



## ***Theale C of E Primary School***

### **Science Policy**

At Theale CE Primary School the children come first. They are central to every decision made in school. We will ensure that our children are happy and successful. They will grow to be ambitious and resilient, and their talents will be nurtured so they become highly skilled. Our children will be courageous and always behave with integrity.

“I have come that they may have life and that they may have it more abundantly.”  
*John 10:10*

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*“The feeling of awed wonder that science can give us is one of the highest experiences of which the human psyche is capable.”*

*Richard Dawkins, Evolutionary Biologist*

*“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”*

*Marie Curie, Physicist and Nobel Prize Winner*

*“Somewhere, something incredible is waiting to be known.”*

*Dr Carl Sagan*

## **Why study Science?**

Science stimulates and excites pupils' curiosity about phenomena and events in the world around them. It also satisfies this curiosity with knowledge based on quantifiable evidence. Scientific method is about developing and evaluating explanations through experimental evidence and modelling, which is a spur to critical and creative thought. Through science, pupils understand how major scientific ideas contribute to technological change – impacting on industry, business and medicine and improving quality of life. Pupils recognise the cultural significance of science and trace its worldwide development. They learn to question and discuss science-based issues that may affect their own lives, the direction of society and the future of the world.

## **Intent**

At Theale CE Primary School, the science curriculum is designed to be ambitious, enjoyable and knowledge rich, sparking pupils' enthusiasm and curiosity for the world around them. The curriculum is designed to teach the children the skills required to work scientifically, provide knowledge and understanding of key processes, including the relevant technical vocabulary, and help them develop a thirst to extend their knowledge and understanding by asking questions. Through experimentation, the curriculum aims to develop an understanding of simple, comparative and fair testing, together with the mathematical, ICT and literacy skills to make observations, take measurements and record results accurately while using safe practices. The curriculum seeks to offer scientific experiences to all students in a variety of formats, encouraging an appreciation for the wonders of the world. Through the study of science, we aim to celebrate the world's diversity and inspire curiosity in our students, motivating them to explore by asking questions and making careful observations.

## **Implementation**

Throughout the teaching of science, there is a strong emphasis on gaining knowledge. As knowledge is taught, careful explanations are delivered, with teachers modelling new principles and techniques. Students are questioned about their knowledge and encouraged to pose their own questions and lines of enquiry. Where possible, they either investigate or re-enforce their knowledge using practical experimentation. To enable the students to review lessons and the associated knowledge, Recap and Remember sessions are used for each lesson. This is in line with our curriculum policy: *“Teachers plan and structure lessons with an understanding of the principles of instruction to enable pupils to hold on to their learning.”* (Barak Rosenshine, 2012)

At Theale, we employ specialist teachers to ensure a strong foundation in scientific knowledge, enabling them to deliver lessons with rich subject content. This approach is intended to maximize the impact on students' learning.

‘Working scientifically’ is embedded throughout the curriculum.

## **Structure of Provision**

At Theale, all pupils are taught science for a minimum of 2 hours every two weeks. Due emphasis is placed on investigative practical experiments, particularly with reference to real life situations.

Science is taught in year groups, so that it mostly follows the progression of the curriculum as laid out in the National Curriculum for each year group.

This has several advantages:

- Children are introduced to content when they are ready for it.
- A logical progression can be followed, which allows for material to be revisited.
- Children are taught in smaller groups, which facilitates practical work and aids discussion.

All year groups have a full afternoon of science teaching once a fortnight. Years 2 and 3 additionally have “half” an afternoon’s short lesson every intervening week.

All lessons should begin with recap of prior knowledge. This is also revisited weekly in “Recap and Remember” sessions with class teachers.

## **Cross-curricular links**

Science work will not be considered in isolation. It will be for the skill of the individual teacher to draw links between pupils’ existing and new knowledge to other areas of learning, particularly mathematics, ICT and literacy. Within each unit there will be opportunities for children to consolidate and develop existing scientific understanding through cross-curricular activities.

## **The Use of ICT**

Teachers should be conscious of the need to reinforce scientific investigations through the appropriate use of ICT across all age groups. Reference should be made to the ICT Co-ordinator for the most appropriate software and resources to support the delivery of the subject.

## **Resources**

Appropriate resources to support work should be readily available and accessible to both teachers and pupils. They should be maintained in adequate supply and in a good state of repair. Care of resources should be emphasised, to both pupils and staff. It is the responsibility of the subject co-ordinator to monitor and organise the resources.

## **Health and Safety**

The science curriculum includes practical investigations to engage children in hands-on learning, helping them develop critical thinking, problem-solving skills, and a deeper understanding of scientific concepts. To ensure safety, children are closely supervised during practical work and use protective equipment when needed. Risk assessments are conducted in advance to identify potential hazards and minimize risk, and teachers will assess dynamically throughout.

## **Equal Opportunities and Special Needs**

Every pupil will be given equal opportunity to follow the National Curriculum or Early Years Foundation Stage curriculum irrespective of their ethnic or linguistic background, gender, disability or religious beliefs. Children with special educational needs or disabilities will have full access to the science curriculum which will be modified to best meet their needs. Planning is carried out with these children in mind. Those identified as able, gifted and talented will be given opportunities to develop their skills through additional challenge and extracurricular activities.

## The Science Curriculum

### Early Years Foundation Stage

Within EYFS, the teaching of science is about experiencing different phenomena through both self-led and teacher-led practical activities, observing effects and learning the associated vocabulary.

The study of science helps children achieve several Early Learning Goals (ELGs), particularly in the areas of *Understanding the World*, *Communication and Language*, and *Personal, Social and Emotional Development*.

1. **Understanding the World.** Science activities encourage children to explore, observe, and make sense of their environment. Children develop knowledge about the natural world, technology, and their communities, fulfilling goals like recognising similarities and differences, as well as noticing changes and patterns in their surroundings.
2. **Communication and Language.** As children describe their observations, ask questions, and discuss findings with peers and teachers, they develop vocabulary and critical language skills. This supports ELGs related to listening, understanding and speaking, as children learn to articulate ideas and share discoveries.
3. **Personal, Social and Emotional Development.** Collaborative science activities build social skills such as teamwork, turn-taking, and problem-solving. By investigating together, children learn to respect others' ideas, work cooperatively, and develop confidence in expressing curiosity.

Through these interdisciplinary benefits, early years science supports broad development and a lifelong interest in learning.

A key aim in the foundation stage is to ensure children have sufficient underlying knowledge, understanding and experiences to facilitate success in Key Stage 1.

### Children are taught about

- **Humans and other animals** – This topic starts with learning the different parts of our bodies. Time is spent looking at similarities and differences between us and celebrating the diversity of the class. Parts of the human body are compared with some of the features of animals in our world, and the names of different types of animals are learnt.
- **Seasons** – Through the year, the children observe the changes across the seasons and begin to appreciate the temperature variations through the year.
- **Materials** – The children are given the opportunity to explore their environment and discover the materials around them, learn their names and how to describe them. Through a series of challenges, the children investigate the properties of materials.
- **Plants** – Within the local environment, the children explore and discover the different plants that grow around them and discuss how to treat them with care. They grow plants themselves, learn how to make careful observations and learn the names of the parts of plants and flowers.

## Key Stage 1

During years 1 and 2, pupils are taught to use safe, practical scientific methods, processes and skills through a range of activities and experiments:

- 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 answers to questions
- gathering and recording data to help in answering questions

Working scientifically is an essential element of the science curriculum and is taught as an integral part of the learning.

## Year 1

### Children are taught about

- **Animals including humans** – The children review the basic parts of the human body and explore the five senses and which part of the body is used for each. They look at common animals and learn how to describe their features. What different animals eat is investigated.
- **Seasonal changes** – Through the year, the children observe the changes across the seasons and the associated weather.
- **Everyday materials** – Through this unit there is a focus on distinguishing between objects and materials. The names of common materials, their properties, usage and comparisons are learnt through investigative tasks, alongside learning the associated vocabulary for describing the materials.
- **Plants** – By growing and looking after plants, the pupils discover what plants need to grow healthily. They look carefully at the basic parts of plants and make observational drawings.

## Year 2

### Children are taught about

- **Living things and their habitat** – By investigating the things around them, the pupils identify whether they are alive, dead or have never been alive. The characteristics of living things are defined. The habitats for different living things are explored to see how they meet the needs of each to keep them alive and healthy.
- **Uses of everyday materials** – Building on knowledge from earlier years, the focus of this unit is developing the understanding of properties and why materials are chosen for particular purposes. The different ways in which materials can have their shape changed is also investigated.
- **Animals including humans** – Life cycles of different animals are compared, identifying similarities and differences. Children learn about the importance of exercise, healthy diets and hygiene for humans.
- **Plants** – Again building on previous knowledge, growing plants under different conditions is investigated, taking careful observational drawings of each stage of growth, recording the changes made as they grow from seed to plant.

## Lower Key Stage 2

During years 3 and 4, pupils continue to be taught to use safe, practical scientific methods, processes and skills through a range of activities and experiments to broaden their scientific view of the world around them. They are supported in asking their own questions about what they observe and making 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.

Having asked scientific questions, they are taught to record observations and results, developing their literacy and mathematical skills. Drawing conclusions based on evidence is scaffolded for them, encouraging them to identify similarities and patterns. The relevant technical vocabulary is taught with every unit, with working scientifically taught continually throughout the curriculum.

## Year 3

### Children are taught about

- **Animals including humans** – Pupils learn that animals, including humans, can be grouped according to what they eat and learn how to extract data from tables and bar charts, including identifying patterns and trends in data. The need for the five food groups to create a healthy, balanced diet is identified, together with the nutritional properties of carbohydrates, fruit and vegetables, proteins and dairy foods and the importance of limiting fat and sugar intake. The structure and function of the skeleton is looked at and the children learn how muscles work.
- **Light and shadows** – Through experimentation, our need for light to see is identified, followed by discussion as to what creates light (light sources) and defining darkness as the absence of light. The formation of shadows is investigated, as well as how they change. Children observe opaque, transparent and translucent materials, and investigate how reflective different materials are. They also compare the strength of different light sources.
- **Rocks** – How to group different kinds of rocks based on their appearance and physical properties is explored. Comparative tests are carried out to determine which is the hardest rock and to investigate which rocks are most likely to be affected by acid rain. The children are introduced to the rock cycle and how different types of rock are formed, transformed, weathered and eroded. How fossils are formed is explained, together with what they can tell us about different periods of time. Children investigate the composition of soil and learn how it is formed.
- **Forces and magnets** – The children are introduced to forces and identify pushing and pulling forces and their effects on objects (starting or stopping motion, speeding up, slowing down or changing direction or shape). Movement on different surfaces is investigated and friction is identified as slowing objects down. The difference between contact forces and non-contact forces is explained and magnetic forces that can act at a distance are studied. Magnetic and non-magnetic materials are identified by practical investigation.
- **Plants** – Through experimentation, the conditions that plants need for healthy growth are determined. Close observation allows children to learn the structure of plants and the function of each part. Transportation of water is investigated, and the children are taught about the life cycle of plants, with particular emphasis on mechanisms for seed dispersal.

## Year 4

### Children are taught about

- **Animals including humans** – The main parts of the digestive system are examined, and children gain an understanding of how the digestive system functions. Teeth, their structure and functions are explored and the importance of keeping them clean and healthy is considered. Food chains are drawn, identifying the producers, consumers, predators and prey and exploring the effects when food chains break down.
- **Sound** – What is sound and how sounds are made? Through experiencing sound, children learn how it is created and how travels from the source to our ears. Pitch and volume are investigated, looking at how sound waves are produced. Vibrations are recognised as how sound travel from source to our ears.
- **States of matter** – The three states that materials exist in are identified, together with the processes through which materials change their state. Through experimentation, children learn what happens to water and other materials when they are warmed or cooled. These processes are related to the water cycle, together with the factors that affect the rate of these processes.
- **Living things and their habitat** – The classification of animals as vertebrates or invertebrates is investigated and children develop an understanding of how scientists classify living organisms. Different habitats are studied, explaining how different animals are adapted to living in these environments. Children explore how changes within environments affects living things.
- **Electricity** – How to handle electricity safely is taught alongside an understanding that many everyday appliances require electricity. Complete circuits are created and detective work is used to determine why some do not work. Children investigate how switches work. Fair tests are set up to determine the types of materials that conduct electricity and those that insulate it.

## Upper Key Stage 2

During years 5 and 6, pupils continue their development of safe, practical scientific methods, processes and skills. They plan, with increasing levels of independence, different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary, using a range of scientific equipment, taking measurements with increasing accuracy and precision and taking repeat readings when appropriate to ensure accuracy. Data and results are recorded and presented using scientifically appropriate formats. Children develop their ability to draw appropriate conclusions from their results, using scientific evidence to support their reasoning.

### Year 5

#### Children are taught about

- **Animals including humans** – The human circulatory system is studied, identifying the parts and functions of the different parts. The purpose of muscles is revised, and the children learn that when muscles work, they need oxygen; the more work muscles do, the more oxygen is required and hence the heart rate is increased. The impact of diet, exercise and drugs on our lives is explored, together with the different nutrients we need for a healthy life and how they are transported within animals, including humans.
- **Earth and Space** – Our solar system is studied, identifying that the Sun (a star), Earth and Moon are approximately spherical bodies. The children gain an understanding of the relative sizes and distances of the planets in the solar system. Through practical demonstrations, the children understand that the relative movement of the Earth, Sun and Moon explains day and night, why the Sun appears to move across the sky and why the northern and southern hemispheres experience different seasons throughout the year.
- **Properties and changes of materials** – The grouping of materials by their properties is taught, with reference to how materials are selected for function by their properties. Through setting up comparative tests with relevant questions, solutions are investigated, findings recorded and conclusion from the data drawn. Reversible and irreversible processes are investigated, and children understand that reversible changes allow the original materials to be reclaimed, while irreversible changes result in the formation of new materials. Children apply their knowledge of solids, liquids and gases to consider how to separate mixtures by filtering, sieving and evaporating.
- **Forces** – Building on prior learning, students investigate gravity and its effects, including the relationship between mass and weight. They explore how air resistance, water resistance, and friction influence the movement of objects, examining the forces acting on these bodies. They also study mechanisms such as levers, pulleys, and gears, understanding how these tools enable a smaller force to produce a greater effect.
- **Living things and their habitats** – Students learn about the stages in the life cycle of flowering plants, with a focus on pollination, fertilisation and the flower parts involved in reproduction. They also study the life cycles of animals from various classes, exploring similarities and differences, including metamorphosis. In connection with the computing curriculum, students research and present the lives and contributions of notable naturalists and animal behaviourists.
- **Animals including humans** – This unit is taught in conjunction with sex education. The children are introduced to the stages of the human life cycle, and the changes as humans develop to old age (including sex education) are taught. Some aspects of growth and development are compared to those of other animals.



## Year 6

### Children are taught about

- **Living things and their habitats** – Children are taught about the life and works of Carl Linnaeus. They research the five kingdoms, understand the concept of progressively smaller classification groups and use IT to research and classify an individual species according to the Linnaean system. Children explore how to sort animals in different ways and classify a range of vertebrates and invertebrates on the basis of their observable characteristics. Microorganisms are investigated, including describing and categorising them and understanding which can be harmful or helpful. Fair testing is used to investigate the conditions required for the growth and reproduction of both yeast and bread mould. Pupils learn how to create branching keys for sets of animals, generating their own questions. They also explore the classification of plants and the variety of observable characteristics that are used to achieve this.
- **Light** – Man-made and natural light sources are identified. The pupils are taught that we see objects because they give out or reflect light into the eye. The mechanics of the eye is covered, including how we can see objects in low light. The way light travels in straight lines from a light source or is reflected from a surface into the eye is explored and the children learn to draw simple ray diagrams. They then make periscopes and apply their understanding of reflection to explain how they work. Children build on their understanding of shadow formation by using fair testing to investigate how the size of a shadow can be changed, recognising dependent and independent variables in the investigation, taking precise measurements, recording their findings and drawing conclusions.
- **Evolution and inheritance** – Through investigation, the pupils understand that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents and that inherited characteristics can be passed down from generation to generation. Adaptation is studied as a means of increasing an organism's chance of survival. Children learn about Charles Darwin's theory of evolution through natural selection, recognising that living things have changed over time. They learn that fossils provide information about living things that inhabited the Earth millions of years ago and identify scientific evidence that has been used to support or refute ideas or arguments. Through studying Darwin's theory, they understand how he thought human beings have evolved and how adaptations can result in both advantages and disadvantages.
- **Electricity** – Pupils consider the impact of the use of electricity. They build on their understanding of circuits, are introduced to the difference between current and voltage, and learn to draw circuit diagrams using the correct symbols. While planning investigations, they decide which variables to control, how to report their findings, make predictions based on previous results and consider the degree of trust there will be in their results. The effect of increasing or decreasing the voltage on circuits is investigated as well as the effect of adding more components to a circuit.

## **Impact**

### **Assessment, Record Keeping and Marking**

We assess by:

- talking to the pupils and asking questions
- discussing the work with the pupil
- looking at the work and marking against the learning objective
- observing the pupils carrying out practical tasks
- pupils' self-evaluation of their work
- implementing low stakes informal testing

We monitor the pupils' progress in skills by using their books, marked after each session, and these observations during lessons. We plan for further development based upon what we have observed.

In Years 1-6 an assessment sheet is completed mid-year and at the end of the academic year. Children are assessed as working towards, working at or working above the age-related expectation in science. At the end of the academic year, assessment sheets are available for the next class teacher. Assessments are communicated to parents in the children's school reports.

At the end of foundation stage, the children are assessed against the early learning goals (ELGs). At the end of KS1 and 2, the children are assessed using teacher assessments.

### **Monitoring**

The monitoring of science teaching and learning will take the form of classroom observations, monitoring of planning, work scrutiny, interviews with children, learning walks and monitoring of displays. The subject leader, working with the head teacher is responsible for the monitoring of science. The headteacher will report to governors using information provided by the subject leader.