



Antibiotics and infection control: practice questions

6 questions · 24 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 / 24

1 UNIT 4 STYLE [1 mark]
A Level only

Which statement describes a bacteriostatic antibiotic?

- A. ☐ It kills bacteria by making holes in the cell-surface membrane
- B. ☐ It prevents bacteria multiplying without necessarily killing them
- C. ☐ It kills viruses in infected cells
- D. ☐ It destroys the immune cells that target bacteria

2 UNIT 4 STYLE [4 marks]
A Level only

Penicillin is a bactericidal antibiotic that prevents the formation of cross-links in the bacterial cell wall. Explain why penicillin kills bacteria but does not harm human cells, and why it does not kill viruses.

3

[6 marks]

A Level only

A student investigated the effect of four antibiotics on a bacterium using discs on an agar plate. Disc E was a control. (a) Calculate the area of the zone of inhibition around antibiotic C. (2) (b) State which antibiotic was most effective and give a reason. (2) (c) Explain the purpose of disc E, and suggest what it contained. (2)

Diameter of zones of inhibition	
Disc	Diameter of zone / mm
A	18
B	0
C	11
D	25
E (control)	0

[illegible]

4

[4 marks]

A Level only

Describe how the risks are reduced when an investigation into the effect of antibiotics on bacteria is carried out in a school laboratory.

[illegible]

5 UNIT 4 STYLE

[6 marks]

A Level only

MRSA is a common cause of hospital-acquired infection. Explain how an understanding of the causes of hospital-acquired infections has led to changes in hospital practice and in the prescription of antibiotics.

6 UNIT 4 STYLE

[3 marks]

A Level only

A doctor refuses to prescribe antibiotics to a patient with a cold. Give three reasons that support the doctor's decision.

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

B B (1)

2. [4] A Level only

- cross-links in the peptidoglycan wall cannot form, so the wall is weakened (1)
- water enters by osmosis / the cell bursts (1)
- human cells have no cell wall / peptidoglycan, so are not affected (1)
- viruses have no cell wall / are not cells / replicate inside host cells (1)
- Max 4

3. [6] A Level only

- (a) radius = 5.5 mm (1)
- area = $\pi \times 5.5^2 = 95 \text{ mm}^2$ (allow 95.0 or 95.03) (1)
- (b) antibiotic D (1)
- the largest zone of inhibition / bacteria least able to grow (1)
- (c) shows that the paper disc / solvent has no effect on growth (1)
- sterile water / no antibiotic (1)

4. [4] A Level only

- use a non-pathogenic strain / harmless bacteria (1)
- use aseptic technique / flame loop and forceps / sterile equipment (1)
- tape the lids with short pieces and do not open the plates after incubation (1)
- incubate at 25 °C, not 37 °C (1)
- wash hands / disinfect the bench / wear a lab coat (1)
- autoclave or disinfect all plates and equipment before disposal (1)
- Max 4

5. [6] A Level only

- patients have weakened immune systems / are vulnerable, so infected patients are isolated / screened (1)
- bacteria are spread by hands of staff, so hand washing / alcohol gel between patients (1)
- equipment / surfaces contaminated, so sterilise instruments / cleaning (1)
- wounds / catheters give entry to pathogens, so aseptic technique / remove devices early (1)
- overuse of antibiotics selects for resistant bacteria (1)
- so antibiotics are prescribed only when necessary / not for viral infections (1)
- use narrow-spectrum antibiotics / test for sensitivity first / reserve antibiotics / take the course as prescribed (1)
- Max 6

6. [3] A Level only

- colds are caused by viruses (1) and antibiotics do not work on viruses (1)
- unnecessary use of antibiotics selects for resistant bacteria (1)
- antibiotics may kill gut / normal flora and allow pathogens such as C. difficile to grow (1)
- possible side effects / allergic reaction (1)
- Max 3