

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

★ HIGHER TIER

Q1. ★ Describe the stages of genetic engineering to insert a human gene into bacteria. Name both enzymes used.

[4 marks]

★ HIGHER TIER

Q2. ★ Give ONE advantage and TWO potential concerns about the use of GM (genetically modified) crops.

[3 marks]

Total: 7 marks

Q1 (4 marks) [★ HT]

★ Describe the stages of genetic engineering to insert a human gene into bacteria. Name bo...

- Desired gene (e.g. insulin) identified and cut out of human DNA using RESTRICTION ENZYMES [1]
- Bacterial plasmid cut with same restriction enzyme → complementary sticky ends [1]
- Gene inserted into plasmid; DNA LIGASE seals the joins → recombinant DNA [1]
- Recombinant plasmid introduced into bacterium; bacteria reproduce and express the gene → produce human protein [1]

Q2 (3 marks) [★ HT]

★ Give ONE advantage and TWO potential concerns about the use of GM (genetically modified)...

- Advantage: herbicide-resistant / pest-resistant / improved yield / improved nutritional content [1]
- Concern: GM genes might transfer to wild plants through cross-pollination → unknown ecological consequences [1]
- Concern: ethical concerns about "unnatural" manipulation / large corporations controlling seed supply / allergen risks [1]