

Higher Combined version — Higher Tier (★) included; Separate-only (◆) removed.

**Q1. Describe how antibiotic resistance in bacteria develops through natural selection.**

[4 marks]

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**Q2. Describe the stages of drug development for a new medicine. Include the purpose of each stage.**

[4 marks]

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**Q3. Explain why a double-blind trial is important when testing a new drug.**

[2 marks]

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Total: 10 marks

**Q1 (4 marks)**

*Describe how antibiotic resistance in bacteria develops through natural selection.*

- Random mutation gives some bacteria resistance to the antibiotic [1]
- Antibiotic kills non-resistant bacteria but resistant bacteria survive (selection) [1]
- Resistant bacteria reproduce rapidly, passing on the resistance allele [1]
- Over many generations, resistant allele becomes more common — population is now resistant [1]

**Q2 (4 marks)**

*Describe the stages of drug development for a new medicine. Include the purpose of each st...*

- Preclinical: tested on cells and animals — assess toxicity, dosage, mechanism [1]
- Phase 1 clinical: small group of healthy volunteers — safety in humans [1]
- Phase 2 clinical: patients with disease — effectiveness [1]
- Phase 3: large-scale double-blind placebo-controlled trial — confirm safety/effectiveness vs existing treatments [1]

**Q3 (2 marks)**

*Explain why a double-blind trial is important when testing a new drug.*

- Neither patients nor doctors know who receives real drug or placebo [1]
- Prevents bias: doctors cannot unconsciously treat groups differently; patients cannot experience placebo effect [1]