _____

Do not write outside the box

0 4 . 3 Explain the difference in the rate of photosynthesis at 40 °C compared with the rate of photosynthesis at 10 °C.

[3 marks]

0 4 . 4 Give **two** other factors that affect the rate of photosynthesis.

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

[2 marks]

1

2

0 4 . 5 Describe **one** way the method could be changed to obtain more accurate results for the rate of photosynthesis.

[1 mark]

Question 4 continues on the next page

Do not write outside the box

A gardener noticed that some plants were not growing as well as usual.

0 4 . 6 Describe **two** ways the gardener could identify a plant disease.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 7 One of the plants had purple spots on its leaves and the leaves fell off.

What disease is the plant most likely to have?

[1 mark]

_____

0 4 . 8 A different plant had yellow leaves, but no spots.

Explain why plants may develop yellow leaves.

[2 marks]

_____

_____

_____

_____

_____

16

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0 5 This question is about the human circulatory system.

0 5 . 1 Blood plasma transports blood cells around the body.

Give **one** other function of blood plasma.

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

[1 mark]

_____

_____

Question 5 continues on the next page

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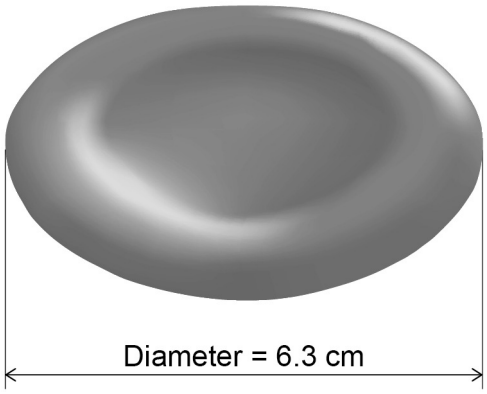
0 5 . 2 **Figure 5** shows a red blood cell.

Figure 5



The image of the red blood cell in **Figure 5** is magnified 7200 times.

Calculate the real diameter of the red blood cell.

Give your answer in micrometres (μm).

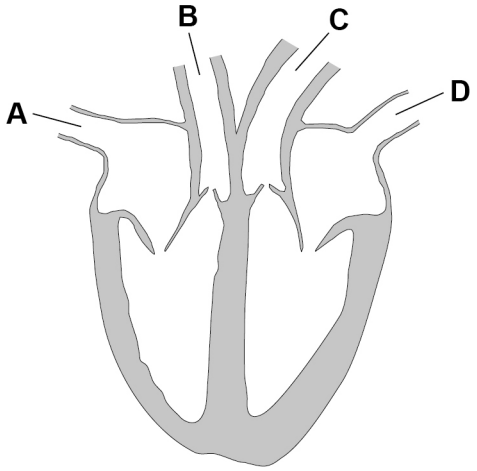
[5 marks]

Real diameter = _____ μm

Do not write outside the box

Figure 6 shows the heart.

Figure 6



0 5 . 3 Blood pressure is a measure of the force of the blood against the walls of the blood vessels.

Table 5 shows information about the different types of blood vessel shown in **Figure 6**.

[2 marks]

Table 5

Pressure of blood travelling through blood vessel in arbitrary units	Blood vessel in Figure 6
4	**D**
5	
18	
120	

Complete **Table 5** using the correct letters from **Figure 6**.

One row has been completed for you.

0 5 . 4 Name blood vessel **D** in **Figure 6**.

[1 mark]

Question 5 continues on the next page

Do not write outside the box

0 5 . 5 Describe the structure of the walls of an artery.

[1 mark]

An athlete ran on a running machine.

The athlete:

- reached their maximum intensity of exercise and then stopped exercising
- had their use of oxygen recorded
- had the lactic acid concentration in their blood recorded.

0 5 . 6 During the exercise the athlete respired aerobically **and** anaerobically.

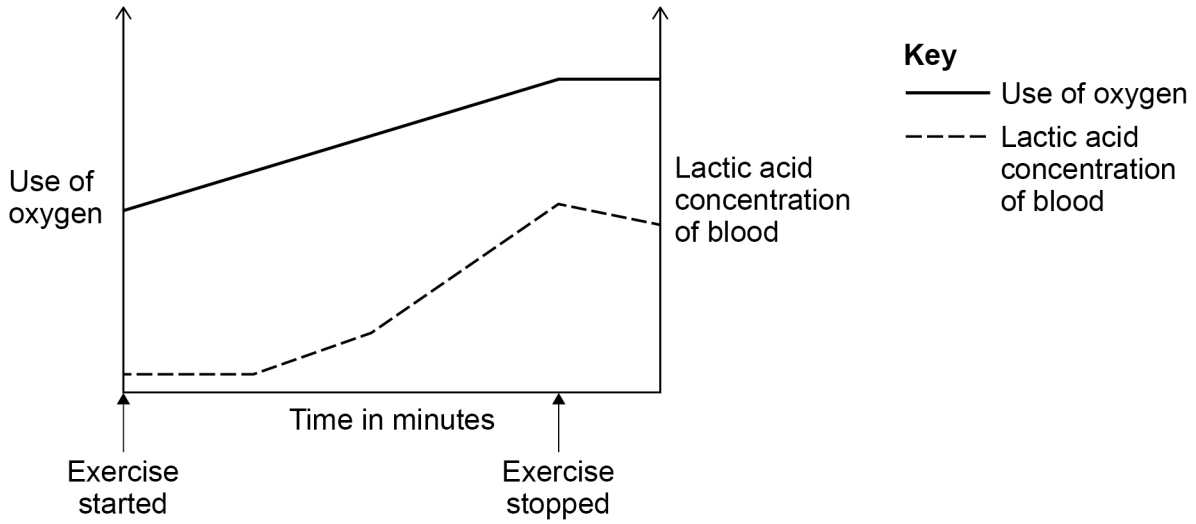
Explain why anaerobic respiration is less efficient than aerobic respiration.

[2 marks]

Do not write outside the box

Figure 7 shows the athlete's use of oxygen and the lactic acid concentration of blood during exercise and after exercise.

Figure 7



0 5 . 7 Explain why the use of oxygen remained high **after** the athlete stopped exercising.

[2 marks]

Question 5 continues on the next page

Do not write outside the box

0 5 . 8 Some athletes regularly exercise in conditions that increase the number of red blood cells.

Explain why having an increased number of red blood cells is an advantage to an athlete.

[2 marks]

_____

_____

_____

_____

16

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0 6 Diffusion is important for gas exchange.

0 6 . 1 Define the term ‘diffusion’.

[1 mark]

Question 6 continues on the next page

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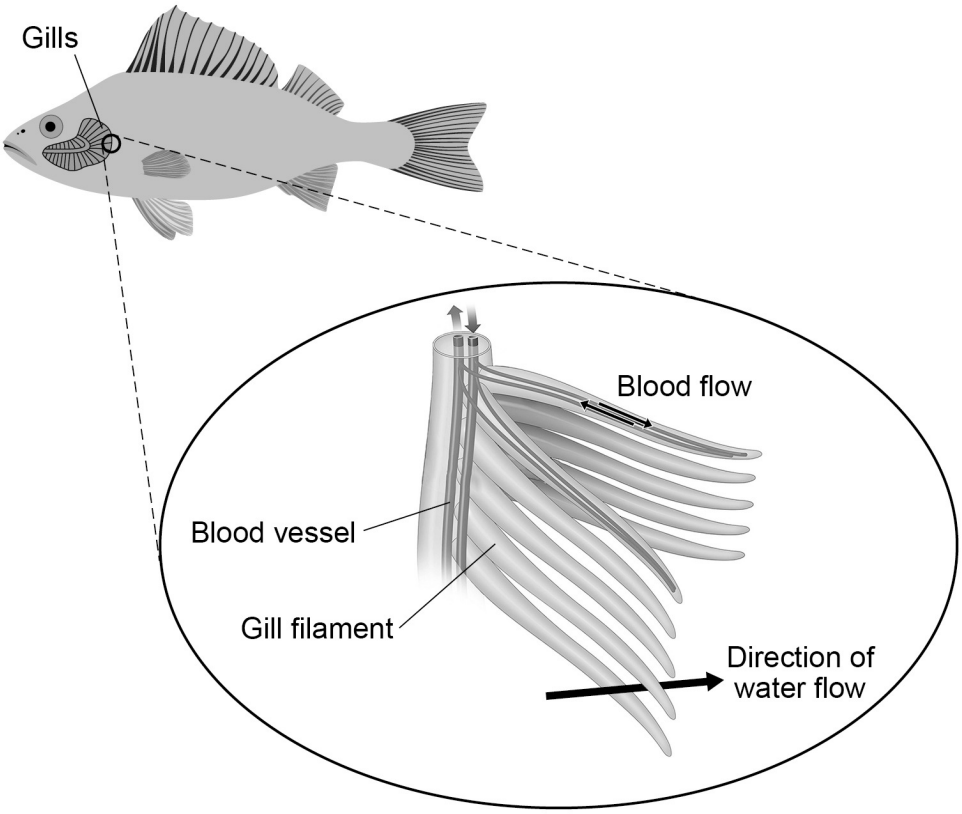
0 6 . 2 Fish exchange gases through gills.

Oxygen from the water enters the blood of a fish through the gills.

Figure 8 shows part of a gill.

Figure 8



Explain how gills are adapted to maximise the exchange of oxygen between the water and the blood.

[4 marks]

Do not write outside the box

0 6 . 3 Some fish rest on the sea floor.

Explain why the metabolic rate of a fish is higher when swimming compared with when resting.

[4 marks]

9

Turn over for the next question

Do not write outside the box

0 7 In people with severe liver disease the liver stops working correctly.

A person with severe liver disease can be treated with:

- an injection of embryonic stem cells
  or
- a liver transplant from a donor.

The person's body can reject embryonic stem cells and can reject a liver transplanted from a donor.

0 7 . 1 What property of embryonic stem cells makes them suitable to treat liver disease?

[1 mark]

_____

_____

0 7 . 2 Suggest **one ethical** reason why a person may **not** want an injection of embryonic stem cells.

[1 mark]

_____

_____

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Question 7 continues on the next page

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ANSWER IN THE SPACES PROVIDED

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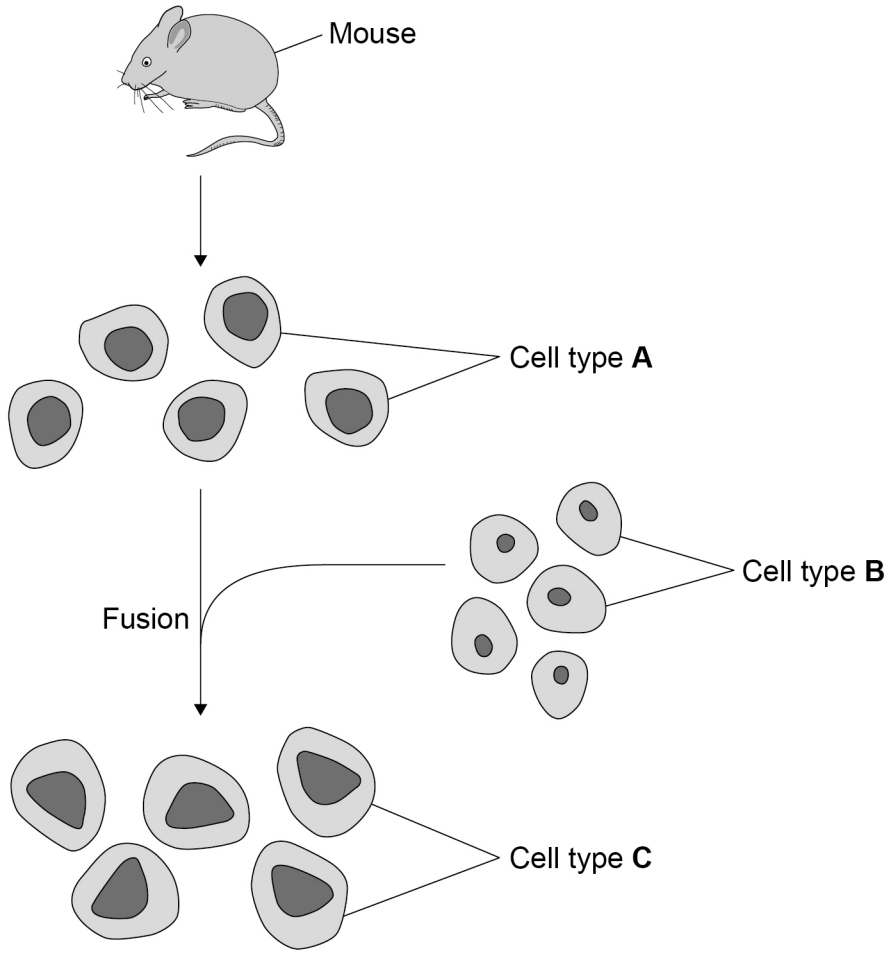
Drugs can be used to reduce the risk of liver rejection after a transplant.

One drug contains monoclonal antibodies.

The monoclonal antibodies are specific to an antigen on the surface of liver cells.

Figure 9 shows part of the process used to create the monoclonal antibodies.

Figure 9



0 7 . 3 Name the **three** types of cell in **Figure 9**.

[3 marks]

A _____

B _____

C _____

Do not write outside the box

0 7 . 4 How is the mouse stimulated to produce cell type **A**?

[1 mark]

0 7 . 5 A patient with severe liver disease was given a liver transplant.

The drug containing the monoclonal antibody is given to the patient.

Explain how the monoclonal antibody stops the patient's white blood cells from attacking the cells of the donor liver.

[3 marks]

0 7 . 6 Give **one** other use of monoclonal antibodies.

Do **not** refer to pregnancy tests.

[1 mark]

Question 7 continues on the next page

Do not write outside the box

The liver produces bile.

Bile is needed for efficient digestion.

0 7 . 7 Where is bile stored in the human body?

[1 mark]

Tick (✓) **one** box.

Gall bladder ☐

Kidney ☐

Pancreas ☐

Small intestine ☐

0 7 . 8 Explain why a person with severe liver disease has difficulty digesting fats.

[6 marks]

17

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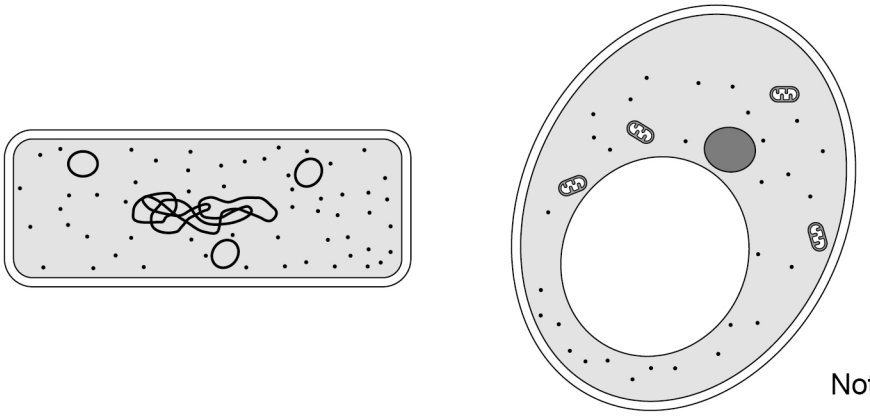
0 8 **Figure 10** shows a bacterial cell and a yeast cell.

Figure 10



Not to scale

0 8 . 1 Which statement about bacterial cells and yeast cells is correct?

[1 mark]

Tick (✓) **one** box.

Bacterial cells and yeast cells are eukaryotic. ☐

Bacterial cells and yeast cells are prokaryotic. ☐

Bacterial cells are eukaryotic and yeast cells are prokaryotic. ☐

Bacterial cells are prokaryotic and yeast cells are eukaryotic. ☐

0 8 . 2 Give **two** features of a yeast cell that are **not** found in a bacterial cell.

Use **Figure 10**.

[2 marks]

1 _____

_____

2 _____

_____

Turn over ►

Do not write outside the box

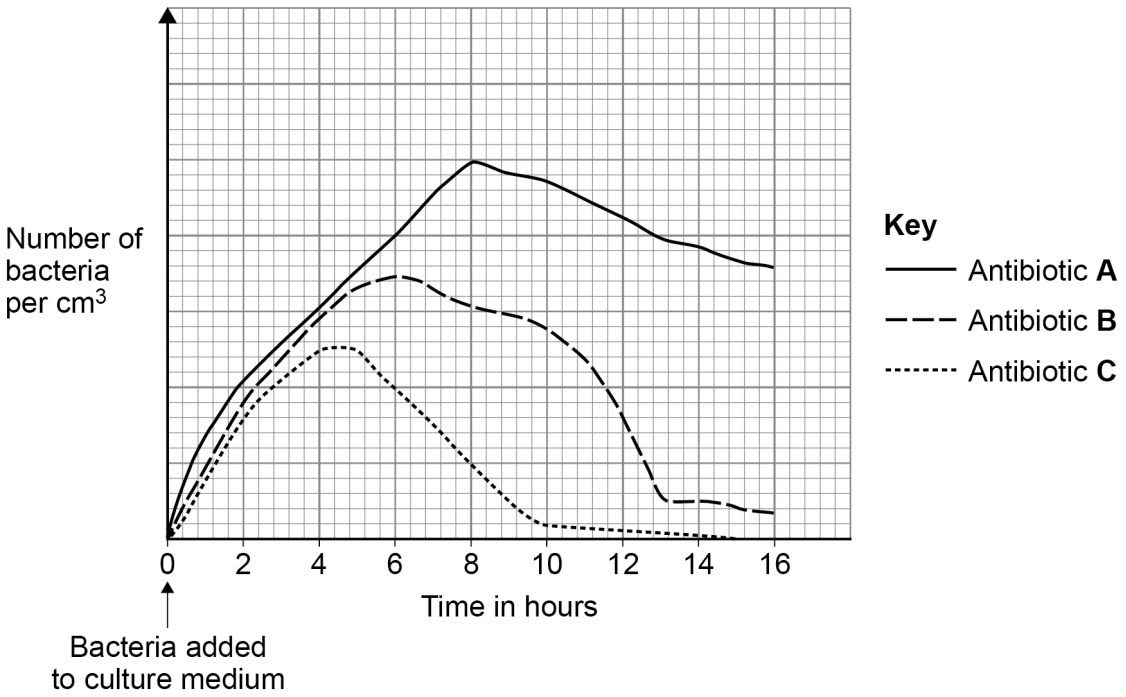
A scientist investigated the effect of different antibiotics on one type of bacterium.

The scientist:

- used three samples of culture medium
- added a different antibiotic to each sample
- added equal numbers of bacteria to each sample.

Figure 11 shows the results.

Figure 11



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0 8 . 3 Compare the effectiveness of the antibiotics shown in **Figure 11**.

[4 marks]

0 8 . 4 It was **not** possible for the scientist to count the total number of bacteria per cm^3 of culture medium.

The cells were too close together to be counted accurately.

The scientist took 10 samples from the culture medium.
Each sample had a volume of 0.02 cm^3.

Describe how the scientist could use the samples to estimate the number of bacteria in 1 cm^3 of culture medium.

[2 marks]

9

END OF QUESTIONS

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