Subject: Science

Subject Leader: Keely Henley
Our science curriculum is aligned with the National Curriculum. This progression builds naturally on their Key Stage 2 knowledge and prepares them for the content and expectations of Key Stage 4. A key element of the Key Stage 3 programme is the development of practical skills, with teachers modelling techniques that help students strengthen their scientific enquiry and their ability to work scientifically. At Key Stage 4, students explore a broad range of new scientific topics and skills while following the GCSE AQA Combined Science (Trilogy) course at either foundation or higher tier. Each topic builds on the knowledge and understanding developed at Key Stage 3, with additional links that support further study or training for post-16. Students also study an entry level certificate in science to maximise their science outcomes when they leave Kingsmead. This is taught alongside the GCSE Combined Science course and has many overlaps between the content caught in lesson. This helps to deepen scientific knowledge and enhances student outcomes.
Curriculum Intent
Science at The Kingsmead School is driven by one goal: to provide a fascinating, challenging and exciting exploration of science to support pupils understanding of the world around them through the specific disciplines of biology, chemistry and physics. All students work towards the highest science qualification that reflects their ability and progress through their time with us. This helps to develop their understanding of the impact and importance of science in their lives and ever-increasing relevance in tackling the challenges of the world around them. The Science curriculum, across both Key Stages, is designed in a way to enable our pupils to grow into confident, resilient learners through a learning approach that develops practical, theoretical, mathematical and literacy skills. In an ever increasingly scientific world, with challenges such as the global pandemic and climate change, this approach aims to equip all pupils with the appropriate knowledge and understanding that supports them in become confident citizens who appreciate the impact and importance of science on their lives. Teachers are passionate and enthusiastic about the importance of pupils being able to engage and grapple with the concepts we deliver. Motivated by the acknowledgement of how science is changing all our lives and is vital to the world's future, we endeavour to inspire all students and to promote high levels of engagement, aspiration and progression that will hopefully take them beyond Key Stage 4 or careers made possible by their science outcomes. Students in years 7, 8 and 9 follow the National Curriculum over a three-year SOW that is designed to consolidate learning from Key Stage 2 and develop a deeper understanding of the range of scientific ideas in the subject disciplines of biology, chemistry and physics. The KS3 science scheme of work has something to offer every student studying at Kingsmead. Year 10 and 11 students follow the Combined Trilogy GCSE scheme of work. The Combined Trilogy pathway allows each KS4 student to gain a double award qualification in science. The GCSE Combined Science Trilogy offers practical activities as an integral part of teaching and learning. It offers a series of required

practical's that are clearly delivered by each subject teacher so that our KS4 students will have a clear understanding of what is required. Students also complete an entry level award in science to enhance their academic outcomes.

All students at both KS3 and 4 will complete practical tasks identified within the curriculum as part of the scientific enquiry. The expectation is that during Key Stage 3, students show progress in their scientific ability to predict, plan and carry out the most appropriate types of scientific enquiries. The ability to choose the most appropriate techniques, apparatus, whilst paying attention to health and safety in order to record observations and measurements using a range of methods for a variety of different investigations.

Once in KS4 students will develop skills allowing them to further evaluate the reliability of methods and suggest possible improvements to practical activities. In all lessons, students are encouraged to understand processes and methods of science through enquiry that help them to answer scientific questions about the environment around them and to develop a sense of excitement and curiosity about natural phenomena of the world we live in. Our aim is to dispel misconceptions, to develop key specialist science vocabulary, and to equip them with the scientific knowledge required to understand the uses and implications of science not only today but for the future.

Teaching and learning approaches are differentiated and considered, according to the needs of different groups of pupils. With this approach to teaching we aim to encourage students to question the scientific method and nurture their interest - at a level that is appropriate, challenging but never overwhelming - should they wish to pursue a deeper understanding of the scientific world around them.

Curriculum Implementation

At Kingsmead, we focus on the big ideas of science. We have a mix of biology, chemistry and physics topics which are incorporated into each year group at key stage 3 and key stage 4.

KS3 Science Curriculum

Big Ideas	Year 7	Year 8	Year 9
Forces	**CONTACT FORCES** • Balanced and Unbalanced • Friction • Density	**MOVEMENT** • Speed • Distance graphs	**GRAVITY** • Weight • Gravitational Force • Solar System
Energy	**ENERGY TRANSFERS** • Energy • Wasted Energy • Heat and Temperature	**ELECTRICAL ENERGY** • Electric Charge • Resistance • Electric Current • Voltage	**LIGHT AND SOUND** • Reflection • Refraction

Matter	**PARTICLES** • Particle Model **EARTH SYSTEMS** • Earth Processes • Potable Water	**SUBSTANCES** • Mixtures	**ATOMS, ELEMENTS AND COMPOUNDS** • Elements and Compounds • Simple or Giant **REACTANTS AND PRODUCTS** • Acid Reactions • Oxidation and Reduction • pH Scale • Neutralisation
Organisms	**CELLS** • Cell Structure • Specialised Cells	**TISSUES AND ORGANS** • Cell Organisation • Digestive System • Gas Exchange	
Ecosystems		**INTERDEPENDENCE** • Feeding Relationships • Competition • Abiotic and Biotic	**RESPIRATION AND PHOTOSYNTHESIS** • Cellular Energy • Aerobic anaerobic
Genes	**REPRODUCTION** • Sexual and asexual • Menstrual Cycle • Embryo Development		**SPECIES** • Natural Selection • Variation • Selective Breeding

Term	Year 7	Year 8	Year 9
Term 1a	Cells	Health and Digestion	Species
Term 1b	Contact Forces	Movement	Respiration and Photosynthesis
Christmas			
Term 2a	Reproduction	Interdependence	Acids and Bases
Term 2b	Earth Systems	Gravity	Sound and Light
Easter			
Term 3a	Particles	Electrical Energy	Atoms, Elements and Compounds
Term 3b	Energy Transfers	Substances	Y10- Biology ELC unit

KS4 Science Curriculum

Term	1A	1B	2A	2B	3a	3b
Y10	Bio ELC 1 • Cells • Microscopy • Cell Division and the Cell Cycle • Neurones • Reflexes and Reaction Time • DNA Structure • Genetic Disorders • Inheritance • Sex Determination • Natural Selection • Antibiotic Resistance • Selective Breeding • Genetic engineering • Variation	Chem ELC 3 • Atomic Structure • Development of the model of the atom • Atoms, Elements and Compounds • Electronic Structure and the Periodic Table • Atomic Number and Mass Number • Development of the Periodic Table • Ionic bonding • Covalent bonding • Metallic bonding • The Three States of Matter	Phys ELC 5 • Energy transfers • Renewable and non-renewable energy sources • Efficiency • Newton's 3rd Law and Forces in pairs • Gravity • Newton's 1st Law resultant Force • Work done • Forces and elasticity • Newton's 2nd Law • Power • Speed • Velocity • Distance Time Graphs Acceleration • Stopping Distance	Bio ELC 2 + extra Bio paper 1 • Diffusion, Active Transport and Osmosis • Human Organisation • The Human Digestive System • Food Tests • Enzymes • The Circulatory System • Plant Tissues • Photosynthesis • Aerobic and Anaerobic Respiration • Disease • Cardiovascular Disease • Risk factors of Disease • Cancer • Viral, Bacterial, Fungal and Protist Disease • Sexually Transmitted Disease • Plant Disease	Chem ELC 4 • Separating Mixtures • Reactivity Series • Extracting Metals • Acids and Metals • Neutralisation • Soluble Salts • pH Scale • Electrolysis • Pure Substances and Formulations • Chromatography • Gas Tests • Life Cycle Assessment • Potable Water • Earth's Resources	Phys ELC 6 • Structure of an atom • Mass number, atomic number and isotopes • Development of the atom • Radioactive decay • Nuclear equations • Half lives • Radioactive contamination • Waves • Wave properties • Electromagnetic spectrum • Density • Changes of State • Specific latent heat • Particle motion in gases

		• Properties of molecules • Carbon molecules • Alloys • Greenhouse Gases • Climate change and carbon footprint • Pollution		• Non-specific defence against pathogens • Immunity • Antibiotics • Drug Development		
Y11	**Extra Bio paper 2** • Homeostasis • Metabolism • Endocrine System • Controlling blood glucose • Menstrual Cycle • Contraception • Types of Reproduction and Meiosis • Adaptation • Extinction • Fossils • Classification • Communities • Quadrats and Transects • Carbon and water cycles • Global Warming • Pollution • Land use and Biodiversity	**Extra Chem Paper 1/2** • Word and Symbol equations • Relative atomic mass and Formula mass • The Periodic Table-Group 0 • The Periodic Table-Group 1 • The Periodic Table-Group 7 • State Symbols	**Extra Phys Paper 1/2** • Energy stores and Systems • Kinetic Energy • Gravitational Energy • Specific heat capacity • Renewable and Non-renewable energy sources • Circuit symbols • Electric charge • Current, resistance and potential difference • Resistance graphs • Series and parallel circuits • Wiring a plug • Power • Energy transfers in an appliance • The National Grid		**Revision** • Biology Paper 1 • Chemistry Paper 1 • Physics Paper 1 • Biology Paper 2 • Chemistry Paper 2 • Physics Paper 2	

		• Concentration of solutions • Metal Oxides • Exothermic and Endothermic reactions • Rates of Reaction • Collision theory • Catalysts • Reversible reactions and Equilibrium • Crude Oil and Fractional Distillation • Alkanes • Cracking, Alkenes and Polymers		