



Bacteria, viruses and infection: practice questions

7 questions • 22 marks • mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 22

1 UNIT 4 STYLE [1 mark]

A Level only

Which feature is present in HIV but not in lambda phage?

- A. ☐ An envelope containing viral glycoproteins
- B. ☐ A protein capsid
- C. ☐ Nucleic acid as genetic material
- D. ☐ Reproduction only inside a host cell

2 UNIT 4 STYLE [4 marks]

A Level only

Compare and contrast the structure of a bacterium with the structure of a virus such as tobacco mosaic virus.

3 UNIT 4 STYLE [4 marks]

A Level only

Explain what is meant by the terms lytic and latency in relation to viruses.

4

UNIT 4 STYLE

[5 marks]

A Level only

Describe how HIV enters a helper T cell and is replicated.

5

UNIT 4 STYLE

[4 marks]

A Level only

Explain how infection with *Mycobacterium tuberculosis* can lead to damage to the lungs.

6

UNIT 4 STYLE

[3 marks]

A Level only

Describe how the skin, the stomach and the gut flora help to protect the body from infection.

7

UNIT 4 STYLE

[1 mark]

A Level only

A nurse is infected with a pathogen after a needle-stick injury. By which route did the pathogen enter her body?

- A. ☐ Through the gas exchange system
- B. ☐ Through the digestive system
- C. ☐ Through a break in the skin
- D. ☐ Across the placenta

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1] A Level only

A A (1)

2. [4] A Level only

- both contain nucleic acid as genetic material (1)
- bacterium has DNA, but TMV has RNA (1)
- bacterium has cell wall / cell-surface membrane / cytoplasm, virus has none (1)
- bacterium has (70S) ribosomes, virus has none (1)
- virus has a protein capsid, bacterium does not (1)
- bacterium is much larger / virus is smaller (1)
- Max 4 (must include at least one similarity and one difference)

3. [4] A Level only

- lytic: the virus replicates / makes many new virus particles inside the host cell (1)
- the host cell bursts / lyses releasing the new particles (1)
- latency: viral nucleic acid is present in the host cell without producing new virus particles (1)
- for example, DNA integrated into the host chromosome as a prophage / provirus (1)
- and can later enter the lytic cycle (1)
- Max 4

4. [5] A Level only

- glycoprotein (gp120) on the viral envelope binds to CD4 receptor on the helper T cell (1)
- envelope fuses with the cell-surface membrane / capsid enters the cytoplasm (1)
- reverse transcriptase makes DNA from viral RNA (1)
- DNA is inserted into the host chromosome (1) as a provirus (1)
- host cell makes viral RNA and proteins / transcription and translation (1)
- new viruses assemble and bud off from the cell surface, taking part of the membrane as envelope (1)
- Max 5

5. [4] A Level only

- bacteria inhaled reach alveoli and are engulfed by macrophages (1)
- bacteria are not digested / survive inside macrophages (1) because they prevent lysosomes fusing with phagosome / have a waxy cell wall (1)
- immune system forms tubercles around the infected cells (1)
- if immunity is weakened, the tubercle breaks down and bacteria spread (1)
- lung tissue is destroyed / cavities form, reducing gas exchange (1)
- Max 4

6. [3] A Level only

- skin: keratinised layer forms a physical barrier / sebum makes surface acidic / skin flora compete with pathogens (1)
- stomach: hydrochloric acid at about pH 1 to 2 kills most pathogens in food and drink (1)
- gut flora: compete with pathogens for nutrients and space / produce substances that inhibit pathogens (1)

7. [1] **A Level only**

C C (1)