

Curriculum Map: Combined Science Biology Year 11

	Autumn	Spring
<p>Content Declarative knowledge 'I Know'</p>	<p>Topic: B6 Inheritance, variation and evolution Know the main features of sexual and asexual reproduction, that it involves the fusion of gametes, sperm and egg in animals and pollen and ovule cells in flowering plants. Know that the mixing of genetic information in gametes leads to variation in the offspring. Know that asexual reproduction only involves one parent and there is no mixing of gametes and that it leads to genetically identical offspring known as clones. Know that gametes are produced by a process known as meiosis when a cell divides twice to form four gametes, each with a single set of chromosomes. Know that gametes join at fertilisation to restore the normal number of chromosomes and the new cell divides by mitosis to form an embryo in which cells differentiate. Know that the human body cells contain 23 pairs of chromosomes, 22 pairs control characteristics only and the 23rd pair carries the genes that determine sex. Know that in females the sex chromosomes are the same (XX); in males the chromosomes are different (XY). Know the basic structure of DNA and define the term genome. Know the importance of understanding the human genome. Know how to use the terms allele, dominant, recessive, homozygous, and heterozygous correctly. Know that some characteristics are controlled by a single gene while most characteristics are a result of multiple genes interacting. Know that each gene may have different forms called alleles. Know that the genes present, or genotype, operate at a molecular level to develop characteristics that are expressed as a phenotype. Know the symptoms of some disorders like polydactyly and cystic fibrosis and how they are inherited. Know that the differences in the characteristics of individuals may be due to genes they have inherited, environmental causes or a combination of both. Know that mutations are changes in the DNA code that may lead to more rapid evolution, although mutations that result in a new phenotype are rare. Know that Charles Darwin proposed the theory of evolution by natural selection which states that all species evolved from simple life forms that first developed more than three billion years ago and that this theory is now widely accepted. Know the stages of evolution by natural selection.</p>	<p>Topic: B6 Inheritance, variation and evolution Know how fossils are formed and that they are the remains of organisms from many years ago, which support Darwin's theory. Know how bacteria becomes resistant to antibiotics and how mutation is involved in the developing of resistant strains. Know that extinction may be caused by many different reasons. Know that organisms of the same species can interbreed to produce fertile offspring. Know that selective breeding (artificial breeding) is a process by which humans breed animals and plants for their desirable characteristics. Know the steps involved in selective breeding and explain the impact it can have on a phenotype. Know examples of GM organisms and state how they are useful to humans. Know the term genetic engineering and that it involves modifying the genome of an organism to introduce a desired characteristic, with examples. Know that enzymes are used to cut the gene from a chromosome; gene is inserted into a vector, e.g. bacterial plasmid or virus; vector is used to insert gene into cell; cell then makes a new protein to produce the desired characteristic. Know the basic principles of classification and the system developed by Linnaeus.</p>
<p>Skills</p>	<p>Know how to make models to show what happens during fertilisation in plants and animals</p>	<p>Know how to use a model to describe genetic engineering techniques.</p>

Procedural Knowledge 'I know how to'	<p>Know how to use a model to show why variation is produced in offspring from sexual reproduction than asexual reproduction.</p> <p>Know how to model the behaviour of chromosomes during meiosis.</p> <p>Know how to complete Punnett squares and genetic crosses. Interpret the results and describe the offspring.</p> <p>Know how to reorder by size: cell, nucleus, DNA, chromosome, and gene and extract DNA from Kiwi fruit.</p> <p>Know how to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.</p> <p>Know how to obtain and analyse data for continuous and discontinuous variation.</p> <p>Know how studying identical twins help scientists to investigate which traits have genetic causes.</p>	<p>Know how to produce a model to describe selective breeding.</p> <p>Know how to model how a fossil can be formed.</p>
Strategies Conditional Knowledge 'I know when to'	<p>Make an informed judgements about the economic, social, and ethical issues concerning embryo screening, given appropriate information.</p> <p>Discuss the importance of understanding the human genome.</p> <p>Interpret evolutionary trees.</p> <p>Research MRSA and C. difficile infections and treatment and interpret data about antibiotic resistance.</p>	<p>Consider the social, economic, and ethical implications of selective breeding.</p> <p>Interpret information about genetic engineering techniques.</p> <p>Evaluate advantages and disadvantages of GM crops.</p> <p>Evaluate the use of genetic engineering in agriculture and medicine.</p>
Key Questions	<p>What are the main features of sexual and asexual reproduction?</p> <p>How do cells divide by meiosis to form gametes?</p> <p>Explain how sexual reproduction gives rise to variation.</p> <p>Why is understanding the human genome important?</p> <p>What is the cause of animal and plant variation?</p> <p>Explain the theory of evolution by natural selection.</p>	<p>How are fossils formed and how do they provide evidence for evolution?</p> <p>Describe the process of selective breeding and give some examples.</p> <p>What is genetic engineering and what is its advantages in gene therapy and medicine.</p> <p>How are organisms classified?</p>
Assessment topics	<p>B6 Mid topic test (17min) after 6 lessons</p> <p>PPE: Paper 2 Topics B5, B6, B7 (1 hour 15 minutes)</p>	<p>B6 End of topic test 37min</p> <p>PPE: Paper 1 Topics B1, B2, B3, B4 (1 hour and 15 minutes)</p>
Cross curricular links/Character Education	<p>Maths - The concept of probability in predicting the results of a single gene cross</p> <ul style="list-style-type: none"> - using direct proportion and simple ratios to express the outcome of a genetic cross - interpret charts, graphs and tables. <p>SMSC - Appreciate that embryo screening and gene therapy may alleviate suffering but consider the ethical issues which arise.</p>	<p>SMSC - Concerns about GM crops include the effect on populations of wildflowers and insects.</p>

In the Spring and Summer terms students focus on revision of all Biology content in preparation for the summer examination series.