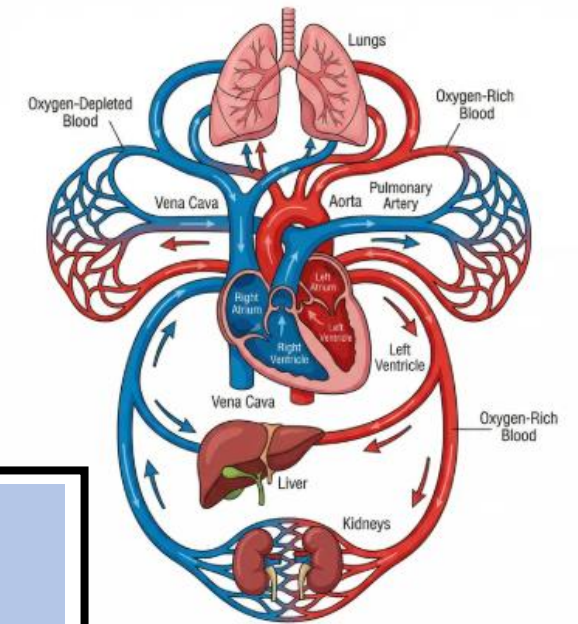
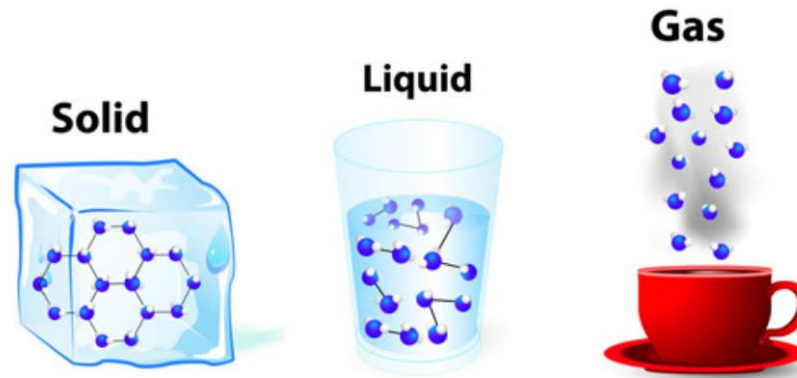
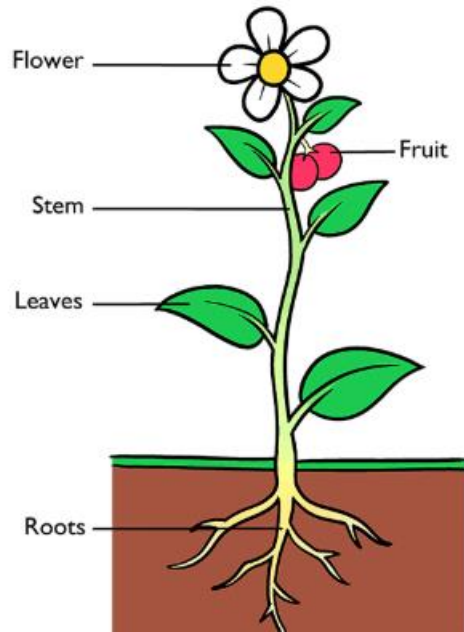
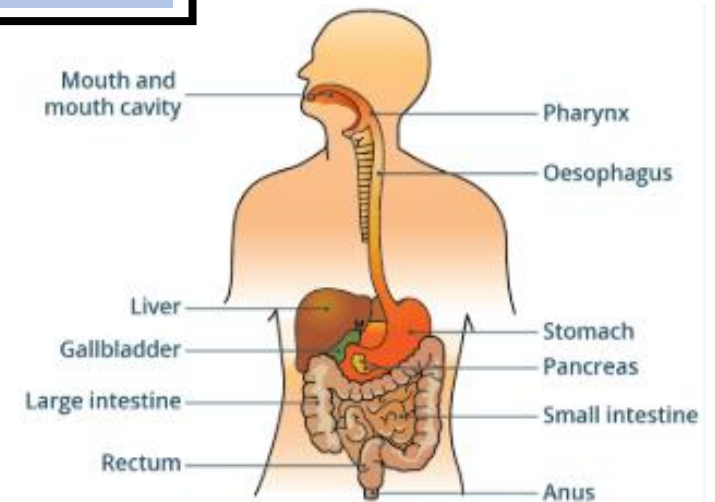
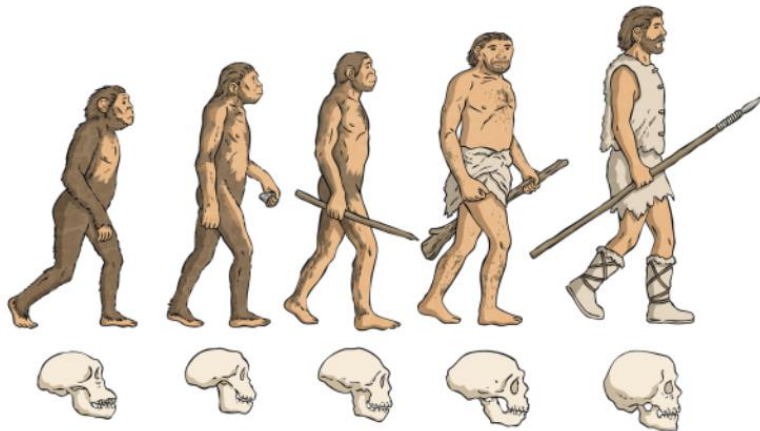




Science at Caldecote Primary School





Science Curriculum Intent

“The scientist is not a person who gives the right answers, he's one who asks the right questions.”

— Claude Levi-Strauss

At Caldecote Primary School, we believe that science is a vital part of understanding the world around us. Through the disciplines of biology, chemistry and physics, we aim to inspire curiosity, encourage exploration, and develop a deep appreciation of how science shapes our lives and our future. Our science curriculum is carefully designed in line with the National Curriculum to provide all pupils with the knowledge, skills and understanding they need to become successful learners, confident individuals, responsible citizens and effective contributors.

We recognise that children are naturally inquisitive and learn best through first-hand experiences. Therefore, our curriculum provides rich opportunities for practical investigation, observation, experimentation and enquiry. Through engaging and meaningful learning experiences, pupils develop a secure understanding of key scientific concepts and processes while building the confidence to question, predict, test ideas, analyse evidence and draw conclusions.

Science and Our Personal Development Drivers

As **successful learners**, pupils develop a strong foundation of scientific knowledge and understanding across biology, chemistry and physics. They are encouraged to think critically, ask questions about the world around them and develop the skills needed to investigate and solve problems. Through carefully planned progression, children build on prior learning, deepen their understanding and prepare for future scientific study.

As **confident individuals**, pupils learn to communicate scientific ideas accurately using appropriate vocabulary and evidence. They are supported to apply their scientific knowledge to real-life situations, helping them to see the relevance of science in everyday life. Through practical enquiry and investigation, children develop resilience, independence and confidence in their ability to learn from mistakes, interpret data and justify conclusions.

As **responsible citizens**, pupils gain an understanding of the role science plays in society and its impact on the environment, health and sustainability. They learn to respect living things, appreciate the importance of biodiversity and conservation, and make informed decisions based on scientific evidence. Our curriculum encourages pupils to consider ethical issues linked to scientific developments and to understand their responsibilities as future custodians of the planet.



As **effective contributors**, pupils work collaboratively, sharing ideas and solving problems together through practical investigations and discussion. They are encouraged to think creatively, design and evaluate investigations, and communicate their findings. Through these experiences, pupils develop the organisational, analytical and teamwork skills needed to contribute positively to their learning and wider society.

Ultimately, our science curriculum seeks to ignite a lifelong love of learning, foster a sense of wonder about the natural world, and equip every child with the scientific knowledge, enquiry skills and confidence needed to thrive in an ever-changing world.

Curriculum Design

Our science curriculum is carefully sequenced to ensure that both substantive knowledge and disciplinary knowledge build progressively from the Early Years through to the end of Key Stage 2. Drawing on the National Curriculum, we have identified the essential knowledge, concepts and skills that pupils need to develop at each stage of their learning journey. This cumulative approach enables pupils to develop secure scientific understanding, make meaningful connections in their learning and achieve age-related expectations by the time they leave our school.

The foundations of scientific learning begin in the Early Years through the 'The Natural World' strand of Understanding the World. Through exploration, observation, play-based experiences and first-hand investigations, children begin to make sense of the world around them. They explore seasonal changes, plants, animals, materials and natural phenomena, while developing curiosity, questioning skills and an understanding of how to observe and talk about change. Opportunities to investigate, predict and discuss their findings support the development of early scientific thinking and communication skills.

In Key Stage 1, pupils begin to develop a broader understanding of scientific concepts through the study of plants, animals including humans, everyday materials and seasonal changes. They learn to observe closely, carry out simple tests, gather and record data, and use observations to answer questions. Pupils begin to use scientific vocabulary with increasing accuracy and develop an understanding of how scientific enquiry helps us to understand the world.

In Key Stage 2, pupils build upon their prior learning through the study of a wider range of scientific topics within biology, chemistry and physics. Areas such as living things and their habitats, forces, electricity, states of matter, light, sound, Earth and space, and evolution and inheritance enable pupils to develop increasingly sophisticated scientific knowledge and understanding. Scientific enquiry skills are systematically developed throughout each year group, allowing pupils to plan investigations, identify variables, interpret data, evaluate evidence and draw conclusions. Through repeated opportunities to work scientifically, pupils learn to think critically, ask relevant questions and understand how scientific ideas are developed and tested.

The curriculum is further enriched through practical investigations, educational visits, visitors with scientific expertise and opportunities to engage with the natural environment. These experiences bring science to life, deepen understanding and inspire pupils to develop a lifelong curiosity about the world around them.



Substantive knowledge and concepts in our curriculum

Substantive knowledge is the scientific knowledge that pupils acquire through the study of biology, chemistry and physics. It includes key facts, information, scientific theories, vocabulary and concepts that help children understand the world around them. Within our science curriculum, substantive knowledge can be divided into two types: 'fingertip knowledge' and 'generative knowledge'.

Fingertip Knowledge

Fingertip knowledge is the essential factual knowledge that pupils need to have readily available in their minds whilst undertaking scientific enquiries and investigations. This includes key scientific vocabulary, facts, definitions, processes and examples that enable children to engage successfully with scientific learning. Without this essential knowledge, working memory can become overloaded, making it more difficult for pupils to think scientifically, analyse evidence and draw conclusions.

Fingertip knowledge is therefore identified within knowledge organisers and explicitly taught, revisited and retrieved throughout each unit to ensure it is retained and applied effectively. An example of a knowledge organiser:

Y4

States of matter

Knowledge organiser

Can materials change state?

Measuring temperature with a thermometer

- Place the thermometer in the liquid.
- Wait for the coloured centre to stop moving.
- Read the scale precisely to find the temperature. Ask an adult for help if needed.

Remember!
We usually measure temperature in degrees Celsius which can be shortened to °C.

The water cycle

The water cycle stages:

Evaporation: The Sun warms water and it changes into an invisible gas called water vapour.

Condensation: Water vapour cools and changes back into tiny drops of liquid, forming clouds.

Precipitation: Water falls from clouds as rain, snow, hail or sleet.

Collection: Water gathers in rivers, lakes and oceans.

Key vocabulary

cold	collect	cool	cycle	dry	fall	faster	freeze	hard	hot	measure	melt
move	observe	pour	repeat	reverse	slower	soft	spread	temperature	time	wet	

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Generative Knowledge

Generative knowledge is the deeper scientific understanding that enables pupils to connect ideas, explain phenomena and build increasingly sophisticated scientific schemas. This knowledge supports future learning by helping children generate new understanding from what they already know. Generative knowledge can be categorised into scientific themes and scientific concepts.

Scientific Themes

Scientific themes provide the broad areas of knowledge that pupils encounter throughout the curriculum - Biology, Chemistry and Physics:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Scientific Theme: Biology	Plants Animals, including humans	Plants Animals, including humans Living things and their habitats	Plants Animals, including humans	Animals, including humans Living things and their habitats	Animals, including humans Living things and their habitats	Animals, including humans Living things and their habitats Evolution and inheritance
Scientific Theme: Chemistry	Everyday materials	Uses of everyday materials	Rocks	States of matter	Properties and changes of materials	Consolidation and application
Scientific Theme: Physics	Seasonal changes		Light Forces and magnets	Sound Electricity	Earth and space Forces	Light Electricity

As pupils progress through the school, they revisit these themes in increasing depth, developing a more secure understanding of scientific knowledge and processes.



Disciplinary Knowledge in our curriculum

Disciplinary knowledge is knowledge about how scientists investigate the world around them, develop explanations based on evidence, and build scientific understanding. In our curriculum, pupils develop this knowledge through practical enquiry and the application of scientific skills within a range of topics.

Working Scientifically

Working Scientifically skills enable pupils to think and work like scientists by:

-  Asking questions
-  Making predictions
-  Setting up tests
-  Observing & measuring
-  Recording data
-  Interpreting & communicating results
-  Evaluating

These are taught progressively and applied across a wide range of scientific contexts, enabling pupils to build confidence, competence and independence as young scientists. Through regular opportunities to investigate, evaluate evidence and communicate their ideas, pupils develop a deeper understanding of both scientific concepts and the processes of scientific enquiry.

Working Scientifically skills are carefully mapped to ensure progression across all year groups. This allows pupils to revisit and deepen their understanding of scientific enquiry over time. Further details can be found in the **[Science Working Scientifically progression document](#)**.



Scientific enquiry skills

Lessons are focused on one or more of the scientific enquiry skills:



Testing



Researching



Observing



Pattern seeking



Identifying & classifying



Problem solving



Science Curriculum Implementation

Enquiry-based approach

We have adopted an enquiry-based approach to learning. Pupils begin by asking questions about themselves and their immediate world, then gradually extend their enquiries to broader scientific phenomena. Each unit of work is driven by an overarching enquiry question that frames the theme and the key scientific concepts pupils will build. For example, a unit might ask, “How do we change as we grow older?” and focus on the theme of Living Things and their Environment with substantive concepts such as life cycles, adaptation and interdependence.

Every lesson has a clear key question that explores specific substantive concepts in greater depth and develops the disciplinary knowledge of science (how scientists work). For example, a lesson question such as “What conditions do woodlice prefer?” would develop substantive concepts (growth, requirements for life) alongside disciplinary concepts such as observation, prediction, fair testing and measurement.

Curriculum links

Connections are made consistently across the science curriculum — between lessons, units and year groups — so pupils add new knowledge to existing schema. This sequencing reinforces substantive concepts (for example, building from basic needs in Early Years to more complex ideas of adaptation and ecosystems in KS2) and strengthens pupils’ chronological and conceptual understanding of scientific ideas.

Where appropriate, we make cross-curricular links to deepen learning: for example, investigating animal habitats alongside geography; using statistics in maths to analyse experiment results; designing and testing simple mechanisms in design and technology; and writing scientific explanations and reports in English. These connections help pupils apply scientific knowledge and the disciplinary methods they have learned in different contexts.

Vocabulary development

Vocabulary is a fundamental component of our science curriculum, enabling pupils to develop a secure understanding of scientific concepts and communicate their ideas accurately and confidently. A rich scientific vocabulary helps children make sense of the world around them, explain their observations, interpret evidence and engage effectively in scientific enquiry.



Tier 1, Tier 2 and Tier 3 vocabulary has been carefully identified within each unit of study. Key vocabulary is explicitly taught and revisited throughout lessons, with clear, child-friendly definitions provided to ensure that language does not become a barrier to learning. Pupils are encouraged to use scientific terminology when discussing, recording and explaining their learning.

Vocabulary is mapped progressively across the curriculum to ensure that knowledge and understanding build over time. Previously taught vocabulary is regularly revisited and applied in new contexts, enabling pupils to make connections between different areas of science and develop increasing confidence in their use of subject-specific language. Please see the **Science vocabulary progression document** for further details.

Planning

Curriculum allocation

Approximately 12 hours per half term are allocated for the teaching of Science. Teachers use their professional judgement to deliver this in weekly lessons or in blocked sessions (e.g., afternoons for a whole week or as full days).

Planning documentation

Curriculum overview

The **Science whole-school overview** is mapped for each year group. It outlines what topic is taught and when.



Science whole-school overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reception	TBC	TBC	TBC	TBC	TBC	TBC
Year 1	Materials <i>Why do we use different materials for different things?</i> Seasonal changes <i>What are the seasons?</i>		Plants <i>How can we identify different plants and trees?</i>		Animals including humans <i>How can we group animals and what makes us human?</i>	
Year 2	Animals including humans <i>How do animals survive, grow and stay healthy?</i>	Living things and their habitats <i>How do we know something is alive?</i>	Materials <i>How are materials chosen in design?</i>	Plants <i>How do seeds and bulbs grow into healthy plants?</i>	Seasonal changes <i>What changes occur throughout the seasons?</i>	
Year 3	Rocks <i>How can we classify rocks?</i>	Animals including humans <i>How do the systems inside our body work to make a healthy human?</i>	Forces and Magnets <i>How do magnets work?</i>	Plants <i>How does each part of the plant fulfil its function?</i>		Light <i>What is light?</i>
Year 4	Animals including humans <i>What happens to the food that we eat?</i>	States of matter <i>Can materials change shape?</i>	Electricity <i>What is electricity?</i>	Living things and their habitats <i>Which living things can be found in the local area?</i>	Sound <i>What is sound?</i>	
Year 5	Animals including humans <i>How do we change as we grow older?</i>	Living things and their habitats <i>How do living things reproduce, and why is this important in a life cycle?</i>	Forces <i>Are there different types of forces?</i>	Materials <i>How do materials change?</i>	Earth and Space <i>How does the Earth fit into our solar system?</i>	
Year 6	Animals including humans <i>How do an animal's living systems work together to maintain a healthy body?</i>	Light <i>What is light?</i>	Living things and their habitats <i>What is classification?</i>		Evolution <i>What is evolution?</i>	Electricity <i>How can circuits vary?</i>

Substantive knowledge (Scientific themes)

Enquiry questions



Unit overviews

The **unit overviews** form our medium-term plans. They outline:

- an overarching enquiry question for the unit and individual enquiry questions for each lesson
- links to prior and future learning related to the topic
- National Curriculum (NC) objectives covered in the unit
- Working scientifically skills and enquiry skills covered in each lesson
- common misconceptions students may have
- key vocabulary for teaching and explaining
- ideas for stretching and challenging students
- suggestions for assessment
- climate change and sustainability links

Short term plans

Teaching presentations and daily lesson plans form our short-term plans.

Planning cycle

There are four key elements to planning within the science curriculum:

- **Plan:** Each lesson is judiciously planned to identify the different types of knowledge that the lesson focusses on. It builds on pupils' prior learning, drawing upon previously lessons and the prior learning as identified in the medium-term plans.
- **Teach:** The Caldecote Lesson Rubric is used when implementing the science curriculum.
- **Assess:** Pupils are given enquiry-based tasks that enable them to demonstrate their understanding of the knowledge.
- **Intervene and re-teach:** Carefully designed pit-stop style activities ('true or false' and 'stop-and-jot') and exit tickets (cumulative quiz questions) identify knowledge that is not secure. Concepts are re-taught or misconceptions addressed before moving on to avoid future gaps emerging.



Adapting the curriculum for pupils with SEND

Adaptive teaching takes place:

- For sensory-impaired pupils, learning may necessitate enlarging texts, using clear fonts, using visual overlays, or audio description of images. Dyslexic pupils use well-spaced print.
- Teachers identify and break down the components of the subject curriculum into manageable chunks for pupils who find learning more difficult, particularly those with cognition and learning needs. These smaller 'steps' avoid overloading the working memory.
- A variety of additional scaffolds may be used in lessons, such vocabulary banks, additional visual stimuli or adult support.



Pedagogy

Our lessons are based on Rosenshine's Principles of Instruction, and split into 6 key phases, outlined in the Caldecote Lesson Rubric:

Caldecote Lesson Rubric		
Phases	Principle	Details
Connect	Activate prior learning	Teachers introduce the learning outcome of the lesson, making links to both the wider learning journey and the real world. They connect what pupils already know with what they are about to learn, activating prior knowledge. Teachers provide opportunities for retrieval practice of substantive knowledge through a range of strategies: completing 'Do now' tasks (starter activities), populating blank knowledge organisers and participating in low-stakes quizzes.
Explain (I do)	Explicit instruction and modelling of working scientifically	Teachers explain the key concept concisely and precisely. Teachers ensure explicit teaching of dual-coded vocabulary (Tier 2 and Tier 3) to support children to retain substantive knowledge. The 'Think aloud' technique is used during explicit instruction to promote metacognition. Teacher modelling of key substantive concepts is built around clear success criteria.
Practise (We do)	Guided practice	Through guided practice, pupils all achieve success in applying the target concept. Scaffolding is gradually reduced.
Apply (You do)	Independent practice	Pupils achieve fluency with the target concept through deliberate practice. Some pupils may need additional instruction at this point – flexible grouping is used to ensure children receive the right support at the right time.
Challenge	Deepen understanding	Pupils are challenged to sophisticate their thinking and to think hard about the concept they have been taught. This may include exploring exceptions, identifying common errors or applying a concept in multiple contexts. Teachers ensure that substantive knowledge is developed alongside disciplinary knowledge within meaningful scientific enquiry. Teachers provide meaningful opportunities for extended writing.

This is not a linear structure and teachers may need to move backwards and forwards between the lesson phases to help them break concepts into manageable chunks for pupils or to provide additional modelling or guided practice. Checking for understanding should be built into each phase of instruction so that misconceptions can be addressed and resolved quickly.



Assessing learning

Teachers will:

1. Maximise engagement, learning and progress through regular use of techniques such as Cold Calling (using lolly sticks to randomise pupil responses), 'Phone a Friend' (pupil gaining a response from a peer), 'TTYP - Talk To Your Partner (peer discussion time)', '123, Show Me' (pupils displaying response recorded on mini whiteboard).
2. Build in regular checks for understanding during lessons, through assertive monitoring, mini plenaries, self-assessment opportunities and targeted questioning, addressing misconceptions quickly and remodelling where necessary.
3. Check priority knowledge and vocabulary has been retained to the working memory at the end of every lesson, including through the use of cumulative quizzes and Exit Tickets.
4. Use the Caldecote Science Assessment Grids to make judgements on pupils' attainment in science (substantive and disciplinary knowledge, including working scientifically), and record overall judgements on the Insight tracking system.

Subject-specific enrichment

In every year group, we provide rich scientific experiences to make learning memorable, build secure knowledge and develop pupils' curiosity about the world around them. Enrichment activities are carefully chosen to strengthen the curriculum by deepening understanding, providing first-hand experiences and enabling pupils to apply their scientific knowledge and enquiry skills in meaningful contexts. They also support personal development, including confidence, teamwork, resilience and environmental awareness, and are designed to be inclusive for pupils with SEND.

Our enrichment opportunities include the following:

- Science investigations and outdoor learning opportunities, including habitat studies, fieldwork and environmental projects
- Visits to science centres, nature reserves, farms, zoos and environmental sites
- Workshops led by scientists and science educators linked to current topics
- Hands-on experiences with specialist equipment and technology to enhance learning
- Community partnerships and engagement with local experts to support real-world scientific learning
- Participation in national science events and competitions, such as Science Week activities
- A whole-school or phase-based "Science in Action" day each year, celebrating scientific enquiry, discovery and innovation.



Science Curriculum Impact

The impact of our science curriculum is evident in pupils' growing scientific knowledge, their ability to work and think as scientists, and their curiosity about the world around them. Through a carefully sequenced curriculum, pupils build upon prior learning over time, enabling them to know more, remember more and do more as they progress through the school.

Pupils develop a secure understanding of key scientific concepts across biology, chemistry and physics. They are able to make meaningful connections between different areas of science and use scientific vocabulary with increasing confidence and accuracy. Children demonstrate their understanding by asking questions, making predictions, carrying out investigations, observing carefully, recording results, analysing evidence and drawing conclusions based on their findings.

The impact of both the curriculum intent and its implementation is monitored systematically through our school monitoring cycle. This includes planning reviews, book scrutinies, lesson visits, assessment analysis and pupil voice activities. These processes enable leaders to evaluate the quality of teaching and learning, the progression of scientific knowledge and enquiry skills, and the extent to which pupils retain and apply their learning over time.

Pupil voice demonstrates that children enjoy science and are engaged by the exciting and practical experiences that form part of their learning. They can discuss their learning confidently, recall knowledge from previous units and explain how new learning builds on what they already know. Monitoring evidence shows that pupils make strong progress through the curriculum and develop an increasingly sophisticated understanding of scientific concepts and processes.

Regular curriculum reviews ensure that the science curriculum remains ambitious, relevant and inclusive, meeting the needs of all learners while providing appropriate challenge. As a result, pupils leave primary school with a strong foundation of scientific knowledge, a curiosity about the natural and physical world, and the skills needed to investigate, question and understand the world around them as informed and responsible citizens.