

Unit 3 - Genetics

Opportunities for Breadth and Challenge: Genetic diseases, The Human Genome Project and the advances in Genetic techniques			
Links to Sequencing for Learning: This unit links to previous work on DNA completed at KS3 This unit prepares pupils for work in Y11			
Section	What we are learning (Key knowledge)	Key words	Assessment
1	<p>Triple Sexual and Asexual reproduction</p> <ul style="list-style-type: none"> • How do asexual and sexual reproduction differ? • When is asexual reproduction more advantageous than sexual reproduction? • When is sexual reproduction more advantageous than asexual reproduction? <p>Meiosis</p> <ul style="list-style-type: none"> • What happens in meiosis? • Why is meiosis necessary for sexual reproduction? • What is the role of the genome in the manufacture of proteins? 	Genome, Zygote, Gametes, Chromosomes, Diploid, Haploid, Reproduction, Clones, Asexual, Sexual	Prior knowledge
2	<p>Triple Science Meiosis as above</p> <p>DNA</p> <ul style="list-style-type: none"> • What are DNA bases? • What is the structure of DNA? • How are DNA strands held together? 	Bases, Adenine, Thymine, Cytosine, Guanine, Hydrogen bonds	Retrieval Qs of keywords
3	<p>Triple Science DNA as above</p> <p>DNA extraction -Core Practical</p> <ul style="list-style-type: none"> ○ Explain how DNA can be extracted from fruit. 	Precipitate, Filtrate, Enzymes, DNA	MUM – Method of extracting DNA
4	<p>Triple Science Extraction of DNA as above</p> <p>Allele</p> <ul style="list-style-type: none"> ○ What is the difference between a gene and an allele? ○ Why will a recessive allele not affect the phenotype of an organism that is heterozygous for that gene? ○ Why are genetic diagrams useful? 	Gene, Allele, Recessive, Dominant, Heterozygous, Homozygous, Mendel,	Heterozygous and Homozygous Questions
5	<p>Triple Science Protein Synthesis</p> <ul style="list-style-type: none"> • How does DNA store a code for building proteins? • What happens during the transcription stage in protein synthesis? • What happens in the translation stage in protein synthesis? 	Transcription, Translation, Ribosomes, Polypeptide, Amino Acids, Triplet code	Punnett Square and genetic diagram exam style questions

	<p>Inheritance</p> <ul style="list-style-type: none"> ○ How is the sex of offspring determined in humans? ○ How do we use genetic diagrams, Punnett squares and family pedigrees to show inheritance? ○ How are the probable outcomes of offspring phenotypes calculated, using information about alleles? 	Punnett Squares, Probability, Sex Chromosomes, Family Pedigree chart.	
6	<p>Triple Science Genetic Variants and Phenotypes</p> <ul style="list-style-type: none"> ● What is a mutation? ● How can mutations alter the functions of proteins? ● How can mutations alter the amount of protein that is produced? <p>Gene Mutation</p> <ul style="list-style-type: none"> ○ Why is it difficult to identify how most inherited characteristics are controlled? ○ What is a mutation? ○ How can mutations cause variation? 	<p>Mutations, Phenotypes, Coding and noncoding</p> <p>Mutation, The Human Genome Project, Variation</p>	Human Genome Questions
7	<p>Triple Science Mendel and Alleles</p> <ul style="list-style-type: none"> ● Before Mendel, why did scientists struggle to understand inheritance? ● What experiments did Mendel carry out? ● Why did Mendel draw the conclusion that inheritance was due to inherited 'factors'? ● What is the difference between a gene and an allele? ● Why will a recessive allele not affect the phenotype of an organism that is heterozygous for that gene? ● Why are genetic diagrams useful? <p>Variation</p> <ul style="list-style-type: none"> ○ How is genetic variation caused? ○ How can the environment affect characteristics? ○ What are continuous and discontinuous variation? 	<p>Gene, Allele, Recessive, Dominant, Heterozygous, Homozygous, Mendel,</p> <p>Continuous and discontinuous variation. Environmental and genetic variation.</p>	Continuous and Discontinuous practical and graph work
8	Triple Science Inheritance as L5 Combined		
9	<p>Triple Science Multiple and Missing Alleles</p> <ul style="list-style-type: none"> ● How are the ABO blood groups inherited? ● What is codominance? ● Why do more men than women suffer from sex-linked genetic disorders? 	Codominance, sex linked disorders, carrier.	Exam style Questions
10	Triple Science Gene Mutation as L6 Combined		As above
11	Triple Science Variation as L7 Combined		As above
8/12	Revision		Class assessment sheet
9/13	End of Unit Test		EUT
10/14	Test Feedback		Test feedback sheet

Unit 4 – Natural Selection and Genetic Modification

Opportunities for Breadth and Challenge:			
Links to Sequencing for Learning: This unit links to previous work on DNA completed at KS3 This unit prepares pupils for work in Y11			
Section	What we are learning (Key knowledge)	Key words	Assessment
1	<u>Human Evolution</u> <ul style="list-style-type: none"> • What is evolution? • How do fossils provide evidence for human evolution? • How do stone tools provide evidence for human evolution? 	Binominal system, Species, Evolution, Fossils	Prior knowledge
2	<u>Darwin's Theory</u> <ul style="list-style-type: none"> • What is natural selection? • How is Darwin's theory supported by evidence? 	Genetic Variation, Competition, Natural Selection, Resistant.	Retrieval Qs of keywords
3	<u>Development of Darwin's theory</u> <ul style="list-style-type: none"> • How did Darwin and Wallace come up with the idea of Natural Selection? • What impact does the idea of evolution by natural selection have on modern Biology? • How does evidence of changes in vertebrate limbs over time support evolution by natural selection? 	Pentadactyl limb	Natural Selection Beak practical and conclusion
4	<u>Classification</u> <ul style="list-style-type: none"> • How are organisms classified as five kingdoms? • How has genetic analysis changed our understanding of evolution? • How are organisms classified as three domains? 	Classification, Domains, Genus, Species, Kingdoms	Exam style Question
5	<u>Breeds and Varieties</u> <ul style="list-style-type: none"> • What are the ways in which we create new breeds and varieties? • How is selective breeding carried out? • Why do we genetically engineer organisms? 	Artificial selection, Selective Breeding, Resistance, Yield, Genetically modified organisms, Genome, Genetic Engineering.	MUM- Comparing Selective breeding and GE
6	<u>Triple Science- Tissue Culture</u> <ul style="list-style-type: none"> • What is Tissue Culture? • What are the advantages of using Tissue Culture in medical research and plant breeding? 	Stem cells, Tissue Culture, Differentiate, Extinction, Clones	Exam style Question

7	<u>Genes in agriculture and medicine</u> <ul style="list-style-type: none"> • What are the benefits and risks of selective breeding? • What are the benefits and risks of genetic engineering? • How is genetic engineering carried out? 	Ligase, Sticky ends, restriction enzymes, plasmids, recombinant DNA.	Placing GE stages into order
8	<u>Triple Science- GM and Agriculture</u> <ul style="list-style-type: none"> • How can crop plants be modified to make them resistant to insects? • What are the advantages and disadvantages of producing GM organisms? 	Pests, Bt toxin, strains	Exam style Question
9	<u>Triple Science- Fertilisers and Biological control</u> <ul style="list-style-type: none"> • What is biological control? • What are the advantages and disadvantages of biological control? • What are the advantages and disadvantages of using fertilisers on crops? 	Biological control, pollution, fertiliser.	Table of advantages and Disadvantages
10	Revision		Revision sheet
11	EOT test		Test
	Test feedback		Review sheet

Unit 5 – Health, Disease and the development of Medicines

Opportunities for Breadth and Challenge: Discussion of various communicable and noncommunicable diseases.			
Links to Sequencing for Learning: This unit links to previous work on Natural selection in KS3 This unit prepares pupils for work in Y11			
Section	What we are learning (Key knowledge)	Key words	Assessment
1	Health and Disease <ul style="list-style-type: none"> • What is health? • How do communicable and non-communicable diseases differ? • Why can having one disease increase the chance of getting another disease? 	Health, Correlate, Communicable, Noncommunicable, Correlation, Lifestyle.	Prior knowledge
2	Non- Communicable Disease <ul style="list-style-type: none"> • What do non-communicable diseases have in common? • How can diet affect malnutrition? • Why does alcohol cause problems for people and for society? 	Genetic disorders, Malnutrition, Deficiency, Drug.	Retrieval Qs of keywords
3	Cardiovascular Disease <ul style="list-style-type: none"> • What is cardiovascular disease? • What effect do smoking and obesity have on the risk of developing cardiovascular disease? • Why are there a range of treatments for cardiovascular disease? 	Obesity, Cardiovascular Disease, Heart attack, Body Mass index, Waist to Hip ratio.	Calculating BMI
4	Pathogens <ul style="list-style-type: none"> • Which groups of organisms include pathogens? • Which pathogens cause some common infections? • What are the symptoms of some common infections? 	Cholera, Diarrhoea, Chalaria dieback, Malaria, Protist, Virus, Bacteria, Haemorrhagic fever, Human Immunodeficiency.	Table of various diseases
5	Spreading Pathogens <ul style="list-style-type: none"> • How can pathogens spread? • What is a vector of disease? • How can the spread of pathogens be reduced or prevented? 	Hygiene, Epidemic, Vectors	Exam question
6	Triple Biology Virus Life Cycle <ul style="list-style-type: none"> • What is a virus? • What happens in the lytic and lysogenic pathways of a virus' life cycle? • How can we compare the effects of viruses? Physical and Chemical Barriers <ul style="list-style-type: none"> • How do physical barriers of the body protect against infection? • How do chemical barriers of the body protect against infection? • How can the spread of sexually transmitted infections be reduced or prevented? 	Capsid, Lysis, Lysogenic, Nutrient Agar, Bacteria Lawn plates. Physical, Lysozymes, Chemical, Sexually Transmitted Infections, Screening.	Body outline of Barriers

7	<p>Triple Biology Plant Diseases and defences</p> <ul style="list-style-type: none"> • How do plants protect themselves using physical barriers and chemical substances? • How do we use some of the substances that plants make to protect themselves? • Why is aseptic technique important when testing the activity of plant substances on bacteria? • How does observing visible symptoms help in the identification of plant diseases? • How does distribution analysis help in the identification of plant diseases? • How does diagnostic testing help in the identification of plant diseases? <p>The Immune System</p> <ul style="list-style-type: none"> • What is the function of the immune system? • What are the stages of response by the immune system to infection? • How does immunisation protect the body from disease? 	<p>Cuticle, Yield, Pests, Aseptic techniques, Autoclave, Sterilise, Distribution analysis, Diagnosis.</p> <p>Antigens, Lymphocytes, Antibodies, Vaccine, Immunisation, Herd immunity.</p>	<p>MUM- Health and Diseases Exam style Question on Immune system graph</p>
8	<p>Triple Biology Physical and Chemical barriers as above.</p> <p>Antibiotics and medicine development</p> <ul style="list-style-type: none"> • What are antibiotics? • Why are antibiotics useful? • How are new medicines developed? 	<p>Antibiotics, Penicillin, Inhibits, Resistance, Side effects, Dose, Clinical Trial, Placebo</p>	<p>Arranging the order of how new medicines are developed</p>
9	<p>Triple Biology The Immune System as above</p>		<p>As above</p>
10	<p>Triple Biology Antibiotics and Medicine development as above</p> <p>Core Practical - Investigate the effects of antiseptic, antibiotics or plant extracts on microbial cultures.</p>	<p>Antiseptic, Antibiotics, Lawn plates, Zone of inhibition</p>	<p>Core practical sheet</p>
11	<p>Triple Biology Monoclonal Antibodies</p> <ul style="list-style-type: none"> • What are monoclonal antibodies? • How are monoclonal antibodies produced using hybridoma cells? • How are monoclonal antibodies used? 	<p>Monoclonal antibodies, Clones, Hybridoma Cells, Cancer cells, Platelets, Radiotherapy, Chemotherapy.</p>	<p>Exam style question</p>
9 & 12	<p>Revision</p>		<p>Revision</p>
10&13	<p>EOT</p>		<p>Test</p>
11&14	<p>Test feedback and review</p>		<p>Review sheet</p>

Unit 6 – Plant structures and their functions

Opportunities for Breadth and Challenge: Impacts of Climate change			
Links to Sequencing for Learning: This unit links to previous work on Photosynthesis in KS3 This unit prepares pupils for work in Y11			
Section	What we are learning (Key knowledge)	Key words	Assessment
1	Photosynthesis <ul style="list-style-type: none"> • What happens during photosynthesis? • Why is photosynthesis so important for almost all life on Earth? • How is a leaf adapted for photosynthesis? 	Photosynthesis, Glucose, Producer, Endothermic reaction, Chloroplast, Respiration, Palisade cell, Guard cell.	Prior knowledge
2	Factors affect Photosynthesis <ul style="list-style-type: none"> • What are the limiting factors of photosynthesis? • How do limiting factors change the rate of photosynthesis? • How is the rate of photosynthesis related to light intensity? 	Concentration, Rate, Limiting, Directly proportional, Linear relationship.	Retrieval Qs of keywords
3	Core Practical <i>Investigate the effect of light intensity on the rate of photosynthesis.</i>	Inverse Square Law, Algae, Limiting Factors	MUM- Investigation
4	Absorbing Water and Mineral Ions. <ul style="list-style-type: none"> • How are diffusion and osmosis different? • How do plant roots use diffusion, osmosis and active transport? • How are root hair cells adapted to their functions? 	Wilt, Diffusion, Active Transport, Concentration Gradient, Osmosis, Partial Permeable Membrane, Root Hair cells.	Exam style Question
5	Transpiration and Translocation <ul style="list-style-type: none"> • How do different factors affect the rate of transpiration? • How is sucrose translocated around a plant? • How are xylem and phloem adapted to their functions? 	Phloem, Xylem, Sucrose, Transpiration, Translocation, Potometer	Potometer practical write up
6	Plant adaptations <ul style="list-style-type: none"> • How is the structure of a leaf adapted for photosynthesis and gas exchange? • Why do some plants have needle-shaped leaves? • How do plants reduce water loss? 	.Spongy cells, Epidermis, Cuticle, Deciduous, Conifer, Stomata.	Labelling a leaf
7	Triple Biology Plant Hormones <ul style="list-style-type: none"> • What are the names of some plant hormones? • What are positive and negative phototropism and gravitropism? • How do auxins cause tropisms in shoots and roots? 	Stimulus, Response, Tropism, Phototropism, Auxins, Gravitropism, Gibberellins, Ethene.	Table of hormones
8	Triple Biology Uses of Plant Hormones <ul style="list-style-type: none"> • How are auxins used by plant growers? • What are the uses of gibberellins? 	Selective weedkillers, Rooting powders, Photoperiodism, Ethene	Poster on uses of hormones

	<ul style="list-style-type: none">• How do farmers ripen fruit once it have been removed from the tree?		
7&9	Revision		Revision sheet
8&10	EOT		Test
9&11	Review and test feedback		Review sheet