

KS4 and KS5 Biology Long term planning grid

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 13	<p>MODULE 5: COMMUNICATION, HOMEOSTASIS AND ENERGY</p> <p>5.1.1 Communication and Homeostasis Approx 4 lessons. What will be learnt?</p> <ul style="list-style-type: none"> • The need for communication systems in multicellular organisms • Principles of homeostasis • Temperature regulation in endotherms and ectotherms <p>Main outcomes: To understand the need and basic principles of homeostasis</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific 	<p>5.1.4 Hormonal communication - continued Approx 3 lessons. What will be learnt?</p> <ul style="list-style-type: none"> • How blood glucose concentration is regulated • Differences between type 1 and type 2 diabetes mellitus • Potential treatments for diabetes mellitus <p>Main outcomes: To describe how blood glucose concentrations are maintained in the blood, and effects and treatments of both types of diabetes mellitus.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Evaluate the ways in which society uses science to inform decision making. <p>How will learning be assessed?</p>	<p>5.2 Photosynthesis Approx 6 lessons. What will be learnt?</p> <ul style="list-style-type: none"> • The structure of a chloroplast and the sites of the light dependent and light independent stages of photosynthesis • Photosynthetic pigments and their role, and chromatography to separate photosynthetic pigments • Light dependent stage of photosynthesis • Carbon dioxide fixation and the light independent stage of photosynthesis • Uses of triose phosphate • Factors affecting photosynthesis 	<p>Complete 5.2.2 Respiration Approx 6 lessons. See previous column/half term</p>	<p>REVISION</p>	<p>REVISION</p>

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<p>arguments and scientific ideas</p> <ul style="list-style-type: none"> • Communicate information and ideas in appropriate ways using appropriate terminology <p>How will learning be assessed? PAG 11.1</p> <p><u>5.1.2 Excretion</u> Approx 6 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Structure and function of the liver • Structure and function of the kidney • Control of water potential of blood • Effects of kidney failure and its potential treatments • How excretory products can be used in medical diagnosis <p><u>Main outcomes:</u> To describe the roles of the kidneys, liver and lungs in the removal of</p>	<p>End of topic test</p> <p><u>5.1.5 Plant and animal responses</u> Approx 12 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Types of plant responses including phototropism and geotropism • Role of plant hormones and their commercial uses • Organisation of the nervous system in mammals • Structure and function of the different regions of the brain • Reflex actions • Coordination of responses by the nervous and endocrine systems • Effects of hormones and nervous 	<p><u>Main outcomes:</u> To describe the importance of photosynthesis in the synthesis of large organic molecules from inorganic molecules.</p> <p><u>Skills developed:</u> HSW Skills:</p> <ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • Use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems • Communicate information and ideas in appropriate ways using appropriate terminology • Analyse and interpret data to provide evidence, recognising 			
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<p>toxic products from the blood and their role in homeostasis.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • Evaluate methodology, evidence and data, and resolve conflicting evidence • Know that scientific knowledge and understanding develops over time • Communicate information and ideas in appropriate ways using appropriate terminology • Consider applications and implications of science and evaluate their associated benefits and risks • Evaluate the role of the scientific community in validating new 	<p>mechanisms on heart rate</p> <ul style="list-style-type: none"> • Structure of muscle and the mechanism of muscle contraction <p>Main outcomes: To understand and describe plant responses to changes in the environment and how in animals the nervous and hormonal systems work together in a continuous process to respond to changes in the environment.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • Analyse and interpret data to provide evidence, recognising correlations and causal relationships • Evaluate the ways in which society uses 	<p>correlations and causal relationships</p> <ul style="list-style-type: none"> • Evaluate the ways in which society uses science to inform decision making. <p>Maths skills:</p> <ul style="list-style-type: none"> - Recognise and make use of appropriate units in calculations - Recognise and use expressions in decimal and standard form - Use ratios, fractions and percentages - Estimate results - Use an appropriate number of significant figures - Construct and interpret frequency tables and diagrams, bar charts and histograms - Identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined - Change the subject of an equation - Substitute numerical values into algebraic equations using 			
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	<p>knowledge and ensuring integrity</p> <ul style="list-style-type: none"> Evaluate the ways in which society uses science to inform decision making. <p>Maths skills:</p> <ul style="list-style-type: none"> -Recognise and make use of appropriate units in calculations - Use ratios, fractions and percentages - Use an appropriate number of significant figures - Construct and interpret frequency tables and diagrams, bar charts and histograms - Understand and use the symbols: =, , 1 «, », 2, , \ + - Translate information between graphical, numerical and algebraic forms <p>How will learning be assessed?</p> <p>End of topic test PAG 1, PAG 2 and PAG 9(if not already done in Year 12)</p>	<p>science to inform decision making.</p> <p>Maths skills:</p> <ul style="list-style-type: none"> -Recognise and make use of appropriate units in calculations -Recognise and use expressions in decimal and standard form - Use ratios, fractions and percentages - Use an appropriate number of significant figures - Find arithmetic means - Construct and interpret frequency tables and diagrams, bar charts and histograms - Understand simple probability - Understand the terms mean, median and mode - Select and use a statistical test - Understand measures of dispersion, including standard deviation and range - Translate information between graphical, numerical and algebraic forms 	<p>appropriate units for physical quantities</p> <ul style="list-style-type: none"> - Solve algebraic equations - Translate information between graphical, numerical and algebraic forms - Plot two variables from experimental or other data - Determine the intercept of a graph - Calculate rate of change from a graph showing a linear relationship - Draw and use the slope of a tangent to a curve as a measure of rate of change - Calculate the circumferences, surface areas and volumes of regular shapes <p>How will learning be assessed?</p> <p>End of topic test PAG 6, PAG 4, PAG 10 and PAG 11(if not already done)</p> <p>5.2.2 Respiration</p>			
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<p>5.1.3 Neuronal Communication Approx 5 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Role of sensory receptors as transducers • Structure and function of the sensory, relay and motor neurones • Generation and transmission of nerve impulses • Structure and role of synapses in neurotransmission <p>Main outcomes: To describe the generation and transmission of nerve impulses as a method of communication.</p> <p>Skills developed: Maths skills: - Construct and interpret frequency tables and diagrams, bar charts and histograms - Translate information between graphical, numerical and algebraic forms</p>	<p>- Plot two variables from experimental or other data</p> <p>How will learning be assessed? End of topic test PAG 11 PAG 10 (if not already done in Year 12)</p> <p>6.1.3 Manipulating Genomes Approx 6 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • DNA sequencing • Uses of gene sequencing in comparisons between individuals and between species; gene sequencing allowing predictions of amino acids in polypeptides; development of synthetic biology • DNA profiling • Polymerase chain reaction • Uses of electrophoresis 	<p>Approx 4 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • The need for respiration • The structure of a mitochondrion • Process and site of glycolysis • The link reaction and where it occurs • Process and site of the Krebs cycle • Importance of coenzymes in cellular respiration • Process and site of oxidative phosphorylation • Chemiosmotic theory • Process of anaerobic respiration in eukaryotes • Respiratory quotients • Effects of temperature, substrate concentration 			
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<p>How will learning be assessed? End of topic test</p> <p>5.1.4 Hormonal Communication Approx 6 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Endocrine communication using hormones • Structure and function of the adrenal glands • Histology of the pancreas <p>Main outcomes: To describe the roles of hormones in communication, the role of the adrenal glands, and the identification of pancreatic tissue and cells.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts <p>How will learning be assessed?</p>	<p>for separation of nucleic acids fragments or proteins</p> <ul style="list-style-type: none"> • Genetic engineering • Ethical issues related to genetic manipulation of animals, plants and micro organisms • Gene therapy <p>Main outcomes: To describe how advances in science have led to genome sequencing and genetic engineering. To be able to explain the process of each and give examples. To evaluate the ethical considerations when using these methods.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas 	<p>and different respiratory substrates on the rate of respiration</p> <p>Main outcomes: To describe how energy stored in complex organic molecules is transferred to ATP (an immediate source of energy)</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • Communicate information and ideas in 			
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	<p>End of topic test PAG 1 (if not already done in Year 12)</p> <p>MODULE 6: GENETICS, EVOLUTION AND ECOSYSTEMS</p> <p>6.1.1 Cellular Control Approx 4 lessons. What will be learnt?</p> <ul style="list-style-type: none"> • Gene mutations and their effects on protein production and function • Regulatory mechanisms that control gene expression at transcriptional level, post transcriptional level and post translational level • Genetic control of the development of body plans • Importance of mitosis and apoptosis <p>Main outcomes:</p>	<ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • Know that scientific knowledge and understanding develops over time • Consider applications and implications of science and evaluate their associated benefits and risks • Consider ethical issues in the treatment of humans, other organisms and the environment • Evaluate the ways in which society uses science to inform decision making. <p>How will learning be assessed? End of topic test</p> <p>6.2 Cloning and Biotechnology Approx 8 lessons. What will be learnt?</p>	<p>appropriate ways using appropriate terminology Maths skills:</p> <ul style="list-style-type: none"> - Recognise and make use of appropriate units in calculations - Recognise and use expressions in decimal and standard form - Use an appropriate number of significant figures - Find arithmetic means - Construct and interpret frequency tables and diagrams, bar charts and histograms - Understand the terms mean, median and mode - Understand measures of dispersion, including standard deviation and range - Substitute numerical values into algebraic equations using appropriate units for physical quantities - Solve algebraic equations - Translate information between graphical, 			
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<p>To describe how cells and their control of metabolic reactions determines how organisms grow, develop and function.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas • Know that scientific knowledge and understanding develops over time <p>How will learning be assessed? End of topic test</p> <p>6.1.2 Patterns of inheritance Approx 10 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Contribution of environmental and genetic factors to variation • How sexual reproduction 	<ul style="list-style-type: none"> • Natural clones in plants and their use in horticulture • How to use plant cuttings as a simple cloning technique • Micropropagation and tissue culture in artificial plant cloning • Arguments for and against artificial cloning in plants • Natural cloning in animals • Artificial cloning in animals including artificial embryo twinning, enucleation and somatic cell nuclear transfer • Arguments for and against artificial cloning in animals • Uses of microorganisms in biotechnology 	<p>numerical and algebraic forms</p> <ul style="list-style-type: none"> - Plot two variables from experimental or other data - Understand that $y = mx + c$ represents a linear relationship - Calculate rate of change from a graph showing a linear relationship - Draw and use the slope of a tangent to a curve as a measure of rate of change <p>How will learning be assessed? End of topic test PAG 4, PAG 10 and PAG 11(if not already done)</p> <p>6.3.1 Ecosystems Approx 4 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> • Ecosystems and how they are influenced by abiotic and biotic factors • Biomass transfers 			
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	<p>leads to genetic variation within a species</p> <ul style="list-style-type: none"> • Genetic diagrams to show patterns of inheritance • Use of phenotypic ratios to identify linkage and epistasis • Use of chi-squared test • Genetic basis of continuous and discontinuous variation • Factors that can affect the evolution of species • Use of Hardy-Weinberg principle to calculate allele frequencies in populations • The role of isolating mechanisms in the evolution of a new species • Artificial selection and its uses 	<ul style="list-style-type: none"> • Advantages and disadvantages of using microorganisms to make food for human consumption • Use of aseptic techniques to culture microorganisms • Manipulating growing condition in batch and continuous fermentation to maximise yield of product • Standard growth curve of a microorganism in a closed culture • Uses of immobilised enzymes in biotechnology and the different methods of immobilisation of enzymes. <p>Main outcomes: To describe the methods and importance of</p>	<p>through an ecosystem</p> <ul style="list-style-type: none"> • Recycling within an ecosystem • Primary succession • Methods used to measure the distribution and abundance of organisms in an ecosystem. <p>Main outcomes: To describe how organisms engage in complex interactions with other organisms and the environment. To explain how biomass is transferred and nutrients are recycled within an ecosystem. To describe how ecosystems can lead to climax communities.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> • Carry out experimental and investigative activities, including appropriate risk 			
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	<ul style="list-style-type: none"> Ethical considerations surrounding the use of artificial selection <p>Main outcomes: To predict and identify phenotypic ratios in genetic crosses and to describe how variation within a species may occur. To describe how a new species may arise through the processes of isolation and the uses and ethical considerations of using artificial selection.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas Communicate information and ideas in appropriate ways using appropriate terminology Consider ethical issues in the treatment of humans, other 	<p>cloning and biotechnology to produce food, drugs and other products for humans.</p> <p>Skills developed: HSW Skills:</p> <ul style="list-style-type: none"> Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts Consider applications and implications of science and evaluate their associated benefits and risks Consider ethical issues in the treatment of humans, other organisms and the environment Evaluate the ways in which society uses science to inform decision making. <p>Maths skills: - Recognise and make use of appropriate units in calculations</p>	<p>management, in a range of contexts</p> <ul style="list-style-type: none"> Evaluate the ways in which society uses science to inform decision making. <p>Maths skills: - Recognise and make use of appropriate units in calculations - Recognise and use expressions in decimal and standard form - Use ratios, fractions and percentages - Estimate results - Use an appropriate number of significant figures - Construct and interpret frequency tables and diagrams, bar charts and histograms - Understand simple probability - Understand the principles of sampling as applied to scientific data - Understand the terms mean, median and mode - Use a scatter diagram to identify a correlation between two variables</p>			
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	<p>organisms and the environment</p> <ul style="list-style-type: none"> Evaluate the ways in which society uses science to inform decision making. <p>Maths skills:</p> <ul style="list-style-type: none"> Recognise and use expressions in decimal and standard form Use ratios, fractions and percentages Understand simple probability Select and use a statistical test Understand and use the symbols: =, <, >, <math>2^x</math>, <math>+</math> Change the subject of an equation Substitute numerical values into algebraic equations using appropriate units for physical quantities <p>How will learning be assessed? End of topic test</p>	<ul style="list-style-type: none"> Recognise and use expressions in decimal and standard form Use ratios, fractions and percentages Use calculators to find and use power, exponential and logarithmic functions Use an appropriate number of significant figures Find arithmetic means Construct and interpret frequency tables and diagrams, bar charts and histograms Understand simple probability Understand the terms mean, median and mode Understand measures of dispersion, including standard deviation and range Use logarithms in relation to quantities that range over several orders of magnitude Translate information between graphical, numerical and algebraic forms 	<ul style="list-style-type: none"> Select and use a statistical test Understand measures of dispersion, including standard deviation and range Translate information between graphical, numerical and algebraic forms Plot two variables from experimental or other data <p>How will learning be assessed? PAG 3 End of topic test</p> <p><u>6.3.2 Populations and sustainability</u> Approx 4 lessons.</p> <p>What will be learnt?</p> <ul style="list-style-type: none"> Factors that determine the size of a population Interactions between populations Reasons for, and differences between, 			
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		<ul style="list-style-type: none"> - Plot two variables from experimental or other data - Determine the intercept of a graph - Calculate rate of change from a graph showing a linear relationship - Draw and use the slope of a tangent to a curve as a measure of rate of change - Calculate the circumferences, surface areas and volumes of regular shapes <p>How will learning be assessed? PAG 7 End of topic test</p>	<p>conservation and preservation</p> <ul style="list-style-type: none"> • Management of an ecosystem to provide sustainable resources • Management of environmental resources and the effects of human activities. <p><u>Main outcomes:</u> To describe the economic, social and ethical reasons why ecosystems need to be carefully managed, and why we need to use biological resources in a sustainable way, especially with an increasing human population.</p> <p><u>Skills developed:</u> HSW Skills:</p> <ul style="list-style-type: none"> • Use theories, models and ideas to develop scientific explanations • Use knowledge and understanding to pose scientific 			
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			<p>questions, define scientific problems, present scientific arguments and scientific ideas</p> <ul style="list-style-type: none"> • Know that scientific knowledge and understanding develops over time • Consider applications and implications of science and evaluate their associated benefits and risks • Consider ethical issues in the treatment of humans, other organisms and the environment • Evaluate the ways in which society uses science to inform decision making. <p>Maths skills:</p> <ul style="list-style-type: none"> - Recognise and make use of appropriate units in calculations - Recognise and use expressions in decimal and standard form 			
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			<ul style="list-style-type: none">- Use ratios, fractions and percentages- Estimate results- Use calculators to find and use power, exponential and logarithmic functions- Construct and interpret frequency tables and diagrams, bar charts and histograms- Use logarithms in relation to quantities that range over several orders of magnitude- Translate information between graphical, numerical and algebraic forms- Plot two variables from experimental or other data <p>How will learning be assessed? End of topic test</p>			
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