St Mary's CE (Aided) Primary School
A Christ-centred school with a child-centred curriculum

Science Curriculum Policy

Updated: June 2024

Up for review: June 2027

In our school our Christian vision shapes all we do.

St Mary's CE (Aided) Primary School is:

'A Christ-centred school, with a child centred curriculum' where wisdom and love guide and influence learning and teaching for our whole community.
We treasure each child and enable them to flourish, using their God-given potential, establishing a secure foundation for them to thrive in a rapidly changing world.

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Intent

At St. Mary's, our intent is to give the teaching and learning of science the dignity it deserves as we recognise the significance of science in every aspect of daily life. With our vision in mind, we believe this scientific area of the curriculum is concerned with increasing pupils' knowledge and understanding of our world while maintaining focus on acquiring and embedding skills associated with science as a process of enquiry, including providing opportunities for critical evaluation of evidence. We strive to nurture the natural curiosity of the child, while fostering and promoting respect for living organisms and the physical environment around us.

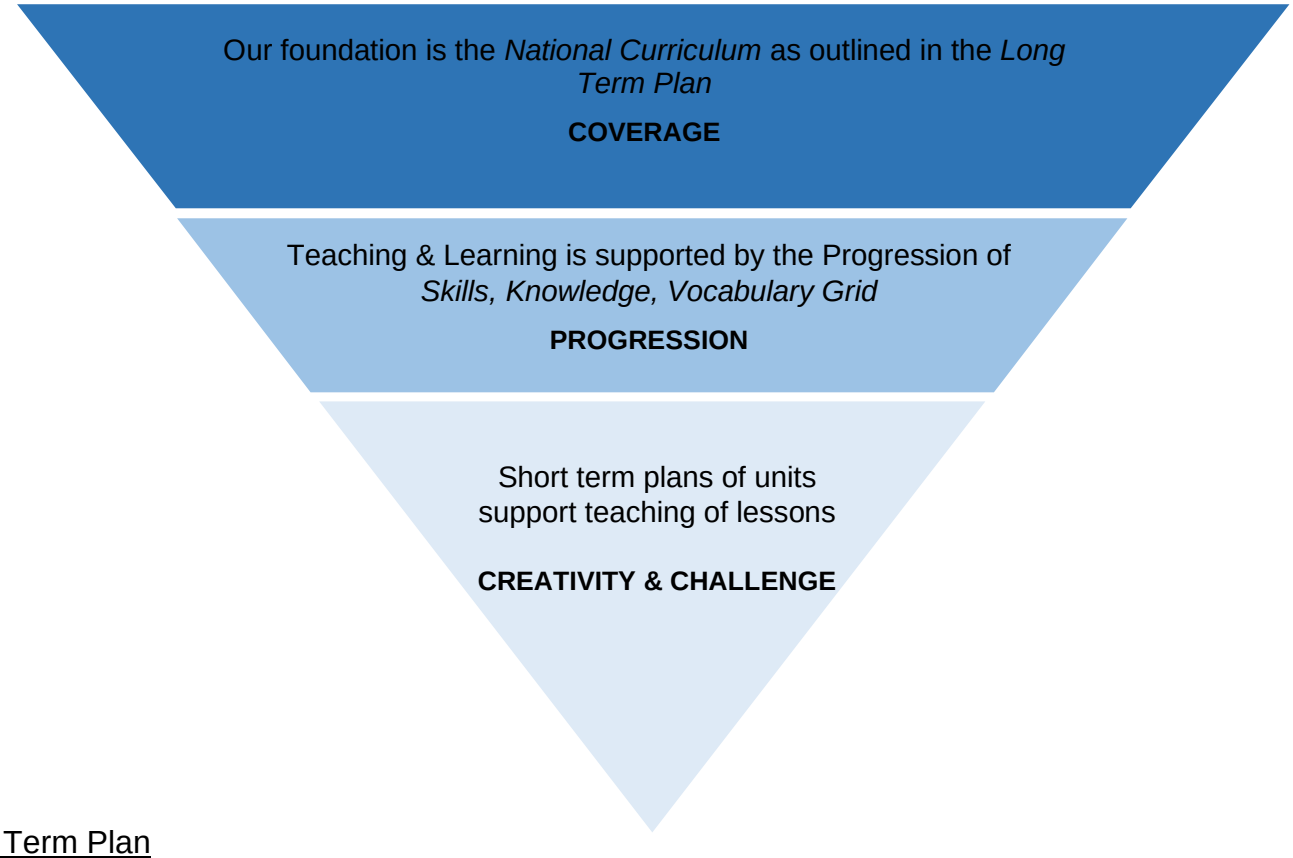
We are a committed team, working closely together to design and deliver an engaging science curriculum that facilitates deep learning and secures progress for all our learners, no matter what their starting point. In order to maximise the outcomes for every child, so that they know more, remember more and understand more, a language-rich, cyclical approach is adopted.

By adopting the blended learning approach, where knowledge and skills are taught side by side, we hope to enable pupils to become enquiry-based learners. The 'Thinking Doing Talking Science Project' (2012) aimed to make science lessons in primary schools more practical, creative and challenging and found pupils made three additional months' progress in science on average, with a particularly positive effect for girls and pupils with low prior attainment. The programme appeared to have a positive impact on attitudes towards science and supported enquiry-based learning.

Furthermore, Education Endowment Fund research indicates that the ability to reason scientifically – by testing hypotheses through well-controlled experiments – is a strong predictor of later success in the sciences and that this skill can be developed through experiences that allow pupils to design experiments that require them to control variables.

Finally, other Education Endowment Fund research indicates that identifying the key learning styles of pupils will help to underpin the individual's style of preferred learning. This theory suggests that learning will therefore be more effective or more efficient if pupils are taught using the specific style or approach that has been identified as their learning style. A successful approach will allow children to make an additional two months progress.

Implementation



Long Term Plan

Knowledge

During the November 2019 INSET Day, the teachers explored the KS1 and KS2 programme of study to establish a whole school Long Term Plan (LTP), see appendix 1, which placed both scientific knowledge and conceptual understanding learning objectives across the 6 half terms of the school year. The colour key signifies and corresponds with the specific disciplines of biology,

chemistry and physics, which develop understanding of nature, processes and methods of science through different types of science cognition and enquiry.

Skills

The scientific process of enquiry or 'Working scientifically' is described separately at the beginning of each programme of study, but must always be taught throughout and clearly related to substantive science content in the curriculum. Using the blended learning approach, each key stage carefully matched these skills of enquiry to the knowledge and concept objectives for each year group, and finally, recorded these onto the LTP.

Progression of Skill, Knowledge and Vocabulary Grid

Finally, in order to support the process of planning for progression and challenge, a 'Progression of Skills, Knowledge & Vocabulary Grid' was established (see Appendix 2). Using this alongside the LTP when planning, will support teachers in assessing prior learning, establishing a starting point in their own teaching and their pupils' learning, embedding correct vocabulary, and setting appropriate levels of challenge and pace to secure good or better than expected progress throughout the children's science learning journey - from EYS to Year 6.

Teaching

Resources

Our Intent emphasises our acknowledgement of science in our daily lives and all around us - this means that children will secure deep learning by **actively observing and experiencing science in action**. Therefore, the **learning environment and concrete scientific resources and equipment** are a crucial aspect of good teacher practice and pupils' learning opportunities.

Science curriculum resources can be found in Brazil, in the Science Resource Room. Careful consideration must be taken when planning for the use of such resources so children use them accurately and their choice and application of resources supports their learning appropriately.

Sequence of Teaching

Every year group's units of work must include:

Teaching Sequence in Science	Big Picture: Start with what the children know, understand, are able to do and able to say. Review: Revisit previous learning.
	Provide information and scientific concepts.
	Specify key vocabulary to be used and its meaning.
	Provide opportunities for the children to investigate in a variety of concepts
	Obtain and present evidence through observations, comparisons and collected data.

Short-term Planning

As with all curricular areas, each individual science lesson within a unit is recorded on **the school's weekly planning template**, consisting of fundamental aspects of good quality teaching.

Approaches to teaching

Possible pedagogical approaches used in Science	**Behaviourism**	Direct teacher instruction; modelling of skills and techniques; demonstration
	Constructivism	Inquiry-based learning
	Social Constructivism	Teacher modelling; questioning; mix of individual, paired and group instruction
	Liberationism	Pupil-led learning; opportunities
	Learning, working and talking about Science with confidence. Being introduced to the key vocabulary relating to Science so that all children can express their understanding, findings and conclusions	

Working Scientifically

To ensure a consistent approach in developing and recording lines of scientific enquiry, a Year 1 and 2, a Year 3 and 4, and a Year 5 and 6 *Working Scientifically* template was created for use in lessons as a writing frame/scaffold for children. Designed specifically as a guide to achieve age-related expectations when working scientifically, these are available in Appendix 3a/3b/3c.

These are not used in the form of worksheets, and more importantly do not have to be used as a whole. When developing specific objectives for *Working Scientifically*, elements of these can be used to scaffold learning. For example, a lesson may focus around 'accurate data collection and presentation' so only this aspect is modelled by the teacher, and is then practised and recorded by the children in their books.

In order to expose pupils to the different approaches of scientific enquiry, varied typed of experimentation and investigation will be planned for by teachers when modelling and teaching skills. Appendix 4 can be referenced for further information on the different types.

Vocabulary

Using standardised language across all teaching will ensure children move through the science curriculum in a uniform way that permits them to **acquire and embed a progressive, technical vocabulary**. Aside from securing progression and coverage, this consistent approach will deliver subject knowledge in a clear and accurate way, ultimately **securing deeper learning for pupils who are able to verbalise their learning outcomes**.

Working Scientifically Vocabulary Progression			
KS1			
question answer observe/ing describe equipment	compare contrast identify classify sort group	record diagram chart map data	biology chemistry physics
LKS2			
research – relevant questions; scientific enquiry comparative, fair test; systematic	**data** – gather; record; classify; present; careful observation; accurate measurements **equipment** – thermometer; data logger	**record** – drawings; labelled diagrams; keys; bar charts; tables; guides; differences; similarities; changes; construct; interpret evidence	improve; secondary sources oral and written explanations conclusion; predictions
UKS2			
plan; variables; measurements accuracy; precision; repeat readings	**record data** – scientific diagrams; labels; classification keys; scatter graphs; bar graph; line graph predications further comparative and fair test	**report and present –** conclusions; casual relationships; explanations; degree of trust; oral and written; display and presentation;	**evidence –** support; refute ideas or arguments identify; classify and describe patterns; systematic; quantitative measurements

To achieve deep conceptual understanding of knowledge and new ideas, we also adopt standardised language in the form of a set vocabulary that is used in all lessons when teaching knowledge.

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals, including humans Fish, reptiles, mammals, birds, amphibians (+ examples of each) herbivore, carnivore, omnivore, leg, arm, elbow, head, ear, nose, back, wings, beak	**Animals including humans** Survival, water, air, food, adult, baby, offspring, kitten, calf, puppy, exercise, hygiene	**Animals including humans** Movement, muscles, bones, skull, nutrition, skeleton.	**Animals including humans** Mouth, tongue, teeth, oesophagus, stomach, small intestine, large intestine, herbivore, carnivore, canine, incisor, molar	**Animals including humans** Foetus, embryo, womb, gestation, baby, toddler, teenager, elderly, growth, development, puberty	**Animals including humans** Circulatory, heart, blood,vessels, veins, arteries, oxygenated, deoxygenated, valve, exercise, respiration
Plants Deciduous, evergreen trees, leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem	**Plants** Seeds, bulbs, water, light, temperature, growth	**Plants** Air, light, water, nutrition, soil, reproduction, transportation, dispersal, pollination, flower	**Living Things & Their Habitats** Vertebrates, fish, amphibians, reptiles, birds, invertebrates, snails, slugs, worms, spiders, insects, environment, habitats	**Living Things & Their Habitats** Mammal, reproduction, insect, amphibian, bird, offspring	**Living Things & Their Habitats** Classification, vertebrates, invertebrates, micro-organisms, amphibians, reptiles, mammals, insects
Everyday materials Wood, plastic, glass, paper, water, metal, rock, hard, soft, bendy, rough, smooth	**Living Things & Their Habitats** Living, dead, habitat, energy, food chain, predator, prey, woodland, pond desert	**Rocks** Fossils, soils, sandstone, granite, marble, pumice, crystals, absorbent	**States of Matter** Solid, liquid, gas, evaporation, condensation, particles, temperature, freezing, heating	**Properties and Changes of Materials** Hardness, solubility, transparency, conductivity, magnetic,, filter, evaporation, dissolving, mixing	**Evolution and Inheritance** Fossils, adaptation, evolution, characteristics, reproduction, genetics
Seasonal Changes Spring, summer, autumn, winter, sun, day, moon, night, light, dark	**Everyday Materials and Their Uses** Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, waterproof, absorbent, opaque, transparent, brick, paper, fabrics, squashing, bending, twisting, stretching, elastic, foil	**Light** Light, shadows, mirror, reflective, dark, reflection	**Sound** Volume, vibration, wave, pitch, tone, speaker	**Earth & Space** Earth, sun, moon, axis, rotation, day, night, phases of the Moon, star, constellation	**Light** Refraction, reflection, light, spectrum, rainbow, colour
		Forces & Magnets Magnetic, force, contact, attract, repel, friction, poles, push, pull	**Electricity** Cells, wires, bulbs, switches, buzzers, battery, circuit, series, conductors, insulators	**Forces** Air resistance, water resistance, friction, gravity, Newton, gears, pulleys	**Electricity** Cells, wires, bulbs, switches, buzzers, battery, circuit, series, conductors, insulators, amps, volts, cell

Impact

The great majority of children will achieve age-related expectations in science at the end of each year.

Outcomes

- Pupils will retain knowledge that is pertinent to science - within a real life context.
- Pupils will be able to question ideas, reflect on knowledge and link concepts.
- Pupils will work collaboratively and practically to investigate and experiment.
- Pupils will explain processes they have taken and will reason scientifically.
- Pupils will articulate their understanding of concepts using accurate, rich vocabulary.

Assessment

• Formative assessments inform starting points and next steps in units.

• Summative assessments recorded on Target Tracker and progress tracked termly

• Termly moderation embeds rigorous and valid data systems and processes

Expectations and Non-Negotiables

1. Science is delivered on a weekly or half-termly block basis with KS1 learning 1hr/week and KS2 learning 1.5-2hrs/week.

2. Work is recorded in science books, with limited use of worksheets.

3. Science books take the form of scientific journals in which all learning, observations and ideas are recorded, collecting every aspect of the individual pupils' learning journeys, and capturing progress over time.

4. Other evidence is collected on 2Simple – this aims to build a cohesive picture of each pupil's knowledge and skills in practical scientific experimentation

5. Scientific enquiry is developed alongside knowledge and throughout ALL units, in real life context where possible.

6. Scientific enquiry is developed either at individual skill level or as a whole experiment report, in books and using the KS1, LKS2, UKS2 WS templates - as writing frames/scaffold, not worksheets.

English

7. Pupils are expected to use correct, technical and scientific vocabulary as outlined above.

8. Teachers plan both formal and informal 'Speaking and Listening' opportunities which allow pupils to present, discuss, reason and justify understanding and process of enquiry.

9. Pupils use their reading skills frequently during science lessons - encouraged to read about scientists and understand the impact on lives today.

10. When possible guided reading texts are linked to learning in science; pupils have the opportunity to access science books in the school library, classroom reading areas and around the school environment.

11. Presentation and Marking, etc as per whole school policies – with high expectation for literacy.

Maths

12. Application of Maths learning, specifically focusing on Statistics, is facilitated regularly – with opportunities for gathering, recording and presenting data in the form of tables, charts, graphs, diagrams, etc. – and appropriate for age.

Appendices

Appendix 1 – Science Long Term Plan See attachment – Appendix 1

Appendix 2 – Progression of Skills, Knowledge and Vocabulary Grid See attachment – Appendix 2

Appendix 3 –

3a Template for Yr 1 & 2 (KS1) Working Scientifically

3b Template for Yr 3 & 4 (LKS2) Working Scientifically

3c Template for Yr 5 & 6 (UKS2) Working Scientifically

Appendix 4 – Types of Scientific Enquiry