

### Curriculum Map: Biology Year 9

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Content</b> Declarative knowledge 'I Know'</p>	<p><b>Topic: B1 Cell Biology</b> Know the main sub-cellular structures found in plant and animal cells (eukaryotic) and bacterial cells (prokaryotic) and their functions. Know how the structure of some specialised cells are related to their functions. Know that cells differentiate to become specialised cells. Know the stages of the cell cycle. Know how cells divide by the process of mitosis and when this type of cell division occurs. Know what stem cells are and their functions in embryos, adult animals and in plants. Know how treatments with stem cells may be used in medicine. Know how stem cells in plants can be used commercially. Know what diffusion is and the factors which affect the rate. Understand the need for exchange surfaces in multicellular organisms. Know how the small intestine, lungs, gills, roots and leaves are adapted for exchanging materials. Know how water moves across cell membranes via osmosis. Know what active transport is and examples of when it is used. Know the differences between diffusion, osmosis and active transport.</p>		<p><b>Topic: B2 Organisation</b> Know the levels of organisation of cell, tissue, organ, organ system and the digestive system as an example of an organ system. Know how enzymes catalyse reactions and how their activity is related to temperature and pH changes. Recall the sites of production and the action of amylase, proteases and lipases. Know where bile is made and its function. Know the structure and functioning of the heart and the lungs. Know how the structure of arteries, veins and capillaries is related to their function. Know the function of the components of the blood. Know how coronary arteries can become narrowed and treated with stents and statins. Know that heart valves can become faulty and that they can be replaced using biological or mechanical valves. Know the treatments for heart failure. Know the lifestyle factors that can contribute to ill health and that different types of disease may interact. Know that cancer is the result of changes in cells that lead to uncontrolled growth and division and the lifestyle risk factors. Know the difference between benign and malignant tumours. Know how the structures of plant tissues are related to their functions. Know how water and minerals are transported around the plant by transpiration, including the adaptations of root hair cells and the function of stomata. Know how materials are transported around the plant by translocation and the basic structure of phloem.</p>		<p><b>Topic: B3 Infection and Response</b> Know examples of diseases caused by viruses, bacteria, protists and fungi and how they are spread in animals and plants. Know how the spread of diseases can be reduced or prevented. Know the non-specific defence systems of the human body against pathogens. Know the role of the immune system in the defence against disease. Know how vaccinations will prevent illness in an individual and can reduce the spread of pathogens. Know how antibiotics and other medicines are used in treating disease. Know that the emergence of strains of bacteria resistant to antibiotics is of great concern. Know that traditionally drugs were extracted from plants and microorganisms. Know that drugs must be tested and trialled before being used to check that they are safe and effective.</p>	
<p><b>Skills</b></p>	<p>Be able to make order of magnitude calculations, including the use of standard form.</p>		<p>Be able to carry out rate calculations for chemical reactions.</p>		<p>Be able to describe the process of discovery and development of potential new medicines.</p>	

Procedural Knowledge 'I know how to'	<p>Be able to carry out magnification calculations.</p> <p>Be able to calculate and compare surface area to volume ratios.</p> <p>Be able to use simple compound measure of rate of water uptake.</p> <p>Be able to calculate percentage gain and loss.</p> <p>Be able to plot, draw and interpret appropriate graphs.</p> <p>Be able to recognise, draw and interpret diagrams that model osmosis.</p> <p><b>Required practical:</b> Use a light microscope to observe, draw and label of selection of plant and animal cells.</p> <p><b>Required practical:</b> Investigate the effect of a range of concentrations of salt solutions on the mass of the plant tissue.</p>	<p>Be able to use the 'lock and key theory' as a simplified model to explain enzyme action.</p> <p>Be able to understand simple word equations.</p> <p>Be able to use simple compound measures such as rate and carry out rate calculations for blood flow.</p> <p>Be able to recognise different types of blood cells in a photograph or diagram.</p> <p>Be able 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.</p> <p>Understand the principles of sampling as applied to scientific data, including epidemiological data.</p> <p>Be able to plot and draw appropriate graphs, selecting appropriate scales for axes.</p> <p><b>Required practical:</b> Use qualitative reagents to test for a range of carbohydrates, lipids and proteins.</p> <p><b>Required practical:</b> Investigate the effect of pH on the rate of reaction of amylase.</p>	
<b>Strategies</b> Conditional Knowledge 'I know when to'	<p>Understand how microscopy techniques have developed over time and be able to evaluate the advantages of electron microscopes vs light microscopes.</p> <p>Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments.</p>	<p>Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant.</p> <p>Evaluate the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally.</p>	<p>Evaluate the global use of vaccination in the prevention of disease.</p>
Key Questions	<p>What are the functions of the main cell organelles?</p> <p>What are specialised cells and how do their structures enable their functions?</p> <p>What are the different ways in which substances can enter and exit cells?</p> <p>Why do multicellular organisms need specialised exchange surfaces?</p>	<p>How do enzymes catalyse reactions?</p> <p>How does the heart and circulatory system supply blood to our tissues?</p> <p>What treatments are available for coronary heart disease?</p> <p>What lifestyle factors can contribute to the development of non-communicable disease?</p> <p>How are substances transported in plants?</p>	<p>How do pathogens cause disease?</p> <p>How can the spread of disease be reduced?</p> <p>How do our bodies fight against pathogens?</p> <p>How do medicines help us to fight disease?</p> <p>How are potential medicines tested to ensure efficacy and safety?</p>
Assessment topics	<p>Mid topic test (20 minutes) after 8 lessons.</p> <p>End of topic test (25 minutes)</p>	<p>Mid topic test (20 minutes) after 10 lessons.</p> <p>End of topic test (35 minutes)</p>	<p>Mid topic test (25 minutes) after 5 lessons.</p> <p>End of topic test (35 minutes)</p>
Cross curricular links/Character Education	<p>Chemistry – diffusion</p> <p>Maths – calculations, graph skills</p> <p>SMSC – ethical issues surrounding the use of stem cells</p>	<p>Maths – calculations, graph skills</p> <p>PE – heart and circulation</p>	<p>SMSC – the role of global vaccination as a way of protecting vulnerable groups</p>