Science Year 9 Long Term Map biology

Subject Intent/Aims

Expose all students to a broad range of learning opportunities to deepen their knowledge and understanding of themselves and the world around them and to build a solid foundation of Science knowledge and skills.We believe in developing curiosity and understand that science is an active process with many questions to be answered and still to be asked. We provide an understanding of how knowledge was derived, discovered and came to be accepted by the scientific community. By focusing on thinking, interpreting and evaluating rather than simply memorising scientific fact we intend to enable our students to use the skills that they need to answer their own scientific questions.

Our focus on the scientific process as a way of thinking and working will allow our students to develop their own ideas, attitudes and interpretations.

Topic **Cells**	**Topic** **Organisation**
National Curriculum: • life processes depend on molecules whose structure is related to their function • the fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling life processes to be performed more effectively •cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells • stem cells in animals and meristems in plants.	**National Curriculum:** • Enzymes • Factors affecting the rate of enzymatic reactions • Carbohydrates, proteins, nucleic acids and lipids as key biological molecules. • The need for transport systems in multicellular organisms, including plants • The relationship between the structure and functions of the human circulatory system.
Composition	**Composition**
Understand how structural differences between types of cells enables them to perform specific functions within the organism. Understand how molecules move into and out of cells, how this can be controlled and its link to size.	Understand how the body is organised and how we transports substances throughout the body. Understand how the impact of lifestyle can impact the health of the body and potential treatments. Understand how the parts of the body are adapted to their function. Understand how plants are organised and adapted.
Components	**Components**
Component 1: • Know the main organelles in an animal and plant cell and describe their function • Know the order of size of: cell, nucleus, chromosome and gene. **Component 2:** • Know the magnification of a light microscope. •	**Component 1 :** • Know cells, tissues, organs and systems in terms of size and function and provide examples. **Component 2:**

Component 3: • Know that all animals and plants produce carbon dioxide and water all the time as a by-product of aerobic respiration. • Know what organisms need energy for. • Know the site of aerobic respiration and be able to give examples of cells that contain a lot of mitochondria. **Component 4:** • Know the different transports used to move nutrients into cells including diffusion, osmosis and active transport. • Know the different factors that affect the rate of diffusion. **Component 5:** • Know how stem cells could be used to help treat some medical conditions. • Know the risks and benefits, as well as the social and ethical issues concerning the use of stem cells from embryos in medical research and treatments. **Component 6:** • Know what a chromosome is and where chromosomes are found in the cell. • Know how cells divide through mitosis and label diagrams to represent this.	• Know the function of organs of the digestive system and the nutritional value of different food groups. **Component 3** • Know the the role of enzymes to Metabolism. • Know the nature of enzyme molecules and relate their activity to temperature and pH changes • Know the models of enzyme activities. **Component 4:** • Know the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange • Know how the structure of these vessels relates to their functions **Component 5**: • Know how to recognise different types of blood cells in a photograph or diagram, and explain how they are adapted to their functions. **Component 6:** **Component 6:** • Know the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant. **Component 7:** • Know how to describe the relationship between health and disease and the interactions between different types of disease. • Know how to translate disease incidence information between graphical and numerical forms, construct and interpret frequency tables and diagrams, bar charts and histograms, and use a scatter diagram to identify a correlation between two variables. **Component 8:** • Know the effects of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. **Component 9:** • Know cancer is the result of changes in cells that lead to uncontrolled growth and division.

	Component 10 • Know how the structures of plant tissues are related to their functions. **Component 11:** •Know the structure of root hair cells, xylem and phloem are adapted to their functions. • Know the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration.
Composites	**Composites**
use knowledge of diffusion to complete practicals that investigate the factors that affect it. Explain how to use light microscopes to create slides and work out magnification of an image. carry out calculations using the formula: real size = (image x size)/magnification use knowledge and practical skills to explain osmosis in a potato. rearrange the equation to calculate image size or magnification. convert values for the units: cm, mm, µm and nm. Labelling and drawing scientifically.	Be able to work out the rate of enzyme controlled reactions from data gather in a required practical. Know how to use simple compound measures such as rate and carry out rate calculations for blood flow. Be able to use qualitative data to make scientific assumptions and identify different nutritional groups. interpret data linking disease to external causes and treatments.
Higher Order Knowledge	**Higher Order Knowledge**
• Know what an aseptic technique is. **Component 12:** biological molecules are often polymers and are based on a small number of chemical elements. **Component 13:** the sequence of bases in the DNA molecule determines the structure of proteins, including enzymes. **Component 14:** factors such as size or metabolic rate affect the requirements of organisms and this gives rise to adaptations such as specialised exchange surfaces and mass transport systems • Know why aseptic techniques are used in research and its links to antibiotic resistance. • Apply knowledge of aseptic techniques to interpret disc assays and analysis zones of inhibition to provide evidence for antibiotic resistance.	biological molecules are often polymers and are based on a small number of chemical elements. the sequence of bases in the DNA molecule determines the structure of proteins, including enzymes. factors such as size or metabolic rate affect the requirements of organisms and this gives rise to adaptations such as specialised exchange surfaces and mass transport systems
Key terms	**Key terms**

Cells Organisation Enzyme Carbohydrase Protease Lipase Bile Emulsify Xylem Phloem Lipids Stomata Meristem Guard Cells Epidermal Tissue	**Diffusion** **Active transport** **Osmosis** **Partially permeable membrane** **Microscopic** **Multicellular Organism** **Stem cell** **Eukaryotic** **Prokaryotic** **Nucleus** **Cytoplasm** **Mitochondria** **Ribosome** **Chloroplast** **Vacuole** **Differentiation** **Mitosis**
Final Composition/Deliberate Practice	**Final Composition/Deliberate Practice**
Planning, carrying out and analysing an investigation Required practical- Microscopy including magnification and scientific diagrams. Required practical- Osmosis Practical. Make and record observations and measurements using a range of apparatus and methods.	Planning, carrying out and analysing an investigation Required Practical- Testing for qualitative data about the composition of food groups in differing food types. Required Practical- Measuring how rate of reaction involving an enzyme is altered by pH.
Summative/Formative assessment	**Summative/Formative assessment**
RRR, quick quizzes and Century nuggets. End of unit test on animal and plant cell organelles, using a microscope and calculating magnification, respiration, diffusion, active transport, osmosis and the factors that affect them, use risks and benefits of stem cells and cell division by mitosis. Learners Check RRR Direct questioning Low stakes quizzes	RRR, quick quizzes and Century nuggets. End of unit assessment and end of term assessment on The digestive system Respiratory system The circulatory system Food groups Plant organs

Numeracy and literacy	**Numeracy and literacy**
Maths skills – graphs, calculations English – literacy skills – focusing onkeywords, tier 3 vocabulary, connectives, SPAG, synonyms,	Maths skills – graphs, calculations English – literacy skills – focusing onkeywords, tier 3 vocabulary, connectives, SPAG, synonyms,
Cross curricular links	**Cross curricular links**
Magnification Equations, graph skills, rearranging equations– Maths Diffusion particle theory– Physics Chemical Reactions– Chemistry	GCSE PE- Respiration Chemistry- Rates of reaction Physics- Particle collision theory Food Technology – Food groups and healthy diets. Healthy diets and the impact on health

SMSC	British Value	RSHE
There will be multiple opportunities for students develop spiritually; being creative in their learning and a range of activities *The high expectations placed on the student from the school and department mean that pupils will regularly be made aware of the right and wrong morally* *Pupils are expected to share the views morally on the different topics but also show respect and appreciate others in the classroom.* *The majority of topics will give the students opportunity to develop their social skills, from giving presentations to working in group tasks.*	*Students will be taught the legal implications of using the internet* *Students will be taught to fully appreciate other students viewpoints and the importance of being respectful* *Students will be taught the importance of selecting valid information from reliable sources for any presentation tasks that they do.* *Students are taught how to contribute to life in modern Britain by learning about the history of scientific discovery* *Students will learn how to display British Values to use the internet*	*The students will be taught about how to be safe online and the dangers.* *The students will be made aware of online relationships and the sexual issues that may arise.* *The students will be regularly conversed on their physical and mental health when issues arise within topics* *They will be taught about the need for tolerance of other people'sviewpoints*

Adapted Curriculum Content: All pupils are expected to cover all of the aspects of the introductory topic Rearrangement of formulae are not necessary for foundation tier Higher expected to use standard form	**Adapted Curriculum Content:** All content is common for all learners
Adaptive Implementation Practices: Coloured paper/pens Differentiated worksheets Differentiated tasks Seating plans to maximise concentration allowing for visual/hearing impairments etc Appropriate use of IWB Dual coding Spare equipment Modelling experimental detail Pre drawn tables/graphs/diagrams to be labelled	**Adaptive Implementation Practices:** Coloured paper/pens Differentiated worksheets Differentiated tasks Seating plans to maximise concentration allowing for visual/hearing impairments etc Appropriate use of IWB Dual coding Spare equipment Modelling experimental detail Pre drawn tables/graphs/diagrams to be labelled