



Curriculum Map

Subject: Biology

Year Group: 13

	Autumn	Spring/Summer 1	Summer
Content	<p>Unit 5: Energy transfer in and between organisms. Photosynthesis Understand the role of chlorophyll in absorbing energy from sunlight in the light dependent reaction (LDR). Know how energy from excited electrons is used to generate ATP and NADPH. How the production of ATP involves electron transfer of electrons down the electron transfer chain and passage of protons across chloroplast membranes and is catalysed by ATP synthase embedded in these membranes (chemiosmotic theory) Explain how photolysis of water produces photons, electrons and oxygen for the LDR. Know how the products from the LDR allow for the production of glucose and organic molecules in the light independent reaction (Calvin cycle). Describe how combination of RuBP with CO₂ using the enzyme Rubisco, forms GP then TP as intermediates in the production of glucose or regeneration of RuBP. Identify environmental factors that limit the rate of photosynthesis. Respiration Anaerobic respiration is a series of complex reactions that allow for the generation of ATP. Understand and describe the processes of glycolysis, link reaction, Krebs cycle and oxidative phosphorylation. Know that synthesis of ATP by oxidative phosphorylation is associated with the transfer of electrons from reduced coenzymes NAD and FAD₂ down the electron transfer chain and passage of protons across inner mitochondrial membranes, catalysed by ATP synthase embedded in these membranes (chemiosmotic theory). Know how if respiration is only anaerobic, pyruvate can be</p>	<p>Unit 6 (continued): Organisms respond to changes in their environment -Understand the role of chemo and pressure receptors in the control of heart rate - Know the properties of slow and fast skeletal muscle fibres. -Explain the roles of actin, myosin, tropomyosin, calcium ions and ATP in myofibril contraction. -Compare the structure of a neuromuscular junction with a synapse and explain how it facilitates muscle contraction. -Know how negative and positive feedback mechanisms facilitate homeostasis -Understand factors that affect blood glucose concentration Unit 8: The control of gene expression -How alteration of the sequence of bases in DNA can alter the structure of proteins -Totipotent and pluripotent cells Role of oestrogen in the control of transcription -Epigenetic control of gene expression - Role of RNAi in regulation of translation -Gene expression and cancer - Uses of genome projects -Recombinant DNA technology - how fragments of DNA can be produced and amplified - The use of labelled DNA probes and DNA hybridisation to locate specific genes and alleles - The use of genetic counselling - Genetic fingerprinting</p>	<p>Unit 6 (continued): Organisms respond to changes in their environment Homeostasis (continued) -The structure of the kidney and its function in osmoregulation -The roles of the hypothalamus, posterior pituitary and antidiuretic hormone (ADH) in osmoregulation. Revision in preparation for public exams Revision in preparation for public exams Essay writing practise</p>

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	<p>converted to ethanol or lactate using reduced NAD. The oxidised NAD produced in this way can be used in further glycolysis.</p> <p>Unit 6: Organisms respond to changes in their environment -Know how organisms respond to internal and external stimuli Understand and be able to use the terms kinesis, taxis and tropisms -Explain the role of receptors in establishing generator potentials -Explain nervous coordination in terms of neuron membrane permeability at resting potential and when depolarised during action potentials. - Understand synaptic transmission and predict effect of drugs</p> <p>Unit 7: Genetics, populations, evolution and ecosystems. -Know how genetic inheritance works, including the role of alleles -Understand and be able to use the terms population, gene pool, allele frequency. -Be able to explain how evolutionary change over a long period of time has resulted in a great diversity of species.</p>		
Skills	<p>Unit 5 Required practical 7: Use of chromatography to investigate the pigments isolated from leaves of different plants, eg shade tolerant / intolerant plants or leaves of different colours. Required practical 8: Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts Devise and carry out experiments to investigate the effect of named environmental variables on the rate of photosynthesis using immobilised algal beads. Required practical 9: Investigation into the effect of a named variable on the rate of respiration of cultures of single celled organisms.</p>	<p>Unit 6: -Design and carry out an investigation into the effect of a named variable on human pulse rate. -Required practical 11: production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample.</p> <p>Unit 8: -Produce tissue cultures of explants of cauliflower -Evaluate the use of stem cells in treating human disorders -Interpret data provided from investigations into gene expression -Evaluate appropriate data for the relative influences of genetic and</p>	<p>Exam technique practise using past paper questions Essay writing skills with practise synoptic essays</p>

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	<p>Unit 6: -Design and carry out investigations into the effects of IAA on root growth in seedlings. - Know how to plot and interpret an action potential graph in terms of potential difference. -Required practical 10: Investigate the effect of an environmental variable on the movement of an animal using a choice chamber</p> <p>Unit 7: Know how to use 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. -Know how to use the Hardy-Weinberg equation to calculate the frequency of alleles, genotypes and phenotypes in a population</p>	<p>environmental factors on phenotype - Evaluate evidence showing correlations between genetic and environmental factors and various forms of cancer-Interpret information relating to the way in which an understanding of the roles of oncogenes and tumour suppressor genes could be used in the prevention, treatment and cure of cancer - Evaluate the ethical, financial and social issues associated with the use and ownership of recombinant DNA technology in agriculture, industry and medicine -Carry out electrophoresis -Interpret data showing the results of gel electrophoresis</p>	
Key questions	<p>Unit 5: How is energy from sunlight converted to organic sugars by photosynthesising plants? How does regeneration of RuBP allow for the continuation of the Calvin cycle? What are the limiting factors affecting the rate of photosynthesis in plants? How is the energy in organic sugars used in respiration to form ATP? Why is the energy released in aerobic respiration so much greater than that from anaerobic respiration? How do respiratory inhibitors such as toxins exert their effects?</p> <p>Unit 6: How does growth facilitate movement in plants? How can external stimuli trigger voluntary and involuntary responses? impulses in nerve cells? How are signals passed within and between neurons in the nervous system?</p> <p>Unit 7: How does inheritance work? How can we calculate the probability of different</p>	<p>Unit 6: How is heart rate regulated? How does stimulation of a motor neuron lead to muscle contraction? What is negative feedback? How is homeostasis achieved? How does insulin help diabetics regulate their own blood sugar level?</p> <p>Unit 8: How can mutations lead to a non-functional protein? How is transcription and translation regulated? How can epigenetics influence gene expression? How can scientists genetically modify organisms? What is a genetic fingerprint? How are they produced?</p>	<p>Unit 6: How is water volume regulated in the body? How can the body prevent dehydration by producing a concentrated urine</p>

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	phenotypes? How are new species formed? What is the theory behind natural selection and evolution?		
Assessment	Kerboodle Retrieval Questions Essay Practice Questions Exampro Past Exam Questions Seneca Learning Assessments		
Literacy/ Numeracy/ SMSC/ Character	Unit 6: Numeracy Use appropriate units when calculating the maximum frequency of impulse conduction given the refractory period of a neurone. Graphical representation of information including negative values of potential difference. SMSC -Ethical implications of using living organisms in investigations, including safety, handling and humane disposal (pest). -Appreciation of vision differences, including long/short sightedness and color blindness. -Effect of alcohol and drug use on neural response. -Degenerative diseases such as Parkinsons and MND Unit 7: Numeracy Represent phenotypic ratios (monohybrid and dihybrid crosses). Use ratios, fractions and percentages.	Essay writing skills Unit 6: Numeracy Use values of heart rate (R) and stroke volume (V) to calculate cardiac output (CO), using the formula $CO = R \times V$ SMSC -Show understanding of type I and type II diabetes, and the requirement for a type I diabetic to regulate their own blood sugar through insulin administration. -Evaluate the positions of health advisers and the food industry in relation to the increased incidence of type II diabetes. Unit 8: Numeracy - Interpret data provided from investigations into gene expression -Translate information between graphical, numerical and algebraic forms SMSC Consider alternative views on use of recombinant DNA technology for use in agriculture, industry and medicine Evaluate the use of genome projects Evaluate the use of genetic fingerprinting in forensic science and paternity testing Character Tolerance - consider alternative views on the use of recombinant DNA technology and genetic fingerprinting Confidence, resilience - carry out complex practical steps to produce DNA fragments, amplify DNA and carry out gel electrophoresis	Literacy -Long and short answer exams questions - Synoptic essay writing skills