LOUDWATER COMBINED SCHOOL
Science Policy

Vision

Science and engineering are rapidly growing and becoming increasingly important in the modern world. Our children will grow up in a world that requires scientific literacy and critical thinking skills. Science surrounds us. We therefore want our children to develop a lifelong love of Science and be forever curious about our universe. We are not afraid of asking 'big' questions to develop a sense of wonder. Science lessons make meaningful links between the classroom and the real world. Science at Loudwater Combined School promotes respect for the living and non-living, and will enable our children to make sensible future decisions which may positively impact our planet and beyond.

Statement of Intent

We believe Science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Throughout the programmes of study, the children will acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that children build on and develop their Working Scientifically skills throughout their time at school so that they can apply their knowledge of Science when using equipment, conducting experiments, building arguments and explaining concepts confidently. We understand that is important for lessons to have a skills-based focus, and that knowledge can be taught through this.

The National Curriculum for Science Purpose for Study states that:
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 Science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Following Ofsted's short inspection of our school on 10th January 2018, next steps were identified including:
Leaders and those responsible for governance should ensure that:

- *the quality of pupils' work and the depth of learning in Science and the wider curriculum are consistently as good as the best in the school.*

Implementation

The National Curriculum for Science aims to ensure that all children:

- 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

In addition, the Science curriculum supports our school's Curriculum Policy and seeks to:

- Promote high standards in speaking, listening, reading and writing
- Create and strengthen links to mathematical skills and their application
- Enable children to be aware of Science in the wider world
- Provide equality of access and the opportunity for all pupils to make progress
- Prepare pupils for the opportunities, responsibilities and experience of adult life and participation in society

The aim of our Science curriculum is to enable children to:

- apply their 'Working Scientifically' skills to solve problems, explore, observe and investigate.
- ask questions and work together to discover the answers (where they exist!)
- feel positive and enthusiastic about Science
- develop a sense of awe and wonder
- enhance their study through outdoor learning, specialist visitors and access to quality resources
- be involved in creating and carrying out investigations during which they can share and explain their ideas and conclusions
- be prepared for further Science learning in the next phase of their learning and beyond

In Loudwater Combined School, teachers create a positive attitude to Science learning within their classrooms and reinforce an expectation that all pupils are capable of achieving high standards in Science. Our whole school approach to the teaching and learning of Science involves the following;

- Science is currently taught in planned and arranged topic blocks by the class teacher, to have a project-based approach. This is a strategy to enable the achievement of a greater depth of knowledge.
- Through our planning, we involve problem solving opportunities that allow children to apply their knowledge, and find out answers for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.
- We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to draw conclusions based on real evidence.
- 'Working Scientifically' skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics. (***See Appendix 1 and 2)***
- Teachers demonstrate how to use scientific equipment, and the various 'Working Scientifically' skills in order to embed scientific understanding.
- Science Floor books are used throughout the school in every year group to record Science work, discussions and thoughts. These are used in addition to Science exercise books (Y2-Y6) and provide assessment opportunities as well as evidence to show progress in knowledge and skills across the years.
- Teachers find opportunities to develop children's understanding of their surroundings by accessing outdoor learning and workshops with experts - The Chiltern Rangers, for example.

- Children are offered a wide range of extra-curricular activities, visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class. Wherever possible, cross-curricular links are sought and exploited.

Through the provision of rich and varied activities, we aim to:

- Engage all learners
- Broaden horizons
- Provide discussion and debate opportunities linked to the wider curriculum

We seek to ensure that:

- Planning addresses the needs of all learners within the class
- Planning provides coverage of all aspects of the National Curriculum
- Planning is regularly monitored to ensure quality

Teaching and Learning

- Teachers ensure that Science planning facilitates children asking their own questions and that children are given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom.
- Teachers ask a range of questions which enable all children to take part, listening carefully to answers and taking learning forward, using open and closed questions and allowing children time to think. Our Science Floor books provide evidence of classroom discussions.
- Planning involves teachers creating engaging lessons, often involving hands-on resources to aid understanding of conceptual knowledge.
- Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up.
- New vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.
- 'Working Scientifically' skills are embedded into lessons to ensure these skills are being developed throughout the children's school career. (***See Appendix 1 and 2***)
- The key knowledge for each topic and across each year group is mapped across the school and checked at the end of each Science topic.
- Teachers demonstrate how to use scientific equipment, and the various 'Working Scientifically' skills in order to embed scientific understanding.
- Teachers find opportunities to develop children's understanding by accessing outdoor learning.

Assessment

Assessment for learning permeates all our teaching and allows us to adapt, change and target our teaching to the precise point and pace of children's learning thus ensuring our teaching is effective and learning is maximised.

Assessment allows us to give quality feedback to children and celebrate their progress with them. It allows them to be involved and take control of their learning. Through regular whole-class feedback, pupils are provided with information about their learning and what their next steps are.

Assessment at Loudwater Combined School involves the following:

- Observing children at work, individually, in pairs, in a group and in whole-classes
- Questioning, talking and listening to children
- Considering work/materials / investigations produced by children together with discussion about this with them
- Updating The Sonar Tracker data for individual pupils after unit completion (Y1-6)
- Completing a unit assessment tracker at the end of a unit
- Use of Science Floor books throughout the school

The children are assessed continually throughout the year, with the teacher giving feedback orally and through written marking where relevant. This process is supported by the end of KS2 statements in the National Curriculum 2014.

Role of the Subject Leader

- To write a subject development/action plan, informed by the whole school development plan.
- Recorded outcomes in Topic books (Y1), Science Books (Y2-Y6) and Science Floor books (Foundation Stage to Y6) are monitored termly by the subject leader and SLT to ensure curriculum coverage.
- The subject leader attends specialist courses and disseminates good practice to staff where relevant (STEM Primary Network group, local schools' liaison group and potential use of Science Oxford for CPD).
- To monitor the standards of children's work.
- To support colleagues in their teaching and delivery of lessons and activities
- To be informed about current developments in the subject.
- To provide a strategic lead and direction for Science in the school.
- To monitor the budget, resources, Science topics and books available to the school.
- To organise and coordinate trips and workshops to support learning.
- To liaise with subject leaders from other schools.

Role of Parents

Parental input is highly valued and parents are regularly invited and welcomed into school to share their own expertise and learning with the children – during talks and class assemblies, for example. Children may also receive Science home-learning based on their current topic.

Scientific knowledge and conceptual understanding

Our schemes of learning 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. Children's starting points are identified at the beginning of each Science topic and the children are able to convey and record what they know already. This ensures that teachers are able to adapt the programme of study and that planning is informed by children's interests to maximise their engagement with and motivation to study Science.

At the end of the block, children's knowledge is checked in line with the key knowledge identified prior to the teaching block. 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 and teachers ensure that this is developed within each lesson and throughout each Science topic. The

Science curriculum ensures that children are provided with regular opportunities to 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 and this is embedded within lessons and focuses on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils are given opportunity to seek answers to questions through collecting, analysing and presenting data.

Spoken language
The national curriculum for Science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. At Loudwater School, Science lessons provide a quality and variety of subject specific language to enable the development of children's confident and accurate use of scientific vocabulary and their ability to articulate scientific concepts clearly and precisely. They are encouraged and assisted in making their thinking clear, both to themselves and others, and teachers ensure that pupils build secure foundations by using discussion to probe and remedy any misconceptions.

Planning and Resources
Planning is a process in which all teachers are involved. All teachers should keep a copy of the termly and weekly planning in their files. The key knowledge and skills of each Science topic is informed by the national curriculum and the Associate of Science Education's 'Planning Matrices' https://www.ase.org.uk/plan. Teachers have access to PIXL Club and may also access various on-line resources, including but not limited to STEM, Explorify, FSC and BBC Bitesize. Physical Science resources are available in labelled Science unit boxes for classes to use in the resources room. Also, our outdoor classroom and woodland provide excellent opportunities for Science teaching and learning.

Evidence of 'good Science' taking place in classrooms includes:

- An active learning environment and relevant 'Working Scientifically' posters for age phase on the working walls during Science topic coverage.
- Key vocabulary relevant to the unit of work displayed clearly for reference during lessons.
- Children being encouraged to ask and answer questions and discuss their work and ideas.
- Displays and/or new topic skills sheets in books or floor books prompting children to say what they already know about a topic and what they would like to find out.
- Children devising and conducting their own investigations within the context of the relevant curriculum content, as well as being given opportunities to develop their 'Working Scientifically' skills.
- Children recording their findings in a variety of ways.
- Children showing enjoyment in the activities they are undertaking.
- The cross-curricular teaching of Science.
- Having sufficient, quality Science resources to aid and support the teaching of all units and topics taught, from EYFS to Y6. We keep these in a central store, where they are labelled and easily accessible to all staff.
- EYFS have a range of resources kept in class and in the outdoor area for simple access for children during exploration time.

- A well-used Science Floor book evidencing classroom discussions and practical work, children's answers to 'big' questions, vocabulary and skills progress.
- The library contains a good supply of Science topic books to support children's individual research and books relevant to the focus topic should also be on display in the classroom.
- We are fortunate to be able to request books from our Library Service in advance and our Red Topic boxes should contain a proportion of Science books that may be accessed by the children in quiet or paired-reading time.

Organisation
Science is taught in planned units of work and arranged into topic blocks by the subject leader who disseminates these to class teachers through the Science schemes of learning. There are 5 topics (4 topics for Year 2) that can be covered at any point throughout the year.

Please also refer to our school **Curriculum Maps, Schemes of Learning, Key Objectives and Skills Progression documents** available on the teachers' shared drive which details class topics, Science objectives and practical experiments planned.

These topics will be covered for each year group					
Year 1	Materials Seasons (introduction)	Animals	Humans	Seasonal Change	Plants
Year 2	Living things and their habitat	Animals including humans		Uses of everyday materials	Plants
Year 3	Forces and magnets	Animals including humans	Rocks	Light	Plants
Year 4	Living things and their habitats	Animals including humans	Sound	States of matter	Electricity
Year 5	Living things and their habitats	Animals including humans	Earth and space	Properties and changes of materials	Forces
Year 6	Living things and their habitats	Animals including humans	Evolution and inheritance	Light	Electricity

EYFS
The Foundation Stage deliver Science content through the 'Understanding of the World' strand of the EYFS curriculum. This involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment. They are assessed according to the Development Matters attainment targets. Teachers and children may find the 'Working Scientifically' CIEC progression of skills document a useful tool (please refer to Appendix 1).

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study as set out in the National Curriculum. These are set out as statutory requirements. In EYFS, we assess the children's Understanding of the World according to the Development Matters statements and some aspects of Expressive Arts Design are also Science based.

Curriculum Monitoring
The curriculum is monitored by the Subject Lead for Science, SLT and Science Governor through:
- Lesson observations
- Moderating children's work

- Deep Dives / Book scrutinies
- Learning walks
- Pupil interviews
- Subject Champion meetings
- Governing Body Curriculum & Admissions Committee meetings and reports

Equal Opportunities
At Loudwater Combined School we are committed to promoting equal opportunities irrespective of socio-economic background, gender, disability and ethnicity in all areas of the curriculum. We believe all children should have access to and participate in the learning of Science and be supported in this process.

Inclusion
At Loudwater Combined School, Science forms part of the school's commitment to providing a broad and balanced education to all children. Through our Science teaching, we provide learning opportunities that enable all children to make progress. We do this by setting suitable learning challenges and responding to each child's different needs. Some children will require closer supervision and more adult support to allow them to progress whilst more able children will be extended through differentiated activities. By being given enhancing and enriching activities, more able children will be able to progress to a higher level of knowledge and understanding appropriate to their abilities. Teachers will use the school's inclusion planning key to ensure that a range of strategies are used which include and motivate all learners. Teachers do their best to ensure children's full involvement and engagement within lessons and consistently celebrate the efforts and achievements of all.

Impact
Our approach at Loudwater results in a fun, engaging, high-quality Science education, that provides children with the foundations and knowledge for understanding the world and for future Science learning beyond KS2. Our engagement with the local environment ensures that children learn through varied and first-hand experiences of the world around them. Frequent and progressive learning outside the classroom is embedded throughout the Science curriculum. Through various workshops, trips and interactions with experts and local charities, children have the understanding that Science has changed our lives and that it is vital to the world's future prosperity. This, together with focus sessions where pupils are encouraged to learn about our Scientist of the Term (diverse contemporary and historical scientists), ensure that children understand that anyone may become a scientist and aspire to have a career in Science.

March 2024

Review This policy will be reviewed in line with the governor's policy review schedule and before March 2027

Appendix 1: Please also refer to our school **Progression of Skills document** and Science Scheme of Learning for each Year Group available on the Teachers' Shared drive.

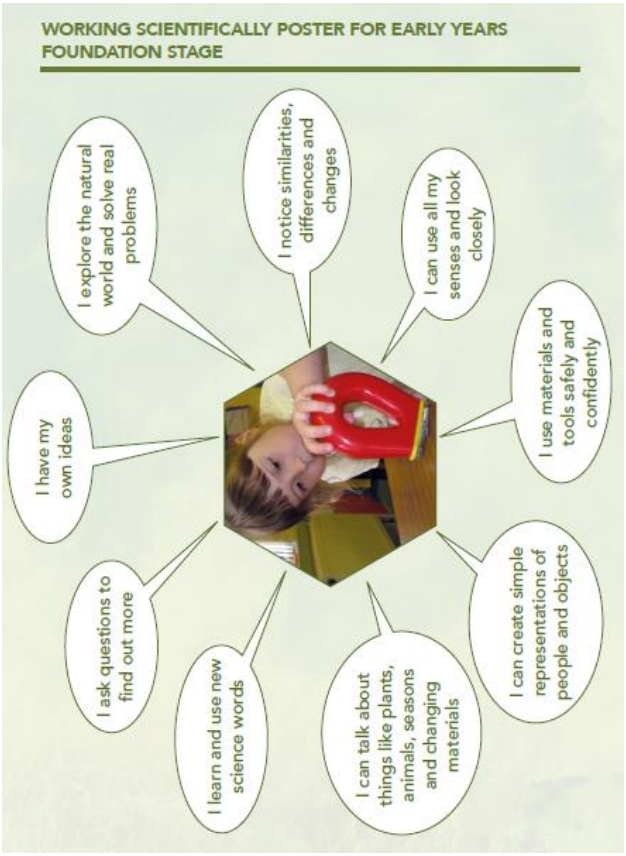
Progression in Thresholds Concepts in Science

Thresholds concept	Milestone 1 Years 1 and 2	Milestone 2 Years 3 and 4	Milestone 3 Years 5 and 6
Nature, processes and methods of science through science enquiries 5 Science enquiry types • Observing over time • Pattern seeking • Identifying, Classifying and grouping • Comparative and fair testing • Researching using	• Asking simple questions and recognising that they can be answered in different ways. • Observing closely, using simple equipment. • Performing simple tests • Identifying and classifying • Using their observations and ideas to suggest	• Asking relevant questions and using different types of scientific enquiries to answer them • Setting up simple practical enquiries, comparative and fair tests • Making systematic and careful observations and, where appropriate, taking	• Planning different types of scientific enquiries to answer questions, including • Recognising and controlling variables where necessary • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat
secondary sources • Collecting, presenting and analysing data	answers to questions • Gathering and recording data to help in answering questions.	accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • Recording findings using simple scientific language,	readings when appropriate • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • Using test results to make predictions to set up further comparative and fair tests • Reporting and presenting findings from enquiries, including conclusions,

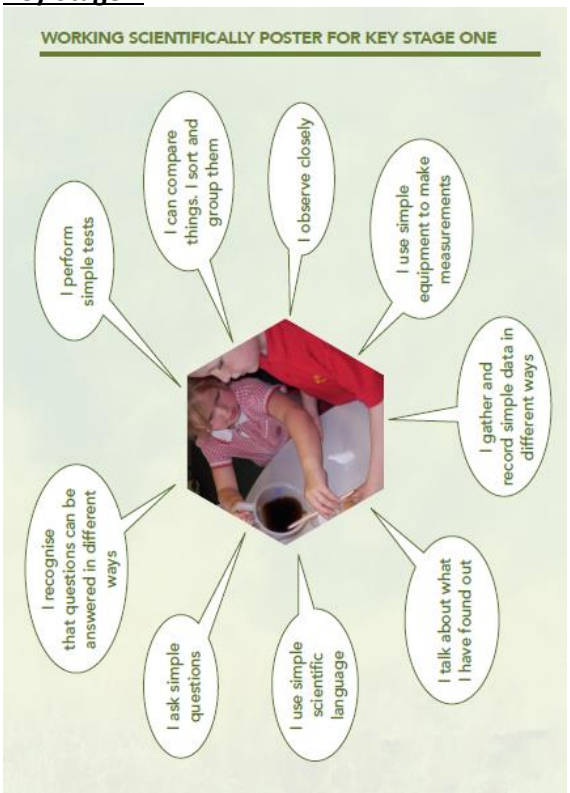
		drawings, labelled diagrams, keys, bar charts, and tables. • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • Using results to draw simple conclusions, make predictions for new values, suggest	causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Identifying scientific evidence that has been used to support or refute ideas or arguments.
		improvements and raise further questions. • Identifying differences, similarities or changes related to simple scientific ideas and processes • Using straightforward scientific evidence to answer questions or to support their findings	

Appendix 2: <u>'Working Scientifically' Skills Progression (CIEC Posters)</u>

<u>Early Years</u>



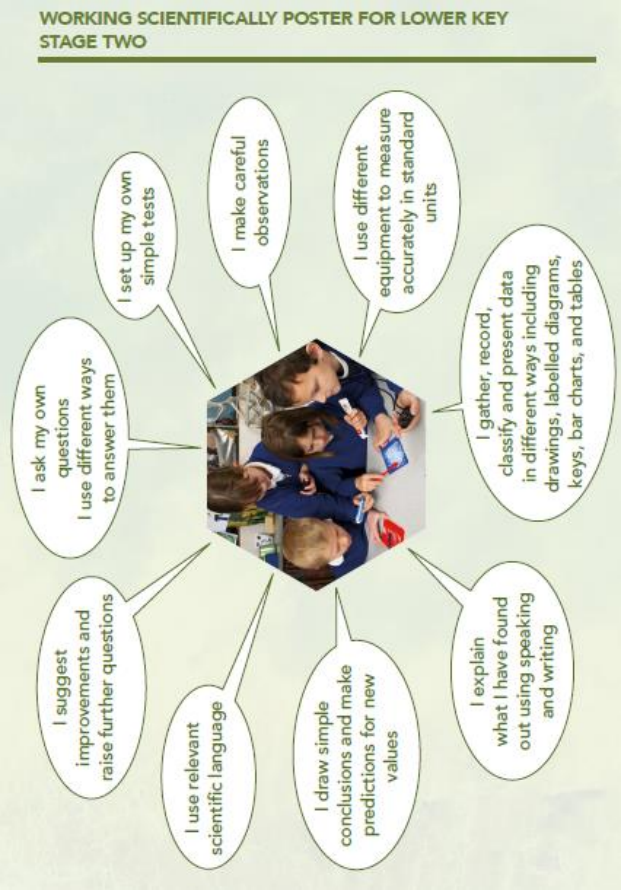
<u>Key Stage 1</u>



Appendix 2 Cont'd: 'Working Scientifically' Skills Progression

The principal focus of Science teaching in Key Stage 1 is to enable pupils to 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 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 about Science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.
'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive Science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower Key Stage 2



The principal 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 comparative and 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' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive Science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2

The principal 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 more abstract ideas 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 comparative and 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' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive Science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.