Year 9 Curriculum Overview: Biology *subject to change

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Principles of Organisation Eukaryotic Cells Prokaryotic Cells Magnification and Microscopes Specialised Cells Biological Molecules Metabolism Enzymes Part 1	Difference between unicellular + multicellular organisms, + the levels of organisation in multicellular organisms. Organelles present in eukaryotic cells and their functions. Structure of prokaryotic cells compared to eukaryotic. Method to calculate magnification, and actual size using image size and magnification. Conversion of units from mm to µm, and µm to nm. Preparation of a temporary mount to view with an optical microscope, + the production of a biological drawing. Key features of an optical microscope and steps to focus an image at different magnifications. Electron microscope vs optical microscope Explaining the adaptations of specialised cells of multicellular organisms. The biological molecules that living organisms are made from. Definition of metabolism and examples o chemical reactions in organisms. Enzymes are proteins that catalyse chemical reactions. Application of the lock + key hypothesis to explain enzyme action Skills: Detailed factual recall, written communication, application of knowledge, data handling + analysis, revision techniques, practical skills and scientific method	Recall of the facts. Application of your knowledge to explain new situations. Describing and explaining data. Practical Skills and scientific method **Assessment 1**– Principles of Organisation, Cells, Magnification and Microscopes	Ensure students complete all homework thoroughly, using their lesson notes to help. Encourage students to make lists of questions/problem areas to ask teachers about. Ensure they use the checklists we provide to methodically revise all topics. Make revision a part of the regular routine throughout the course. Factsheets and revision resources are available on their showbie revision code. Producing flashcards or quizlets for self-testing as they go along reduces workload later in the course and you can help by testing them too using these resources.
Spring Term	Enzymes Part 2 Aerobic and Anaerobic Respiration Diffusion Surface Area to Volume Ratio Gas Exchange Surfaces	Describe and explain how factors affect the rate of enzyme-controlled reactions. Measure and calculate the rate of an enzyme-controlled reaction. Role and location of respiration and comparing the different types of respiration. Word and chemical equations for aerobic respiration, word equations for anaerobic respiration in animals, plants and yeast. Yeast and fermentation in the production of bread and alcohol. Definition of diffusion and the factors that affect the rate of diffusion. The difference between surface area and volume and how to calculate the SA:Vol ratio so that this factor can be compared between organisms. The relationship between size of an organism and surface area to volume ratio, and how this affects heat exchange and gas exchange. The key features of gas exchange surfaces to enable a fast rate of diffusion. Humans, fish, plants and application to other organisms. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, revision techniques, practical skills and scientific method	Recall of the facts. Application of your knowledge to explain new situations. Describing and explaining data. Practical Skills and scientific method **Assessment 2** – Any topic from the Autumn Term + Biological Molecules, Metabolism and Enzyme Theory	
Summer Term	Blood Heart Blood Vessels Response to Exercise	The component parts of the blood and their functions. Calculating the rate of blood flow. Features of the double circulatory system. Structure and function of the heart, and the direction of blood flow. Role of the natural heart pacemaker and artificial pacemakers. The different types of the blood vessels and their functions. Structure of the blood vessels and how they are adapted for their functions. Changes in breathing rate and volume of breath, heart rate and blood distribution during exercise, and the link to rates of respiration to provide sufficient energy for muscle contraction. Role of glycogen stores in exercise. Use of anaerobic respiration during vigorous exercise + the production of lactic acid that leads to muscle fatigue. Fate of lactic acid and the role of the liver in removing lactic acid. Oxygen debt and the link to breathing rate and heart rate initially remaining higher post exercise. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, comprehension, practical competencies	Recall of the facts. Application of your knowledge to explain new situations. Describing and explaining data. Practical Skills and scientific method **Assessment 3** – Any topic from Autumn and Spring Term + Blood	

Year 10 Curriculum Overview: Combined Biology *subject to change

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Digestion Osmosis Active Transport Plant organs, tissues + cells Photosynthesis Phloem and Translocation	Definition of digestion and the role of enzymes. Organs of the digestive system and locations of enzyme action. Role of bile in digestion. Adaptations of solute exchange surface (small intestine) for absorption. Definition of osmosis and application of knowledge to explain uptake or loss of water. How to investigate the effect of concentration of solutes on cells and osmosis Definition of active transport and the link to respiration to release the energy required. Names of different plant organs and their functions. Names and functions of plant tissues + specialised plant cells. Determining the number of stomata per mm^2 and how stomata open and close Reactants and products of photosynthesis Fate of the glucose made in photosynthesis Importance of photosynthesis in producing biomass for plants and their growth as well as for the food chain. Translocation, why transport of sugar is required and the adaptions of the phloem. Skills: Detailed factual recall, written communication, application of knowledge, data handling + analysis, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 1**– respiration, diffusion, enzymes and metabolism from year 9, digestion, osmosis and active transport from year 10.	Ensure students complete all homework thoroughly, using their lesson notes to help. Encourage students to make lists of questions/problem areas to ask teachers about. Ensure they use the checklists we provide to methodically revise all topics. Make revision a part of the regular routine throughout the course. Factsheets and revision resources are available on their showbie revision code. Producing flashcards or quizlets for self-testing as they go along reduces workload later in the course and you can help by testing them too using these resources. Direct students to their IGS biology youtube link for guided revision videos. Help students plan a revision timetable to enable them to thoroughly revise well in advance of assessments.
Spring Term	Rate of photosynthesis Nervous System Endocrine System Homeostasis	How to investigate the rate of photosynthesis Limiting factors. Describing and explaining factors that affect the rate of photosynthesis Artificial growth conditions and maximising profits. Function of the nervous system and the steps in the nerve impulse pathway. Roles of receptors, neurones and effectors. Features of nerve cells. Measuring reaction times and factors that affect reaction times. Function of reflex actions and the nerve impulse pathway. Location of endocrine glands and their function in secreting hormones. Comparing action to nervous response. Transport of hormones and target organs. Investigating the effect of pH on amylase in starch digestion Definition of homeostasis and examples of factors that need to be controlled. Negative feedback and its role in homeostasis. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 2** – Cells, microscopes, diffusion and respiration from year 9, Active Transport, photosynthesis, phloem and translocation	
Summer Term	Homeostasis Control of Blood Glucose Levels Diabetes Adrenaline Thyroxine Uptake and transport of water + ions by plants Water Cycle Ecology 1 – Estimating population sizes + studying the distribution of organisms	Causes of increases and decreases in blood glucose levels and the fate of glucose in humans. Why blood glucose levels need to be controlled The role of the pancreas in detecting blood glucose levels and secreting hormones The role of insulin, glucagon and negative feedback in controlling blood glucose levels Causes, symptoms + treatments of type 1 + type 2 diabetes. Risk factors for type 2 diabetes, human + financial costs. Times when adrenaline is secreted and the effects of this hormone. Role of thyroxine, TSH and negative feedback in the control of the basal metabolic rate. Role of osmosis in the uptake of water and the role of diffusion and active transport in the uptake of ions Xylem adaptations, transpiration and transpiration stream. Factors that affect the rate of transpiration and the features of xerophytes to reduce the rate of transpiration. Events in the water cycle Definition of an ecosystem, population, community, abiotic and biotic factors. Sampling method to estimate population size and transects to study distribution of organisms. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, comprehension, practical competencies	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 3** (Mock Exam) Any topic from yr 9, term 1+2 of yr 10 + control of blood glucose levels, diabetes, adrenaline, thyroxine, uptake + transport of water + ions in plants	

Year 10 Curriculum Overview: Additional Triple Biology Topics *subject to change

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Food Security Decomposition Plant mineral deficiencies	Definition of food security and factors that threaten food security Methods for sustainable fishing Value of mycoprotein and its production. Microorganisms that cause decay and the factors that affect the rate of decay Role of decay in releasing mineral ions and carbon dioxide Compost and plant growth Investigating the effect of temperature or pH on the rate of decay Role of nitrate ions and magnesium ions in plants and symptoms of the deficiencies Skills: Detailed factual recall, written communication, application of knowledge, data handling + analysis, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 1**– respiration, diffusion, enzymes and metabolism from year 9, digestion, food security, decomposition osmosis and active transport from year 10.	Ensure students complete all homework thoroughly, using their lesson notes to help. Encourage students to make lists of questions/problem areas to ask teachers about. Ensure they use the checklists we provide to methodically revise all topics. Make revision a part of the regular routine throughout the course. Factsheets and revision resources are available on their showbie revision code. Producing flashcards or quizlets for self-testing as they go along reduces workload later in the course and you can help by testing them too using these resources. Direct students to their IGS biology youtube link for guided revision videos. Help students plan a revision timetable to enable them to thoroughly revise well in advance of assessments.
Spring Term	Trophic Levels and Transfer of Biomass The Brain The Eye	Stages in a food chain and the transfer of biomass along the chain Drawing and interpreting pyramids of number and pyramids of biomass Reasons for the loss of biomass along food chains. Intensive farming and how efficiency of food production is increased Parts of the brain and their functions Methods used to determine the functions of brain parts and why the brain is difficult to study. Parts of the eye and their functions Function and events in the pupil reflex action Events to focus on near or far objects. Eye defects and how to correct with lenses Evaluation of new technologies to treat eye conditions – contact lenses, laser eye surgery and lens replacement. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 2** – Cells, microscopes, diffusion and respiration from year 9, Active Transport, photosynthesis, phloem and translocation, plant mineral deficiencies, Trophic levels and biomass	
Summer Term	Control of Body Temperature Plant Hormones	Receptors used to detect changes in environmental temperature and core blood temperature Part of the brain that co-ordinates the control of body temperature Role of sweating and vasodilation in reducing body temperature Role of shivering and vasoconstriction in maintaining body temperature. Definition of a plant tropism and examples of positive and negative tropisms in response to light and gravity. Auxins role in stimulating shoot growth and inhibiting root growth to lead to directional growth. Uses of plant hormones in food production and as a weedkiller. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, comprehension, practical competencies	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 3** (Mock Exam) Any topic from yr 9, term 1+2 of yr 10 + control of blood glucose levels, diabetes, adrenaline, thyroxine, control of body temperature uptake + transport of water + ions in plants, plant hormones	

Year 11 Curriculum Overview: Combined Biology *subject to change

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Hormones in human reproduction + the menstrual cycle Contraception Fertility drugs + IVF Coronary heart disease, risk factors + treatments Drug Discovery and Testing Antibiotic Resistance Genetic Material Cell Division + Differentiation	Events in the menstrual cycle Roles of FSH, oestrogen, LH + progesterone in controlling the events of the menstrual Cycle + glands that secrete them The role of negative feedback in the menstrual cycle Types of contraception + evaluation of effectiveness. Hormones in contraceptives + how they prevent pregnancy Hormones used in fertility drugs and IVF. Steps in IVF and evaluation of the process. Coronary arteries and how blockages lead to heart attacks. Risk factors for heart disease, role of statins and stents in reducing risk of heart attacks + evaluation. Role of heart valves, faulty valves and artificial hearts Origins of drugs and the steps in pre-clinical and clinal trials to test new drugs How antibiotic resistance develops and how to reduce the chances of resistance developing. DNA structure + the code, chromosomes as large DNA pieces with many genes + a gene as the code for a protein Events in the cell cycle to produce new cells for growth and repair, including events in mitosis. Features of stem cells and their uses. Types of tumours and what cancer is. Skills: Detailed factual recall, written communication, application of knowledge, data handling + analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 1**– Homeostasis, endocrine system, control of blood glucose, thyroxine and adrenaline, Nervous system, circulatory system, response to exercise and reproductive hormones, contraception and fertility treatments **Assessment 2 Mock Exam** – Any topic from year 9, year 10 + Autumn term yr 11	Ensure students complete all homework thoroughly, using their lesson notes to help. Encourage students to make lists of questions/problem areas to ask teachers about. Ensure they use the checklists we provide to methodically revise all topics. Make revision a part of the regular routine throughout the course. Factsheets and revision resources are available on their showbie revision code. Producing flashcards or quizlets for self-testing as they go along reduces workload later in the course and you can help by testing them too using these resources. Direct students to their IGS biology youtube link for guided revision videos. Help students plan a revision timetable to enable them to thoroughly revise well in advance of assessments.
Spring Term	Communicable Diseases Human Defence Systems Vaccination Plant Disease Meiosis + Variation Sex Determination Genetic Inheritance and Inherited Disorders Embryo Screening Adaptations and Natural Selection Evidence for Evolution Extinction	Types of pathogens and how they cause disease. Pathogens, symptoms, treatments and prevention for gonorrhoea, HIV and AIDS, measles, salmonella and malaria. Non-specific defence and the functions of white blood cells and antibodies in specific defence. How vaccines prevent the development of disease Plant disease - Rose black spot and Tobacco mosaic virus, symptoms, effect on growth and prevention. Events in producing gametes via meiosis and how this leads to variation. Comparing mitosis to meiosis. Inheritance of X and Y chromosomes in determining sex. Genetic crosses with one gene and the use of punnett squares to predict the outcomes of crosses. Polydactyl and cystic fibrosis and their inheritance Screening embryos for genetic conditions and evaluation Explaining how the features of organisms enable their survival. The steps in the process Charles Darwin's theory of evolution and the evidence for this theory + the theory of evolution Reasons why a species becomes extinct. Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 3** – Communicable disease, human defence, vaccination, plant disease, Meiosis and variation, genetic inheritance and genetic disorders + other topics determined after mocks.	
Summer Term	Classification Selective Breeding Genetic Engineering Ecology Decay + the Carbon cycle Human Impact on Ecosystems + Biodiversity	Grouping organisms based on evolutionary relationships and interpreting evolutionary trees. Binomial naming systems and the taxonomic groups Steps in selective breeding and reasons for the process Method for genetically engineering bacteria, plants and animals. Advantages and issues with genetic modification. Levels of organisation in an ecosystem The process of decay, the organisms that carry it out and its role in releasing mineral ions and carbon dioxide. Events in the carbon cycle Deforestation, burning of fossil fuels and the use of peat as compost increase carbon dioxide levels in the atmosphere Causes of the increase in methane levels Pollution of the air and the effects of acid rain and particulates. Pollution of water and the process of eutrophication How human activities reduce land available for other organisms Definition of biodiversity and its importance, ways in which humanslower biodiversity and ways to maintain biodiversity Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, comprehension, practical competencies	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **External GCSE Exam** – Paper 1 + Paper 2 Students issued with complete checklists for each paper post assessment 3.	

Year 11 Curriculum Overview: Additional Triple Biology Topics *subject to change

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	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Kidneys and the Control of Water Levels DNA Structure Protein Synthesis and Mutations	Functions of the kidneys Processes of ultrafiltration, selective reabsorption and excretion ADH and how water levels are controlled Kidney dialysis and transplants to treat kidney disease and evaluation of these treratments Describe the structure of DNA and how it codes for proteins. Steps in making proteins using the code in DNA. Mutations and how they lead to changes in protein shapes and function. Skills: Detailed factual recall, written communication, application of knowledge, data handling + analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 1**– Homeostasis, endocrine system, control of blood glucose, thyroxine and adrenaline, kidneys Nervous system, circulatory system, response to exercise and reproductive hormones, contraception and fertility treatments **Assessment 2 Mock Exam** – Any topic from year 9, year 10 + Autumn term yr 11	Ensure students complete all homework thoroughly, using their lesson notes to help. Encourage students to make lists of questions/problem areas to ask teachers about. Ensure they use the checklists we provide to methodically revise all topics. Make revision a part of the regular routine throughout the course. Factsheets and revision resources are available on their showbie revision code. Producing flashcards or quizlets for self-testing as they go along reduces workload later in the course and you can help by testing them too using these resources. Direct students to their IGS biology youtube link for guided revision videos. Help students plan a revision timetable to enable them to thoroughly revise well in advance of assessments.
Spring Term	Binary Fission Culturing Microorganisms Plant Disease + Defence Monoclonal Antibodies Mendel Life Cycles	Steps in reproduction of prokaryotic cells (bacteria) Use of aseptic techniques to safely grow a pure culture of microorganisms Producing a bacterial lawn and investigating the effects of antimicrobial substances on bacterial growth Diagnosing plant diseases + the ways in which plants defend themselves from pathogens + herbivores Definition of monoclonal antibodies and their uses in testing and treating disease. The work of Mendel with pea plants and the importance of this work in understanding genetic inheritance Features of sexual and asexual reproduction and the advantages and disadvantages. Key features of the life cycles of plants, fungi and malarial protists Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, revision techniques, practical skills and scientific method	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **Assessment 3** – Binary fission, culturing microorganisms, Communicable disease, human defence, vaccination, plant disease, monoclonal antibodies, Meiosis and variation, genetic inheritance and genetic disorders + other topics determined after mocks.	
Summer Term	Speciation Darwin and developing Understanding Cloning Maintaining Biodiversity	Definition of a species and the steps in the formation of new species via the theory of natural selection. The work of Darwin, Wallace and Lamark, evidence and the gradual acceptance of Darwin's theory. Cuttings and tissue culture methods to clone plants. Embryo splitting and adult cell cloning methods to clone animals. Advantages and disadvantages of cloning. Methods to maintain biodiversity Skills: Detailed factual recall, written communication, application of knowledge, data handling and analysis, evaluation, comprehension, practical competencies	Recall of the facts. Application of knowledge to explain new situations. Describing + explaining data. Practical Skills + scientific method **External GCSE Exam** – Paper 1 + Paper 2 Students issued with complete checklists for each paper post assessment 3.	