This paper covers the **full Higher Separate** specification. Higher Tier questions are marked ★. Separate-only questions are marked ◆.

Selective Breeding and Genetic Engineering (B6b)

Specification reference: B6b

Q1. Describe the process of selective breeding to produce a crop plant with higher yield.

[3 marks]

★ HIGHER TIER

Q2. ★ Describe how genetic engineering is used to produce bacteria that make human insulin. Name the enzymes used.

[4 marks]

Q3. Evaluate selective breeding as a method of improving crop plants.

[4 marks]

Conservation and Biodiversity (B6c)

Specification reference: B6c

Q4. Explain THREE reasons why maintaining biodiversity is important.

[3 marks]

Q5. Evaluate zoos and captive breeding programmes as methods of conserving endangered species.

[4 marks]

Total: 18 marks

Selective Breeding and Genetic Engineering (B6b)

Q1 (3 marks)

Describe the process of selective breeding to produce a crop plant with higher y…

- Identify plants with highest yield from existing population [1]
- Breed these plants together — select seeds from highest-yielding offspring [1]
- Repeat the process over many generations until desired yield is consistently achieved [1]

Q2 (4 marks) [★ HT]

★ Describe how genetic engineering is used to produce bacteria that make human i…

- Human insulin gene identified and cut out using restriction enzymes [1]
- Bacterial plasmid cut with same restriction enzyme — complementary sticky ends [1]
- Insulin gene inserted into plasmid; ligase seals the joins [1]
- Recombinant plasmid introduced into bacteria; bacteria reproduce and produce insulin [1]

Q3 (4 marks)

Evaluate selective breeding as a method of improving crop plants.

- Advantage: can significantly improve yield, disease resistance, nutrition in crops [1]
- Advantage: well-established, does not require advanced genetic techniques [1]
- Disadvantage: reduces genetic diversity — narrows gene pool [1]
- Disadvantage: inbreeding increases risk of inherited disorders; population vulnerable to new diseases [1]

Conservation and Biodiversity (B6c)

Q4 (3 marks)

Explain THREE reasons why maintaining biodiversity is important.

- Ecosystem stability: high biodiversity makes ecosystems more resilient to change [1]
- Source of food, medicines and raw materials — many drugs derived from natural organisms [1]
- Ethical/intrinsic value of all life — each species may have undiscovered potential value [1]

Q5 (4 marks)

Evaluate zoos and captive breeding programmes as methods of conserving endangere…

- Advantage: prevents extinction — keeps species alive in controlled environment [1]
- Advantage: allows reintroduction to wild once threats are managed [1]
- Disadvantage: animals may not develop natural behaviours needed for survival in wild [1]
- Disadvantage: small captive population may lose genetic diversity — inbreeding [1]