

AQA Year 12 AS Level Biology – Overview

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
3.1 Biological molecules & 3.2 Cells	3.1 Biological molecule	3.2 Cell Structure & 3.3 Organisms exchange substances with their environment	3.4 Genetic information, variation and relationships between organisms.	3.4 Genetic information, variation and relationships between organisms.	
Teacher 2 3.1.1 Monomers & polymers: - Monomers are the smaller units from which larger molecules are made. - Polymers are molecules made from a large number of monomers - Examples of monomers. - Condensation reactions. - Hydrolysis reactions 3.1.2 Carbohydrates: - Monosaccharides are examples of monomers from which larger	Teacher 2 3.1.5 Nucleic acids are important information-carrying molecules. 3.1.5.1 Structure of DNA & RNA: - DNA holds genetic information. - RNA transfers genetic information from DNA to the ribosomes. - Ribosomes are formed from RNA & proteins. - DNA & RNA are polymers of nucleotides. - Nucleotides are composed of a pentose sugar, a nitrogen-containing	Teacher 2 3.2.4 Cell recognition & the Immune System: - Molecules that the immune systems identifies (pathogens, cells from other organisms, abnormal cells and toxins) - Antigens - Phagocytosis of pathogens. - Response of T lymphocytes to foreign antigen - Role of antigen-presenting cells in cellular responses. - Role of T cells (TH cells) in	Teacher 2 3.4.7 Investigating diversity: - Genetic diversity within or between species. - Interpret data relating to similarities and differences in the base sequences of DNA and in the amino acid sequences of proteins. - Gene technology (not tested on) - Quantitative investigations of variation within a species.	Teacher 2 Revision/Exams Teacher 1 3.4.4 Genetic diversity & adaptation: - Genetic diversity as the number of different alleles of genes in a population. - The principles of natural selection to occur. - Directional selection, exemplified by antibiotic resistance in bacteria and stabilising selection, exemplified by human birth weights.	Revision/Exams Catch up on any missed required practical (1-6) Statistical tests introduction. Synoptic question practice.

carbohydrates are made. - Condensation reactions between two monosaccharides forms a glycosidic bond. - Disaccharides are formed by the condensation of two monosaccharides (maltose, sucrose, lactose) - Isomers of glucose (alpha and beta glucose) with structures. - Polysaccharides are formed by the condensation of many glucose units (glycogen, starch and cellulose) - Biochemical tests using Benedict's solution for reducing and non-reducing sugars and iodine for starch	organic base and a phosphate group. 3.1.5.2 DNA replication: - Semi-conservative replication of DNA. - Evaluate the Watson-Crick model of DNA replication. 3.1.6 ATP: - Structure of ATP - Hydrolysis of ATP - ATP resynthesis by the condensation of ADP + Pi catalysed by the enzyme ATP Synthase. 3.1.7 Water: - Properties of water 3.1.8 Inorganic ions: - Specific role of each ion (H⁺ and pH, iron ions, Na⁺ ions and phosphate ions)	stimulating cytotoxic T cells, B cells and phagocytes. - Role of B lymphocytes to foreign antigen. - Clonal selection and release of monoclonal antibodies. - Antibodies: Structure and function. - Vaccines to provide protection for individuals and populations against disease. - Herd immunity. - Active and passive immunity. - Structure of the HIV and its replication in helper T cells. - How HIV causes the symptoms of AIDS. - Use of MAb in targeting medication to	Teacher 1 3.4.1 DNA, genes and chromosomes: - Prokaryotic cells, DNA molecules are short, circular and not associated with proteins. - In the nucleus of eukaryotic cells, DNA molecules are very long, linear and associated with proteins, called histones. - The mitochondria and chloroplasts of eukaryotic cells also contain DNA (like prokaryotic cells) is short, circular & not associated with protein. - What a gene is. - A gene occupies a fixed position, called a locus,	RP 6: Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth. 3.4.5 Species and taxonomy: - Fertile offspring. - Courtship behaviour (behavioural adaptation) for mating and species recognition.. - The phylogenetic classification system. - Taxonomic systems: Domain, kingdom, phylum, order, family, genus and species. - Binomial identification. 3.4.6 Biodiversity with a community:	
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3.1.3 Lipids: • Triglycerides and phospholipids are two groups of lipids. • Condensation reaction between glycerol and fatty acids. • The emulsion test for lipids. 3.1.4 Proteins: • General properties of proteins. • Amino acids are monomers from which proteins are made. • The structure of an amino acid. • Condensation reaction between two amino acids forms a peptide bond (dipeptides, polypeptides) • Functional proteins. • The role of hydrogen bonds, ionic and disulfide bridges in the	Teacher 1 3.2.3 Transport across cell membranes: • The basic structure of a cell membrane. • The arrangement and movement of phospholipids, proteins, glycoproteins & glycolipids in the fluid mosaic model of membrane structure. • The role of cholesterol in the cell membrane. • Movement across membranes occurs by simple diffusion, facilitated diffusion, osmosis, active transport and co-transport.	specific cell types by attaching a therapeutic drug to an antibody. • Ethical issues associated with the use of vaccines and MAb. • Use of antibodies in the ELISA test. 3.3.3 Digestion and absorption: • Digestion in mammals • Mechanisms for the absorption of the productions of digestion by cells lining the ileum of mammals. 3.3.4 Mass transport: • Efficient movement of substance to and from exchange surfaces.	on a perpendicular DNA molecule. • Triplet codes for specific amino acids. • The genetic code is universal, non-overlapping and degenerate. • Introns and exons. 3.4.2 DNA and protein synthesis: • The genome project. • The structure of mRNA and tRNA. • Transcription as the production of mRNA from DNA (pre-mRNA). • Translation as the production of polypeptides from the sequence of codons carried by mRNA. • The role of ribosomes, tRNA and ATP.	• Biodiversity can relate to a range of habitats. • Species richness. • Index of diversity • Calculating an index of diversity. • Farming techniques reduce biodiversity.	
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structure of proteins. • The relationship between primary, secondary, tertiary and quaternary structure and protein function. • The biuret test for proteins. 3.1.4.2 Many proteins are enzymes: • Enzymes lower the activation energy • Induced-fit model of enzyme action. • Properties of an enzyme related to the tertiary structure of its active site. • The specificity of enzymes. • Rate of enzyme-controlled reactions. • Required practical 1 Investigation into the effect of a named variable on the rate of an enzyme-	• Required practical 3: Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue. • Required practical 4	3.3.4.1 Mass transport in animals: • The role of Haemoglobin and RBCs in the transport of oxygen. • Required practical 5: Dissection of animal or plant gas exchange system or mass transport system or of organ within such a system. 3.3.4.2 Mass transport in plants: • Xylem transports water in the stem and leaves of plants. • The cohesion-tension theory of water transport in the xylem. • Phloem as the tissue that transports organic	3.4.3 Genetic diversity can arise as a result of mutation or during meiosis: • Gene mutations. • Meiosis		
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controlled reaction. Teacher 1 3.2.1 Cell structure: • The structure of eukaryotic cells. • Specialised cells 3.2.1.2 Structure of prokaryotic cells and of viruses.: • Prokaryotic cells are much smaller than eukaryotic cells. • The structure of prokaryotic cells. • Viruses are acellular and non-living cells. 3.2.1.3 Methods of studying cells: • The principles and limitations of optical, TEM & SEM microscopes. • Measuring the size of an object viewed with an optical microscope. • The difference between		substances in plants. • The mass flow hypothesis for the mechanism of translocation in plants. • Use of tracers and ringing experiments to investigate transport in plants. Teacher 1 3.3.1 Surface area to volume ratio: • The relationship between the size of an organism or structure and its surface area to volume ratio. 3.3.2 Gas exchange: • Adaptations of gas exchange surfaces. • Structural and functional			
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magnification and resolution. • Use the formula: magnification = size of image/size of real object • Principles of fractionation & ultracentrifugation. 3.2.2 All cells rise from other cells: • The cell cycle. • Mitosis • Binary fission in prokaryotic cells. • Viruses do not undergo cell division. • Required practical 2 Preparation of stained squashes of cells from plant root tips. Mitotic index.		compromises between the opposing needs for efficient gas exchange. • The limitations of water loss shown by terrestrial insects and xerophytic plants. • Gross structure of the human gas exchange system limited to the alveoli, bronchioles, bronchi, trachea and lungs. • The essential features of the alveolar epithelium as a surface over which gas exchange takes place. • Ventilation and the exchange of gases in the lungs. • The mechanism of breathing to			
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		include the role of the diaphragm.			
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AQA Year 13 A Level Biology – Overview

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
3.5 Energy transfers in and between organisms. 3.6 Organisms respond to changes in their internal & external environment	3.5 Energy transfers in and between organisms. 3.6 Organisms respond to changes in their internal & external environment	3.6 Organisms respond to changes in their internal & external environment. 3.7 Genetics, populations, evolution & ecosystems.	3.7 Genetics, populations, evolution & ecosystems. 3.8 The control of gene expression	3.8 The control of gene expression	
Teacher 1 3.5.1 Photosynthesis: • The light-dependent reaction • The light independent reaction • Factors that limit the rate of photosynthesis. • Evaluate data relating to common agricultural practices used to overcome the effect of these limiting factors. • RP 7: Use of chromatography to investigate the pigments isolated from	Teacher 1 3.5.3 Energy and ecosystems: • Ecosystems. • Biomass • Gross primary production (GPP) • Net primary production (NPP) • Primary and secondary productivity. 3.5.4 Nutrient cycles: • The nitrogen cycle • The phosphorus cycle • The role of micro-organisms in recycling chemical elements such as phosphorus and nitrogen	Teacher 1 3.7.1 Inheritance: • The genotype is the genetic constituent of an organism. • The phenotype is the expression of this genetic constituent and interaction with the environment. • Alleles. • Genetic diagrams. • Use of Chi-squared test to compare the goodness of fit of observed phenotypic ratios.	Teacher 1 3.8.4.1 Recombinant DNA technology: • Transfer of fragments of DNA from one organism to another. • CDNA • Restriction enzymes • Gene machine. • PCR Teacher 2 3.8.1 Alteration of the sequence of bases in DNA can alter the structure of proteins: • Gene mutations arising during DNA replication.	Teacher 1 3.8.4.2 Difference in DNA between individuals of the same species can be exploited for identification and diagnosis of heritable conditions: • Labelled DNA probes and hybridisation • Genetic counselling and personalised medicine. 3.8.4.4 Genetic fingerprinting: • Variable number tandem repeats (VNTRs). • Technique of genetic fingerprinting.	Revision/Exams Catch up on any missed required practical (7-12)

leaves of different plants, e.g. leaves from shade-tolerant and shade-intolerant plants or leaves of different colours. • RP 9: Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts. 3.5.2 Respiration: • Respiration produces ATP. • Stages of aerobic respiration (glycolysis, link reaction, Krebs cycle & oxidation phosphorylation) • RP 9: Investigation into the effect of a named variable on the rate of	• The use of natural and artificial fertilisers to replace nitrates and phosphates lost by harvesting plants and removing livestock. • The environmental issues arising from the use of fertilisers including leaching and eutrophication. Teacher 2 3.6.2 Nervous co-ordination: • Nerve impulses • The structure of a myelinated motor neurone. • Resting potentials • Changes in membrane permeability leading to depolarisation	3.7.2 Populations: • Populations. • Gene pool and allele frequency. • The Hardy-Weinberg principle provides a mathematical model, which predicts the allele frequencies will not change from generation to generation. 3.7.3 Evolution may lead to speciation: • Variation in a phenotype. • Competition and natural selection. • Selective advantages. • The effects of stabilising, directional and disruptive selection. • Evolution.	3.8.2 Gene expression is controlled by a number of features: • Most of a cell's DNA is not translated. • Stem cells. • Totipotent cells • Pluripotent cells • Multipotent • Unipotent cells 3.8.2.2 Regulation of transcription and translation: • Transcription • Transcription factors • Epigenetic control of gene expression in eukaryotes. • Translation of mRNA. • RNA interference.	• Use of genetic fingerprinting in the fields of forensic science, medical diagnosis, animal and plant breeding. Revision Teacher 2 3.8.2.3 Gene expression and cancer: • The main characteristics of benign and malignant tumours. • Tumour suppressor genes and oncogenes. • Abnormal methylation of tumour suppressor genes and oncogenes. • Increased oestrogen	
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respiration of cultures of single-celled organisms. Teacher 2 3.6.1 Stimuli, both internal and external are detected and lead to a response: • Survival and response. • Growth factors in plants. • Different concentrations of IAA on cell elongation in the roots and shoots of flowering plants. • Taxes and kineses. • The protective effect of a simple reflex. • RP 10: Investigation into the effect of an environmental variable on the	and generation of action potential. • Nature of the refractory period in producing discrete impulses. • Factors affecting the speed of conductance 3.6.2.2 Synaptic transmission: • The detailed structure of a synapse and a neuromuscular junction. • The sequence of events involved in transmission across a cholinergic synapse. 3.6.3 Skeletal muscles are stimulated to contract by nerves and act as effectors: • Muscles act in antagonistic pairs. • Gross and microscopic	• Reproductive separation of two populations • Allopatric and sympatric speciation. • The importance of genetic drift. 3.7.4 Populations in ecosystems: • A community • Abiotic and biotic factors. • Use of quadrats to estimate the size of a population. • Ecosystems in dynamic systems. • Primary succession. • Conservation of habitats. • RP 12: Investigation into the effect of a named environmental factor on the		concentrations in the development of some breast cancers. 3.8.3 Using genome projects: • Sequencing projects. • Genome. Revision	
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movement of an animal using either a choice chamber or a maze. 3.6.1.2 Receptors: • The Pacinian corpuscle receptor. • The human retina in sufficient detail (rods, cones) 3.6.1.3 Control of heart rate: • Myogenic stimulation of the heart and transmission of a subsequent wave of electrical activity. • The role of SAN, AVN & Purkyne tissue in the bundle of His. • The roles and location of chemoreceptors and pressure receptors.	structure of skeletal muscle. • The ultrastructure of a myofibril. • The roles of actin, myosin, calcium ions and ATP in myofibril contraction. • The roles of calcium ions and tropomyosin in the cycle of actinomyosin bridge formation. • The role of ATP and phosphocreatine in muscle contraction. • The structure, location and general properties of slow and fast skeletal muscle fibres. 3.6.4 Homeostasis is the maintenance of a stable internal environment: • Principles of homeostasis and	distribution of a given species. <u>Teacher 2</u> 3.6.4.2 Control of blood glucose concentration: • The factors that influence blood glucose concentration. • The role of the liver in glycogenesis, glycogenolysis and gluconeogenesis • The action of insulin, glucagon and adrenaline. • The second messenger cAMP. • The causes of Type I and II diabetes • RP 11: Production of a dilution series of a glucose solution and use of			
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The roles of the autonomic nervous system and effectors in controlling heart rate.	negative feedback. - The importance of maintaining a stable core temperature and blood pH in relation to enzyme activity. - The importance of maintaining a stable blood glucose concentration. - Negative feedback restores systems to their original level. - The possession of separate mechanisms involving negative feedback.	colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample. 3.6.4.3 Control of blood water potential: - Osmoregulation as control of water potential of the blood. - The roles of the hypothalamus, posterior pituitary and ADH in osmoregulation. - The structure and function of the nephron.			
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