

St Mary Magdalen's RCVA Primary School

Science Curriculum Statement

NATIONAL CURRICULUM PURPOSE OF STUDY

THE NATIONAL CURRICULUM STATES THAT:

A high-quality science education curriculum provides the foundations for understanding the world through specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of knowledge, methods, processes and use of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. This should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave and analyse causes.

In addition, at St Mary Magdalen's we ensure that our children understand that science is embedded within other subjects and different aspects are relevant within their everyday lives. We ensure we provide opportunities throughout each topic and year group to work scientifically and focus on the key features of enquiry so that pupils learn a variety of approaches to answer relevant scientific questions, articulating their responses using the appropriate scientific vocabulary.

NATIONAL CURRICULUM REQUIREMENTS FOR SUBJECT CONTENT AT KS1

Pupils should experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas. Most learning about science should be done through the use of first-hand practical experiences as well as appropriate secondary sources.

Pupils are taught:

- About plants and animals in their local environment and globally in order to compare habitats and species.
- What conditions plants need to grow as well as basic needs of animals and humans to survive.
- Keeping healthy and personal hygiene.

- The similarities and differences between material based on their properties and how different material can be manipulated.
- To observe changes within the four seasons.
- To ask simple questions, observe closely, perform simple tests, identify and classify, change findings into questions, gathering and recording data.

NATIONAL CURRICULUM REQUIREMENTS FOR SUBJECT CONTENT AT LOWER KS2

Pupils should continue to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments. They should begin to develop questions about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best way of answering them. This should include observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should be able to draw simple conclusions using scientific language to talk and write about their findings.

Pupils are taught:

- The different parts of a plant and their requirements to live as well as how water is transported.
- Life cycles of a flowering plant and how seeds are formed and dispersed.
- To be able to classify living things in their local and wider environment.
- How animals, including humans, need the right nutrition.
- About the skeletal system and the purpose skeleton and muscles.
- About the simple functions of the digestive system.
- About the different types of teeth in humans and their functions.
- How to understand the structure of a food chain.
- To compare different types of rocks based on their properties and how these are different to fossils.
- To know how fossils are formed.
- About light and its purpose in our world as well as how shadows are formed and how it is reflected.
- To know how things, move on different surfaces.
- About the function of the magnet and which materials are magnetic.
- Know the difference between solids, liquids and gases and how they can change state when heated or cooled.
- About evaporation and condensation in relation to the water cycle.

- How sounds are made and know how vibrations travel through the medium to the ear as well as finding patterns between pitch of sound and objects which produce it and volume of sound and the strength of the vibrations needed to produce it.
- How to recognise appliances that run on electricity and how to construct a simple series electrical circuits, naming basic parts and know how changing the components affect the effectiveness of a circuit.
- To recognise common conductors and insulators
- How to ask relevant questions, set up simple practical enquiries, conduct fair tests, make systematic observations, take accurate measurements, gather, record, classify and present data in a variety of ways, use results to draw simple conclusions and make predictions to further an investigation.

NATIONAL CURRICULUM REQUIREMENTS FOR SUBJECT CONTENT AT UPPER KS2

Pupils should have the opportunity to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationship and interactions more systematically. Children should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should recognise that scientific ideas change over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests using a wide range of sources to do this. Children should be able to draw conclusions based on their data and observations, use evidence to justify their ideas and use their scientific knowledge and understanding to explain their findings using the appropriate scientific vocabulary to articulate their answers.

Pupils are taught:

- Describe the life cycle of mammals, amphibians, insects and birds, comment on the life process and reproduction in plants and animals as well as being able to describe the changes in a human from birth to old age.
- How to classify living things into broad groups against their characteristics and know why different species are classified.
- The main parts of the human circulatory system, knowing the function of the heart, blood and blood vessels and how water and nutrients are transported around the bodies of both humans and animals.
- The importance of personal hygiene and maintaining a healthy lifestyle.
- To be able to compare and classify materials based on their properties and know how they can be manipulated and change state which can be a reversible or irreversible change.
- That the voltage in a circuit affects the effectiveness of the components and give reasons for this.

- The different symbols used within a simple circuit diagram.
- How the Earth and other planets move relative to the sun and the solar system and then describe the movement of the Moon relative to the Earth.
- About the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
- About different forces which include: gravity, water resistance and friction and recognise that mechanisms allow smaller force to have a greater effect.
- That light travels in straight lines and objects it comes from a source into our eyes either directly or via an object which reflects the light into our eyes.
- Why shadows have the same shapes as the objects that cast them.
- About evolution and inheritance and are to know that things have changed over time and adapted to suit their environments.
- Fossils provide information about living things that inhabited the earth millions of years ago.
- That living things produce offspring which are the same type of species but not identical to their parents.

We are a Roman Catholic school. Our curriculum teaches our children about evolution and natural selection in accordance with the science National Curriculum as well as scientific discoveries and theories relating to Earth and the Solar System. We adhere to Catholic doctrine in teaching about our belief in God as a divine creator in line with Pope Francis' comments on the church's position on scientific teaching.

God is not perceived as "a magician, with a magic wand" in our teaching and learning.

"The Big Bang, which is today posited as the origin of the world, does not contradict the divine act of creation; rather, it requires it"

"evolution of nature is not inconsistent with the notion of creation because evolution pre-supposes the creation of beings which evolve."

Sex & Relationships Education is taught in line with the Journey of Love scheme.

CURRICULUM INTENT

At St Mary Magdalen's Primary School, we believe that primary science should be the beginning of a journey through the key stages where pupils are looking to further their personal experiences and understanding, so with support they can shape the world they live and potentially further. We encourage all pupils to engage with an open mind to the possibility's science can lead them and to ask inquisitive questions to further their understanding. Furthermore, children are afforded opportunities to see science 'in action' both in and outside of school; this is through engaging lessons and investigations, as well as the opportunity to see experts in the wide range of jobs and occupations where science of some discipline is required. Children will be able to see science's importance in making our world a better place, through an understanding of the world or innovation and invention to solve a range of problems that our planet may encounter.

The Scientific area of learning is concerned with increasing pupils' knowledge and understanding of our world, and with developing skills associated with Science as a process of enquiry and investigation. It will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence.

In our school, we work alongside the aims of the National Curriculum. However, our teaching of Science encompasses the distinctiveness of our locality providing opportunities for children to engage within their locality at appropriate times throughout the curriculum to enable pupils to better understand and engage with science and opportunities to see science 'in action'. We appreciate the range of children's life experiences and support all pupils in progressing together to live their lives to the fullest. To do this we encourage all pupils to try their best and to become resilient learners through teaching of skills and a high expectation of their work as well as support through learning, we do this through;

- developing scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics;
- developing understanding of the nature, processes and methods of Science through different types of science enquiries that help them to answer scientific questions about the world around them;
- equipping them with the scientific knowledge required to understand the uses and implications of Science, today and for the future.
- developing the essential scientific enquiry skills to deepen their scientific knowledge.
- using a range of methods to communicate their scientific information and present it in a systematic, scientific manner, including I.C.T., diagrams, graphs and charts.
- developing a respect for the materials and equipment they handle with regard to their own, and other children's safety.
- developing an enthusiasm and enjoyment of scientific learning and discovery through new experiences and intriguing investigations.

The National Curriculum provides structure and skills for development to be taught throughout the school, this is linked where possible to the theme topics to provide a creative scheme of work, which reflects a balanced programme of study. Additionally, Science is seen as an opportunity to further strengthen the

children's enjoyment and approach to reading and maths, enabling them to access different text styles and refine their use of mathematical concepts such as drawing and interpreting graphs. Furthermore, the correct use of technical vocabulary is critical for pupils to fully understand and appreciate the subject content they are studying in addition to building upon prior knowledge to use this vocabulary effectively.

CURRICULUM IMPLEMENTATION

SEQUENCE

Science is a core subject in the National Curriculum. Our school uses the objectives from the curriculum as the basis for the planning in Science. Planning is progressive and begins with basic knowledge and skills which are then applied and practised in different year groups and with an expectation of deeper knowledge, understanding and application of scientific enquiry and investigative skills.

In Key Stage 1, children are taught a wide range of subject knowledge and working scientifically is embedded throughout. It encourages children to ask questions and know the same question can be answered in different ways; make close observations; perform simple tests; identify and classify; use observations and ideas to suggest possible answers to an enquiry question; gather and record data which will also help them answer questions.

These skills are taught through the different biology, chemistry and physics units throughout KS1 but there is also emphasis on the children being able to read and spell scientific vocabulary at a level consistent with their KS1 word reading and spelling knowledge.

In Key Stage 2, children are taught to deepen their knowledge and understanding of biology, chemistry and physics at KS1 as well as being introduced to new topics. The children are encouraged to build on the scientific investigation and enquiry skills from KS1 in lower KS2 but by the time the children are in upper KS2 they should be able to perform these skills with increased independence. By end of KS2 it is expected most children should be able to plan different types of scientific enquires to answer questions; know how and why variables needs to be controlled; take measurements using a range of scientific equipment with increased accuracy and precision and know when repeat findings are needed; record data and results of increasing complexity and present these in the appropriate form; use test results to make predictions for further testing; report and present findings from enquiries including conclusions, casual relationships, explanations and a degree of trust in the trust; they should also be able to use scientific evidence that has been used to support or refute ideas and arguments.

All children are encouraged to lead their own investigation showcasing the knowledge and skills developed as it helps them develop resilience when things do not go as planned and a greater understanding of the importance of fair testing.

TEACHING & LEARNING

We teach and promote an understanding of the world around us for our children in the reception class as an integral part of their work. We relate the different aspects of the knowledge and skills to the objectives set out in the Early Learning Goals, which underpin the curriculum planning in 10 areas for children aged three to five years of age. It is important they have the opportunity to be curious, observe and explore and with the support of an adult use the correct vocabulary to help develop a broad vocabulary.

All KS1 and KS2 children receive a minimum of 1 hour of Science teaching a week with a progression of skills and knowledge through the phases, this is supported in class through the use of defining in context circle maps to show prior knowledge or misconceptions to the class teacher. This is often exceeded as we use a variety of teaching and learning styles in science lessons and more time may need to be allocated for investigative lessons to ensure the children have time to make the most of their practical learning opportunity and child-initiated learning.

Teacher subject knowledge and confidence is reviewed regularly through staff meetings, scrutines of work and lesson observations as well as CPD opportunities being made available to any staff members. Resources are stored centrally so teachers can readily access them with regular audits to enhance practical learning opportunities. All Science is taught by teachers or a HLTA with responsibility for teaching and learning in school but there is the expectation that teachers have a solid understanding of the ability of all children in their class.

EXTRA CURRICULAR SCIENCE OPPORTUNITIES

We plan extra-curricular activities annually. We have a Science week each year where the children in each class, including EYFS can focus on their enquiry and practical investigation skills set around a chosen theme, raising the profile of science in school and setting high expectations and challenges for all pupils regardless of their background or gender. Gardening clubs are run all year on our school allotment. In addition, there is a yearly STEM club ran by the science lead enabling pupils to engage with other elements of science that may not be statutory on the on the Primary Science Curriculum.

SPECIAL EDUCATIONAL NEEDS

All science lessons are tailored to the needs of the children in the class. The teachers/HLTA deliver lessons pitched at an appropriate level for all before modelling activities as well as providing differentiated tasks to support less able pupils. All science lessons are inclusive for all children.

SPIRITUAL, MORAL, SOCIAL & CULTURAL DEVELOPMENT

The teaching of Science offers opportunities to support the spiritual development of our children through looking at the process of growing and changing and providing the children with opportunities to ask questions which science cannot always answer. They learn about themselves as well as being able to reflect on the world around them. The children share awe and wonder during investigations and science focused weeks.

We recognise our role in challenging class and gender stereotypes within science we enable our pupils to experience cultural development through showing them how to care for the world in which they live as well as looking at famous male and female scientists and their discoveries on a local and global scale which have affected our lives.

We celebrate heritage of Seaham and the North East by using our local area to our advantage as we are a coastal town with parks, woodlands and farms on our doorstep. The North East of England has produced many well-known inventions and scientific discoveries by local people such as Joseph Swan from Sunderland, Lord William Armstrong and George Stephenson.

Science is also embedded in moral and social development for all children. They learn how to take responsibility for their own and other people's safety when carrying out practical work. They learn about personal hygiene and how to not only care for themselves, but for plants and animals. They appreciate that in order to investigate fairly, commitment and honest observations are important.

CURRICULUM IMPACT

ASSESSMENT & RECORDING

Teachers assess children's work in science by making judgements against objectives at the end of blocks of work alongside more formal assessments for each unit of work which is then input on to ITrack. Concerns about pupil performance in science may be discussed with the next class teacher or picked up with home learning or intervention to help with misconceptions if necessary. Pupils showing particular strength and skill or who show enjoyment of science are challenged and moved on through activities that help develop and broaden their working scientifically skills.

At the end of the year, the class teacher makes a summary judgement about the work of each pupil in relation to the skills they have developed in-line with the National Curriculum in England 2014 and these are reported to parents as part of the child's annual school report. We use this as the basis for assessing the progress of the child and we pass this information on to the next teacher at the end of the year. It is crucial that this is done accurately as at the end of KS2 a teacher assessment of science is submitted in-line with the STA grading.

MONITORING & REVIEW

The monitoring of the standards of children's work and of the quality of teaching is through monitoring planning, lessons and pupil voice in science which is the responsibility of the subject lead and Head Teacher.

The work of the science lead also involves supporting colleagues in the teaching of science, being informed about current developments in the subject, and providing a strategic lead and direction for the subject in the school. Pupils and staff also have opportunities informally and more formally to make suggestions e.g. questionnaires, resources audit and in curriculum staff meeting time.

The science lead and link governor meet each term to discuss teaching and learning as well as development priorities. Subject lead will also contribute to the Head Teacher's report to governors on developments in science within our school.

EXTERNAL VERIFICATION

As a school, we can be selected at random to carry out standardised testing in science.

We have previously taken part a STEM research project to look at how science can be improved across our school and how experience is key to improve understanding. This project through regular updates, meetings and peer review agreed we were on track to making effective improvements in our school to improve the profile of science and that more practical experiences were being given to pupils.

The science lead attends regular cluster group meetings with other science leads to share good practice as well as supporting each other in the role of a primary science subject lead.

We have links with the local catholic comprehensive (St Bede's) where pupils are able to experience higher level science in purpose-built science 'labs' with subject specialist input.