



# Thurston CE Primary Academy Progression in Science Skills

## **Intent**

At Thurston CE Primary Academy we want to inspire our pupils to ask and answer questions about the world we live in. We ensure that there is a clear progression of skills for working scientifically that can be used to gain knowledge of scientific concepts, many of which build upon each other as children move through the school, covering all the National Curriculum requirements. Our pupils develop transferable skills which equip them for future learning, regardless of the scientific domain being covered. These skills include asking questions, setting up enquiries, observing and measuring, recording, interpreting and reporting, and evaluating.

## **Implementation- How is Science taught at Thurston CE Primary Academy?**

Our Science curriculum focuses on enabling pupils to gain knowledge by working scientifically. This includes asking questions, setting up enquiries, observing and measuring, recording, interpreting and reporting, and evaluating.

Science is taught on a rolling two-year programme throughout Key Stage One and Two. To embed practical skills, these lessons may support or be supported by additional learning across the curriculum, such as statistics in Maths and the writing of procedural texts in English. Lessons are differentiated by outcome to ensure equal access to knowledge and skills.

The curriculum at Thurston CE Primary Academy enables pupils to develop their knowledge and understanding of the world we live in. We aim to give pupils the ability to ask questions about the world we live in and develop the skills to answer those questions independently.

Science is planned and delivered at a high standard and there are high expectations for pupils in lessons. Types of presentation in Science should be varied but expectations should be high, with writing at the same standard as in English books, and mathematics skills applied with the same strategies and accuracy as in maths books. Opportunities should be given for wider scientific experiences through whole school events such as Science week.

## **Impact**

The structure of the science curriculum focuses on a clear progression of knowledge and skills, ensuring a deep and positive impact on the outcomes of every pupil.

Cross curricular writing is undertaken through explanatory and procedural writing, and there is frequent use of maths skills including the representation of statistics and results. Previous learning is reviewed at the start of each lesson through quizzes and the use of knowledge organisers, in line with Rosenshine's principles, which supports pupils to retain the knowledge that they have been taught. Knowledge organisers detail key vocabulary, key knowledge, and examples of enquiries and investigations that are vehicles to the development of skills needed to work scientifically. Assessment against the progression of skills and knowledge will be made by class teachers by the end of each unit and be used to inform future planning. Science is monitored by subject leads through learning walks, book looks, and conversations with staff and pupils.

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EYFS						
<p>The early learning goals support children in <b>working scientifically</b>. They will be able to:</p> <ul style="list-style-type: none"> <li>- Answer simple questions about observable properties of objects and people, animals and plants around them.</li> <li>- Compare objects in their environment and talk about similarities and differences.</li> <li>- Ask questions about the world around them, and seek to find their own answers.</li> </ul>						
Early Learning Goal	Ask questions and plan enquiries	Set up enquiries	Observe and measure	Record	Interpret and report	Evaluate
<b>ELG: Listening, Attention and Understanding:</b> Make comments about what they have heard and ask questions to clarify their understanding.	✓				✓	✓
<b>ELG: Building Relationships:</b> Work and play cooperatively and take turns with others.	✓	✓				
<b>ELG: Speaking:</b> Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	✓					✓
<b>ELG: Fine Motor Skills:</b> Use a range of small tools, including scissors, paint brushes and cutlery.		✓	✓			
<b>ELG: The Natural World:</b> Explore the natural world around them, making observations and drawing pictures of plants and animals. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.			✓			✓

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EYFS				
The early learning goals facilitate a foundation of <b>scientific knowledge</b> that will prepare children for KS1.				
Early Learning Goal	Plants	Animals Including Humans	Everyday Materials	Seasonal Change
<b>ELG: Speaking:</b> Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	✓	✓	✓	✓
<b>ELG: The Natural World:</b> Explore the natural world around them, making observations and drawing pictures of plants and animals. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.	✓	✓		
<b>ELG: The Natural World:</b> Understand some important processes and changes in the natural world, including the seasons and changing states of matter.			✓	✓
	<b>KS1 Readiness:</b> To know what a plant is To know what a flower is To know where you see plants To describe different plants and flowers	<b>KS1 Readiness:</b> To know what an animal is To recognise and name a variety of different animals To know the names of different body parts of humans and animals they have experience of	<b>KS1 Readiness:</b> To recognise that different everyday objects are made from different materials To describe how different objects look and feel	<b>KS1 Readiness:</b> To know about different types of weather To observe changes in trees and plants as the seasons progress

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		KS1	LKS2	UKS2
Working Scientifically	<b>Ask questions and plan enquiries</b> <small>*Enquiry including: observing changes over time, noticing patterns, grouping and classifying, comparative and fair tests, using secondary sources.</small>	Ask simple Qs and recognise that they can be answered in different ways*.	Ask relevant questions and use different types* of scientific enquiries to answer them.	Plan different types* of scientific enquiries to answer their own questions, including recognising and controlling variables where necessary.
	<b>Set up enquiries</b>	Perform simple tests.	Set up simple practical enquiries, comparative and fair tests.	Use test results to make predictions to set up further comparative and fair tests.
	<b>Observe and measure</b>	Observe closely, using simple equipment.	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
	<b>Record</b>	Gather and record data to help in answering questions.	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.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
	<b>Interpret and report</b>	Identify and classify. Use appropriate scientific language to communicate ideas.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Identify differences, similarities or changes related to simple scientific ideas and processes.	Report and present findings from enquiries, inc. conclusions and causal relationships, in oral and written forms such as displays and other presentations, using appropriate scientific language.
	<b>Evaluate</b>	Use their observations and ideas to suggest answers to questions.	Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Use straightforward scientific evidence to answer questions or to support their findings.	Explain degree of trust in results. Identify and evaluate scientific evidence (their own and others') that has been used to support or refute ideas or arguments.

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Working Scientifically (Vocabulary)		question, answer, observe, observing, equipment, identify, sort, group, compare, differences, similarities, describe, measurements, test, results, secondary sources	<u>Record</u> diagram, chart	<b>As KS1 plus:</b> oral and written explanations, conclusion, predictions, criteria, classify, changes, data, contrast, evidence, improve, secondary sources, guides, keys, construct, interpret	<u>Research</u> relevant question  <u>Equipment</u> thermometer  <u>Data</u> gather, standard units, record, classify, present  <u>Record</u> drawings, labelled diagrams, keys, bar charts, tables	<b>As KS1 &amp; LKS2 plus:</b> plan, variables, measurements, accuracy, precision, repeat readings, predictions, further comparative and fair test, identify, classify and describe, patterns, systematic, quantitative measurements	<u>Report Data</u> scientific diagrams, labels, classification keys, tables, scatter graphs, bar graph and line graphs  <u>Report and Present</u> conclusions, casual relationships, explanations, degree of trust, oral and written display and presentation  <u>Evidence</u> support, refute, ideas or arguments, biology, physics, chemistry

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Scientific Knowledge	Plants		
	<p><b>Year A</b></p> <p>1.1 Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</p> <p>1.2 Identify and describe the basic structure of a variety of common flowering plants, including trees.</p> <p><b>Vocabulary:</b> <i>deciduous, evergreen, tree, leaf, flower (blossom), petals, fruit, bulb, seed, roots, stem, trunk, branches</i></p> <p><b>Year B</b></p> <p>2.1 Observe and describe how seeds and bulbs grow into mature plants.</p> <p>2.2 Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p><b>Vocabulary:</b> <i>growth, germinate, light, temperature reproduce, lifecycle</i></p>	<p><b>Year A</b></p> <p>3.1 - Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>3.2 - Explore the requirements of plants for life and growth (air, light, water, nutrients, and room to grow) and how they vary from plant to plant.</p> <p>3.3 - Investigate the way in which water is transported within plants.</p> <p>3.4 - Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p><b>Vocabulary:</b> <i>air, water, transportation, nutrients, soil, reproduction, seed formation, seed dispersal, pollination</i></p>	
	Living Things & Their Habitats		
	<p><b>Year B</b></p> <p>2.6 Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>2.7 Identify that most living things live in habitats to which they are best 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.</p> <p>2.8 Identify and name a variety of plants and animals in their habitats, including micro-habitats.</p> <p>2.9 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.</p> <p><b>Vocabulary:</b> <i>living, dead, habitat, microhabitat, woodland, meadow, hedgerow, pond</i></p>	<p><b>Year B</b></p> <p>4.4 - Recognise that living things can be grouped in a variety of ways.</p> <p>4.5 - Explore and use classification keys to group, identify and name.</p> <p>4.6 - Recognise that environments can change and that this can sometimes pose dangers to living things.</p> <p><b>Vocabulary:</b> <i>vertebrates, invertebrates, environment, habitat, classification key</i></p>	<p><b>Year A</b></p> <p>5.2 - Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>5.3 - Describe the life process of reproduction in some plants and animals.</p> <p><b>Vocabulary:</b> <i>life process, reproduction, offspring,</i></p> <p><b>Year B</b></p> <p>6.7 - 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.</p> <p>6.8 - Give reasons for classifying plants and animals based on specific characteristics.</p> <p><b>Vocabulary:</b> <i>characteristic, classification, organism, micro-organism</i></p>

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Animals Including Humans		
<p><b>Year A</b>            1.3 Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals; describe and compare their structures.            1.4 Identify carnivores, herbivores and omnivores.            1.5 Identify, name, draw and label the basic parts of the human body and say which part is associated with which sense.</p> <p><b>Vocabulary:</b> <i>amphibians, fish, reptiles, mammals, birds, herbivore, omnivore, carnivore, head, nose, ear, neck, shoulder, arm, elbow, wrist, hand, back, chest, hip, leg, knee, ankle, foot, wing, beak, tail, fin, sight, smell, touch, taste, hearing</i></p> <p><b>Year B</b>            2.3 Know that animals, including humans, have offspring which grow into adults.            2.4 Know and describe the basic needs of animals, including humans, for survival (water, food, air, shelter)            2.5 Describe the importance for humans of exercise, eating the correct amounts of different types of food and personal hygiene.</p> <p><b>Vocabulary:</b> <i>survival, water, air, food reproduce, adult, baby, offspring, kitten, calf, puppy, food chain, prey, predator, camouflage, protection exercise, hygiene, balanced diet</i></p>	<p><b>Year A</b>            3.5 - Identify that animals, including humans, needs the right types and amount of nutrition, and that they cannot make their own food.            3.6 - Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p> <p><b>Vocabulary:</b> <i>skeleton, skull, bones, muscles, movement, support, protection, nutrition</i></p> <p><b>Year B</b>            4.1 - Describe the simple functions of the basic parts of the digestive system in humans.            4.2 - Identify the different types of teeth in humans and their simple functions.            4.3 - Construct and interpret a variety of food chains, identifying producers, predators and prey.</p> <p><b>Vocabulary:</b> <i>mouth, tongue, teeth, oesophagus, stomach, small intestine, large intestine, nutrients, absorb, canine, incisor, molar, producer, consumer, apex predator</i></p>	<p><b>Year A</b>            5.1 - Describe the changes as humans develop to old age.</p> <p><b>Vocabulary:</b> <i>womb, foetus, embryo, gestation, baby, toddler, teenager, elderly, growth, development, puberty</i></p> <p><b>Year B</b>            6.1 - Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.            6.2 - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.            6.3 - Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p><b>Vocabulary:</b> <i>function, circulatory system, heart, valve, blood vessel, vein, artery transport, oxygenated, deoxygenated, lifestyle, drug</i></p>

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Materials		
<p><b>Year A</b></p> <p>1.6 Distinguish between an object and the material(s) from which it is made.</p> <p>1.7 Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</p> <p>1.8 Describe the simple physical properties of a variety of everyday materials.</p> <p>1.9 Compare and group together a variety of everyday materials on the basis of their simple physical properties.</p> <p><b>Vocabulary:</b> <i>wood, plastic, glass, paper, metal, rock, hard, soft, rough, smooth, shiny, dull, bendy, stiff.</i></p> <p><b>Year B</b></p> <p>2.10 Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>2.11 Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p> <p><b>Vocabulary:</b> <i>brick, fabric, elastic, foil, property, solid, waterproof, absorbent, opaque, transparent, squash, bend, flexible, twist, stretch push, pull, roll, slide, bounce</i></p>		<p><b>Year A</b></p> <p>5.4 - Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>5.5 - Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>5.6 - Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>5.7 - 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.</p> <p>5.8 - 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.</p> <p>5.9 - Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p><b>Vocabulary:</b> <i>hardness, transparency, conductivity (electrical, thermal) solubility, solution dissolve, filter, evaporate, sieve, reversible, irreversible</i></p>

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States of Matter		
	<p><b>Year B</b></p> <p>4.7 - Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>4.8 - 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.</p> <p>4.9 - Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with ambient temperature.</p> <p><b>Vocabulary:</b> <i>solid, liquid, gas, evaporation, condensation, particle, temperature, freezing, heating</i></p>	
Rocks		
	<p><b>Year A</b></p> <p>3.7 - Compare and group together different types of rocks on the basis of their appearance and simple physical properties.</p> <p>3.8 - Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>3.9 - Recognise that soils are made from rocks and organic matter.</p> <p><b>Vocabulary:</b> <i>soils, organic matter, fossil, crystal, sandstone, granite, marble, absorbent, sedimentary, layer, sediment igneous, magma, lava, metamorphic</i></p>	

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Forces and Magnets		
	<p><b>Year A</b></p> <p>3.15 - Compare how objects move on different surfaces.            3.16 - Notice that some forces need contact between two objects, but magnetic forces can act at a distance.            3.17 - Observe how magnets attract or repel each other and attract some materials but not others.            3.18 - 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.            3.19 - Describe magnets as having two poles.            3.20 - Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p><b>Vocabulary:</b> force, contact, surface, magnetic, attract, repel, poles</p>	<p><b>Year A</b></p> <p>5.14 - Explain that unsupported objects falls toward to the Earth because of the force of gravity acting between the Earth and the falling object.            5.15 - Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.            5.16 - Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p> <p><b>Vocabulary:</b> air resistance, water resistance, friction, gravity, lever, gear, pulley, Newtons</p>
Light		
	<p><b>Year A</b></p> <p>3.10 - Recognise that they need light in order to see things and that dark is the absence of light.            3.11 - Notice that light is reflected from surfaces.            3.12 - Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.            3.13 - Recognise that shadows are formed when the light from a light source is blocked by a solid object.            3.14 - Find patterns in the way that the size of shadows change.</p> <p><b>Vocabulary:</b> light source, mirror, reflect, reflective, reflection shadow, blocked transparent, translucent, opaque</p>	<p><b>Year B</b></p> <p>6.9 - Recognise that light appears to travel in straight lines.            6.10 - 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.            6.11 - 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.            6.12 - Use the ideas that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.            6.13 - Know that white light is made up of coloured light of the spectrum and know how the human eye perceives colours.</p> <p><b>Vocabulary:</b> refraction, reflection, spectrum, rainbow</p>

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Electricity		
	<p><b>Year B</b></p> <p>4.15 - Identify common appliances which are powered by electricity.</p> <p>4.16 - Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>4.17 - Identify whether a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a cell/battery.</p> <p>4.18 - Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>4.19 - Recognise some common conductors and insulators, and associate metals with being good conductors.</p> <p><b>Electricity:</b> <i>appliance, battery power, main power, circuit, series, cell, battery, wire, bulb, switch, break in circuit, conductor, insulator</i></p>	<p><b>Year B</b></p> <p>6.14 - Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</p> <p>6.15 - 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.</p> <p>6.16 - Use recognised symbols when representing a simple circuit in a diagram.</p> <p>6.17 - Know and explain the difference between serial and parallel circuits.</p> <p><b>Vocabulary:</b> <i>circuit - series, parallel, voltage, volts, amps</i></p>
Sound		
	<p><b>Year B</b></p> <p>4.10 - Identify how sounds are made, associating some of them with something vibrating.</p> <p>4.11 - Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>4.12 - Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>4.13 - Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>4.14 - Recognise that sounds get fainter as the distance from the sound source increases.</p> <p><b>Vocabulary:</b> <i>vibration, wave, volume, pitch, tone, insulation</i></p>	

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Earth & Space		
		<p><b>Year A</b></p> <p>5.10 - Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>5.11 - Describe the movement of the Moon relative to the Earth.</p> <p>5.12 - Describe the Sun, Earth and Moon as approximately spherical bodies.</p> <p>5.13 - Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.</p> <p><b>Vocabulary:</b> <i>Earth, Sun, moon, solar system, axis of rotation, day, night, phases of the moon, star, constellation</i></p>
Seasonal Changes		
<p><b>Year B</b></p> <p>2.12 Observe changes across the four seasons.</p> <p>2.13 Observe and describe weather associated with the seasons and how day length varies.</p> <p><b>Vocabulary:</b> <i>season, spring, summer, autumn, winter, month, year, day, night, sun, moon, light, dark</i></p>		

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Evolution and Inheritance		
		<p><b>Year B</b></p> <p>6.4 - Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>6.5 - Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>6.6 - Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p> <p><b>Vocabulary:</b> <i>adaptation, evolution, characteristic, reproduction, genetics, survival</i></p>

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