Higher Tier — Separate Science

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

Q1. Describe the structure of DNA.

[3 marks]

Q2. Explain the relationship between DNA, genes and chromosomes.

[3 marks]

★ HIGHER TIER

Q3. ★ Describe the process of protein synthesis, naming where each stage occurs.

[4 marks]

★ HIGHER TIER

Q4. ★ Define a codon and explain what it codes for.

[2 marks]

Total: 12 marks

Q1 (3 marks)

Describe the structure of DNA.

- Double helix — two strands twisted together [1]
- Made of nucleotides: each has a deoxyribose sugar, phosphate group and one of four bases (A, T, C, G) [1]
- Complementary base pairing: A-T and C-G holds strands together [1]

Q2 (3 marks)

Explain the relationship between DNA, genes and chromosomes.

- A gene is a section of DNA that codes for a specific protein [1]
- Chromosomes are long strands of DNA coiled up — each carries many genes [1]
- Humans have 46 chromosomes in 23 homologous pairs in body cells [1]

Q3 (4 marks) [★ HT]

★ Describe the process of protein synthesis, naming where each stage occurs.

- Transcription in nucleus: template strand of DNA → mRNA via complementary base pairing (U replaces T) [1]
- mRNA leaves nucleus through nuclear pores [1]
- Translation at ribosomes: ribosome reads codons (triplets of 3 bases) [1]
- tRNA molecules bring specific amino acids → peptide bonds form → polypeptide/protein assembled [1]

Q4 (2 marks) [★ HT]

★ Define a codon and explain what it codes for.

- A codon is a sequence of THREE mRNA bases [1]
- Each codon codes for one specific amino acid — or start/stop signal [1]