



## Science



*Science at St Paul's seeks to extend children's natural curiosity and eagerness to ask questions about the world, enabling them to develop and evaluate explanations through experimental evidence and modelling. Team work, independence and inventiveness are embedded in our learning and are key attributes for today's scientists. We aim to provide opportunities to ensure pupils acquire knowledge which they can retain in the long term.*

### **Our Vision for science**

Inspired by God's love for us, we illuminate the goodness in others, we care for and protect His children and reach out to help others flourish in their journey to the fullness of life.

The study of science at St Paul's helps our pupils understand how the world in which we live shapes our lives, and how we in turn shape the world around us. At St Paul's we aim for a high quality science curriculum which should inspire in pupils a curiosity and fascination about how things work: living things, man-made inventions and discoveries, and the way natural laws affect our world.

Our teaching will equip pupils with the foundations of biology, chemistry and physics which are detailed in the national curriculum. We want children to enjoy and love learning about science by gaining this knowledge and skills, not just through experiences in the classroom, but also with educational visits and whole school science days.

We hope that in teaching in this way, our pupils increasingly develop the ability to ask and answer questions about how things work: from our human bodies to electricity to the growth of plants. An increasing scientific knowledge will enable children to understand the world in which they live and so reach out to care and protect it.

Lessons involve many practical activities and all children are encouraged to show their understanding in a variety of ways from drawings, photographs, discussion, modelling, sorting and writing.

**Rationale – Why we do what we do...** Over the past few years, St Paul's have found like nationally, that there has been a difference in the language skills of children as they enter in Reception. We have also noted a marked difference in the children's levels of independence, resilience, ambition (skills for life), this along with a need to promote a more deep rooted love of reading, has prompted us to shape our curriculum with greater emphasis in these areas. With this in mind, vocabulary lists for each topic and for 'Working scientifically' are provided. Practical observations provide opportunities for extending children's ability to discuss and use precise vocabulary. Write ups and non-fiction research are often continued in English lessons. Working in a pair or a small group to experiment encourages independence and teamwork.

After completing a science audit with pupils and staff we found that children were fascinated by science and were good at explaining concepts which are statutory in the national curriculum. They had experienced a wide range of practical activities designed to explain scientific principals and extend their ability to experiment fairly. We wanted to improve their ability to ask their own questions and carry out their own fair tests.

As a result we are now using investigation posters to foster independent planning and carrying out of fair tests. The focus is increasingly on conclusions and how they relate to the real world. A clear progression map for 'Working Scientifically' is now in place which tells each year group what skills they need to cover.

### **How do we enable children to learn more and retain more?**

#### **Timings and timetable:**

In Reception, science is taught as part of the 'The World' as well as in 'Technology' and 'Health and self-care'. It is taught through whole class, small group and 1:1 learning with a mixture of adult-led learning and some child-initiated learning with sustained shared thinking.

Across the rest of the school, science is taught as a discrete subject for 2 hours a week to enable the National Curriculum to be covered. Where possible topics are linked to the rest of the curriculum e.g. Levers and pulleys in conjunction with the Egyptians. Writing up of experiments and factual research also takes place in English lessons, and data collection and graphs in maths. This ensures breadth and depth of knowledge and secure knowledge retention and skills progression.

#### **Science– An Overview:**

Discoveries and technology are happening at an incredible rate! The study of science helps our pupils understand how the world in which we live shapes our lives, and how we in turn shape the world around us. At St Paul's we aim for a high quality science curriculum which should inspire in pupils a curiosity and fascination about the world and how it works. Our teaching equips pupils with scientific knowledge and an increasing ability to ask and answer questions.

We want children to develop scientific skills: asking questions; focussed systematic observations; collecting and analysing data using a variety of graphs; using measuring equipment e.g. thermometers, force meters and eventually be able to identify scientific evidence that has been used to support or refute ideas or arguments and be introduced to the degree of trust in data. We want children to enjoy and love learning about science by gaining this knowledge and skills, not just through experiences in the classroom, but also through a whole school science day and educational visits. We hope that in teaching in this way, our pupils become knowledgeable inhabitants of our planet, aware of its diversity, inventions and discoveries and passionate about its protection. In ensuring high standards of teaching and learning in science, we implement a curriculum that is progressive throughout the whole school.

Science is taught as part of a half-termly topic, focusing on knowledge and skills stated in the National Curriculum. Progression is seen in the way children's understanding of investigations gradually expands throughout the school. Each year (1-6) has 'Ten Steps for Success' and in addition, a subject progression map plots skills which should be covered in each year group.

How do we vary our teaching to cater for all learning styles and all needs? Practical work is ideally suited to children who find reading and writing difficult and they are encouraged to show their understanding aurally and pictorially.

Enrichment is an important part of the Science curriculum. There are a range of trips which have been designed with a science focus, including Year 6 visit to the Science Museum in London, Cardiff's Techniquest, Science day organised by St. Mary's High School as well as various outside speakers. Links are made to make explicit what jobs and professions interest in specific skills and knowledge may lead towards.

Whole school science days around a particular topic have been enjoyed by all and have raised the profile of science throughout the school. These have included the opportunity for Years 4, 5 and 6 to go up to Bishop's High School. Their science staff have also run staff meetings to help our staff prior to these days as well as proved us with relevant resources.

Assessing outcomes in Science is rigorous and focused. Teachers regularly review learning and knowledge within and after lessons and adapt their teaching as a result.

In Reception, all children have a personalised 'Learning Journey' using Tapestry which is used to record learning from all areas of learning across the year. Teachers use this evidence to ensure that all children are making progress and attaining well. Where children are not meeting expected standards, teachers provide additional support where appropriate.

Throughout KS1 and 2, children discover and learn more about Science. All acquired knowledge and experimentation of skills linked to Science is recorded in pupils' individual Science books. Data is also collected on an excel spreadsheet where each year group has 10 steps to Success which cover both AT1 and topic specific knowledge. Attainment is colour coded from red (Not at that level of understanding) yellow (Understands with support) green (Understanding at a level for that year group) Blue (Greater depth). A Working Scientifically table shows what should be covered in each year group and ensures teachers have easy access to what has been covered in previous years and what this will lead to in future years.

The Science subject leader completes regular monitoring of attainment and progress through a combination of pupil voice, book monitoring and matching actual outcomes to intended outcomes as identified in the Science 'National Curriculum– Knowledge, Skills and Vocabulary' document. From this monitoring, key actions are given to the teacher and are re-visited frequently.

The Science subject leader then has a formal meeting with senior leaders to discuss outcomes and next steps. The Curriculum Senior Leader uses the information given to them to hold Governor sub-committee 'Curriculum and Achievement Meetings' each half term. These are in addition to the Pupil Progress Meetings that identify and celebrate pupil progress and set agreed targets for narrowing any gaps in knowledge and skills.

### **Enrichment**

Enrichment opportunities within and across all areas of the curriculum are important to St Paul's to help develop the children's skills for life. Our research shows that although lots of children have been exposed to visits, the quality of these visits vary. For example, verbal feedback showed that although lots of children at our school may have visited museums, the opportunities to 'dig deep' into the science knowledge are limited. Therefore, our enrichment opportunities for Science provide a clear purpose with plenty of opportunities for extension and challenge. They are relevant, age appropriate and inclusive to all.

Year Groups	Enrichment Opportunity	Term of Enrichment	Topic
Rec	Opportunity: School science day Purpose: Create an excitement about science and introduce different topics	Spring	
1	Opportunity: School science day Purpose: Create an excitement about science and introduce different topics	Spring	
2	Opportunity: School science day Purpose: Create an excitement about science and introduce different topics	Spring	
3	Opportunity: School science day Purpose: Create an excitement about science and introduce different topics	Spring	
4	Opportunity: Bee keeper visits. Rainforest – visit to Birmingham Botanical Gardens Purpose: Habitat and life cycle	Spring	Animals from local habitat
5	Opportunity: Secondary School (St Mary's ) Science Day for Upper Key stage 2 Purpose: Range of experiments	Summer	
6	Opportunity: Science Museum, London Purpose: History of science , Exciting explosions	Summer	

1	Understand that plastics don't decay and can harm animals	Litter pick around school. Sort type of litter they find
2	Grow plants from seeds and bulbs	Discuss how plants make a positive difference to the environment and are important for each animal's habitat. Plant bee friendly plants in the garden
3	Recognise the importance of soil to healthy plants	Look at environmentally friendly nutrients. Advantages and disadvantages of organic food. Establish a compost heap in the school garden
4	Study British birds	Provide feeders around the school grounds
5	In their study of levers and pulleys, look at carbon neutral machines.	Think about the journeys they make and how they could make use of carbon neutral machines eg bicycles, electric cars, and increasingly hydrogen powered vehicles (STEM link to Dr. Hobbs, Oxford – JCB )
6	Recognise that animals and plants have evolved over time in response to the changing environment	Realise how global warming changes habitats and can cause local extinctions. Discuss how as individuals they can lower their carbon footprint. Write letters to industry leaders and politicians.

