



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.

“And you shall love the LORD your God with all your heart, with all your soul, with all your mind, and with all your strength.’ This *is* the first commandment. And the second, like *it, is* this: ‘You shall love your neighbour as yourself.’ There is no other commandment greater than these.” *Mark 12: v 30-31*

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

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“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, the knowledge of processes of the world around them, including the relevant technical vocabulary and thirst to extend their knowledge and understanding by asking questions. Through experimentation, the curriculum aims to develop an understanding of 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 provide experiences of the scientific world to all students in different forms, appreciating the wonder of the world. By studying science, we aim to celebrate the diversity of the world and foster a curiosity for the world that drives our students to find out about it 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 principals 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 use specialist teachers to ensure the teachers have a strong scientific knowledge of the subject, delivering lessons with strong knowledge content, as this will have the greatest impact on the pupils' learning.

'Working scientifically' is embedded throughout the curriculum.

Early Years Foundation Stage

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

Children will be taught:

- **Humans and other animals** – This topic starts with learning the different parts of our bodies. Time is spent looking at similarities between ourselves and celebrating the diversity of the class. Parts of our bodies are used to compare the features of animals in our world, learning the names of different types of animals.



- **Seasons** – Through the year, the children will observe the changes across the seasons and begin to appreciate the temperature changes 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 building challenges, the children investigate the properties of materials.
- **Plants** – Within the local environment, the children will explore and discover the different plants that grow around them, including discussion about treating them with care. By growing plants themselves, the children will learn how to make careful observations and 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 will be taught:

- **Animals including humans** – The children review the basic parts of the human body and explore the five senses and what 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 will 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 building tasks as well as learning the associated vocabulary for describing the materials.
- **Plants** – By growing plants, the pupils discover what plants need to grow healthily. They will be looking carefully at the basic parts of plants and make observational drawings.

Year 2

Children will be taught:

- **Living things and their habitat** – By investigating the things around us, the pupils will identify whether they are alive, dead or never have 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.

- **Using electricity** – By looking around our environment, pupils identify appliances that use electricity, discussing both mains and batteries. The children learn how to use electrical appliances safely. Time is spent building circuits and investigating what happens when different elements are changed.
- **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 for different animals are compared for similarities and differences, studying 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 will be taught:

- **Animals including humans** – The 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 identify 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 function of the skeleton is looked at and 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. Formation of shadows is investigated and how they change. Experiments are run to determine how opaque different materials are, their reflective properties and the strength of different light sources.
- **Rocks** – How to group different kinds of rocks based on their appearance and physical properties is learnt. Fair testing is used to determine which is the hardest rock and which is the most waterproof one. How fossils are formed is explained, together with what they



can tell us about different periods of time. The rock cycle is defined with an explanation of how soil is formed.

- **Forces and magnets** – What are forces and how are they created? Friction is investigated, looking at what forces are in actions and how it affects movement on different surfaces. The difference between contact forces and magnetic forces that can act at a distance is explained. Fair testing is used to determine the strength of different magnets, recording findings and drawing appropriate conclusions from the data.
- **Plants** – Through experimentation, the conditions that plants need for healthy growth is determined. Close observation allows children to learn the structure of plants and the function of each part; transportation of water; and their life cycle.

Year 4

Children will be taught:

- **Animals including humans** – The main parts of the digestive system and an understanding of how the digestive system functions are examined. Teeth, their structure and functions are identified, with the importance of keeping them clean and healthy. 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, how it travels from the source to our ears is explained. Pitch and volume are investigated, looking at how sound waves are produced. Vibrations are recognised as how sound travel from source to our ears. Fair testing is used to determine what materials makes the best earmuffs.
- **States of matter** – The three states that materials exist in are identified, together with the processes through which materials change their state. Through experimentation, what happens to water when it is warmed or cooled is looked at and how these processes relate to the water cycle, together with the factors that affect the rate of these processes.
- **Living things and their habitat** – The classification of animals based on vertebrates and invertebrates is investigated and a development in understanding of how changes within environments affects living things. Different habitats are studied, explaining how different animal adapt to living in these environments.
- **Electricity** – How to handle electricity safely is taught with an understanding that many everyday appliances require electricity. Complete circuits are built and detective work is used to determine why some do not work. Circuit diagrams are used to record circuits. Fair tests are set up to determine the types of materials that conduct electricity and those that insulate it. Practical enquiries are set up to explain the factors that affect the brightness of a bulb in a circuit.

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 taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate to ensure accuracy. Data and results are recorded using scientifically appropriate forms. They develop their ability to draw appropriate conclusions from their results, using scientific evidence to back statements.



Year 5

Children will be taught:

- **Animals including humans** – The human circulatory system is studied, identifying the parts and functions of the different parts. The purpose of muscles is covered and an understanding that when muscles work, they need oxygen is taught; 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 investigated, 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. Through practical demonstrations, the relative movement of the earth, sun and moon explain day and night; why the sun appears to move across the sky; and the creation of our seasons.
- **Properties and changes of materials** – The grouping of materials by their properties is taught and how materials are selected for function by their properties. Through setting up fair tests with relevant questions, solutions are investigated, findings recorded and conclusion from the data drawn. Reversible and irreversible are investigated and again through experimentation, explain that with a reversible change the original materials are reclaimed; with an irreversible change, a new material is formed. Using their knowledge of solids, liquids and gases, determining how to separate mixtures is covered, including using filtering, sieving and evaporating.
- **Forces** – Gravity and its effect are investigated, including the relationship between mass and weight. The effects of air, water resistance and friction on bodies are identified and the forces acting on it. Using their knowledge, the students build an effective parachute. Building mechanisms are explored, including levers, pulleys and gears and how they allow a smaller force to have a greater effect.
- **Living things and their habitats** – The stages of the life process of flowering plants are taught and the parts of the flower involved in reproduction identified, including pollinations. The stages of the life process of animals are investigated, comparing different animals. The lives and work of leading naturalists and animal behaviourists are researched, together with examples of findings from their work and an understanding the importance of their work.
- **Animals including humans** – This unit is taught in conjunction with Sex Education. The changes as humans develop to old age (sex education) are covered, together with the stages of the life process of animals, comparing those of different animals. The changes experienced in puberty are covered.

Year 6

Children will be taught:

- **Living things and their habitats** – The life and works of Carl Linnaeus are researched, with an understanding of the field of science he was a pioneer of, together with the Linnaean system for classification. How animals are classified are researched using IT, describing groupings as per the Linnaean system. Different types of animals are identified and classified based on their characteristics. Microorganisms are investigated, including describing and categorising them. The pupils create branching keys for sets of animals, including generating their own questions.



- **Light** – Man-made and natural 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 it allows us to see objects in the dark. How light travels in straight lines from a light source or is reflected from a surface into the eye is explored, with ray model diagrams being drawn. The formation of a shadow when an opaque object blocks a ray of light is investigated with how the size of the shadow can be changed, recognising dependent and independent variables in investigations, recording findings.
- **Evolution and inheritance** – Through investigation, the pupils recognise 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 organisms chance of survival. Through research, they learn about Charles Darwin’s theory of evolution, recognising that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago, including identifying scientific evidence that has been used to support or refute ideas or argument. Through studying Darwin’s theory, understand how he thought human beings have evolved and how adaptations can result in both advantages and disadvantages.
- **Electricity** – Through research, the pupils discover how major discoveries led to the widespread use of electricity. They draw circuit diagrams using the correct symbols and label the voltage correctly. While planning an investigation, they decide which variables to control and how to report their findings, making new predictions based on the previous results considering the degree of trust there will be in their results. The effect of increasing or decreasing the voltage on different parts of a circuit is investigated, selecting appropriate scientific enquiries.
- **Working scientifically** – Working scientifically is taught throughout the curriculum. This unit provides further development of investigative and recording skills.

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 the assessment chart. We plan for further development based upon what we have observed.

In Years 1-6 a science skills sheet is completed at the end of each unit of work. At the end of an academic year, a science skills sheet is completed for the class and passed onto the next class teacher.

At the end of Foundation stage, the children are assessed against the progress descriptors in their Foundation Stage Profile. At the end of KS1 and 2, the children are assessed using teacher assessments.



Cross-curricular links

Science work should 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 should be opportunities for children to consolidate and develop existing scientific understanding through cross-curricular activities.

Structure of Provision

All pupils are taught science 2 hours bi-weekly. Due emphasis should be placed on investigative practical experiments, particularly with reference to real life situations.

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 clearly labelled, 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.

Equal Opportunities and Special Needs

Every pupil will be given equal opportunity to follow the National Curriculum or Foundation Stage Curriculum irrespective of their ethnic or linguistic background, gender, disability or religious beliefs. Children with Special Educational Needs will have full access to the Science curriculum which will be modified to best meet their needs. Those identified as Able, Gifted and Talented in Literacy will be given opportunities to develop their skills.

Monitoring

The monitoring of science 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 through a termly report using information provided by the subject leader.

