

KS3 Science – St Joseph’s College

Subject vision statement

In line with the National Curriculum, Science looks to support students in their understanding and exploration of the world around them. Students develop skills that enable them to explain how and why things happen while being analytical and curious. Students are encouraged to think big and apply key ideas to everyday phenomenon. Each discipline (Biology, Chemistry and Physics) is taught through distinct topics, while links in understanding across the Sciences is constantly referenced. There is a large focus on practical work to support the understanding of concepts and to give students the opportunity to develop skills that are beyond learned content.

Intent statement

What: Key elements across all three sciences (e.g. particle behaviour, energy, living organisms, forces) are taught and developed across all key stages; each one drawing on fundamental concepts from previous learning and providing opportunity to develop and broaden students' understanding of the key themes that underpin scientific theory. Students revisit practical work regularly; developing skills linked to identifying variables, writing methods, analysing data and evaluating equipment and techniques, which enable them to become curious and independent scientists. Alongside developing scientific understanding, there is a core focus on the use of numeracy and literacy skills across all key stages, which enable students to successfully access all parts of the subject.

How: The structure of the Science curriculum provides varied opportunity for students to feel success and develop their interest in such a dynamic subject. Practical work, with key aspects such as planning, actioning, analysing and evaluating, is built in at every opportunity and given distinct focus. Students are encouraged to think like scientists and to develop their skill set beyond the acquisition of knowledge. The inclusion of a Reading Week in Key Stage 3 supports students in their developing of key literacy skills, including analysing and evaluating sources of information and considering their validity. There is a high level of focus on the acquisition of new language to enable students to access the curriculum, thinking about the etymology and morphology of key terms. Numerical skills are woven throughout the Science curriculum, providing opportunity to model and develop these frequently.

At KS3 students are assessed using exam-style question during assessment points, focusing on the core skills needed to be a successful scientist: Knowledge recall, Mathematical skills, Graphical skills and Practical skills. Students have the option to select Triple Science as part of their GCSE choices. At KS4 students are assessed using GCSE exam questions, with final external assessments taking place at the end of the Year 11. At KS5 students can choose between the pure A Level subjects (Biology,

Chemistry and Physics) or the more contextual BTEC Applied Science course (offered as both a single and double option). A Levels are assessed at the end of the two-year course while the BTEC offers a blended approach of assessments throughout alongside high demand coursework tasks.

Why: Science enables us to explain what is happening around us; it encourages students to be curious and to ask questions. There is the opportunity to provide transferable skills, including numerical skills, analytical skills and high-quality oracy skills. Boosting science capital is of particular importance as the world develops new and exciting technology, and a rigorous but exciting curriculum is important for students to consider STEM subjects and careers in their future, where they will be at the centre of change and innovation.

Year 7						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	<p>Skills and Cells (Learning about key scientific skills like practical work, lab safety and graph drawing)</p> <p>Atoms (Atoms, elements, mixtures & compounds. Using separation techniques)</p> <p>Forces & Motion (Learning Newton's 1st & 2nd law, Mass vs weight and gravity)</p>	<p>Structure & function (Learn about organ systems and organs in plants and animals)</p> <p>Particles - conservation of mass and energy (The particle model, changes of state and conservation of mass)</p> <p>Energy transfer (Understanding energy stores, transfer and renewable energy sources)</p>	<p>Acids & Alkalis (Carrying out practicals including neutralisation reactions, making copper sulphate crystals and learning about the pH scale)</p> <p>Reproduction (Exploring the changes in males and females during adolescence and puberty, the organs in the reproductive system and the processes of fertilisation, menstruation and reproduction in plants)</p>	<p>Space (Understanding different celestial bodies, what causes day, night and the seasons as well as how stars are born)</p> <p>Science week (Students will carry out practical work to engage them and try to build a curiosity in the subject)</p> <p>Cells project (Students will undertake a creative project based on a specialised cell of their choice)</p>	<p>Health & Lifestyle (Understanding the different nutrient groups and what makes a balanced diet. Testing different food samples for specific nutrients)</p> <p>Waves – sound (Understanding the differences between transverse and longitudinal waves, the properties of waves and how we hear sound waves)</p>	<p>Literacy week (Students will have 3 lessons to improve their literacy in science, using scientific articles and assessing bias)</p> <p>Extinction (Learning about fossils, dinosaurs and extinction. This topic will give students an opportunity to research extinction and dinosaurs and engage in debate)</p> <p>Light (Understanding what light is and how we see different colours of light, investigating reflection and refraction and dissecting an eye)</p>
Building on (knowledge, concepts and skills) KS2	<p>Building on student's skills developed during KS2:</p> <p>"Gathering, recording, classifying and presenting data in a</p>	<p>Building on Year 6 students' prior knowledge of organisation, outlined on the national curriculum</p>	<p>Building on student's prior knowledge of organisation, studied in Year 6.</p>	<p>Building on students' prior knowledge of Earth and the solar system to further their understanding of celestial bodies and the relationship</p>	<p>Building on students' prior knowledge of diet and healthy lifestyle, covered in Year 6 as stated on the national curriculum.</p>	<p>Building on students understanding of light from KS2, introducing the topic of waves and their properties.</p>

	<p>variety of ways to help in answering questions"</p> <p>Also, building on Year 5's prior knowledge of forces, outlined in the national curriculum</p>			between Earth and the moon and sun.		Also, building on the concept of adaptation and evolution covered in Year 6.
Building towards (knowledge, concepts and skills) KS3	Building towards students practical independence in the laboratory, including safely carrying out practical work and effectively collecting and analysing data.	Building towards energy equations in KS4, organisation and the relationship between different organ systems.	Building towards reproduction, hormones and cell division. Titration and neutralisations.	Building towards gravity equations and astrophysics (Triple). Literacy, presentation and investigative skills.	Building towards key nutrients and their roles, deficiencies and food tests. Wave properties and transverse vs longitudinal waves.	Building towards adaptations and evolution, natural selection and favourable traits. Wave properties, anatomy of the eye (Triple).
Independent enrichment (wider reading and learning suggestions)	<p>CGP KS3 Science Revision Guide and Workbook https://www.bbc.co.uk/bitesize/subjects/zng4d2p Twinkl website for resources https://www.mathsociety.org.uk/ks3science https://www.youtube.com/@MattGreenJGM</p>					
SMSC			Discussions around the options available for contraception.	Science week: providing contextual science investigation opportunities.	Discussions about healthy living and making healthy choices in relation to diet.	ZSL summer trip
Careers			Medical sciences e.g. midwife	Geologist	Nutritionist	Journalist, Research scientist

Year 8						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	<p>Skills (Asking scientific questions, lab safety and practical techniques including identifying variables and graph drawing)</p> <p>Mixtures (Investigating solubility)</p> <p>Electricity (Understanding static electricity and electrical circuits, circuit symbols and calculations including potential difference, current and resistance)</p>	<p>Ecosystem processes (Students will learn about photosynthesis, the structure of plants that contributes to photosynthesis, aerobic and anaerobic respiration. Learning about food chains, food webs and ecosystems)</p> <p>The periodic table (Understanding metals, non-metals and their properties, the difference and relevance of groups and properties and reactivity series)</p> <p>Energy transfer (Energy stores & transfers, conduction, convection & radiation)</p>	<p>Inheritance (Competition and adaptation, how these adaptations lead to changes and variation. DNA, inheritance and how differences in DNA lead to natural selection.)</p> <p>Motion & Pressure (Speed, drawing graphs of distance vs time and graphs of velocity vs time. Learning about pressure in solids, liquids and gases.)</p>	<p>Magnets (Learning about electromagnets and investigating how to change the strength of an electromagnet.)</p> <p>Science week (Students will carry out practical work to engage them and try to build a curiosity in the subject)</p> <p>Earth (Students will learn about how materials are cycled, including water, carbon and nitrogen, as well as learning about global warming)</p>	<p>Health & Lifestyle (Students will test food groups for key nutrients. The difference between a balanced diet and an unhealthy diet. Students will also learn about how food is digested and how nutrients are absorbed, as well as enzymes role in digestion)</p> <p>Chemical reactions (Students will learn that chemical reactions involve the rearrangement of atoms to form new compounds. They will investigate exothermic and endothermic reactions and carry out combustion, thermal decomposition, oxidation and displacement reactions)</p>	<p>Literacy week (Students will have 3 lessons to improve their literacy in science, using scientific articles and assessing bias)</p> <p>Turning points in Biology (Students will learn about important Biologists in history and when key concepts were first thought of and developed. The topics will include pathogens, antibiotics, vaccines, microscopes and DNA.)</p>
Building on (knowledge,	Building on Year 7 lab safety and skills. Building on atoms.	Building on students' knowledge of	Building on prior knowledge of	Building on previous knowledge of ks2 magnets, forces,	Building on students' prior knowledge of	Building on students' prior knowledge of cells

concepts and skills)		elements. Building on prior knowledge of organisation.	forces and inheritance.	attraction and repulsion.	health and lifestyle and balanced diet. Building on atoms, compounds and elements.	and scientific investigation.
Building towards (knowledge, concepts and skills)	Building towards electrical circuits, formulae for power, potential difference etc.	Building towards ecology at KS4, using the Periodic table to support knowledge and waves topics.	Building towards the inheritance and forces topics at KS4.	Building towards the magnets and electromagnets and chemistry of the atmosphere topics at KS4. Literacy, presentation and investigative skills.	Building towards key topics on chemical reactions in Y9 and KS4 and digestion topics at KS4.	Developing ideas around how models can support our understanding of key scientific concepts.
Independent enrichment (wider reading and learning suggestions)	CGP KS3 Science Revision Guide and Workbook https://www.bbc.co.uk/bitesize/subjects/zng4d2p Twinkl website for resources https://www.mathsociety.org.uk/ks3science https://www.youtube.com/@MattGreenJGM					
SMSC			ScienceLive! KS3 trip Discussions around inherited diseases.	Science week: providing contextual science investigation opportunities.	Discussions about healthy living and making healthy choices in relation to diet.	
Careers		Environmental scientist		Materials scientist, Environmental sciences	Medical scientist	Research scientist, Journalist

Year 9						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	Are we really made of stardust? (the life cycle of a star and exploring how forces behave in the universe) How do we stop a pandemic? (an understanding of infection and response)	How can chemicals be changed? (understanding how mass is conserved in chemical reactions) If energy cannot be created or destroyed, why does it look like it disappears? (understanding how energy is transferred, how to build a circuit and how plugs work)	How do we know if a substance is safe or dangerous? (understanding how to test substances to determine what is in them)	Are humans the most dangerous organism on Earth? (exploring the theory of evolution and the evidence supporting it) Science week (Students will carry out practical work to engage them and try to build a curiosity in the subject)	Particle model of matter, Respiration and Energy changes (beginning to understand the underpinning knowledge ready for GCSE teaching)	Rate of chemical reactions and Models in Science (applying ideas to scientific concepts)
Building on (knowledge, concepts and skills)	Y7 Forces and Motions (gravity, mass and weight) Y7 Space (the Earth: the birth of the star) Y8 Health and lifestyle (Unhealthy diet, Drugs; Alcohol; Smoking)	Y7 Skills (Lab safety. Bunsen Burner.) Y7 Atoms (Elements and compounds; Chemical formula – naming compounds; Mixtures. Practical: Separation techniques)	Y7 Skills (Lab safety. Bunsen Burner.) Acid and Alkalis (Practical - Neutralisation. pH scale. Practical – Making copper sulphate salt) Y8 Skills	Y7 Skills and cells (Structure of animal cell. Specialised cells) Y7 Reproduction (Fertilisation and implantation) Y7 Extinction (Fossils. Dinosaurs. Extinction) Y8 Inheritance	Y7 Particle model: conservation of mass and energy (States of matter. Changes of state. Boiling. Melting and freezing.) Y7 Structure and Function (Photosynthesis) Y8 Ecosystem processes	Y7 Skills (Lab safety. Bunsen Burner.) Y7 Acid and Alkalis (Practical - Neutralisation. pH scale. Practical – Making copper sulphate salt) Y8 Skills

		<p>Y7 Acid and Alkalis (Practical - Neutralisation. Ph scale. Practical – Making copper sulphate salt)</p> <p>Y7 Particle model: conservation of mass and energy (States of matter. Changes of state. Boiling. Melting and freezing.)</p> <p>Y7 Energy transfer (Energy stores (KE, GPE. EPE). Energy transfer and conservation (Phet Colorado simulator))</p> <p>Y8 Skills (Lab safety, Practical -Burning magnesium - showing change in mass)</p> <p>Y8 Periodic Table (Properties of metals and non-metals. Reactivity series and reactions of metals in water, oxygen and water, Practical - Displacement reactions)</p> <p>Y8 Chemical reactions (types of reactions)</p>	<p>(Lab safety, Practical -Burning magnesium - showing change in mass)</p> <p>Y8 Periodic Table (Properties of metals and non-metals. Reactivity series and reactions of metals in water, oxygen and water, Practical - Displacement reactions)</p> <p>Y8 Chemical reactions (types of reactions)</p>	<p>(Competition and Adaptation. Variation. DNA and Inheritance. Natural selection)</p>	<p>(Photosynthesis. Aerobic and anaerobic respiration. Food chains and webs)</p>	<p>(Lab safety, Practical -Burning magnesium - showing change in mass)</p> <p>Y8 Periodic Table (Properties of metals and non-metals. Reactivity series and reactions of metals in water, oxygen and water, Practical - Displacement reactions)</p> <p>Y8 Chemical reactions (types of reactions)</p>
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		Y8 Energy transfer (Energy stores and transfers -revisited. Conduction. Convection. Radiation)				
Building towards (knowledge, concepts and skills)	Building towards the key aspects of energy and forces explored in GCSE Physics; students will develop their understanding both contextually and from a numerical perspective, developing confidence in the use and rearranging of equations. Building towards topics that explore cell structure, infection, and response to infection in GCSE Biology; students will continue to develop ideas about how the body responds to disease, including how pathogens exploit weakness, including use of graphs to model this.	Building towards key ideas across many topics in GCSE Chemistry in relation to chemical reactions; students will need a concrete understanding about how chemicals can be changed and how we measure this mathematically. Students will begin to develop confidence in the writing and balancing of chemical equations. Building towards the core concept of energy in GCSE Physics, particularly exploring how energy and electricity are used in the home.	Building towards the final topics in GCSE Chemistry which look at the analysis of chemicals and preparing those students that look to take Triple Science for specific knowledge they must learn. Students will also gain clearer understanding of how to structure investigative practical work.	Building towards topics in GCSE Biology that look at inheritance and evolution; students will begin to understand the theories that are used to explain evolution including natural selection. Students will start to think about what is needed for a theory to be accepted, so they can apply this to other areas of the science curriculum.	Beginning to develop understanding of content for GCSE science, developing concrete ideas about the particle model to support topics in GCSE Physics and Chemistry, as well as beginning to represent energy changes in a chemical reaction graphically and link the process of respiration with how the energy is obtained and used in the body.	Continuing to develop the understanding of GCSE content, particularly focussing on measurements of chemical reactions and how their rate can be effected, which is applicable in the explanations found in the Chemical changes topic. Developing analytical skills for models which supports students in their ability to critique models used for bonding and structure.
Independent enrichment (wider reading)	CGP KS3 Science Revision Guide and Workbook https://www.bbc.co.uk/bitesize/subjects/zng4d2p Twinkl website for resources					

and learning suggestions)	https://www.mathsociety.org.uk/ks3science https://www.youtube.com/@MattGreenJGM					
SMSC	Discussion about the impact of the COVID 19 pandemic.			Discussions around the theory of evolution and evidence for this, Science week: providing contextual science investigation opportunities.		
Careers	Medical sciences	Electrician, Materials scientist	Toxicologist, Forensic scientist	Marine biologist, Research scientist, Filmography, Structural engineer		Research scientist