Meden School Curriculum Planning							
Subject	Biology	**Year Group**	13	**Sequence No.**		**Topic**	3.7 Genetics, populations, evolution and ecosystems

Retrieval	Core Knowledge	Student Thinking
What do teachers need **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **development of our students thinking, encouraging them to see the inequalities around them** and 'do something about them!'
AQA GCSE Biology topic 6 DNA, mutations, reproduction, meiosis, Inheritance, genetic diagrams, inherited disorders, variation, evolution, speciation. AQA A level Biology 3.1.5 Structure of DNA AQA A level Biology 3.4.1-6 Genetic information and variation.	**3.7.1 Inheritance** The genotype is the genetic constitution of an organism. The phenotype is the expression of this genetic constitution and its interaction with the environment. There may be many alleles of a single gene. Alleles may be dominant, recessive or codominant. In a diploid organism, the alleles at a specific locus may be either homozygous or heterozygous. The use of fully labelled genetic diagrams to interpret, or predict, the results of: • monohybrid and dihybrid crosses involving dominant, recessive and codominant alleles	

	• crosses involving sex-linkage, autosomal linkage, multiple alleles and epistasis. Use of the chi-squared (X^2) test to compare the goodness of fit of observed phenotypic ratios with expected ratios. **3.7.2 Populations** Species exist as one or more populations. A population as a group of organisms of the same species occupying a particular space at a particular time that can potentially interbreed . The concepts of gene pool and allele frequency. The Hardy–Weinberg principle provides a mathematical model, which predicts that allele frequencies will not change from generation to generation. The conditions under which the principle applies. The frequency of alleles, genotypes and phenotypes in a population can be calculated using the Hardy–Weinberg equation: p 2 + 2pq + q2 = 1 where p is the frequency of one (usually the dominant) allele and q is the frequency of the other (usually recessive) allele of the gene. **3.7.3 Evolution may lead to speciation** Individuals within a population of a species may show a wide range of variation in phenotype. This is due to genetic and environmental factors.	Using the Hardy-Weinberg principle to follow the effect of climate change on the genetics of different populations in habitats most severely impacted.

	The primary source of genetic variation is mutation. Meiosis and the random fertilisation of gametes during sexual reproduction produce further genetic variation. Predation, disease and competition for the means of survival result in differential survival and reproduction, ie natural selection. Those organisms with phenotypes providing selective advantages are likely to produce more offspring and pass on their favourable alleles to the next generation. The effect of this differential reproductive success on the allele frequencies within a gene pool. The effects of stabilising, directional and disruptive selection. Evolution as a change in the allele frequencies in a population. Reproductive separation of two populations can result in the accumulation of difference in their gene pools. New species arise when these genetic differences lead to an inability of members of the populations to interbreed and produce fertile offspring. In this way, new species arise from existing species. Allopatric and sympatric speciation. The importance of genetic drift in causing changes in allele frequency in small populations. Students should be able to: • explain why individuals within a population of a species may show a wide range of variation in phenotype • explain why genetic drift is important only in small populations • explain how natural selection and isolation may result in change in the allele and phenotype frequency and lead to the formation of a new species • explain how evolutionary change over a long period of time has resulted in a great diversity of species.	

	3.7.4 Populations in ecosystems Populations of different species form a community. A community and the non-living components of its environment together form an ecosystem. Ecosystems can range in size from the very small to the very large. Within a habitat, a species occupies a niche governed by adaptation to both abiotic and biotic conditions. An ecosystem supports a certain size of population of a species, called the carrying capacity. This population size can vary as a result of: the effect of abiotic factors interactions between organisms: interspecific and intraspecific competition and predation. The size of a population can be estimated using: randomly placed quadrats, or quadrats along a belt transect, for slow-moving or non-motile organisms the mark-release-recapture method for motile organisms. The assumptions made when using the mark-release-recapture method. Ecosystems are dynamic systems. Primary succession, from colonisation by pioneer species to climax community. At each stage in succession, certain species may be recognised which change the environment so that it becomes more suitable for other species with different adaptations. The new species may change the environment in such a way that it becomes less suitable for the previous species.	

	Changes that organisms produce in their abiotic environment can result in a less hostile environment and change biodiversity. Conservation of habitats frequently involves management of succession. **Students should be able to:** show understanding of the need to manage the conflict between human needs and conservation in order to maintain the sustainability of natural resources evaluate evidence and data concerning issues relating to the conservation of species and habitats and consider conflicting evidence use given data to calculate the size of a population estimated using the mark-release-recapture method. **Required practical 12**: Investigation into the effect of a named environmental factor on the distribution of a given species.	