

Subject: Science

What students are learning through Year 10 and Year 11:

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 10	<p>Unit C2 continues with the golden thread of chemical reactions. Topics from KS3 such as elements, compounds and mixtures are built on here, exploring atomic structure and how this impacts chemical reactions. Covalent, ionic, and metallic bonds are learnt here, looking at the impact of these different bonds on the structure and property of materials. The separation techniques of chromatography, distillation, crystallisation, and filtration are investigated through the cycles of scientific enquiry, from hypothesis to review.</p> <p>During this unit, students discuss how microplastics enter the water supply. They are introduced to the aspirational career of forensic chemists.</p>	<p>Unit B2 continues with the golden thread of organ systems. Content from KS3 is explored more deeply here, ranging from cell structures to gas exchange. Students are introduced to the specific blood vessels in the circulatory system, looking at how each one is adapted for its function. The components of the blood are also explored, alongside the structure of the heart.</p> <p>This unit allows students to develop their maths skills when calculating surface area to volume ration in multicellular structures such as the alveoli and intestines.</p> <p>During B2, students are introduced to the aspirational career of cardiologist, and given opportunities to develop their cultural capital with the THINK Big Question ‘is it ethical to use embryonic stem cells if it enables millions of lives to be saved?’</p>	<p>Unit P2 continues with the golden thread of energy and forces, with a focus on how interactions between objects lead to actions which can be seen by the observer. The direction and magnitude of forces is further studied, looking at Newton’s laws and developing the ability to think like a scientist, investigating speed, and Hooke’s law.</p> <p>During this unit, students discuss the THINK Big Question ‘is it ever okay to break the speed limit?’ and are introduced to two key careers; product designers and design engineers.</p> <p>This unit allows student to practice many mathematical skills, such as rearranging equations and converting between units.</p>	<p>Unit B3, organism level systems, explores the role of the nervous system. Students learn how a stimulus results in a particular action, exploring different scenarios such as starting a car at a green light or blinking when exposed to bright light. This is then compared to hormones in the human body, which are transported in the blood to the target organ or tissue. There is also the introduction to homeostasis and how this is crucial for the regulation of internal environments.</p> <p>Students will carry out their own experiment to investigate reaction time, including identifying variables and making predictions.</p> <p>This unit allows students to discuss the THINK Big Question ‘should scientists and doctors use animals in clinical trials of new medications?’</p>	<p>Unit C3 has a focus chemical formula, conservation of mass and changes of state. During this unit, students will focus on chemical reactions at the atomic level and learn how and why the arrangement of atoms occurs during a chemical reaction. Learners carry out and observe a variety of chemical reactions such as neutralisation and electrolysis, developing the skills of writing predictions, methods, and suggesting improvements. They also use equipment such as pipettes, measuring cylinders and conical flasks to take accurate measurements of chemicals.</p> <p>There will also be several opportunities to strengthen mathematical concepts as they are introduced to the mole and enthalpy changes.</p>	<p>Unit P3 allows students to study the interactions between matter and electrostatic fields. Their understanding of magnetic fields from KS3 will be extended by looking at electrical fields and how they interact. Charge and its flow play a central role to the understanding of electricity. Electrical current, potential difference and resistance are all explored here, which learners will investigate using conventional circuits. There are opportunities for practical work when constructing circuits and investigating resistance in a wire, allowing students to be analytical, inquisitive, and observant.</p> <p>This unit allows for a variety of aspirational careers to be explored, from electricians to clinical engineers.</p>

<p>Year 11</p>	<p>In unit B4, learners explore how living organisms form populations of single species, communities of many species, and are part of ecosystems. Microorganisms will be studied, with a focus on the role they play in the continuous cycling of chemicals in ecosystems. There are opportunities to discuss the ambitious career of ecologist and explore British values, such as the conservation of species.</p> <p>Following this, students continue to explore the golden thread of 'chemical reactions', in unit C4. Here, students will study the current periodic table in depth, and pay closer attention to its initial development. Students will learn how the groups and periods reveal trends and patterns in the behaviour of the elements. Links will be made to the structure of the atom and reactivity. There will also be opportunities to strengthen data analysis</p>	<p>In unit P4, students will develop their understanding of how energy is transferred in mechanical and electromagnetic waves and will use this to explain how and where they are used. After exploring the uses of different waves in the EM spectrum, such as gamma rays for sterilisation, learners move on to explore radiation.</p> <p>Knowledge of the structure of the atom is developed here, to understand alpha, beta and gamma radiation, with students discussing the effects of the Chernobyl disaster. Mathematical skills are further built on, with a focus on decay equations and calculating half-life. The aspirational career of nuclear engineer is introduced during this topic.</p> <p>Unit B5 enables students to build on their knowledge of human reproduction from KS3. They will explore how genetic information is passed from parents to</p>	<p>Unit C5 is centred around monitoring and controlling chemical reactions. During this unit, students will learn how the rate and yield of chemical reaction can be altered by changing the physical conditions. They will observe the effects of changing physical conditions of a reaction, whilst drawing on the fundamental concepts of chemistry to be able to explain these changes. Students will be introduced to the concept of reversible chemical reactions. They will be required to explain the factors that affect the position of equilibrium. The ability to think like a scientist is developed here, with students identifying variables, removing anomalous data and carrying out experiments into the rate of chemical reactions. This links into the career of the topic, chemical engineer.</p> <p>Unit P5 builds on knowledge gained during KS3 on the transfer and dissipation of energy, and ways of reducing waste energy. Learners will have</p>	<p>Unit B6 seeks to integrate learners' knowledge and understanding of biological systems and life processes, with the aim of applying it to global challenges. Biological information is used to help people improve their lives and strive to create a sustainable world for future generations. Students will explore how diseases affect the health of populations of both animals and plants, and how they can affect important life processes. They complete the topic with an exploration of how disease is spread, how our bodies defend themselves against disease and, how immunity is achieved.</p> <p>This unit allows for a discussion around the ethical implications of gene therapy and genetic engineering.</p> <p>Unit C6, integrates learners' knowledge and understanding of chemical systems and processes, with the aim of applying it to global challenges. Applications of chemistry can be used to help humans improve their own lives and strive to</p>	<p>Unit P6 integrates learners' knowledge and understanding of physical systems and processes, with the aim of applying it to global challenges. It provides opportunities to draw together the concepts covered in earlier topics, allowing synoptic treatment of the subject of physics. Physics on the move expands student knowledge on forces and motion, the effects external factors have on this motion. Also, how the design of objects like cars reduce these forces for safety. Powering Earth focuses on our reliance on electricity for everyday life. Students will weigh up the benefits and disadvantages of different types of energy resources. The efficient distribution of electricity will be explored and how electricity is safely used in homes.</p>	<p>During term 6, students receive tailored revision sessions to prepare them for their GCSEs.</p> <p>These sessions cover all GCSE content, from units 1s to unit 6s, and allow for retrieval practice of fundamental knowledge. In this time, students also focus on applying their knowledge to exam style questions, and carrying out scientific investigations around the 'required practicals'.</p>
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