

Science Faculty Rationale

Our vision is to support young people to become independent and enthusiastic scientists.

We aim to instil our students to be confident, resilient, problem solvers who are scientifically literate and numerate.

National Curriculum Aims KS3

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

YEAR 8	Biology Content and Rationale	Chemistry Content and Rationale	Physics Content and Rationale	Scientific Skills Development
Concept 1	<p>Nutrition and Digestion</p> <p>This unit combines personal education in diet and health with a recap of the link between cells and systems in the context of the digestive system. This has clear links to work further on in the 7-13 pathway but allows us to begin to make links between the structure and function of organs as a skill, in addition to work previously done on cell specialisations. We briefly touch on photosynthesis to provide a stepping stone between KS2 and more detailed work later on in the year to highlight its importance as the source of Glucose for livening things.</p>	<p>Further Chemical Reactions</p> <p>Leading directly on from the 'Simple Chemical reactions' and 'Chemistry of the Earth' units, we begin Year 8 by reinforcing the examples of chemical change seen already with further examples which are more advanced in their detail and with which we begin to link the concept of simple chemical equations. This goes hand-in-hand with the introduction of testing for particular gases produced as a result of a reaction as a tool to analyse the composition of unknown substances.</p>	<p>Forces</p> <p>Each of the four topics this year builds on the same topic at the same stage of the previous year. Whilst there are overarching principles, a key aspect of each topic is to review and recap knowledge from the previous year's topic to ensure continuity of learning. In 'Forces', we move on to the more abstract and less familiar concepts of contact forces and use this idea as well as prior learning on solids, liquids and gases through the Chemistry strand to look at Pressure. This last topic leads through into the next stage of the 7-13 pathway as an important factor of GCSE.</p>	

<p>Concept 2</p>	<p>Gas Exchange</p> <p>Looking at the ventilatory system in the 'Gas Exchange' topic builds on the now familiar concepts of cells, diffusion and structural to functional biology, to explain how we exchange gases in the lungs. Students link this to concepts of exercise and health to widen their personal education in addition to the biological concepts which will eventually be extended on to Yr 13. Plants are again touched on to reinforce the idea that they rely on gas exchange for photosynthesis.</p>	<p>Atoms, Elements and Compounds</p> <p>Having undertaken comprehensive work on physical and chemical changes of substances, this unit moves students towards understanding why substances have different properties. This is spread over two units.</p> <p>In the first of the two, students are introduced to the idea that substances are made of atoms which can differ in their sub-atomic structure. By the end of the unit, students are familiar with how elements, mixtures and compounds can be defined relative to each other.</p>	<p>Electromagnetism</p> <p>Work completed on electrical circuits will be built on to illicit the idea that electrical current flowing through a wire creates a magnetic field around that wire. In the first part of this unit the properties and uses of electromagnets are developed with first hand practical experience, and the unit ends with a look at natural magnets. We feel that introducing electromagnets and using it to link circuits to magnets is a logical and novel approach to the topic which better reflects the way that the Physics curriculum needs to spiral through KS3.</p>	
<p>Concept 3</p>	<p>Photosynthesis and Respiration</p> <p>Within this topic, students add the concept that chemical reactions are of fundamental biological importance. They use their previous small, general recaps on photosynthesis and develop these into an understanding of how it works as a reaction and how it provides glucose for respiration. They then use their understanding that the absorption of glucose and oxygen in the digestive and ventilatory systems provides the substrates for a chemical reaction that is the basis of all life.</p>	<p>Periodic Table</p> <p>'Periodic Table' follows on directly from 'Atoms, Elements and Compounds' and makes use of the fact that students will have become familiar with the way that elements are represented by the table in that first unit. The focus of this topic is to take that basic knowledge and to develop a preliminary understanding of the different types of compounds that exist, how we name them and how the periodic table can be used to predict their reactivity.</p>	<p>Energy</p> <p>Previous work on energy transfers is developed into the idea of work, and a classical approach to the understanding of how energy is required to move objects through given distances. The importance of a numerical approach to this topic is a key that underpins teaching and it is used to solidify understanding of the basic algebra fundamental to Physics later on in the 7-13 pathway. This is balanced by an ever more practical approach to the heating and cooling topic which ends the unit.</p>	

<p>Concept 4</p>	<p>Genetics and Evolution</p> <p>'Genetics and Evolution' uses students' understanding of the micro-to-macroscopic nature of Biology to lay the groundwork for the study of genetics and variation as students prepare to start Year 9 and then move on to the GCSE course. Students learn about the nature of DNA and its discovery and use an understanding of its inheritability to explain how species can change over time. We also use this opportunity to look at human impacts on the environment in terms of extinction and how we can maintain biodiversity as a strand of the personal education we believe is a vital element of our curriculum.</p>	<p>Acids, Alkalis and Bases</p> <p>Year 8 finishes with a topic that extends the basic understanding of acids which has been encountered so far and uses it to prepare students to make the step up to beginning the Year 9 work that will lay the foundations for GCSE science.</p> <p>The topic utilises basic knowledge of acids and alkalis along with that of the nature and products of chemical reactions to outline that different compounds form different products when reacting with the same acid. The reaction of metals, carbonates and bases are considered separately and students will look both at the reactions and the equations for each in reinforcing their knowledge through the pathway to this point.</p>	<p>Waves</p> <p>As the most abstract of the four fundamental topics, we use this finally to move on and investigate more detailed ideas about the effects and properties of waves. The most challenging topics that students will encounter fall here, including ideas of reflection and refraction, which link much more directly to Key Stage 4 than almost any other topic included in the curriculum so far. Again, a practical approach reinforces the theory but we also build in a respect for numeracy which underpins the rest of the course from Year 9 onwards.</p>	
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