



Science

Intent

At St. George's Beneficial CofE Primary School, we value science education because it provides the foundations for understanding the world in which we live. Science is not just about knowledge. It is about making predictions, understanding methods and processes, analysing results, providing explanations and drawing conclusions. But most of all, it is about curiosity. Science encourages children to explore and ask questions, developing skills of enquiry and a sense of excitement.

To achieve this and to enable pupils to meet their end of key stage attainment targets, St George's uses the Kapow Science Scheme which aims to develop a sense of excitement and curiosity about the natural phenomena and an understanding of how the scientific community contributes to our understanding of the past, present and future. The scheme is set out to develop a complex knowledge of Biology, Chemistry and Physics, but also adopt a broad range of skills in working scientifically and beyond. The scheme of work is inclusive and meaningful, so all pupils may experience the joy of science and make associations between their science learning and their lives outside the classroom. The curriculum aims to encourage critical thinking and empower pupils to question the hows and whys of the world around them and make links to the school's Christian values.

The Kapow scheme encourages:

- A strong focus on developing knowledge alongside scientific skills across Biology, Chemistry and Physics. ● Curiosity and excitement about familiar and unknown observations.
- Challenging misconceptions and demystifying truths.
- Continuous progression by building on practical and investigative skills across all units.
- Critical thinking, with the ability to ask perceptive questions and explain and analyse evidence.
- Development of scientific literacy using wide-ranging, specialist vocabulary.

Implementation

In order to meet the aims of the National curriculum for Science and in response to the Ofsted Research review into Science, Kapow have identified the following key strands:

- Scientific knowledge and understanding of: Biology - living organisms and vital processes. Chemistry - matter and its properties. Physics - how the world we live in 'works'.
- Working scientifically - processes and methods of science to answer questions about the world around us.
- Science in action - uses and implications of science in the past, present and for the future.

Kapow Primary's Science scheme is a spiral curriculum, with essential knowledge and skills revisited with increasing complexity, allowing pupils to revise and build on their previous learning. A range of engaging recall activities promote frequent pupil reflection on prior learning, ensuring new learning is approached with confidence.

Each unit is based upon one of the key science disciplines; Biology, Chemistry and Physics and to show progression throughout the school we have grouped the National curriculum content into six key areas of science:

Plants Animals, including humans

Living things and habitats, Materials, Energy, Forces, Earth and space.

Pupils explore knowledge and conceptual understanding through engaging activities and an introduction to relevant specialist vocabulary. As suggested in Ofsted's Science research review (April 2021), the 'working scientifically' skills are integrated with conceptual understanding rather than taught discretely. This provides frequent and relevant opportunities for developing scientific enquiry skills. The scheme utilises practical activities that aid in the progression of individual skills and also provides opportunities for full investigations.

Each year group has an optional exploratory 'Making connections' unit that delves beyond the essential curriculum, assimilating prior knowledge and skills to evoke excitement and to provide an additional method of assessing scientific attainment.

Lessons incorporate various teaching strategies from independent tasks to paired and group work, including practical, creative, computer-based and collaborative tasks. This variety means that lessons are engaging and appeal to those with different learning styles.

Guidance for adapting the learning is available for every lesson to ensure that all pupils can access learning, and opportunities to stretch pupils' learning are available when required. Knowledge organisers for each unit help to identify prior and future curriculum links to make the scheme as meaningful as possible and reinforce key technical terms.

Strong subject knowledge is vital for staff to deliver a highly effective and robust Science curriculum. Each unit of lessons includes multiple teacher videos and resources to develop subject knowledge, target fundamental misconceptions effectively and support ongoing CPD. Kapow has been created to build confidence amongst non-specialist primary teachers who are required to deliver and assess the full Science curriculum and maximise pupil progression. Videos created by subject specialists feature troubleshooting advice for practical work that does not go to plan, suggested questioning and support for tackling misconceptions, as well as recordings of practical tasks that can be utilised as demonstrations in the classroom or to support pupil reflection on their own observations.

Useful documentation to support implementation: Kapow National Curriculum coverage document shows which of our units cover each of the National Curriculum attainment targets and the strands within it. Kapow Progression of skills and knowledge shows the skills and key knowledge that are taught within each year group and how these skills develop year on year to ensure attainment targets are securely met by the end of the key stage.

'Working scientifically' describes the process of developing skills in scientific enquiry. Children will be given the opportunity to:

- make observations and measurements;
- identify patterns;
- identify, classify and group living things;
- design and carry out comparative and fair tests (controlled investigations);
- collect, analyse and present data (using ICT where appropriate);
- and research using secondary sources.

Many of these will require children to apply their mathematical knowledge as well as their literacy and ICT skills. Pupils will also learn to consider aspects of health and safety associated with carrying out science activities. They will develop the ability to recognise and assess the risks and hazards involved, planning activities and behaving in such a way as to reduce or remove these. They will learn to take reasonable care for the health and safety of themselves and others, and develop a responsibility for all living things and the environment.

The 'Science in Action' strand is interwoven throughout the scheme to make the concepts and skills relevant to pupils and inspiring for future application. Cross-curricular links are included throughout each unit, allowing children to make connections and apply their Science skills to other areas of learning.

In addition to the Kapow scheme:

- In Early Years, Science is taught through the children learning about the world around them in their learning through play. Teachers support their learning through topic links and resources provided within the classroom and the outside learning areas e.g. plants and bulbs for growing.
- Within KS1 and KS2, additional opportunities are provided through school trips, expert visitors, an annual

Science Day and STEM projects, which are appropriate to the ages, abilities and needs of the children.

- The school provides a science garden and a designated science room to support pupils' learning.
- We celebrate curiosity, problem solving and mistakes, using these to develop and deepen children's understanding.

Statement of Impact

The impact of Kapow Primary's Science scheme is monitored through both formative and summative assessment opportunities. Each lesson includes guidance to support teachers in assessing pupils against the learning objectives and any relevant scientific enquiry skills. Furthermore, each unit has a unit quiz and a knowledge and skills catcher, which can be used at the beginning and/or end of the unit to provide a summative assessment. Opportunities for children to communicate using scientific vocabulary will also form part of the assessment process in each unit.

After implementing Kapow Primary Science, pupils should leave school equipped with the requisite skills and knowledge to succeed in key stage 3 Science. They will have the necessary tools to confidently and meaningfully question and explore the world around them as well as critically and analytically experiencing and observing phenomena. Pupils will understand the significance and impact of Science on society.

The expected impact of following the Kapow Primary Science scheme of work is that children will:

- Develop a body of foundational knowledge for the Biology topics in the National Curriculum: Plants; Animals, Including Humans; Living Things and Their Habitats; Evolution and Inheritance.
- Develop a body of foundational knowledge for the Chemistry topics in the National Curriculum: Everyday Materials; Uses of Everyday Materials; Properties and Changes of Materials; States of Matter; Rocks.
- Develop a body of foundational knowledge for the Physics topics in the National Curriculum: Seasonal Changes; Forces and Magnets; Sound; Light; Electricity; Earth and Space.
- Be able to evaluate and identify the methods that 'real world' scientists use to develop and answer scientific questions.
- Identify and use equipment effectively to accurately gather, measure and record data.
- Be able to display and convey data in a variety of ways, including graphs.
- Analyse data in order to identify, classify, group, and find patterns. Prepared for the next stage of their education.
- Use evidence to formulate explanations and conclusions.
- Demonstrate scientific literacy through presenting concepts and communicating ideas using scientific vocabulary.
- Understand the importance of resilience and a growth mindset, particularly in reference to scientific enquiry.
- Meet the end of key stage expectations outlined in the National Curriculum for Science.

At the end of each unit summative written and practical activities are used to assess children's understanding. The short end of unit quiz and this data can then inform both pupils and teachers of which knowledge needs further reinforcement. The attainment of the curriculum's Working Scientifically skills are monitored throughout the academic year. Science attainment and progress for each year group is recorded using OTRACK with 3 assessment points across the academic year. The science lead and SLT analyse this data.