



Thurlaston CE (Aided) Primary School

Teaching and living the Christian way of life

Science Policy

Approved

Date	May 2022
Review date	April 2025

Intent

The 2014 national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific skills required to understand the uses and implications of science, today and for the future. We understand that it is important for lessons to have a skills-based focus, and that the knowledge can be taught through this

At Thurlaston C of E Primary School we encourage children to be inquisitive throughout their time at the school and beyond. The Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. 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. The key knowledge identified by each year group is informed by the national curriculum and builds towards identified phase 'end points' in accordance with NC expectations. Key skills are also mapped for each year group and are progressive throughout the school. These too ensure systematic progression to identified skills end points which are in accordance with the Working Scientifically skills expectations of the national curriculum. The curriculum is designed to ensure that children are able to acquire key scientific knowledge through practical experiences; using equipment, conducting experiments, building arguments and explaining concepts confidently. Cross curricular opportunities are also identified, mapped and planned to ensure contextual relevance. Children are encouraged to ask questions and be curious about their surroundings and a love of science is nurtured through a whole school ethos and a varied science curriculum.

Implementation

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 will be 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.
 - Existing knowledge is checked at the beginning of each topic, as part of the KWL strategy (What I know, What I would like to Know and What I have Learned). This ensures that teaching is informed by the children's starting points and that it takes account of pupil voice, incorporating children's interests.
 - 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. Tasks are selected and designed to provide appropriate challenge to all learners, in line with the school's commitment to inclusion.
 - We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
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- Working Scientifically skills are embedded into lessons to ensure that skills are systematically 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.
 - 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 of their surroundings by accessing outdoor learning and workshops with experts.

- 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.
- At the end of each topic, key knowledge is reviewed by the children and rigorously checked by the teacher and consolidated as necessary. Assessment criteria are teacher assessed.

Impact

This successful approach at Thurlaston C of E Primary School results in a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through the study of real scientists and inventors, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity and are exposed to different possibilities for careers in science. Children at Thurlaston C of E Primary School overwhelmingly enjoy science and this results in motivated learners with sound scientific understanding. Children feel they are scientists and capable of achieving.

Appendix 1 School skills and knowledge grid

Class	Unit	Key Skills and Knowledge	Key Vocabulary
1	Working Scientifically	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • ask simple questions linked to the science work we are doing • observe closely and describe what I see • perform simple tests, using familiar, everyday equipment • gather and record information to help answer questions (including using photographs and drawings) 	question, answer, observe, equipment, identify, classify sort, diagram, chart, map, data, compare, contrast, describe
	Animals and Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals; • identify and name a variety of common animals that are carnivores, herbivores and omnivores; • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets); <ul style="list-style-type: none"> • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. 	Fish, amphibian, bird, mammal, reptile, pet Omnivore, herbivore, carnivore Senses: taste, smell, vision, touch, hearing Head, legs, arms, eyes, legs, neck, knees, elbows, shoulders
	Marvellous Materials Everyday Materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • distinguish between an object and the material from which it is made; • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock; • describe the simple physical properties of a variety of everyday materials; <ul style="list-style-type: none"> • compare and group together a variety of everyday materials on the basis of their simple physical properties. 	Materials: wood, plastic, glass, water, metal, rock, brick, paper, elastic, foil Properties: hard/soft, rough/smooth, absorbent/waterproof, bendy/stiff, shiny/dull
	Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees; <ul style="list-style-type: none"> • identify and describe the basic structure of a variety of common flowering plants, including trees. 	Wild/garden plants, deciduous, evergreen, trunk, branch, leaf, root, bud, flower, blossom, petal, stem, fruit, vegetables bulb, seed

	Seasonal Changes	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • observe changes across the 4 seasons; • observe and describe weather associated with the seasons and how day length varies. 	Spring, summer, autumn, winter, day, night, Warm, cold, hot, wind, rain, snow, hail, sleet, fog, sun
	Scientists and inventors	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • <i>explore and discuss Neil Armstrong's achievements.</i> • observe and describe the properties of the material that Lego is made from. Name the inventor of Lego. 	Space, Moon, Apollo 11, NASA, the Eagle, astronaut, Neil Armstrong, Buzz Aldrin, Michael Collins, Katherine Johnson, Gene Kranz, historic, important, significant, famous, person, people, explorer. Ole Kirk Christiansen, Plastic, properties, Lego
2	Working Scientifically	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • ask simple questions linked to the science work we are doing • observe closely and describe what I see • perform simple tests, using familiar, everyday equipment • gather and record information to help answer questions (including using photographs and drawings) plan and carry out a simple fair test 	question, answer, observe, equipment, identify, classify sort, diagram, chart, map, data, bar graph, compare, contrast, describe, fair test
	Awesome Animals	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • notice that animals, including humans, have offspring which grow into adults; • find out about and describe the basic needs of animals, including humans, for survival (water, food and air); • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	Adult, baby, toddler, child, child, egg, chick, chicken, caterpillar, pupa, butterfly, spawn, tadpole, frog, reproduce, nutrition, healthy, wter, food, air, exercise, hygiene
	Marvellous Materials Uses of Everyday Materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses; • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	Materials: wood, metal, glass, fabric, brick, rock, paper, cardboard, rubber, plastic Properties: squashing, twisting, bending, stretching

	Roots, Shoots and Fruits	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • observe and describe how seeds and bulbs grow into mature plants; <ul style="list-style-type: none"> • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. 	Germination, reproduction, deciduous, evergreen, trunk, branch, leaf, root, bud, flower, blossom, petal, stem, fruit, vegetables bulb, seed
	Habitat Homes	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never been alive; • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • identify and name a variety of plants and animals in their habitats, including microhabitats; <ul style="list-style-type: none"> • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. 	Living, dead, never alive, habitat, micro-habitat, food, food chain, predator, prey, seashore, woodland, rainforest, ocean, Conditions: hot/warm/cold, dry/damp/wet, bright/shade/dark
	Scientists and Inventors	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • find out about people who have developed new materials in the context of learning about Charles Macintosh. • I can describe Charles Macintosh and his famous invention 	Charles Mackintosh: waterproof, coat, material
3	Working Scientifically	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • ask relevant questions and use different types of scientific enquiries to answer them; • set up simple practical enquiries, comparative and fair tests; • make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers; • gather, record, classify and present data in a variety of ways to help in answering questions; • record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables; 	Relevant, questions, fair test, systematic, observe, accurate, measurements, equipment, gather, record, classify, present, labelled diagram, drawing, key, bar chart, table, conclusion, prediction, difference, similarity, change, evidence, interpret

		<ul style="list-style-type: none"> • report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions; • use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions; • identify differences, similarities or changes related to simple scientific ideas and processes; • use straightforward scientific evidence to answer questions or to support their findings. 	
	Sound	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify how sounds are made, associating some of them with something vibrating; • recognise that vibrations from sounds travel through a medium to the ear; • find patterns between the pitch of a sound and features of the object that produced it; • find patterns between the volume of a sound and the strength of the vibrations that produced it; • recognise that sounds get fainter as the distance from the sound source increases. 	Vibration, ear, hear, sound, volume, pitch, faint, loud, insulate, string, percussion, woodwind, brass
	Electricity	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify common appliances that run on electricity; • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers; • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery; • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit; • recognise some common conductors and insulators, and associate metals with being good conductors. 	Electric circuit, cell, wire, bulb, buzzer, switch, safety, insulator, conductor
	Teeth and Digestion	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • describe the simple functions of the basic parts of the digestive system in humans; 	Digestion, mouth, tongue, saliva, oesophagus, stomach, acid, enzymes, small/large intestines, colon, incisors,

		<ul style="list-style-type: none"> • identify the different types of teeth in humans and their simple functions; • construct and interpret a variety of food chains, identifying producers, predators and prey. 	canines, molars, grinding, chewing, cutting, ripping, tearing, slicing, floss, brush
	States of Matter	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • compare and group materials together, according to whether they are solids, liquids or gases; • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C); • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 	Solid, liquid, gas, melt, cool, freeze, heat, evaporate, condense, temperature, degrees Celsius, thermometer, watercycle, water vapour
	Light	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • recognise that they need light in order to see things and that dark is the absence of light; • notice that light is reflected from surfaces; • recognise that light from the sun can be dangerous and that there are ways to protect their eyes; • recognise that shadows are formed when the light from a light source is blocked by an opaque object; • find patterns in the way that the size of shadows change. 	Light, see, dark, reflect, surface, natural, artificial, shadow, blocked, solid
	Rocks	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties; • describe in simple terms how fossils are formed when things that have lived are trapped within rock; • recognise that soils are made from rocks and organic matter. 	Physical appearance, hard/soft, shiny/dull, rough/smooth, absorbent/not absorbent, sedimentary, soils, organic matter, grains, crystals
	Magnets and Forces	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • compare how things move on different surfaces; 	Force, push, pull, open, surface, magnetic, attract, repel, North/South poles

		<ul style="list-style-type: none"> • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance; • observe how magnets attract or repel each other and attract some materials and not others; • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials; • describe magnets as having 2 poles; • predict whether 2 magnets will attract or repel each other, depending on which poles are facing. 	
	Habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • recognise that living things can be grouped in a variety of ways; • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment; • recognise that environments can change and that this can sometimes pose dangers to living things. 	Vertebrate: mammals, amphibians, reptiles, birds, fish, invertebrate,: snail, slug, worm, spider, insect, environment, plants (flowering/non-flowering), moss, fern, positive/negative human impact, nature reserve, ecology, littering, deforestation
	Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant; • investigate the way in which water is transported within plants; • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 	Pollination, seed formation, seed dispersal, nutrients, fertiliser, life cycle
	Nutrition	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; 	Nutrients, carbohydrate, protein, fat, fibre, water, vitamins, minerals
	Scientists and Inventors	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • To explain how fossils can be used to find the age of rocks by exploring William Smith's principle of fossil succession. 	William Smith-Sedimentary, fossil, strata, William Smith, geology, Dr Lisa White.

		<ul style="list-style-type: none"> To explain how Marie Curie's work on x-rays helps us identify bones 	Marie Curie-x rays radiation, element, chemistry, physics
	Movement	<ul style="list-style-type: none"> identify that humans and some other animals have skeletons and muscles for support, protection and movement. 	Bones, joints, exoskeleton, endoskeleton, vertebrate, invertebrate, relax, muscles, ball/socket/hinge/gliding joint,
4	Working Scientifically	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate; record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs; use test results to make predictions to set up further comparative and fair tests; report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations; identify scientific evidence that has been used to support or refute ideas or arguments. 	Plan, variable, measurement, accuracy, repeat, predict, conclusion, causal relationship, explanation, identify, classify, describe, patterns, systematic, quantitative, classification key, table, scatter graph, bar graph, line graph
	Light	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> recognise that light appears to travel in straight lines; use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye; explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes; use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. 	Travel, straight, reflect, reflection, light source, object, shadow, mirror, periscope, rainbow, filters

	Forces	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object; • identify the effects of air resistance, water resistance and friction, that act between moving surfaces; • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. 	Gravity, air resistance, water resistance, friction, force, effect, move, accelerate, decelerate, brake, pulley, gear, spring,
	Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • describe the changes as humans develop to old age. • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood; • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function; • describe the ways in which nutrients and water are transported within animals, including humans. 	<p>Puberty, gestation, fertilisation, reproduce, foetus, baby, toddler, child, teenager, adult, life expectancy, adolescence, adulthood</p> <p>Internal organs: heart, lungs, brain, kidneys, liver, skeleton, muscles, circulatory system, digestion, blood vessels, blood, diet, exercise, lifestyle, impact, drugs, alcohol, damage, substances</p>
	Inheritance	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents; • identify how animals and plants are adapted to suit their environment in different ways and adapt. 	adaptation, inherited traits, adaptive traits, DNA, genes, variation, parent, offspring,
	Electricity	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit; • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches; • use recognised symbols when representing a simple circuit in a diagram. 	Voltage, brightness, volume, switches, series circuit, safety, circuit diagram, switch, buzzer, bulb, motor, cell, symbol
	Properties of Materials	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets; 	Hardness, solubility, transparency, conductor, dissolve, separate, solid, liquid, gas, reversible/irreversible changes, mixing, evaporation, filter, conductivity, sieve, melt, freeze, rust, burning

		<ul style="list-style-type: none"> • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution; • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating; • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic; • demonstrate that dissolving, mixing and changes of state are reversible changes; • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. 	
	Earth and Space	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • describe the movement of the Earth and other planets relative to the sun in the solar system; • describe the movement of the moon relative to the Earth; • describe the sun, Earth and moon as approximately spherical bodies; • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	Earth, sun, moons, planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune), solar system, rotate, axis, orbit, day/night, seasons, hemisphere, spherical,
	Classification	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals; • give reasons for classifying plants and animals based on specific characteristics. 	Classify, compare, domain, kingdom, class, order, family, genus, species, characteristics, vertebrate, invertebrate, micro-organism
	Life Cycles	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird; • describe the life process of reproduction in some plants and animals. 	Mammal, amphibian, insect, bird, asexual/sexual reproduction, rainforest, ocean, desert, prehistoric
	Scientists and Inventors	<ul style="list-style-type: none"> • To give reasons for classifying plants and animals based on specific characteristics in the context of Libbie Hyman's work on classifying vertebrates and invertebrates. • To understand Libbie Hyman's work about classification • To describe how scientific ideas have changed over time in the context of Margaret Hamilton's development of the software for the Apollo Moon 	<p>Libbie Maynard, classification, taxonomy, zoologist, vertebrate, invertebrate, characteristics</p> <p>Margaret Hamilton, classification, taxonomy, zoologist, vertebrate, invertebrate, characteristics</p>

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