



Curriculum Plan *Separate Biology*



Year 10	Golden Treads: State the big ideas that will be taught across the year (Threshold concepts)				Enrichment: What is offered through the year to support learning in the classroom?		Review and evaluation: Give date for review of the curriculum July 2024
	Topics	Assessment	Substantive Knowledge	Disciplinary Knowledge	Misconceptions	Key Vocabulary	Knowledge tracking
	List the key topics taught in this term. Have you checked that the curriculum the department is teaching links to the National Curriculum where this is appropriate?	Give the name, nature/content and date of the assessment in this term.	List the key facts that students need to learn. Substantive vs disciplinary knowledge	What skills, procedures, thinking is required to use substantive knowledge to progress understanding and application. Substantive vs disciplinary knowledge	What are the key misconceptions that students have in this curriculum area?	List the Tier 2 and Tier 3 words that will be encountered in this term.	What prior learning does this term's curriculum link to and what future learning does this term's curriculum link to?
Term 1	Cell biology		Cell structure Eukaryote and prokaryote Animal and plant cells Cell specialisation Cell differentiation Microscopy Culturing microorganisms Cell division Chromosomes Mitosis and the cell cycle Stem cells Transport in cells Diffusion Osmosis Active transport	Required practical activity 1: use a light microscope to observe, draw and label a selection of plant and animal cells. Required practical activity 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. Required practical activity 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.	Cell membrane and cell wall – students struggle to remember that it is only a plant cell that have a cell wall. The nucleus – NOT the 'brain of the cell'. It controls the cell because it contains the genetic code (DNA). Mitochondria – NOT the 'powerhouse of the cell'. Nor does it 'MAKE/PRODUCE' energy. Energy cannot be created/destroyed, the energy is released. Cell differentiation VS division – division splits in half while differentiation causes the cell to specialise for a certain job. Students get confused with SA:Vol ratio, both in terms of how to calculate it and then how this links to diffusion. Osmosis – students often think that it's the solutes that move rather than the water moving.	Eukaryote Prokaryote Plasmids Chromosome Magnification Resolution Concentration Meristem Therapeutic cloning Gene Stem cell Mitosis	Prior Learning – Year 7 Cells, Future Learning – Year 10 Organisation, infection and response, photosynthesis and homeostasis Year 12 – Biological molecules and cells



Curriculum Plan *Separate Biology*



Term 2	Organisation	Assessment 1 – Cell biology	Principles of organisation Animal tissues, organs and systems Human digestive system Heart and blood vessels Blood Coronary heart disease Health issues Effect of lifestyle Cancer	Required practical activity 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins. Required practical activity 5: investigate the effect of pH on the rate of reaction of amylase enzyme.	Students struggle to understand why food needs to be digested and that the molecules that food is digested to is very small so that it can be absorbed into the blood stream. Students think that the hydrochloric acid in the stomach is used to break down food. It's there to kill any bacteria and the protease enzyme works well at that pH. Students think that enzymes are 'living' and can 'die'. Make clear that enzymes are 'denatured'. The Heart and Blood Vessels – students believe that the blood gets oxygenated in the heart. Differentiate between 'substances' carried in the blood (ie. Hormones and glucose) and 'components' of the blood (ie. RBC, WBC, Platelets and Plasma).	Enzyme Active site Catalyse Substrate Alveoli Plasma Platelet Atrium Ventricle Cardiac Stent Transplant Malignant Benign Carcinogen	Prior Learning – Year 7 & 8 cells to organ systems, Year 7 Lifestyle choices, Year 8 Health and disease, Year 9 Health and infectious diseases Future Learning – Year 10 infection and response
	Organisation		Plant tissues, organs and systems Plant tissues Plant organ systems			Stomata Humidity Transpiration Translocation Xylem Phloem	Prior Learning – Year 9 Biochemistry – plant nutrition, photosynthesis and respiration Future Learning – Year 11 Ecology Year 12 – Exchange and transport systems
	Infection and response	Mock Assessment 2 – Cell biology and organisation	Communicable diseases Communicable diseases Viral diseases Bacterial diseases Fungal diseases Protist disease Human defence systems		Some students think that all disease is caused by bacteria. Pathogens cannot just appear from nothing – they are spread and can reproduce. A lot of students have heard of HIV/AIDS but falsely believe	Bacterium Fungicide Fungus Pathogen Protist Virus Vector Vaccination Placebo	Prior Learning – Year 7 Lifestyle choices, Year 8 Health and disease and Year 9 Pathogens Future Learning – Year 12 Lung disease and immunity and response Year 13 diseases of the nervous system



Curriculum Plan *Separate Biology*



			Vaccination Antibiotics and painkillers Discovery and development of drugs Monoclonal antibodies Producing monoclonal antibodies Uses of monoclonal antibodies Plant disease Detection and identification of plant diseases Plant defence responses		that AIDS can be spread. HIV is the virus which can be transmitted and may lead to AIDS developing in a person. HIV is communicable, but AIDS is non-communicable. Students also find it hard to understand that plants can get infections too It is the toxins released by the Salmonella bacteria which cause vomiting. So stomach acid may kill the bacteria but if the toxins are already in the food that is ingested then vomiting may occur. General misconceptions surrounding any sexually transmitted disease (Gonorrhoea and HIV) due to what students may pick up in everyday life Students unaware of 'fungicides and pesticides Students don't realise there are multiple WBCs. Confusion between antibody and antigen Students may think that there is a vaccine for all diseases. Additionally, due to antigenic variation, multiple vaccines may be needed to prevent an illness. Eg. New flu vaccine each year. Students may think that antibiotics treat all types of infection. They only treat bacterial infections. Students may think that bacteria become immune to antibiotics and that's why they	Toxicity Antigen Antibody Antibiotic Monoclonal Defence Antibody	
--	--	--	--	--	---	--	--



Curriculum Plan *Separate Biology*



					stop working. Bacteria become 'resistant' to antibiotics due to changes in the bacteria's DNA. Students may think viral infections are easy to treat. They aren't as they replicate within our own body cells. Students may think drug development is easy. It is a long process which involves lots of testing over many years and costs billions.		
Term 5	Bioenergetics		Photosynthesis Photosynthetic reaction Rate of photosynthesis Use of glucose from photosynthesis Respiration Aerobic and anaerobic respiration Response to exercise Metabolism	Required practical activity 6: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	Plants don't obtain their water through the leaves, it is through the roots. Plants don't produce oxygen for humans. It's a byproduct of photosynthesis that we happen to need. Plants can photosynthesise AND respire. Photosynthesis occurs in daylight only. Respiration occurs both day and night (otherwise the plant is dead). Respiration is NOT the same as breathing Students find it difficult to link the increase breathing rate and heart rate to respiration.	Concentration Chlorophyll Endothermic Chloroplast Photosynthesis Intensity Aerobic Anaerobic Mitochondria Glycogen Exothermic Fermentation Metabolism	Prior Learning – Year 9 Biochemistry – plant nutrition, photosynthesis and respiration Future Learning – Year 11 Ecology Year 13 Photosynthesis Year 13 Respiration



Curriculum Plan *Separate Biology*



Term 6	Homeostasis and response		Homeostasis Nervous system Structure and function The brain The eye Control of body temperature	Required practical activity 7: plan and carry out an investigation into the effect of a factor on human reaction time.	Response to stimuli includes releasing hormones not just moving muscles. Control of blood glucose concentration - students think Type 1 diabetes is solely caused by genetics. Lots of misconceptions about contraception, especially regarding STI's. Students don't realise that plants have hormones.	Stimulus Effectors Receptors Synapse Reflex Endocrine Thyroxine Adrenaline Adrenal Glycogen Glycogen Insulin Follicle Fertility Infertility Oestrogen Progesterone Testes Ovaries Contraceptive Brain Accommodation Vasodilation Phototropism Auxin	Prior Learning – Year 7 Cells to organs Future Learning – Year 13 Stimuli and response, nervous coordination and homeostasis