

Ingenious Genes Curriculum Links for Pearson Edexcel Level 3 Advanced GCE in Biology B (9B10)

Topic 1: Biological molecules

Topic 2: Cells, Viruses and Reproduction of Living Things

Topic 7: Modern Genetics

Topic 8: Origins of Genetic Variation

Topic 1: Biological molecules

1.3 Proteins

ii Understand the formation of polypeptides and proteins (as amino acid monomers linked by peptide bonds in condensation reactions).

1.4 DNA and protein synthesis

i Know the structure of DNA, including the structure of the nucleotides (purines and pyrimidines), base pairing, the two sugar-phosphate backbones, phosphodiester bonds and hydrogen bonds.

iii Know that a gene is a sequence of bases on a DNA molecule coding for a sequence of amino acids in a polypeptide chain.

vi Understand the processes of transcription in the nucleus and translation at the ribosome, including the role of sense and anti-sense DNA, mRNA, tRNA and the ribosomes.

vii Understand the nature of the genetic code, including triplets coding for amino acids, start and stop codons, degenerate and non-overlapping nature, and that not all the genome codes for proteins.

viii Understand the term gene mutation as illustrated by base deletions, insertions and substitutions.

ix Understand the effect of point mutations on amino acid sequences, as illustrated by sickle cell anaemia in humans.

Topic 2: Cells, Viruses and Reproduction of Living Things

2.3 Eukaryotic cell cycle and division

- iv Understand how meiosis results in haploid gametes, including the stages of meiosis.
- v Understand that meiosis results in genetic variation through recombination of alleles, including independent assortment and crossing over.

Topic 7: Modern Genetics

7.1 Using gene sequencing

- i Understand what is meant by the term genome.

7.4 Gene Technology

- iv Understand how 'knockout' mice can be used as a valuable animal model to investigate gene function.

Topic 8: Origins of Genetic Variation

8.1 Origins of genetic variation

- i Understand that mutations are the source of new variations and that the processes of random assortment and crossing over during meiosis give rise to new combinations of alleles in gametes.
- ii Understand how random fertilisation during sexual reproduction brings about genetic variation.

8.2 Transfer of genetic information

- i Understand the terms 'genotype and phenotype', 'homozygote and heterozygote', 'dominance', 'recessive', 'codominance' and 'multiple alleles'.
- ii Be able to construct genetic crosses and pedigree diagrams.
- v Understand sex linkage on the X chromosome

8.3 Gene pools

ii Understand that sometimes changes in allele frequencies can be the result of chance and not selection, including genetic drift.

iii Understand that allele frequencies can be influenced by:

- population bottlenecks
- founder effect.