AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.1.3.1

Diffusion

Past-paper questions

Tier	**Higher**
Question groups	**2**
Available paper years	**2019–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.1.3.1 Diffusion

Question 01

June 2019 | 8464/B/1H | Original Q4

0 4 Pathogens are microorganisms that cause infectious diseases.

0 4 . 1 What type of pathogen causes malaria?

[1 mark]

Tick (✓) **one** box.

- Bacterium ☐
- Fungus ☐
- Protist ☐
- Virus ☐

0 4 . 2 Give **two** methods used to prevent people catching malaria.

Give a reason why each method works.

[4 marks]

Method 1 _____

_____

Reason _____

_____

_____

Method 2 _____

_____

Reason _____

_____

_____

4.1.3.1 Diffusion

Question 01 · continued

0 4 . 3 Describe **two** differences between a bacterial cell and a eukaryotic cell.

[2 marks]

1 _____

_____

_____

2 _____

_____

_____

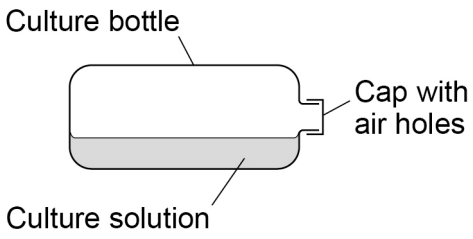
A scientist investigated the population growth of bacteria in a culture solution.

At the start of the investigation the culture solution contained all the nutrients the bacteria needed.

The scientist determined the number of living bacterial cells in the solution every hour over two days.

Figure 5 shows the apparatus used.

Figure 5



0 4 . 4 Describe why there are air holes in the cap of the culture bottle.

[1 mark]

_____

_____

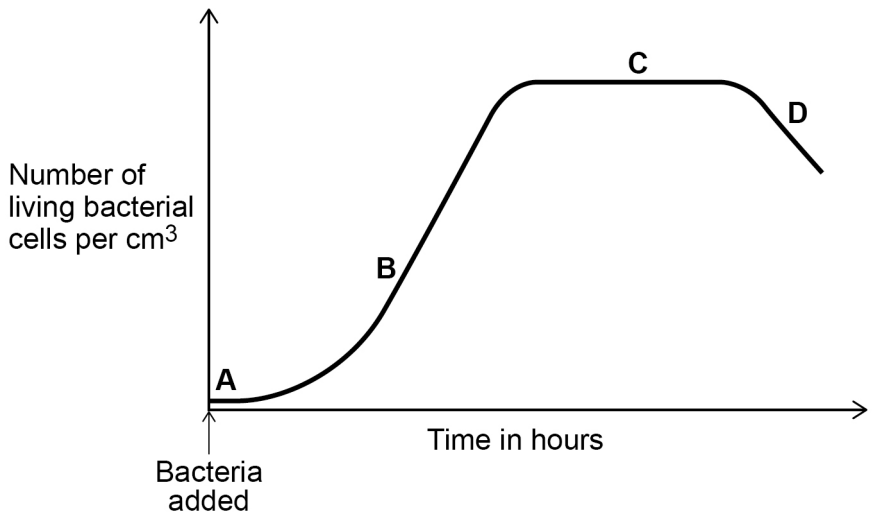
Question 4 continues on the next page

4.1.3.1 Diffusion

Question 01 · continued

Figure 6 shows the scientist's results.

Figure 6



0 4 . 5 Give **one** reason for what is happening to the number of bacteria at each of the stages.

[4 marks]

Stage **A** _____

_____

_____

Stage **B** _____

_____

_____

Stage **C** _____

_____

_____

Stage **D** _____

_____

_____

4.1.3.1 Diffusion

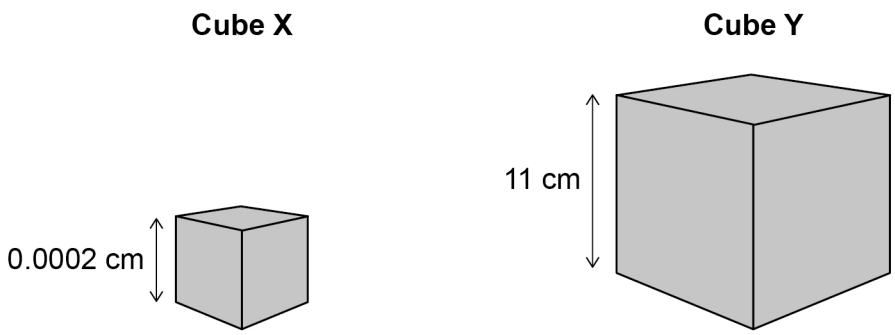
Question 01 · continued

0 4 . 6 **Figure 7** shows two cubes.

Cube **X** represents a bacterial cell.

Cube **Y** represents a small multicellular organism.

Figure 7



A bacterial cell can absorb all the nutrients it needs by diffusion through its outer surface.

Explain why a multicellular organism **cannot** absorb all the nutrients it needs by diffusion through its outer surface.

You **must** include calculations in your answer.

Use **Figure 7**.

[5 marks]

17

4.1.3.1 Diffusion

Question 02

0 6 Hormones are released from endocrine glands.

0 6 . 1 Which gland releases hormones to control other glands?

[1 mark]

Tick (✓) **one** box.

- Adrenal ☐
- Pituitary ☐
- Thyroid ☐

4.1.3.1 Diffusion

Question 02 · continued

Several hormones can affect blood glucose concentration.

0 6 . 2 Adrenaline can increase blood glucose concentration.

What is **one** other effect of adrenaline?

[1 mark]

Tick (✓) **one** box.

- Decreased breathing rate ☐
- Decreased metabolic rate ☐
- Increased blood flow to muscles ☐
- Increased FSH production ☐

0 6 . 3 Cells in the pancreas detect changes in blood glucose concentration.

What type of cell in the body detects changes?

[1 mark]

_____

Question 6 continues on the next page

4.1.3.1 Diffusion

Question 02 · continued

Scientists investigated whether blood glucose concentration affects reaction time.

The reaction times of ten people with Type 1 diabetes were measured.

This is the method used.

1. Tell one person to drink a glucose solution.
2. Monitor the person's blood glucose concentration.
3. Record the person's reaction time when the person's blood glucose concentration is:
   - 16 mmol/dm^3
   - 6 mmol/dm^3
   - 3 mmol/dm^3
4. Repeat steps 1 to 3 for the nine other people.

0 6 . 4 People with Type 1 diabetes were selected for the investigation instead of people who did **not** have diabetes.

Explain why.

[2 marks]

4.1.3.1 Diffusion

Question 02 · continued

0 6 . 5 Control variables between the different people in the investigation included:

- age
- sex
- food and drink consumed before and during the test.

Suggest **two other** control variables that should be used in the investigation.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 6 It was important for the scientists to monitor the health of each person during the investigation.

Suggest **one** reason why.

[1 mark]

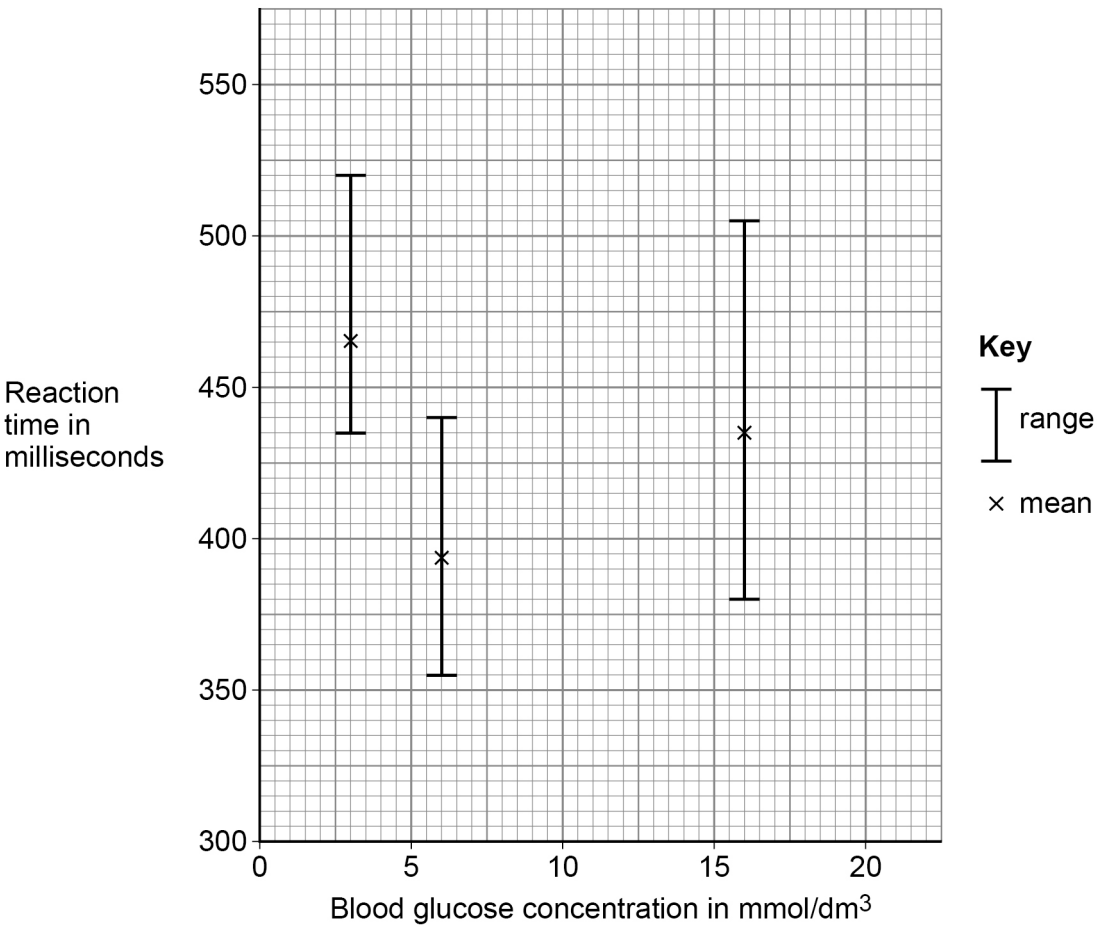
_____

_____

Question 6 continues on the next page

Figure 6 shows the results.

Figure 6



0 6 . 7 People who do **not** have diabetes usually have a blood glucose concentration in the range of 4.0 mmol/dm^3 to 7.8 mmol/dm^3.

Describe how the results in **Figure 6** show the importance of homeostasis.

[2 marks]

4.1.3.1 Diffusion

Question 02 · continued

0 6 . 8 Describe how blood glucose concentration is maintained within narrow limits in people who do **not** have diabetes.

[5 marks]

0 6 . 9 The scientists gave the hypothesis:

‘Optimum blood glucose concentration increases the production of chemicals that diffuse across synapses.’

Describe how an increase in the chemicals could decrease reaction time.

[2 marks]

17