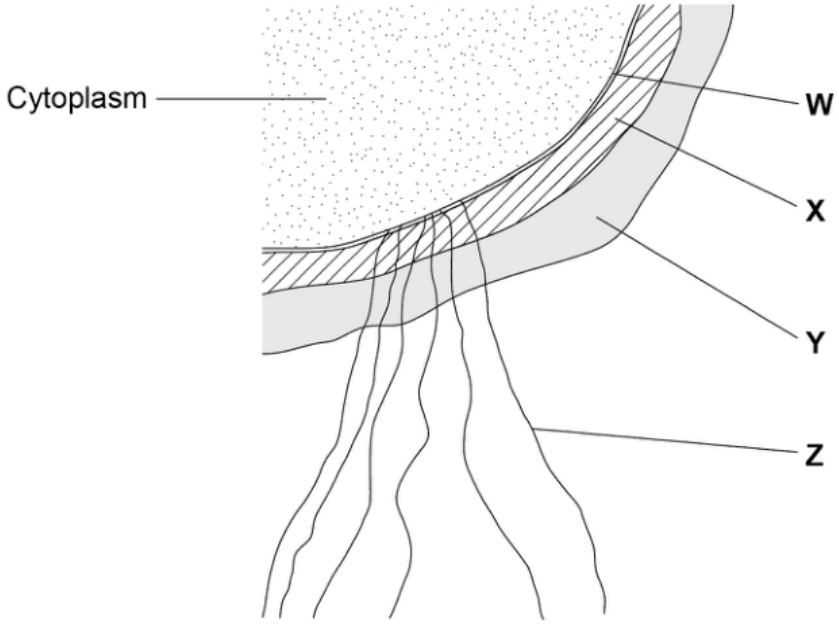
# Prokaryotic Cells and Viruses: AQA A Level Biology Exam Questions by

15 questions · 33 marks · about 43 minutes. Answer in the spaces, then check the mark schemes at the end.

**Question 1 · AS Paper 1 · June 2018 · Q04.1 · 2 marks**

**0 4** **Figure 3** shows part of a prokaryotic cell.

**Figure 3**




**0 4 . 1** Name the structures labelled **W** to **Z** in **Figure 3**.

**[2 marks]**

**W** _____

**X** _____

**Y** _____

**Z** _____

**Question 2 · AS Paper 1 · June 2018 · Q04.2 · 2 marks**

**0 4 . 2** Name the main biological molecule in:

**[2 marks]**

**W** _____

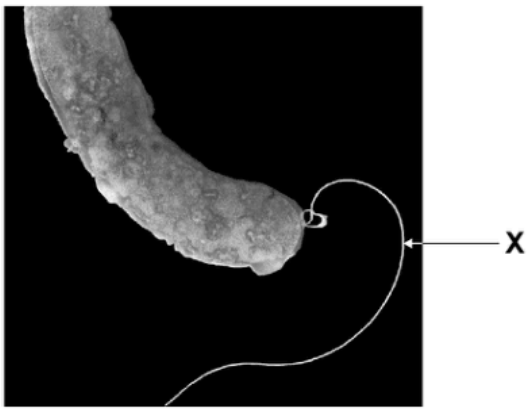
**X** _____


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**Question 3 · AS Paper 1 · June 2022 · Q03.1 · 1 mark**

**0 3 . 1** **Figure 2** is an image of a bacterium obtained using a scanning electron microscope.

**Figure 2**




Name the structure labelled **X**.

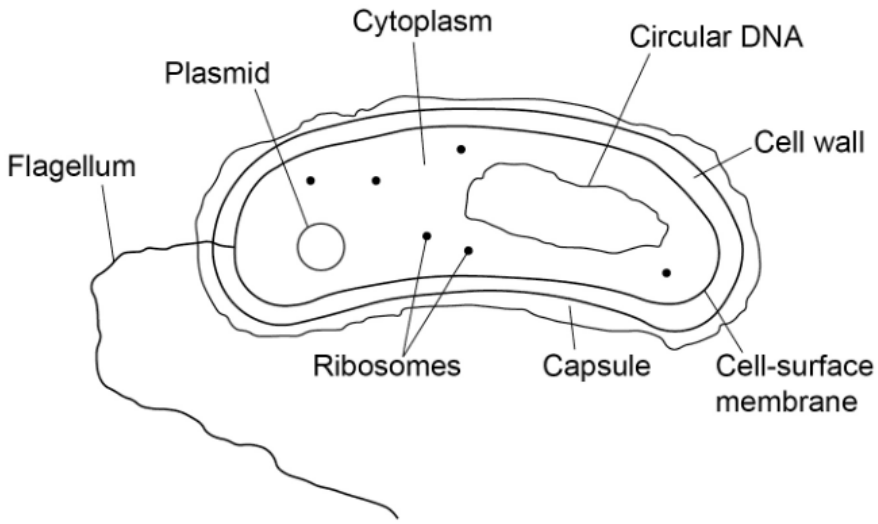
**[1 mark]**

_____

**Question 4 · AS Paper 2 · June 2025 · Q07.1 · 2 marks**

**0 7 . 1** **Figure 11** shows the structure of the bacterium *Vibrio cholerae*.

**Figure 11**




Name **three** structures shown in **Figure 11** that are **not** found in all bacteria.

**[2 marks]**

1 _____

2 _____

3 _____


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**Question 5 · AS Paper 2 · November 2021 · Q04.1 · 2 marks**

**0 4 . 1** Give **two** structures found in all prokaryotic cells and in all eukaryotic cells.

**[2 marks]**

1 _____

2 _____

**Question 6 · A level Paper 1 · June 2022 · Q03.1 · 1 mark**

**0 3 . 1** Give **two** features of **all** prokaryotic cells that are **not** features of eukaryotic cells.

**[1 mark]**

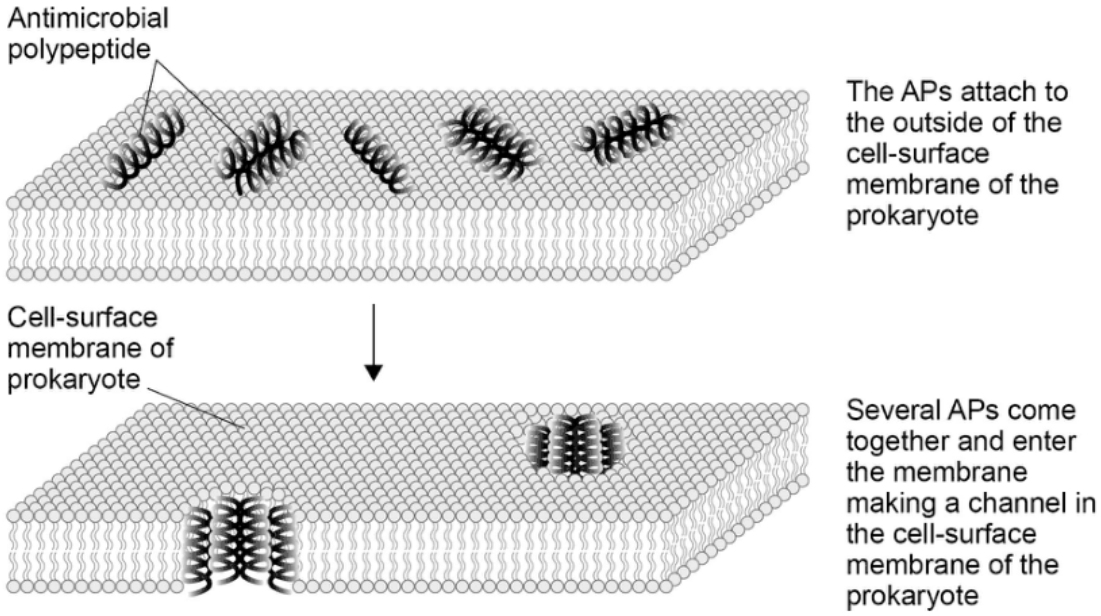
1 _____

2 _____

Many multicellular organisms produce antimicrobial polypeptides (APs) that protect them against prokaryotes.

**Figure 3** shows how one type of AP acts on the cell-surface membrane of prokaryotes.

**Figure 3**




**Question 7 · AS Paper 1 · June 2022 · Q03.5 · 2 marks**

**0 3 . 5** Name **two** structures found in **all** bacteria that are **not** found in plant cells.

**[2 marks]**

1 _____

2 _____


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**Question 8 · A level Paper 1 · June 2025 · Q04.1 · 2 marks**

**0 4 . 1** Name **three** structures that are found in **some** prokaryotic cells but are **not** found in **all** prokaryotic cells.

**[2 marks]**

1 _____

2 _____

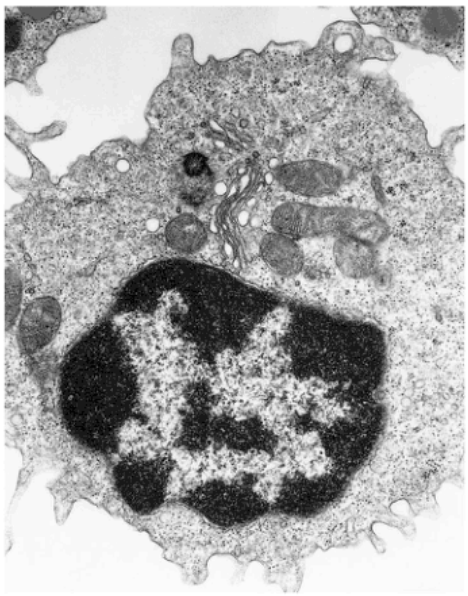
3 _____


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**Figure 14** shows transmission electron micrographs of two cells, one animal cell and one prokaryotic cell.

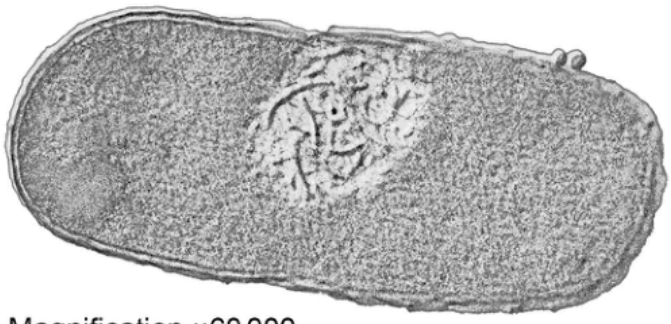
**Figure 14**

**Cell A**



Magnification ×30 000

**Cell B**



Magnification ×60 000

**1 0 . 3** Contrast the structure of the two cells visible in the electron micrographs shown in **Figure 14**.

**[5 marks]**


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**Question 10 · AS Paper 1 · June 2016 · Q01.1 · 2 marks**

**0 1 . 1** **Table 1** shows features of a bacterium and the human immunodeficiency virus (HIV) particle.

Complete **Table 1** by putting a tick (✓) where a feature is present.

**[2 marks]**

**Table 1**

| Feature | Bacterium | Human immunodeficiency virus (HIV) particle |
|---|---|---|
| RNA | | |
| Cell wall | | |
| Enzyme molecules | | |
| Capsid | | |

**Question 11 · A level Paper 1 · June 2023 · Q01.1 · 2 marks**

**0 1 . 1** Give the **three** structural features found in **all** virus particles **and** describe the function of **one** of these features.

**[2 marks]**

1 _____

2 _____

3 _____

Function of **one** named feature _____

_____

_____

_____


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**Question 12 · A level Paper 1 · June 2023 · Q01.2 · 2 marks**

**0 1 . 2** Explain why viruses are described as acellular and non-living.

**[2 marks]**

**Question 13 · AS Paper 1 · June 2022 · Q03.6 · 2 marks**

**0 3 . 6** Name **two** features of HIV particles that are **not** found in bacteria.

Do **not** include attachment protein in your answer.

**[2 marks]**

1 _____

2 _____


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**Question 14 · A level Paper 1 · June 2019 · Q05.1 · 4 marks**

**0 5 . 1** Describe the structure of the human immunodeficiency virus (HIV).

**[4 marks]**


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**Question 15 · A level Paper 1 · June 2025 · Q08.4 · 2 marks**

**0 8 . 4** The length of the single circular (non-plasmid) DNA molecule in a *B. thuringiensis* cell is 5400 kbp

The total length of all plasmid DNA molecules in a *B. thuringiensis* cell is 65% greater than the length of the single circular DNA molecule.

Calculate the total number of kbp in all the plasmid molecules in a *B. thuringiensis* cell.

Show your working.

**[2 marks]**

Answer _____ kbp


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## Mark schemes

**Question 1 · AS Paper 1 · June 2018 · Q04.1 · 2 marks**

| | | | |
|---|---|---|---|
| **04.1** | W – (cell surface) membrane<br>X – cell wall<br>Y – capsule<br>Z – flagellum | 2 | Four correct = 2 marks.<br>Three or two correct = 1 mark.<br>Y - Ignore references to slime/mucus<br>Y - Reject capsid<br>Z - accept flagella |

**Question 2 · AS Paper 1 · June 2018 · Q04.2 · 2 marks**

| | | | |
|---|---|---|---|
| **04.2** | W - Phospholipids;<br>X - Murein / glycoprotein; | 2 | X - Accept peptidoglycans.<br>Accept phonetic spellings |

**Question 3 · AS Paper 1 · June 2022 · Q03.1 · 1 mark**

| | | |
|---|---|---|
| **03.1** | Flagellum/flagella;<br>(AO1) | 1 |


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**Question 4 · AS Paper 2 · June 2025 · Q07.1 · 2 marks**

| | | |
|---|---|---|
| **07.1** | Flagellum/flagella<br>Plasmid(s)<br>Capsule;;<br><br>Accept in any order.<br><br>3 correct = **2 marks**<br>2 correct = **1 mark**<br>1 or 0 correct = **0 marks** | 2<br>(2 x AO1) |

**Question 5 · AS Paper 2 · November 2021 · Q04.1 · 2 marks**

| | | |
|---|---|---|
| **04.1** | 1. Cell(-surface) membrane;<br>2. Ribosomes;<br>3. Cytoplasm;<br>4. DNA;<br><br>2 max | 2. Ignore 70S |


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**Question 6 · A level Paper 1 · June 2022 · Q03.1 · 1 mark**

| | | | |
|---|---|---|---|
| 03.1 | For 1 mark, accept any **two** from<br>Prokaryotes have<br>No membrane-bound organelles/correct example<br>**OR**<br>(Single,) circular/loop DNA (in cytoplasm)<br>**OR**<br>DNA free in cytoplasm<br>**OR**<br>DNA not associated with proteins/histones<br>**OR**<br>Murein/peptidoglycan (in) cell wall; | 1<br>(AO1) | Apply list rule<br>Accept (prokaryotes) only have smaller ribosomes /60S/70S<br>Accept mesosome<br>Accept no introns<br>Accept nucleoid for single, circular DNA<br>Reject nucleosome<br>Reject plasmid<br>Reject (bacterial) chromosome<br>Reject capsule/slime layer<br>Reject flagellum |

**Question 7 · AS Paper 1 · June 2022 · Q03.5 · 2 marks**

| | | | |
|---|---|---|---|
| 03.5 | 1. Circular DNA (molecule in cytoplasm);<br>2. Murein cell wall<br>**OR**<br>Peptidoglycan cell wall<br>**OR**<br>Glycoprotein cell wall;<br>3. Small(er)/70S ribosomes (in cytoplasm); | 2 max<br>(2 x AO1) | Accept mesosome |

**Question 8 · A level Paper 1 · June 2025 · Q04.1 · 2 marks**

| | | | |
|---|---|---|---|
| 04.1 | Capsule, plasmid(s), flagellum/a;;<br>3 correct = **2 marks**<br>2 correct = **1 mark**<br>1 or 0 correct = **0 marks** | 2<br>(2 x AO1) | Accept pili/pilus OR photosynthetic lamellae |


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**Question 9 · A level Paper 1 · November 2021 · Q10.3 · 5 marks**

| | | | |
|---|---|---|---|
| **10.3** | 1. Magnification (figures) show **A** is bigger than **B**;<br>2. **A** has a nucleus whereas **B** has free DNA;<br>3. **A** has mitochondria whereas **B** does not;<br>4. **A** has Golgi body/endoplasmic reticulum whereas **B** does not;<br>5. **A** has no cell wall whereas **B** has a murein/glycoprotein cell wall;<br>6. **A** has no capsule whereas **B** has a capsule;<br>7. **A** has DNA is bound to histones/proteins whereas **B** has DNA not associated with histones/proteins<br>**OR**<br>**A** has linear DNA whereas **B** has circular DNA;<br>8. **A** has larger ribosomes; | 5 max | Accept in all marking points, animal/eukaryote for A and prokaryote/ bacterium for B<br>5. Accept peptidoglycan |

**Question 10 · AS Paper 1 · June 2016 · Q01.1 · 2 marks**

01.1

| **Feature** | **Bacterium** | **Human immunodeficiency virus (HIV) particle** |
|---|---|---|
| RNA | ✓ | ✓ |
| Cell wall | ✓ | |
| Enzyme molecules | ✓ | ✓ |
| Capsid | | ✓ |

2

1 mark for each correct vertical column


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**Question 11 · A level Paper 1 · June 2023 · Q01.1 · 2 marks**

| | | |
|---|---|---|
| **01.1** | 1. Genetic material, capsid **and** attachment protein;<br>2. Genetic material codes for (viral) protein<br>**OR**<br>Capsid protects the genetic material/RNA/DNA<br>**OR**<br>Attachment protein bind to receptors (on cell); | 2<br>(2 x AO1) |

1. Accept 'DNA **or** RNA' (the 'or' OR '/' is needed) OR nucleic acid OR genome for 'genetic material'

1. Ignore genetic information

1. and 2. Accept glycoprotein for attachment protein

1. Accept nucleocapsid for 'capsid and nucleic acid'

1. and 2. Accept capsomeres for capsid

2. Accept DNA OR RNA OR genome for genetic material

2. Accept contains OR stores OR encloses


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**Question 12 · A level Paper 1 · June 2023 · Q01.2 · 2 marks**

| | | |
|---|---|---|
| **01.2** | 1. (Acellular) no cell(-surface) membrane<br>**OR**<br>Not made of cells;<br>2. (Non-living) have no metabolism/metabolic reactions;<br>**OR**<br>Cannot (independently) move/respire/replicate/ excrete<br>**OR**<br>(Have) no nutrition; | 2<br>(2 x AO1) |

1. Accept have no organelles/cytoplasm

Ignore ‘do not contain membrane-bound organelles’

1. Accept ‘do not have cell structure(s)’

2. Accept correct named metabolic reaction

2. Accept reproduce for replicate


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**Question 13 · AS Paper 1 · June 2022 · Q03.6 · 2 marks**

| | | | |
|---|---|---|---|
| **03.6** | 1. Capsid;<br>2. Reverse transcriptase;<br>3. RNA genome;<br>4. Envelope; | 2 max<br>(2 x AO1) | 1. Accept capsomere<br>1. Ignore protein coat<br>3. Accept 'genetic material' **OR** 'genes' for 'genome' |

**Question 14 · A level Paper 1 · June 2019 · Q05.1 · 4 marks**

| | | | |
|---|---|---|---|
| **5.1** | 1. RNA (as genetic material);<br>2. Reverse transcriptase;<br>3. (Protein) capsomeres/capsid;<br>4. (Phospho)lipid (viral) envelope<br>**OR**<br>Envelope made of membrane;<br>5. Attachment proteins; | 4 max | Accept a labelled diagram.<br>1. Reject nucleus/DNA/plasmids.<br>3. Reject capsule.<br>4. Reject if HIV has a cell membrane or a cell wall.<br>5. Accept gp41 and/or gp 120.<br>5. Accept glycoprotein.<br>5. Accept description of attachment protein.<br>5. Ignore 'receptor protein'.<br>Ignore cytoplasm. |


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| | | |
|---|---|---|
| **08.4** | Correct answer of 8910;;<br><br>3510 (correct difference between total number of plasmid kbp and non-plasmid kbp) = **1 mark**<br><br>**OR**<br><br>x1.65 (correct multiplication factor for percentage change) = **1 mark**<br><br>**OR**<br><br>Incorrect answer, but correct answer shown in working = **1 mark;** | 2<br>(2 x AO3) |


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