



Science at St. Joseph's

At St. Joseph's we place a strong emphasis on providing a primary curriculum that is driven by faith, enrichment, equality and diversity, learning for life, and oracy. Our curriculum aims to enhance the educational experience of all pupils by providing opportunities for intellectual, social, and personal growth.



Intent

At St Joseph's Primary School, we believe that every child should learn about science in a way that is engaging, educational and relevant throughout their school years. By the time they leave primary school, children need the right knowledge and investigative skills for their secondary education. It is important that they are able to see the relevance of science in their own lives, and imagine future science-related careers based upon it.

Recent research by UCL has highlighted that: "Children's 'science identities' - the extent to which they see science as 'for them' - are formed early and affect their future interests and aspirations." The early years are critical for building knowledge and vocabulary. While building knowledge is always beneficial, the early years are especially important. Some children build lots of academic knowledge at home, but others rely on school. In the early years, the gaps are still relatively small and the odds of catching up are better.

So that children to grow to be literate and read widely with ease, we have adopted a science curriculum which builds broad knowledge teaching all the knowledge that writers assume readers have. This is because reading comprehension depends on broad knowledge and a large vocabulary.

In line with the National Curriculum Objectives for Science, our intent is that all pupils:

- develop scientific knowledge and conceptual understanding
- develop understanding of the nature, processes and methods of science
- develop scientific enquiries that help children to answer scientific questions about the world around them

At St Joseph's, we take every opportunity to explore our locality and make natural links to the curriculum. Fundamental British Values are interwoven throughout the science curriculum in order to enhance the cultural capital of the children.

Development Priorities:

- Implement 'Dive Deeper' into daily marking and feedback.
- Monitor and 'Tweak to Transform' slide formatting.
- Displays to include anchor charts and children's science achievements.
- Continue to embed scientific vocabulary, using a wide variety of strategies.
- Pupils meet female scientists and engineers to challenge gender stereotypes.
- Science floor books to be developed for all year groups to support children's learning and refresh learning.
- Audit Science resources and order as necessary.

Implementation

We plan units of work that will challenge prior knowledge in order to construct a good, new understanding of substantive **knowledge**. The extensive substantive knowledge for science is carefully sequenced over time. Only after the baseline substantive knowledge has been learnt, is the **disciplinary knowledge** covered. This deepens pupils' understanding of scientific concepts through developing the understanding of scientific methods, degrees of certainty and conducting investigations. Prior knowledge must be re-visited before introducing new ideas, and misconceptions are actively diagnosed and discussed.

Scientific teaching and learning:

- is based on children's existing concepts in science
- arouses curiosity about natural phenomena which stimulates the posing of questions about such phenomena
- is a systematic means of enabling the children to ask and attempt to answer questions arising from observations
- provides models of scientists who have contributed to the field of science
- exposes students to the various strands of specialisation but which are still related
- recognises that different students experience science differently

Scientific vocabulary is a focus, beginning in EYFS, with non-negotiable vocabulary for all, including EAL, PP and SEND children. Vocabulary from the previous lesson, year group and key stage is re-visited and built upon, to enter long-term memory as 'sticky knowledge'. New vocabulary is explicitly taught. Children should read, spell and pronounce scientific vocabulary correctly, within context, as appropriate to their developing reading and spelling skills.

Science resources are prioritised in school to deliver high quality lessons. To enrich Science, a weekly lunchtime science club has run. The profile of Science is elevated by showcasing children's art lessons on the school's Facebook page and awards for Science work in celebration assembly.

Impact

At St Joseph's, the expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. We aim for each child to be confident in each yearly objective and develop their ability to use this knowledge to develop a greater depth understanding. However, decisions about when to progress are always based on the security of pupils' understanding and their readiness to progress.

We believe that our science curriculum is progressive, challenging and relevant. It is carefully planned to demonstrate progression. We measure the impact of our curriculum in several ways, including: learning walks, pupil voice, lesson observations and identifying key skills to aid teacher assessment

Through our science curriculum we envisage that:

- Children will become resilient, independent and curious scientists who ask questions and find things out for themselves.
- Science will be a high-profile subject throughout the school
- Children will be enthusiastic and motivated scientific learners
- Parents and the wider community will support science learning through trips and visitors
- Children will have an awareness of the full range of scientific careers and pathways available to them, and will be keen to pursue STEM subjects at secondary school
- Children will leave for secondary school equipped with the scientific knowledge and skills needed to succeed in their further education

Strengths:

- EYFS develops firm foundations which support the KS1 and KS2 curriculum.
- Quality first teaching.
- Explicit teaching of scientific vocabulary is prioritised to embed ambitious vocabulary and support understanding.
- SEND identified and 'keep up' not 'catch up' strategies used.
- High expectations of all children including SEND and PP.
- Science Co-ordinator is a science specialist.



Science—Curriculum Coverage

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	Autumn	Spring	Summer	Notes
Reception	<u>Understanding the World</u> Describe changes of state. Name parts of plant during harvesting. Describe and represent the home naming rooms and parts of the building. Know that children were babies in the past. Know that adults were children in the past. Know that adults can remember things from the past. Recycle household objects. Describe roles of significant adults in the community. Describe changes to trees and woodland plants in autumn. Know and demonstrate how to plant bulbs. Predict how it will grow. Describe and explain changes of state with Christmas chocolates.	<u>Understanding the World</u> Describe changes to trees and woodland plants in winter. Describe and explain changes of state in water during winter. Name locality features on a local walk. Name other special buildings in our community. Describe and recall life cycles. Identify similarities with babies and four year olds. Describe how people change from 0-4. Identify similarities and differences between 4 year olds and adults. Know farm animals, their homes and features. Know the life cycle of a Frog	<u>Understanding the World</u> Describe changes to trees and woodland plants in spring. Know and demonstrate how to grow and care for seedlings. Name physical features of the beach environment. Describe changes to trees and woodland plants in summer. Identify similarities and differences between seaside and woodland animals. Compare physical features of the coast and inland.	
Year 1	<u>Animals Including Humans</u> Identify (birds, fish, amphibians, reptiles, mammals), describe and compare structure Identify carnivores, herbivores and omnivores	<u>Everyday Materials</u> Distinguish between object and material it is made of Identify everyday materials (examples) Describe simple physical properties of materials Compare/group materials by physical properties	<u>Animals Including Humans</u> Label human body parts, link to senses <u>Plants</u> Identify (garden, wild, trees) Deciduous, evergreen Basic structure of a variety of common flowering plants, incl. trees (roots, stem, leaves, flower)	
Year 2	<u>Animals Including Humans</u> Offspring into adults Explain basic needs for survival (water, food and air) Need for exercise/nutrition/hygiene	<u>Uses of Everyday Materials</u> Identify/compare uses of everyday materials Find out how shapes of solids can be changed by squashing, bending, twisting & stretching	<u>Living Things and Habitats</u> Explain difference between living, dead and non-living (7 processes of life) Live in habitats (suited) Habitats provide basic needs. Depend on each other. Study habitats/microhabitats <u>Plants</u> Food chains (feeding only) Growth from seed/bulb Requirements for growth (water, light and suitable temperature)	
Year 3	<u>Forces and Magnets</u> Compare how things move on different surfaces Explore push/pull Contact forces and 'distance' forces (gravity/magnetism) Magnets attract/repel; two poles Compare/group materials with magnets <u>Light</u> Recognise need light to see things; dark is absence of light Light can be reflected Light from sun can be dangerous to eyes Shadows (light blocked) Patterns in the size of shadow	<u>Rocks</u> Compare/group on physical properties Fossil formation (trapped in rock) Recognise soils are made from rocks and organic matter	<u>Animals Including Humans</u> Get nutrition from food Skeletal/muscular system (simple names) and functions <u>Plants</u> Identify/describe functions of parts Explore requirements for growth (air, light, nutrients, room) and how they vary Investigate transport of water Role of flowers in life cycle (pollination, seed formation/dispersal)	
Year 4	<u>Living Things and Habitats</u> Recognise living things can be grouped in different ways Explore and use keys Identify/name variety of living things in environment	<u>States of Matter</u> Compare and group materials as solids, liquids or gases Explain change state with heating and cooling (°C) Role of evaporation & condensation in water cycle	<u>Sound</u> Identify how sounds are made How sounds travel through medium to ear (vibration) Explain sound travels away from source, gets fainter	



What Drives Our Science Curriculum?



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Faith in Science

Our curriculum helps pupils to develop a deep understanding of their faith and how it informs their lives and interactions with others.

Throughout our Science curriculum, we promote spirituality by encouraging children to ask Big Questions. In lessons, we promote core values such as teamwork, cooperation and supportive partnerships.

The topic of faith is threaded through our Science teaching and the opportunities offered to appreciate all faiths. Children are supported to grow in confidence in Science, viewing themselves as God's creations and fulfilling their potential.

Children are nurtured to understand that they are made in the image and likeness of God.

Equality and Diversity

Our curriculum ensures that every student has access to a high-quality education regardless of their background or abilities. We reflect the diverse needs and interests of our pupils, providing a level playing field for all to succeed.

Our Science curriculum is ambitious for all of our children and aims to embrace, celebrate, highlight and foreground diversity. All children access this curriculum regardless of additional need, disadvantage or social circumstance. The diversity of Britain is reflected in lesson plans and the language in lesson materials is non-discriminatory. Teachers actively avoid using stereotypes in classroom resources and examples. Scientific contributions of under-represented groups are highlighted throughout the year (as opposed to a focus during Black History Month). The scientists illustrating STEM careers that are shared with children are chosen to represent cultural, ethnic and social diversity. Careful and timely assessments ensure that all children keep up with the curriculum we have planned.

Enrichment in Science

We believe that pupils should be challenged and inspired in their learning. Our curriculum offers a range of extra-curricular activities and opportunities for pupils to explore their passions and interests, fostering creativity and critical thinking.

Enrichment in Science is centred around the topics and themes we carefully choose and hook children into. Every topic used in Science lessons is carefully and deliberately chosen because of what it offers beyond the aspects of the science curriculum. Activities are carefully planned to ensure that children become passionate about scientific knowledge as well as working scientifically. We provide opportunities for the enrichment of Science through our active Science Club and also with carefully selected educational visits and visitors.

Learning for Life

We aim to prepare pupils for the challenges and opportunities of the future. Our curriculum provides pupils with the skills, knowledge, and attitudes needed to succeed in a rapidly changing world, fostering independence, creativity, and critical thinking.

The specific skills and knowledge children develop through our ambitious Science curriculum ensure that they are fully equipped for the next stage of their education; to help them to think scientifically, to gain an understanding of scientific processes and also an understanding of the uses and implications of Science, today and for the future. We aim for our children to develop an interest and enthusiasm for Science, given the tools to be global citizens and ready to face the challenges of the future. We aim to give them the skills to develop a good attitude to learning, skills in self-management, self-regulation, resilience, drive and determination to be the best that they can be and an excitement to make a difference.

Oracy in Science

Our curriculum provides pupils with opportunities to develop their speaking, listening and eloquence to raise aspirations and prepare them for a lifetime of confident and effective communication.

Our Science curriculum aims for children to learn to articulate ideas, develop understanding and engage with others through spoken language. In school, oracy is a powerful tool for learning; by teaching students to become more effective speakers and listeners we empower them to better understand themselves, each other and the world around them. Teachers skilfully plan opportunities to model oracy in Science lessons and empower children to confidently take part in discussions. We plan opportunities for children to speak publicly about Science and build their confidence so that they can articulately express opinions.



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Year 1	<u>Animals Including Humans</u> Identify (birds, fish, amphibians, reptiles, mammals), describe and compare structure Identify carnivores, herbivores and omnivores <u>Observe changes across seasons</u> Observe & describe weather / day length changes with seasons Autumn to Winter	<u>Everyday Materials</u> Distinguish between object and material it is made of Identify everyday materials (examples) Describe simple physical properties of materials Compare/group materials by physical properties <u>Observe changes across seasons</u> Observe & describe weather / day length changes with seasons Winter to Spring	<u>Animals Including Humans</u> Label human body parts, link to senses <u>Plants</u> Identify (garden, wild, trees) Deciduous, evergreen Basic structure of a variety of common flowering plants, incl. trees (roots, stem, leaves, flower) <u>Observe changes across seasons</u> Observe & describe weather / day length changes with seasons Spring to Summer	
Year 2	<u>Animals Including Humans</u> Offspring into adults Explain basic needs for survival (water, food and air) Need for exercise/nutrition/hygiene	<u>Uses of Everyday Materials</u> Identify/compare uses of everyday materials Find out how shapes of solids can be changed by squashing, bending, twisting & stretching	<u>Living Things and Habitats</u> Explain difference between living, dead and non-living (7 processes of life) Live in habitats (suited) Habitats provide basic needs. Depend on each other. Study habitats/microhabitats <u>Plants</u> Food chains (feeding only) Growth from seed/bulb Requirements for growth (water, light and suitable temperature)	
Year 3	<u>Forces and Magnets</u> Compare how things move on different surfaces Explore push/pull Contact forces and 'distance' forces (gravity/magnetism) Magnets attract/repel; two poles Compare/group materials with magnets <u>Light</u> Recognise need light to see things; dark is absence of light Light can be reflected Light from sun can be dangerous to eyes Shadows (light blocked) Patterns in the size of shadow	<u>Rocks</u> Compare/group on physical properties Fossil formation (trapped in rock) Recognise soils are made from rocks and organic matter	<u>Animals Including Humans</u> Get nutrition from food Skeletal/muscular system (simple names) and functions <u>Plants</u> Identify/describe functions of parts Explore requirements for growth (air, light, nutrients, room) and how they vary Investigate transport of water Role of flowers in life cycle (pollination, seed formation/dispersal)	
Year 4	<u>Living Things and Habitats</u> Recognise living things can be grouped in different ways Explore and use keys Identify/name variety of living things in environment Recognise environments change and pose dangers to living things <u>Animals Including Humans</u> Digestive system (simple) Teeth (incl. structure/function) Construct food chains (producers, predators & prey)	<u>States of Matter</u> Compare and group materials as solids, liquids or gases Explain change state with heating and cooling (°C) Role of evaporation & condensation in water cycle <u>Electricity</u> Identify common appliances Construct simple circuit Series circuit, incl. switches Common conductors (metals) and insulators	<u>Sound</u> Identify how sounds are made How sounds travel through medium to ear (vibration) Explain sound travels away from source, gets fainter Patterns in pitch and object that produced it	
Year 5	<u>Living Things and Habitats</u> Life cycles Reproduction in some plants & animals (incl. sexual /asexual) <u>Earth & Space</u> Movement of Earth relative to sun and planets (solar system) Movement of Moon relative to Earth Sun, Earth, Moon are spherical Day and night	<u>Forces</u> Objects fall towards earth due to force of gravity Effects of air/water resistance and friction Some mechanisms, incl. levers, pulleys & gears, allow a smaller force to have greater effect <u>Properties and Changes of Materials</u> Compare/group materials Explain dissolving to form a solution Recovery Separating mixtures Changes in state	<u>Animals Including Humans</u> Changes as humans develop to old age (incl. puberty)	
Year 6	<u>Living Things & Habitats</u> Describe classification into broad groups (animals, plants, microbes) based on observable features Reasons for classifying plants & animals based on specific characteristics <u>Animals Including Humans</u> Identify/name parts of human circulatory system Functions of heart, vessels and blood Impact of diet, exercise, drugs and lifestyle on body function Transport of water/nutrients in animals	<u>Evolution and Inheritance</u> Living things change over time (fossil evidence) Recognise offspring normally vary and are non-identical to parents Explain how adaptation leads to evolution	<u>Electricity</u> Explain variation in brightness, loudness with number & voltage of cells used Explain variations in component function (brightness, loudness, on/off) Recognise symbols in circuit diagram <u>Light</u> Light travels in straight lines from a light source or reflected into the eye Ray model to explain size of shadows (prediction)	

Pre-teaching and re-teaching will take place throughout the year during past/pre learning refresh 5 minute sessions at the beginning of Science lessons (sticky knowledge).