# Ingenious Genes Curriculum Links for Edexcel GCSE Biology

| **Topic 3 – Genetics** |
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| 3.3 Explain the role of meiotic cell division, including the production of four daughter cells, each with half the number of chromosomes, and that this results in the formation of genetically different haploid gametes |
| 3.4 Describe DNA as a polymer made up of:<br>a) two strands coiled to form a double helix<br>b) strands linked by a series of complementary base pairs joined together by weak hydrogen bonds<br>c) nucleotides that consist of a sugar and phosphate group with one of the four different bases attached to the sugar |
| 3.5 Describe the genome as the entire DNA of an organism and a gene as a section of a DNA molecule that codes for a specific protein |
| 3.7B Explain how the order of bases in a section of DNA decides the order of amino acids in the protein and that these fold to produce specifically shaped proteins such as enzymes |
| 3.8B Describe the stages of protein synthesis, including transcription and translation:<br>a) RNA polymerase binds to non-coding DNA located in front of a gene<br>b) RNA polymerase produces a complementary mRNA strand from the coding DNA of the gene<br>c) the attachment of the mRNA to the ribosome d the coding by triplets of bases (codons) in the mRNA for specific amino acids<br>e) the transfer of amino acids to the ribosome by tRNA<br>f) the linking of amino acids to form polypeptides |
| 3.10B Describe how genetic variants in the coding DNA of a gene can affect phenotype by altering the sequence of amino acids and therefore the activity of the protein produced |
| 3.12 Explain why there are differences in the inherited characteristics as a result of alleles |
| 3.13 Explain the terms: chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype, gamete and zygote |
| 3.14 Explain monohybrid inheritance using genetic diagrams, Punnett squares and family pedigrees |
| 3.15 Describe how the sex of offspring is determined at fertilisation, using genetic diagrams |
| 3.16 Calculate and analyse outcomes (using probabilities, ratios and percentages) from monohybrid crosses and pedigree analysis for dominant and recessive traits |
| 3.18B Explain how sex-linked genetic disorders are inherited |
| 3.19 State that most phenotypic features are the result of multiple genes rather than single gene inheritance |
| 3.20 Describe the causes of variation that influence phenotype, including:<br>a) genetic variation – different characteristics as a result of mutation and sexual reproduction<br>b) environmental variation – different characteristics caused by an organism's environment (acquired characteristics) |
| 3.22 State that there is usually extensive genetic variation within a population of a species and that these arise through mutations |
| 3.23 State that most genetic mutations have no effect on the phenotype, some mutations have a small effect on the phenotype and, rarely, a single mutation will significantly affect the phenotype |