Science Policy

Aims:
A high-quality science education provides the foundations for understanding the world through the 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 the knowledge, methods, processes and uses 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. They should be encouraged to understand how key foundational knowledge and concepts can be used to explain what is occurring, predict how things will behave, and analyse causes. This foundational understanding should be consolidated through their appreciation of the specific applications of science in society and the economy.

The National Curriculum for science aims to ensure that all pupils:
- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics;
- develop 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;
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

The objectives of teaching science are to enable children to develop:
- a positive attitude towards science and an enthusiastic curiosity;
- an understanding of science through a process of enquiry and investigation;
- confidence and competence in scientific knowledge, concepts and skills;
- an ability to reason, predict, think logically and to work systematically and accurately;
- an ability to communicate scientifically;
- the initiative to work both independently and in co-operation with others;
- the ability to use and apply science across the curriculum and real life.

Teaching and Learning
A variety of teaching and learning styles are used in science lessons; the principal aim is to develop children's knowledge, skills and understanding. Sometimes this is done through whole-class teaching, whilst at other times children are engaged in an enquiry-based research activity. Children are encouraged to ask, as well as answer, scientific questions. The children have the opportunity to use a variety of different mediums to explore and record their understanding such as photos and audio recordings and to use ICT whenever it enhances their learning. Children take part in role-play and discussions and present reports to the rest of the class; they also engage in a wide variety of problem-solving activities. Wherever possible, children are involved in real scientific activities, for example, investigating a local environmental problem, or carrying out a practical experiment and analysing the results. Children are actively encouraged to see how the application of their maths skills are vital when recording results and presenting information obtained.

In all classes, children have a wide range of scientific abilities, and suitable learning opportunities are provided for all children by matching the challenge of the task to the ability of the child. This is achieved in a variety of ways:
- setting tasks which are open-ended and can have a variety of responses;
- setting tasks of increasing difficulty (we do not expect all children to complete all tasks);
- grouping children by ability and setting different tasks for each ability group;
- providing resources of different complexity, matched to the ability of the child;
- using teaching assistants to support the work of individual children or groups of children;
- by making links across subjects;
- giving the children a specific learning time in each year group to explore the role a scientist, the skills they need to 'work scientifically' and to explore the breadth of roles that include science and maths skills;

- engaging through the inclusion of the children's interests and questions, where possible.

Science Curriculum Planning
The programmes of study for Science are set out year-by-year for Key Stages 1 and 2, although the relevant programme of study is only required to be taught by the end of the key stage. Within each key stage there is flexibility to introduce content earlier or later than set out in the programme of study and material from a later key stage may be introduced earlier if appropriate. Teachers base their planning on the programmes of study for their relevant year groups. A long-term plan sets out the agreed programme of study across the year groups (Appendix 1)

Scientific knowledge and conceptual understanding
The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data.

The nature, processes and methods of science
'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand, although some of the specific skills are addressed during an allocated period in each year group.

Teaching and Learning

Foundation Stage

In this phase children are:

- Developing the crucial knowledge, skills and understanding that help them make sense of the world.
- Involved in activities based on first-hand experiences that encourage exploration, observation, problem solving, prediction, critical thinking and decision-making and discussion.
- Experiencing a wide range of activities, indoors and outdoors, which include adult focused, child-initiated and independent play.
- Stimulated, interested and curious.
- Observed by adults and learning is recorded in a variety of ways.

Key Stage 1

The main focus of science teaching in Key Stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and man- made 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 to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning in science should be done using first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. Children should read and spell scientific vocabulary at a level consistent with their reading and spelling knowledge at Key Stage 1. In Key Stage 1 teachers plan science lessons across the year which are equivalent to 1 ½ hours of science per week.

Lower Key Stage 2 – Years 3 and 4

The main focus of science teaching in Lower Key Stage 2 is to enable pupils 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, and by beginning to develop their ideas 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 ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' must **always** be taught through and clearly related to substantive science content in the programme of study. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing reading and spelling knowledge. In Key Stage 2 teachers plan science lessons across the year which are equivalent to 2 hours of science per week.

Upper Key Stage 2 – Years 5-6

The main focus of Science teaching in Upper Key Stage 2 is to enable pupils 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, relationships and interactions more systematically.

At Upper Key Stage 2, they should encounter ideas that are more abstract and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out fair tests and finding things out using a wide range of secondary sources of information. Pupils should 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. 'Working and thinking scientifically' must **always** be taught through and clearly related to substantive science

content in the programme of study.

Pupils should read, spell and pronounce scientific vocabulary correctly. In Key Stage 2 teachers plan science lessons across the year which are equivalent to 2 hours of science per week.

Medium and long-term plans are based on the science National Curriculum. Plans are evaluated and this is used to inform future learning and teaching. Planning is in line with the school's planning policy. Scientific study is combined with work in other subject areas where possible. (Cross-curricular links.)

The contribution of science to teaching in other curriculum areas

English
Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. Some of the texts that children study are of a scientific nature. The children develop oral skills in science lessons through discussions and through recounting their observations of scientific experiments. They develop their writing skills through writing reports and projects and by recording information.

Mathematics
Science contributes to the teaching of mathematics in a number of ways. When the children use weights and measures, they are learning to use and apply number. Through working on investigations, they learn to estimate and predict. They develop accuracy in their observation and recording of events. Many of their answers and conclusions include numbers. They use their data handling skills to present results and information.

Personal, social, health education (PSHE)
Science makes a significant contribution to the teaching of PSHE. The subject matter lends itself to raising matters of citizenship and social welfare. For example, children study the way people recycle material and how environments are changed for better or worse. The subject also gives children numerous opportunities to debate and discuss. They can organise campaigns on matters of concern to them, such as helping the poor or homeless. Science thus promotes the concept of positive citizenship.

Spiritual, moral, social and cultural development
Science teaching offers children many opportunities to examine some of the fundamental questions in life, for example, the evolution of living things and how the world was created. Through many of the amazing processes that affect living things, children develop a sense of awe and wonder regarding the nature of our world. Science raises many social and moral questions. Through the teaching of science, children have the opportunity to discuss, for example, the effects of smoking, and the moral questions involved in this issue. Children are given the chance to reflect on the way people care for the planet, and how science can contribute to the way the earth's resources are managed. Science teaches children about the reasons why people are different and, by developing the children's knowledge and understanding of physical and environmental factors, it promotes respect for other people.

Science and ICT
Information and communication technology enhances the teaching of science because there are some tasks for which ICT is particularly useful. It also offers ways of influencing learning that are not possible with conventional methods. Software is used to animate and model scientific concepts, and to allow children to investigate processes, which it would be impracticable to do directly in the classroom. ICT is used to assist in the collection of data and in producing tables and graphs. Children use ICT to record, present and interpret data, to review, modify and evaluate their work, and to improve its presentation. Children learn how to find, select and analyse information on the internet and on other media.

Inclusion
- Inclusion for science is carried out in line with other school policies
- Planning, learning, and teaching in science set high expectations for all children.
- Science provides opportunities for all children to achieve

- Teachers are aware that children bring to school different experiences, interests and strengths that will influence the way in which they learn science.
- Teachers use a variety of teaching styles and strategies to meet the needs of all children in their science learning.

Promoting Science

- Trips for science are organised where possible in line with the current unit of work, to enhance and extend learning.
- Local resources, such as scientists from industry, are used to support units of work where possible.
- Bi-annually, the whole school embrace a STEM week. During the week children have a range of opportunities to meet scientists from a breadth of disciplines. Children often have the opportunity to be actively involved in a range of different scientific investigations.

Assessment for Learning

- Assessment for science is carried out in line with the school policy,
- Science assessments are carried out using both summative and formative assessment procedures.
- Informal judgements as to children's progress in science are made weekly through observations.
- Formative assessment is usually carried out at the start of a unit of work.
- Summative assessment takes place at the end of each unit of work.
- Assessments are used to inform planning and learning and teaching.
- Written or verbal feedback is given to the child in line with the school's marking policy, to help guide his/her progress.
- Older children are encouraged to make judgements about how they can improve their own work.
- Staff are starting to regularly track the children using Target Tracker.

Monitoring

- Monitoring for science is carried out in line with the school monitoring policy.
- Best practice for science will be identified and shared amongst practitioners.
- Books are monitored within teaching teams to allow staff to have the time to reflect and share good practice.

Resources

- All resources are stored centrally in the science cupboard in the Year two area.
- Resources are organised into topic boxes.
- Staff are responsible for informing the subject leader when extra resources are needed, when there are breakages and when consumables are running low.
- The science subject leader will update and replenish resources when needed, budget permitting.

Health and Safety

- Health and safety is in accordance with the county policy for primary school science.
- The safe use of equipment is promoted at all times.
- Be Safe (ASE) is available for teachers in the science cupboard and science leader's file.