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

Q1. Two carrier parents (Ff) cross. Use a Punnett square to calculate the probability of an affected child (ff).

[3 marks]

Q2. Explain the difference between a carrier and an affected individual for a recessive disorder.

[3 marks]

★ HIGHER TIER

Q3. ★ Polydactyly (D) is dominant. Cystic fibrosis (f) is recessive. Explain why polydactyly appears in almost every generation but cystic fibrosis may skip generations.

[3 marks]

Total: 9 marks

Q1 (3 marks)

Two carrier parents (Ff) cross. Use a Punnett square to calculate the probability of an af…

- Punnett square: FF, Ff, Ff, ff [1]
- 25% / 1 in 4 probability of ff (cystic fibrosis) [1]
- 50% carriers (Ff) [1]

Q2 (3 marks)

Explain the difference between a carrier and an affected individual for a recessive disord…

- Carrier: heterozygous (Ff) — has one faulty allele but NOT the condition [1]
- Affected: homozygous recessive (ff) — two faulty alleles, has the condition [1]
- Carrier can pass faulty allele to offspring undetected [1]

Q3 (3 marks) [★ HT]

★ Polydactyly (D) is dominant. Cystic fibrosis (f) is recessive. Explain why polydactyly a…

- Polydactyly: D dominant — only one copy needed, any parent with D will usually pass it to ~50% of children [1]
- CF: f recessive — both parents must be carriers (Ff) for affected children [1]
- Carriers appear unaffected — disease can skip generations with no visible sign [1]