AQA GCSE Biology | 8461

SPECIFICATION POINT 4.1.1.1

Eukaryotes and prokaryotes

Past-paper questions

Tier	**Higher**
Question groups	**5**
Available paper years	**2010–2023**

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.

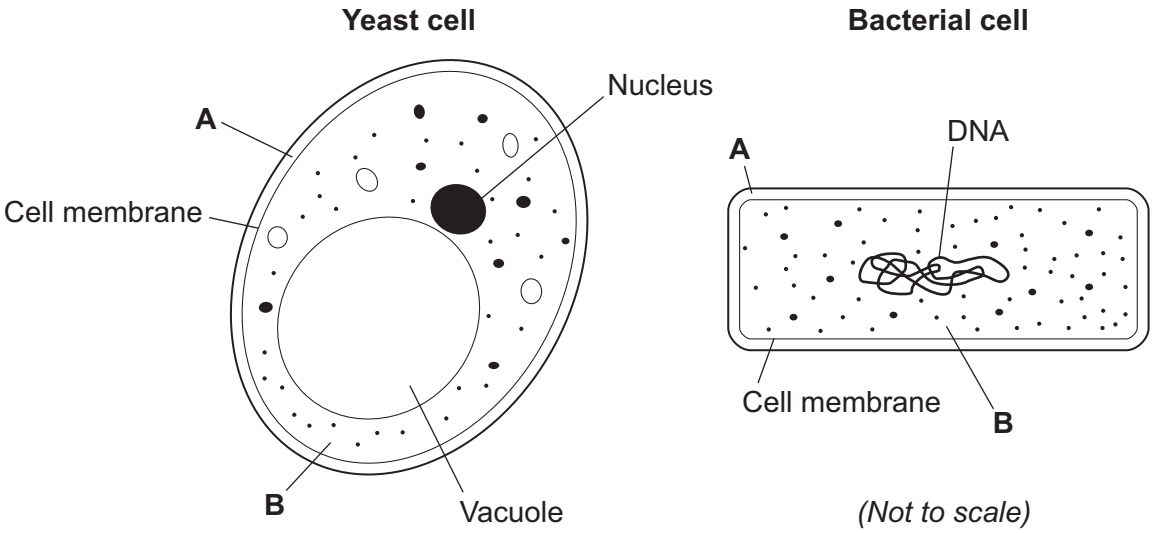
4.1.1.1 Eukaryotes and prokaryotes

Question 01

June 2010 | BLY3H | Original Q1 | Legacy

1 Sourdough bread is light in texture and tastes slightly sour. It is made using two types of microorganism, a yeast and a bacterium. The bacterium can make acids such as lactic acid. This acid makes the bread taste sour.

1 (a) The diagrams show the structures of the yeast cell and the bacterial cell.



1 (a) (i) Both the yeast cell and the bacterial cell have structures **A** and **B**.

Name structures **A** and **B**.

A .....

B .....

(2 marks)

1 (a) (ii) The yeast cell and the bacterial cell have different shapes.

Give **one** other way in which the structure of the bacterial cell is different from the structure of the yeast cell.

.....

.....

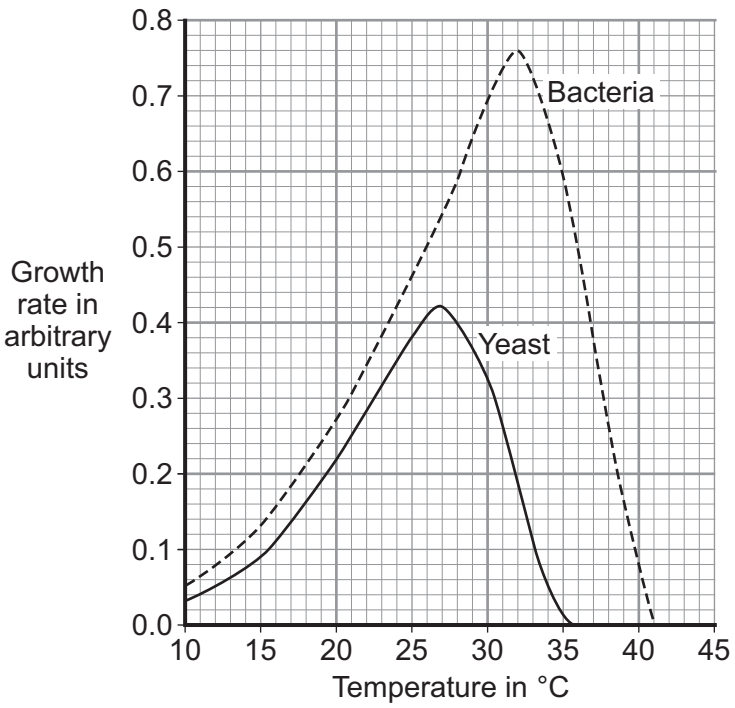
(1 mark)

Question 1 continues on the next page

4.1.1.1 Eukaryotes and prokaryotes

Question 01 · continued

1 (b) The graph shows how the growth rates of the yeast and the bacteria change with temperature.



1 (b) (i) Sourdough bread rises fastest at 27 °C.

Explain why.

.....

.....

.....

.....

(2 marks)

1 (b) (ii) The bread has a sourer taste if it rises at 32 °C.

Explain why.

.....

.....

.....

.....

(2 marks)

4.1.1.1 Eukaryotes and prokaryotes

Question 01 · continued

1 (b) (iii) The growth rate of the yeast is unaffected by pH in the range 3.5 to 7.0 pH units.

Why is this useful in the production of sourdough bread?

.....

.....

(1 mark)

8

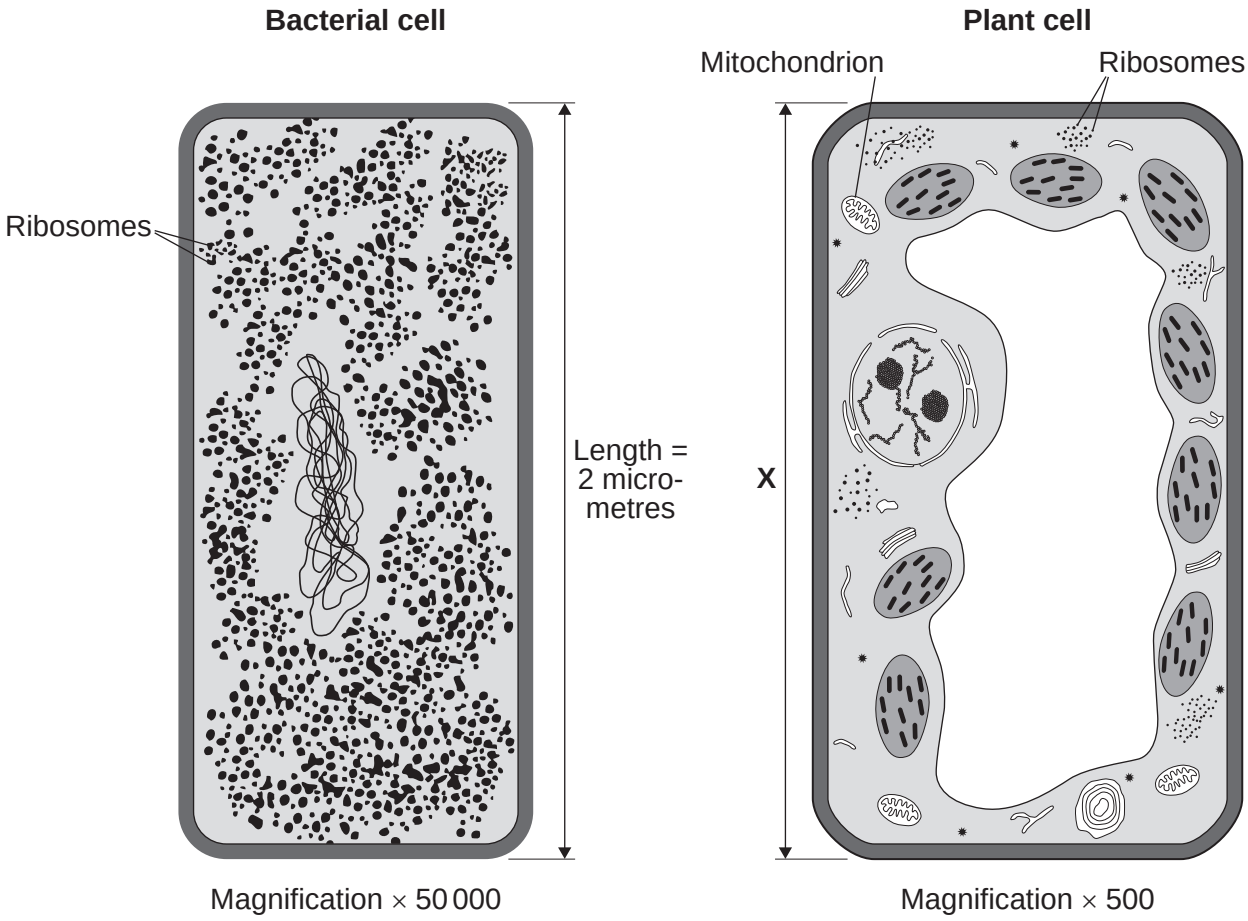
Turn over for the next question

4.1.1.1 Eukaryotes and prokaryotes

Question 02

June 2012 | BL2HP | Original Q2 | Legacy

2 The diagram shows two cells, a bacterial cell and a plant cell.



2 (a) (i) Both the bacterial cell and the plant cell contain ribosomes.

What is the function of a ribosome?

.....

.....

(1 mark)

2 (a) (ii) The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Give **one** other way in which the plant cell is different from the bacterial cell.

.....

.....

(1 mark)

4.1.1.1 Eukaryotes and prokaryotes

Question 02 · continued

2 (b) (i) Both cells are drawn the same length, but the magnification of each cell is different.

The real length of the bacterial cell is 2 micrometres.
Calculate the real length, **X**, of the plant cell. Give your answer in micrometres.

Show clearly how you work out your answer.

.....

.....

.....

X = ... micrometres
(2 marks)

2 (b) (ii) Most mitochondria are about 3 micrometres in length.

The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Use your answer to part **(b)(i)** and the information in the diagram to suggest why.

.....

.....
(1 mark)

5

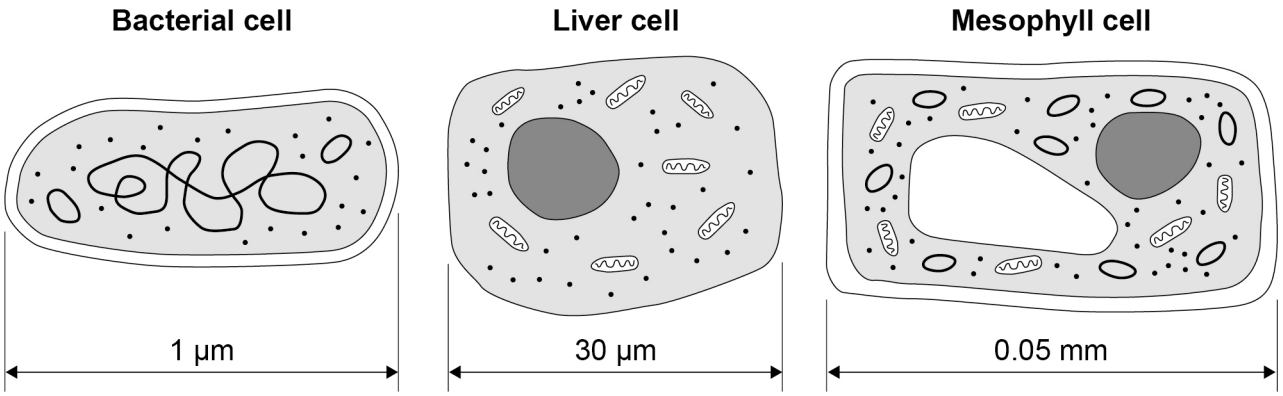
4.1.1.1 Eukaryotes and prokaryotes

Question 03

November 2020 | 8461/1H | Original Q3

0 3 **Figure 5** shows three types of cell.

Figure 5



0 3 . 1 Give **two** similarities between the prokaryotic cell and the eukaryotic cells in **Figure 5**.

[2 marks]

1 _____

2 _____

0 3 . 2 Give **three** differences between the prokaryotic cell and the eukaryotic cells in **Figure 5**.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

4.1.1.1 Eukaryotes and prokaryotes

Question 03 · continued

0 3 . 3 Calculate the ratio of the size of the bacterial cell to the size of the mesophyll cell.

[2 marks]

Ratio = 1 : _____

0 3 . 4 Name the type of cell division that produces genetically identical body cells for growth and repair.

[1 mark]

_____

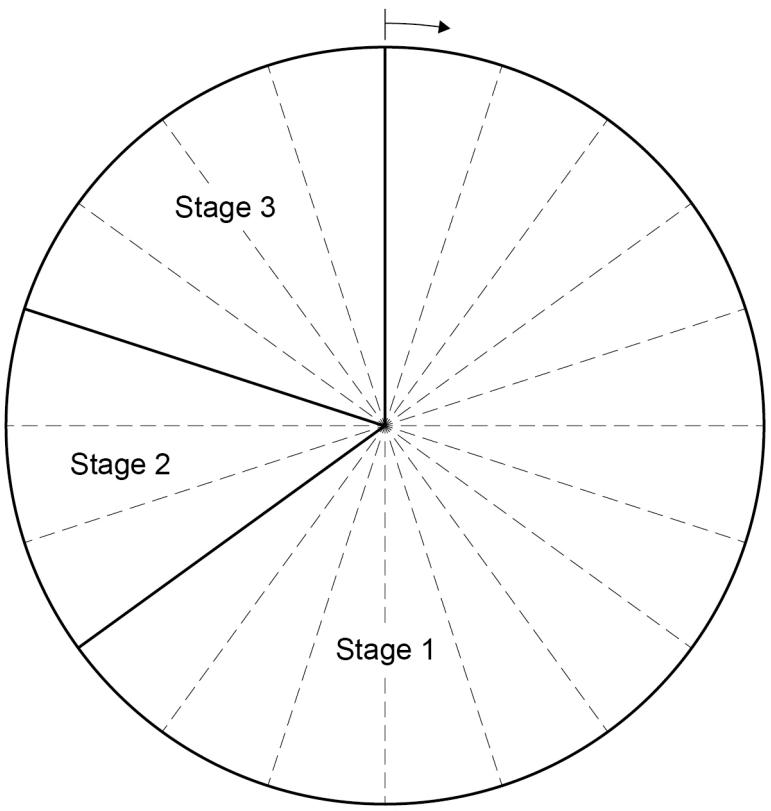
Question 3 continues on the next page

4.1.1.1 Eukaryotes and prokaryotes

Question 03 · continued

Figure 6 shows a cell cycle.

Figure 6



0 3 . 5 What percentage of the time for one cell cycle is represented by stage 2 and stage 3 together?

[1 mark]

Tick (✓) **one** box.

7% ☐ 35% ☐ 40% ☐ 65% ☐

4.1.1.1 Eukaryotes and prokaryotes

Question 03 · continued

0 3 . 6 Describe what happens during each stage of the cell cycle.

[4 marks]

Stage 1 _____

_____

_____

_____

Stage 2 _____

_____

Stage 3 _____

_____

13

Turn over for the next question

4.1.1.1 Eukaryotes and prokaryotes

Question 04

June 2023 | 8461/1H | Original Q3

0 3 *Salmonella* bacteria cause outbreaks of food poisoning in humans.

To prevent food poisoning in humans, farmers vaccinate their animals against *Salmonella* bacteria.

0 3 . 1 How do *Salmonella* bacteria in food cause the symptoms of vomiting and diarrhoea?

[1 mark]

During a food poisoning outbreak, scientists identified the farm where the food came from.

The farmer had **not** vaccinated the farm animals against *Salmonella* bacteria.

0 3 . 2 The food poisoning outbreak could have been prevented if the farm animals had been vaccinated.

Explain how:

- the immune systems of animals respond to a vaccination
- the immune response in farm animals prevents an outbreak of food poisoning in humans.

[4 marks]

Question 3 continues on the next page

4.1.1.1 Eukaryotes and prokaryotes

Question 04 · continued

Most cases of food poisoning do **not** need to be treated with antibiotics.

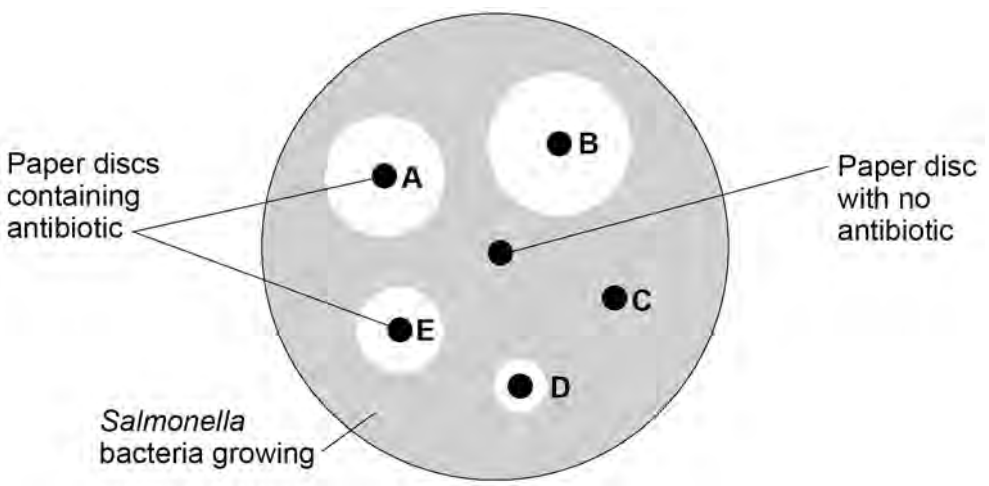
However, some patients may need to take antibiotics to recover.

Scientists investigated the effectiveness of five different antibiotics on the *Salmonella* bacteria in the outbreak.

Antibiotics **A**, **B**, **C**, **D** and **E** were used in the investigation.

Figure 4 shows the results.

Figure 4



0 3 . 3 Describe **two** aseptic techniques the scientists should have used in the investigation.

[2 marks]

1 _____

_____

2 _____

_____

4.1.1.1 Eukaryotes and prokaryotes

Question 04 · continued

0 3 . 4 The scientists incubated the bacteria at 37 °C.
Students in school laboratories incubate bacteria at 25 °C.

Explain why scientists use 37 °C but students must use 25 °C to incubate bacteria.

[3 marks]

0 3 . 5 What is the purpose of the paper disc with no antibiotic in **Figure 4**?

[1 mark]

0 3 . 6 The scientists concluded that either antibiotic **A** or antibiotic **B** should be prescribed to patients with food poisoning.

Why should antibiotic **A** or antibiotic **B** be prescribed?

[1 mark]

0 3 . 7 The scientists wanted to be more certain about which antibiotic should be prescribed.

Describe how the results in **Figure 4** could be used to obtain a **quantitative** comparison of antibiotics **A** and **B**.

[1 mark]

4.1.1.1 Eukaryotes and prokaryotes

Question 04 · continued

0 3 . 8 One year later, there was another outbreak at the farm involving *Salmonella* bacteria.

Antibiotic **B** did **not** have an effect.

Suggest why antibiotic **B** no longer had an effect.

[1 mark]

0 3 . 9 Antibiotics treat food poisoning because they kill *Salmonella* bacteria inside the human body.

Some antibiotics work because they damage the bacterial cell wall.

The bacteria die because the cells burst.

Explain why the cells burst.

[3 marks]

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4.1.1.1 Eukaryotes and prokaryotes

Question 05

June 2023 | 8461/1H | Original Q5

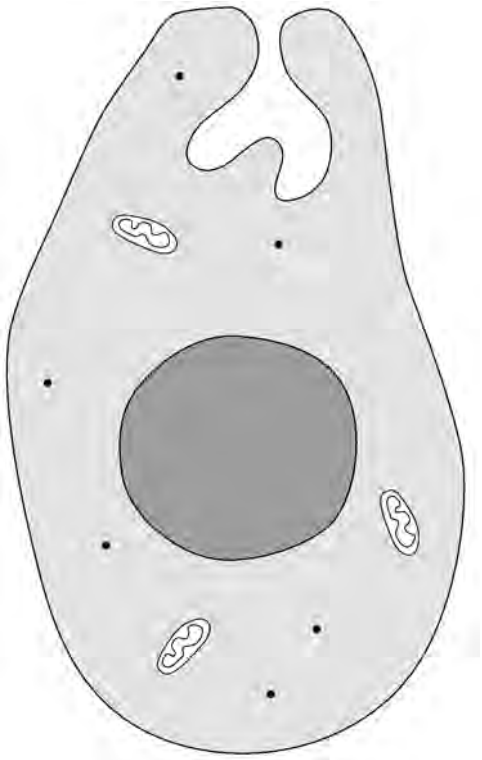
0 5 The protist that causes malaria is passed from one person to another person by mosquitos.

0 5 . 1 What term describes an organism that passes a pathogen from one person to another person?

[1 mark]

0 5 . 2 **Figure 7** shows the malarial protist.

Figure 7



4.1.1.1 Eukaryotes and prokaryotes

Question 05 · continued

The malarial protist is a eukaryotic cell.

Describe **three** ways the structure of the malarial protist is different from the structure of a prokaryotic cell.

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

[3 marks]

1 _____

2 _____

3 _____

0 5 . 3 During one stage of malaria infection, the malarial protists enter red blood cells and cause them to burst.

Explain why the bursting of red blood cells causes tiredness.

[2 marks]

_____

_____

_____

_____

Question 5 continues on the next page

0 5 . 4 The malarial protist reproduces sexually and asexually during a life cycle.

Complete **Table 3** to give **three** differences between sexual reproduction and asexual reproduction.

[3 marks]

One difference has been completed for you.

Table 3

	Sexual reproduction	Asexual reproduction
	Involves two parents	Involves one parent
1		
2		
3		

0 5 . 5 One drug for treating malaria prevents mitosis occurring in the malarial protist.

The drug stops the synthesis of new DNA bases in the cell.

Suggest how the drug prevents mitosis occurring.

[1 mark]

4.1.1.1 Eukaryotes and prokaryotes

Question 05 · continued

0 5 . 6 Describe the process of cell division by mitosis.

[3 marks]

Question 5 continues on the next page

4.1.1.1 Eukaryotes and prokaryotes

0 5 . 7 Different types of disease may interact.

Scientists studied the incidence of malaria infections in children:

- with disorder **S**
- without disorder **S**.

The incidence of malaria in children with disorder **S** was calculated as a percentage of the incidence in children without disorder **S**.

Table 4 shows the results.

Table 4

Age in years	Calculated percentage (%) incidence of malaria in children with disorder S
2 to < 4	69
4 to < 6	63
6 to < 8	50
8 to 10	45
> 10	73

Describe what the results in **Table 4** show about the interaction between disorder **S** and malaria.

[2 marks]

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