Subject: Combined Science and Biology

Medium term plan Module B5 Genes, inheritance and Selection

Unit planning and evaluation sheet:

Topic B5	B5: Genes, inheritance and selection
Rationale	B5.1 Inheritance **Why?** Inheritance relies on the genetic information contained in the genome being passed from one generation to the next, whether sexually or asexually. The characteristics of a living organism are influenced by the genome and its interaction with the environment. This topic builds on work that has been taught in Module B1, where they have learnt about DNA structure and protein synthesis. It also builds upon the knowledge taught in module B2 on cell division. They have learnt mitosis and need this foundation before being taught Meiosis, which is for gamete production. **Common misconceptions** Learners commonly struggle to appreciate the physical relationships between the nucleus, genetic material, the genome, chromosomes and genes. Accurate definitions of these terms will help learners' explanations in this topic. Learners often have well-developed (although not necessarily scientifically accurate) explanations for inheritance before undertaking GCSE study. Some examples include that intraspecific variation is as a result of defects in development or that acquired characteristics can be inherited. Care must also be taken with the concept of dominant and recessive alleles. Whether an allele is dominant or recessive does not affect the mechanism of inheritance of the allele, but is an observed pattern in the phenotype of organisms. Many learners assume that the dominant allele 'dominates' the recessive allele preventing its expression (which is not the case) or that the recessive allele is actually just an absence of the dominant allele (also not generally the case). **B5.2 Natural selection and evolution** **Why?** Variation in the genome and changes in the environment drive the process of natural selection, leading to changes in the characteristics of populations. Evolution accounts for both biodiversity and how organisms are all

	related to varying degrees. Key individuals have played important roles in the development of the understanding of genetics. This module builds upon knowledge taught in B4 where they have learnt about ecological relationships and needs to be taught before module B6 when we teach about distribution of organisms and how we collect data about where organisms live. This topic also relies in the knowledge they are taught in module B2 on adaptations and survival of organisms. **Common misconceptions** Learners are used to hearing the term evolution in everyday life but it is often used for items that have been designed and gradually improved in order to fit a purpose. They therefore find it difficult to grasp the idea that evolution by natural selection relies on random mutations. Learners also tend to imply that individuals change by natural selection. Statements such as 'a moth will change by natural selection in order to become better camouflaged' include both of these common misconceptions.
Why are you teaching it now? What **prior learning** do students have?	B5.1 Inheritance **Underlying knowledge and understanding** Learners should be familiar with the idea of heredity as the process by which genetic information is passed from one generation to the next. They should have a simple model of chromosomes, genes and DNA from module B1, From module B2 an understanding of cell division. **B5.2 Natural selection and evolution** **Underlying knowledge and understanding** Learners should appreciate that changes in the environment can leave some individuals, or even some entire species, unable to compete and reproduce leading to extinction. They should have knowledge of adaptations and ecological relationships from module B4.
Vocabulary	Gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype, haploid, diploid, natural selection, evolution, speciation.
Cultural Capital	Link to the life of Charles Darwin and plan a trip to the Natural History museum.