	Autumn 1 & 2	Spring 1 & 2	Summer 1 & 2
Content Declarative knowledge 'I know'	**<u>Unit 3</u>: Science Investigation Skills** Know how to plan a scientific investigation to produce valid results Know the health & safety associated with hazards and risks of scientific investigations Know how to identify and formulate investigative variables, and how to measure or control these to obtain reliability and validity Know how to collect data to appropriate levels of precision and process it using relevant calculations and graphical displays Know how to interpret, analyse and evaluate data Know protein structure including peptide bonds Know that enzymes are proteins with an active site which can be denatured Know how enzyme -substrate complexes are formed and the specificity of these Know how enzymes lower activation energy Know collision theory Know how changes to substrate concentrations affect the rate of	**<u>Unit 8</u>: Physiology of Human Body Systems. Reports 8B and 8C** Know the structure of the lymphatic system Know the composition and location of the spleen, thymus glands, tonsils, lymph glands, lymph vessels, and five major lymph nodes Know the purpose, location and composition of lymphatic vessel valves Know the function of the lymphatic system Know the location, processes and structures involved and the importance of the formation and transport of lymphocytes and lymph Know the location, processes and structures involved and the importance of the removal of interstitial fluid from tissues Know the location, processes and structures involved and the importance of the maintenance of hydrostatic pressure Know the location, processes and structures involved and the importance of the absorption of fats from the digestive system Know the structure of the digestive system	**<u>Unit 8</u>: Physiology of Human Body Systems. Report 8A** Know the structure and identification of the musculoskeletal system, including major bones like the axial and appendicular skeleton (specific inclusions); long /short /flat /irregular /sesamoid bones Know the composition of bone including the periosteum /compact bone /spongy bone /bone marrow /mineral use Know the structure and identification of the musculoskeletal system, including the major muscle groups Know the structure of muscle fibres Know the structure and identification of the musculoskeletal system, including the major joint types and their locations (specific inclusions) Know how to classify joints into fibrous /cartilaginous /synovial Know the composition and location of ligaments and tendons Know the functions of the skeleton (specific inclusions) and explain how these contribute to the effective functioning of the whole system Know the functions of smooth and skeletal muscles, ligaments,

	formation of enzyme -substrate complexes Know the importance of measuring an initial rate of reaction Know how these are all factors affecting enzyme productivity Know the factors affecting the rate of diffusion, including concentration gradient, shape or size of molecules, temperature, distance and surface area Know the arrangement and movement of molecules including the random movement of molecules in liquids and gases, and how their concentration gradients affect diffusion until a dynamic equilibrium is reached Know the factors affecting plant growth -populations, and plant distributions, including human effects like trampling, soil aeration and pH, light intensity, temperature, soil moisture and rainfall, and mineral ions Know sampling techniques, including why random sampling is important and yields valid data Know techniques which can investigate the effects of abiotic factors on plant populations	Know the location and structural features of the buccal cavity, pharynx, oesophagus, stomach, duodenum, jejunum, ileum, colon - ascending /transverse /descending limbs, rectum and anus Know the location and structural features of the associated digestive organs the pancreas, the liver and the gall bladder Know the function of the digestive system Know the processes involved in digestion, absorption and assimilation of nutrients Know mechanical and chemical digestion Know the action of enzymes including the hydrolysis and assimilation of proteases, amylase, and lipase Know the sites of nutrient absorption, active transport and diffusion	tendons, and explain how these contribute to the effective functioning of the whole system Know the functions and the process of muscle contraction, and explain how it contributes to the effective functioning of the whole system Know the functions and the process of muscle contraction, and explain how it contributes to the effective functioning of the whole system Know the functions and the process of fast and slow twitch fibres, and explain how they contribute to the effective functioning of the whole system Know the functions and the processes of movement, including flexion /extension /adduction /abduction /internal /external /rotation /circumduction due to muscle, bone, joints, and attachment apparatus interactions and explain how they contribute to the effective functioning of the whole system

	including transects and point /gridded /open quadrats Know how to select adequate sample sizes based on practical constraints and the need for valid data analysis Know how to evaluate the energy content of fuels including petrol, paraffin, food cooking oil, alcohols, and wax Know the hazards associated with fuels including their flammability and explosiveness, their toxicity, and their harmful by -products of incomplete combustion and polluting sulfur impurities Know the units of energy including j, kJ, calories, kilocalories and kWh; and how to calculate the heat of combustion of a fuel, and the heat energy released from a fuel in kJ/mol-1 Know how to use both equations of power and what work done means Know how to relate the size of a fuse to the power of the machine Know the use of electrical symbols to design circuitry including a battery of cells, ammeter,		

	voltmeter, bulbs, resistors, and diodes Know how to consider a variety of domestic appliances to calculate energy useage		
Skills Procedural knowledge 'I know how to'	Know how to develop a hypothesis for an investigation, formulating a hypothesis or a null hypothesis Know how to select appropriate equipment, techniques and standard procedures for quantitative or qualitative investigations Know how to produce a logical scientific method including relevant measurements across a suitable range Know how to record data precisely to increase reliability Know how to control or measure variables Know how to collect data accurately Know how to tabulate data accurately Know how to identify and handle anomalous data including repeated measurements Know how to make qualitative observations and draw inferences Know how to calculate mean and standard deviation Know how to interpret error bars	Know health matters and treatments related to the lymphatic system Know symptoms, treatment and physiological reasoning behind treatment for disruption or dysfunction of the lymphatic system, including lymphadenitis, lymphodema, and Hodgkin's lymphoma Know how to, and complete practicals for chemical testing for the presence of macro nutrients in foods, including starch, proteins, lipids, vitamin C, reducing and non - reducing sugars Know health matters and treatments related to the digestive system Know dietary sources and importance of macronutrients fibre, water, lipids, proteins and carbohydrates Know dietary sources and importance of micronutrients	Know how to, and complete practicals on dissection of chicken bones to observe interactions /locations /structures of the musculoskeletal system Know health matters and treatments related to the musculoskeletal system Know causes, symptoms and common treatments involved in common disorders or dysfunctions in the musculoskeletal system including arthritis /hip dysplasia /hypermobility /bone fracture /bone dislocation /RSI /muscle trauma /ligament trauma /tendon trauma Know treatments for musculoskeletal disorders including physiotherapy, arthroscopy, joint replacement therapy, RICE, splinting and casting Know the physiological reasoning behind treatments for musculoskeletal disorders (including physiotherapy, arthroscopy, joint

	Know how to use and interpret statistical tests specifically the t-Test, Chi-squared and correlation displays Know how to manipulate or transpose formulae, use standard form and convert units Know how to calculate percentage error Know how to choose appropriate and create accurate graphical displays of data Know how to identify trends and draw valid conclusions in data and compare to other sources Know how to explain anomalous data and sources of error affecting the data's reliability, making suggestions for improvements Know how to evaluate the strengths or weaknesses of a method or techniques used and suggest improvements Know how to calculate the heat energy the enthalpy of a fuel in kJ/mol-1 Know how to use both equations for calculating power, and then work done Know how to calculate energy useage of domestic appliances and the cost of electricity	vitamins A, B, C and D, and minerals iron, magnesium and iodine. Know digestive system diseases and physiological reasoning behind treatments including coeliac disease, irritable bowel syndrome and colitis	replacement therapy, RICE, splinting and casting)

	Know how to complete a practical highlighting the optimum pH or temperature of an enzyme on its substrate Know how to complete a practical on diffusion in agar and diffusion in gases Know how to complete a practical using ecological sampling techniques for both population and distribution ensuring samples taken allow for valid conclusions Know how to complete a practical on calorimetry		
Strategies Conditional knowledge 'I know when to'	Use primary and secondary data sources and contextual knowledge to inform my own work or to judge the validity of an interpretation Use my own knowledge to explain consequences eg when using biological washing powders in real life application Apply understanding of scientific empiricism to unknown practical methods and identify errors and make improvements Use subject specific language to describe, analyse and evaluate my work and the work of others Use a range of standard procedures or valid techniques to overcome	Use primary and secondary data sources and contextual knowledge to inform my own work or to judge the validity of an interpretation Use my own knowledge to explain consequences eg disorders of the lymphatic and digestive systems Use subject specific language to describe, analyse and evaluate treatments for disorders of the lymphatic and digestive systems Evaluate and critically analyse the physiological reasoning behind specific treatments Apply my understanding of specific materials and content to real life contexts	Use primary and secondary data sources and contextual knowledge to inform my own work or to judge the validity of an interpretation Use my own knowledge to explain consequences eg disorders of the musculoskeletal systems Use subject specific language to describe, analyse and evaluate treatments for disorders of the musculoskeletal systems Evaluate and critically analyse the physiological reasoning behind specific treatments Apply my understanding of specific materials and content to real life contexts

	errors or make improvements in unknown practical investigations Evaluate and critically analyse the validity of current practical methodology or to choose the most reliable or suitable method for a given problem Demonstrate the importance of safe working practices and safe handling of substances or artefacts Use a range of techniques to develop further extension practicals Consider the environmental impacts of processes by evaluating sampling data When to apply the most valid strategies to explorative or developmental work in progress Apply my understanding of specific materials and techniques	Evaluate social, medical and global issues like financial costs linked to treatments Evaluate lifestyle factors contributing to treatment plans	Evaluate social, medical and global issues like financial costs linked to treatments Evaluate lifestyle factors contributing to treatment plans
Key questions	Record experimental results in a suitable table Plot a graph Describe the relationship seen on the graph Explain one risk and hazard in this investigation and how it was controlled Identify and justify one different piece of equipment you could use to improve the accuracy of measuring volumes in this investigation	Describe the gross anatomy and function of the organs of the lymphatic system Describe the effect of a disorder on the lymphatic system and possible corrective treatments Explain the physiological reasoning for corrective treatments associated with a disorder of the lymphatic system Evaluate the effect of corrective treatments for a disorder of the lymphatic system	Explain the functional role of the musculoskeletal system Describe the effect of disorders of muscles and joints and possible corrective treatments Compare how disorders of the musculoskeletal system can affect how muscles bring about movement of joints and the role of corrective treatments Evaluate the effect of corrective treatments associated with a musculoskeletal disorder

	Identify an anomalous result and explain what might have caused it Add error bars to your graph and calculate the standard deviation Explain which results are the least reliable Explain how two other variables were controlled Describe two other ways you could extend your investigation Plan an investigation including a hypothesis, select and justify equipment and SOPs, control health and safety, write a valid method showing the range and quantities measured with control variables and how to analyse the results Evaluate the method results and conclusion of an investigation A variety of calculate, describe and explain content based questions.	Explain the role and location of organs involved in digestion Correctly carry out investigations to establish sources and importance of key nutrients for a balanced diet Describe the symptoms of nutrient deficiency as a result of dietary -related disease Analyse the role of digestive enzymes on nutrient uptake in each part of the digestive system Explain the use of corrective treatments for nutrient deficiency Evaluate the effect of dietary disease and corrective treatments on human health	
Assessment topics	Two end of topic tests available depending on time. Enzymes and Ecology and Fuels, Mock full papers available depending on time	Two opportunities to submit each report, with one opportunity for individual feedback IV process embedded into feedback opportunity	Two opportunities to submit the report, with one opportunity for individual feedback. IV process embedded into feedback opportunity
Cross curricular links **Character education**	Maths -calculations, graph skills Chemistry -diffusion, reactions and fuels Physics -power and electricity	SMSC -social and financial implications to treatment processes	SMSC -social and financial implications to treatment processes

	Biology -enzymes and plants SMSC -ethical issues surrounding the environment and fuel use and electricity costs Developing a working knowledge of health and safety Problem solving Critical thinking Planning and organising	Literacy -coherency and writing skills; improving performance based on feedback; spag Problem solving using critical thinking ICT use for research and writing Healthy living and lifestyle choices Justifying opinions for treatments Planning and organising PE Food preparation and Nutrition	Literacy -coherency and writing skills; improving performance based on feedback; spag Problem solving using critical thinking ICT use for research and writing Healthy living and lifestyle choices Justifying opinions for treatments Planning and organising PE Food preparation and Nutrition