

# Long Term Plan – Key Stage 4 - Science

The intent of the Science curriculum is to develop students' scientific knowledge, literacy and problem solving ability, by fostering a spirit of independent inquiry, nurturing curiosity and bringing current, relevant real world science into the classroom Encouraging a culture of questioning, feeding the natural inquisitiveness of students, while developing an awareness of the social, economic and environmental implications of science that will enable students to contribute positively to society. Students would examine a wealth of scientific concepts both theoretically and by investigation so they can formulate conclusions and evaluate processes and data using a variety of data collection and analytic tools in the classroom, through media and external providers such as visits to the science museum and interactions with external providers such as STEM Ambassadors. Students will develop the knowledge and skills to expand their reservoir of quality SMSC values to enable informed contributions to public debates around issues such as climate change, genetic engineering, morality and religion.

## Year 10

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Biology: Cell Structure &amp; transport</b></p> <p><b>Chemistry: Atomic structure</b></p> <ul style="list-style-type: none"> <li>Describe, compare and investigate different methods of cell transport</li> <li>Explain how the melting point and boiling points of a substance depend on the particle arrangement and forces between them</li> <li>Define elements, compounds, ionic and covalent bonding</li> <li>Model bonding and compounds and relate properties of a compound to type of bonding and structure of molecules</li> <li>Define and calculate relative atomic mass of elements and compounds solute in a volume of solution</li> </ul>	<p><b>Physics: Conservation &amp; Dissipation of energy; Energy Transfer by heating</b></p> <p><b>Biology: Cell Division</b></p> <ul style="list-style-type: none"> <li>Describe ways in which energy can be stored, transferred and conserved</li> <li>Define the terms: work, energy, power, efficiency, wasted energy and relative calculations</li> <li>Describe ways of reducing heat transfer from our homes</li> <li>Describe the role of chromosomes and state chromosome numbers for human somatic and sex cells and describe mitosis and its importance</li> <li>Describe how stem cells are used in medicine and surrounding issues</li> </ul>	<p><b>Biology: Organisation &amp; the Digestive System</b></p> <p><b>Chemistry: Development of the Periodic table</b></p> <ul style="list-style-type: none"> <li>Show the relationship between atoms, elements and compounds and the periodic table.</li> <li>Investigate the properties of the alkali metals, halogens and the noble gases and their position and groups in the periodic table</li> <li>Explain the organisation of plants and animals</li> <li>Explore the function, structure, and relative processes associated with digestion</li> <li>Examine and compare different sources of energy</li> </ul>	<p><b>Biology: Organising animals &amp; plants</b></p> <p><b>Chemistry: Structure &amp; Bonding</b></p> <ul style="list-style-type: none"> <li>Explore the structure and function of the blood and circulatory system in animals</li> <li>Explore the features of transport systems in plants</li> <li>List factors that affect transpiration</li> <li>Show the relationship between particle arrangement</li> <li>State the melting and boiling points of substances</li> <li>Investigate the formation and properties of compounds and the types of bonding involved</li> <li>Relate properties of a compound to types of bonding and structures of molecule</li> </ul>	<p><b>Biology: Preventing &amp; treating diseases</b></p> <p><b>Chemistry: Chemical Changes</b></p> <p><b>Physics: Electricity in the home</b></p> <ul style="list-style-type: none"> <li>Investigate electric circuits and represent them as diagrams</li> <li>Use measurements and equations to calculate the effects of temperature changes on resistance and potential differences</li> <li>Explore concepts of health; how it is maintained and factors which cause poor health</li> <li>Provide examples of specific classes of diseases</li> <li>Define the term relative atomic mass; calculate atomic and molecular masses of elements, compounds and solutions in a given volume of solution</li> </ul>	<p><b>Biology: Preventing &amp; treating diseases</b></p> <p><b>Chemistry: Chemical Changes</b></p> <p><b>Physics: Electricity in the home</b></p> <ul style="list-style-type: none"> <li>Describe, investigate, and write word and symbol equations for metals, acids and neutral reactions</li> <li>Prepare a pure dried sample of a given salt</li> <li>Describe how the general principles of treating and preventing diseases are including in drug development</li> <li>Calculate the electric power supplied to a device from its current and make predictions</li> <li>Link electric energy supplied by a battery in a circuit to the energy transferred to electrical components</li> </ul>

**Year 11**

<b>Autumn 1</b>	<b>Autumn 2</b>	<b>Spring 1</b>	<b>Spring 2</b>	<b>Summer 1</b>	<b>Summer 2</b>
<p><b>Biology: Cell Transport</b></p> <p><b>Chemistry: Structure &amp; Bonding; Chemical Calculations</b></p> <ul style="list-style-type: none"> <li>Describe, compare and investigate different methods of cell transport</li> <li>Explain how the melting point and boiling points of a substance depend on the particle arrangement and forces between them</li> <li>Define elements, compounds, ionic and covalent bonding</li> <li>Model bonding and compounds and relate properties of a compound to type of bonding and structure of molecules</li> <li>Define and calculate relative atomic mass of elements and compounds solute in a certain volume of solution</li> </ul>	<p><b>Biology: Adaptation &amp; Interdependence and Competition</b></p> <p><b>Chemistry: Rates &amp; Equilibrium</b></p> <ul style="list-style-type: none"> <li>Investigate and describe factors which affect the rate of a reaction</li> <li>Understand the role of catalysts and explain their importance within industries</li> <li>Explain how organisms adapt to live in their natural environment</li> <li>Recall and define predators and prey, herbivore, carnivore, omnivore, food webs and how energy is transferred around an ecosystem, recall the water cycle</li> <li>Draw and label diagrams of the carbon and decay cycles, including their processes.</li> </ul>	<p><b>Biology: Hormonal coordination; Evolution &amp; natural selection</b></p> <p><b>Physics: Motion</b></p> <ul style="list-style-type: none"> <li>Identify endocrine glands on the human body and describe the functions of hormones in the body</li> <li>Explore the basic principles of variation &amp; evolution Differentiate human traits caused by genetics and environments</li> <li>Give examples where selective breeding has been used and describe genetically modified organisms</li> <li>Use formulas to calculate speed Differentiate between velocity and acceleration</li> <li>Measure the acceleration of an object moving down a ramp</li> </ul>	<p><b>Biology: Genetics and Reproduction</b></p> <p><b>Physics: Radioactivity; Electromagnetic waves</b></p> <ul style="list-style-type: none"> <li>Evaluate the practice of selective breeding and genetic engineering in agriculture and medicine</li> <li>Name the seven types of electromagnetic waves and describe their properties and uses.</li> <li>Understand the electromagnetic spectrum in respect to visible light and human sight</li> </ul>	<p align="center"><b>Examination Revision</b></p>	<p align="center"><b>Examination Revision</b></p>

**Year 9**

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Biology: The human body</b></p> <ul style="list-style-type: none"> <li>Understanding cell organelles and their functions</li> <li>Compare the similarities and differences between plant and animal cells</li> <li>Understanding cells as the fundamental unit of living organisms</li> <li>Observe, interpret and record cell structures using a light microscope</li> <li>Investigate pulse rate</li> <li>Describe how vaccination works</li> </ul>	<p><b>Chemistry: Elements Mixtures and Compounds</b></p> <ul style="list-style-type: none"> <li>Distinguishing atoms, elements and compounds</li> <li>Recognise chemical symbols and formulae for elements and compounds</li> <li>State the law of conservation of mass</li> <li>Describe changes of state and chemical reactions.</li> <li>Review the history of the Periodic Table</li> <li>Describing the Periodic Table: periods and groups; metals and non-metals</li> <li>Investigating the patterns in reactions and predict reactivity</li> </ul>	<p><b>Physics: Energy, forces and the structure of Matter</b></p> <ul style="list-style-type: none"> <li>Describe changes in energy stores and conservation</li> <li>Distinguish between renewable and non-renewable energy sources</li> <li>Define and differentiate between force, work done, energy and power</li> <li>Investigate and calculate speed acceleration and friction</li> <li>Explain the three types of ionising radiation</li> </ul>	<p><b>Biology: Environment, evolution &amp; inheritance</b></p> <ul style="list-style-type: none"> <li>Explore concepts of processes of photosynthesis using word equations</li> <li>Suggest some factors that decrease biodiversity</li> <li>Differentiate between dominant and recessive alleles, heterozygous and homozygous</li> <li>Use a Punnett square to show a genetic cross</li> </ul>	<p><b>Chemistry: Chemistry in our World</b></p> <ul style="list-style-type: none"> <li>Investigating the properties and reactions of acids and alkalis with word equations</li> <li>Investigate factors which affect rate of reaction</li> <li>Describe how the earth's atmosphere has evolved over time</li> <li>Explaining the Greenhouse Effect</li> <li>Describe ways of distilling water</li> <li>Investigate the amount of dissolved salts in different water samples</li> </ul>	<p><b>Physics: Electricity Magnetism &amp; Waves</b></p> <ul style="list-style-type: none"> <li>Describe the difference between alternating and direct current</li> <li>Calculate the power of an appliance</li> <li>Examine concepts of magnets and electro magnets</li> <li>Distinguish between transverse and longitudinal waves</li> <li>Calculate speed using the wave equation</li> <li>Calculate density</li> </ul>