



St Andrew's Church of England Junior School - Progression of Skills and Knowledge: Science



At St Andrew's our vision statement is 'Shining Light on a World of Possibilities' and we have designed our curriculum to be relevant, exciting and creative, underpinned by our school values and based around our 'curriculum drivers':

- Curiosity, enquiry and creativity
- Community
- Possibilities

This document aims to give guidance on the progression of Science knowledge and skills across the year groups.

		Year 3	Year 4	Year 5	Year 6
Overview	Lower & Upper Key Stage Overview	The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some 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 and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.		The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.	
	Working Scientifically Overview	Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.		Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.	

Programme of study		Y3 Rocks	Y4 Sound	Y5 Properties of materials	Y6 Electricity
	Autumn 1	Pupils should be taught to: -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.	Pupils should be taught to: -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.	Pupils should be taught to: -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. -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.	Pupils should be taught to: -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.
Key Vocabulary:		Rock Soil Igneous Sedimentary Metamorphic Fossil Decay Sediment Geography Organic matter	Sound Volume Pitch Medium Vibration	Material Solubility Transparency Conductivity Dissolve Solution Substance Filter Evaporation Reversible/irreversible change	Series circuit Bulb Wire Buzzer Switch Conductor Insulator Cell Voltage current

Working Scientifically		-asking relevant questions and using different types of scientific enquiries to answer them. -setting up simple practical enquiries, comparative and fair tests. -making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. -gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. -recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. -reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. -using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.		-planning 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. -recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. -using test results to make predictions to set up further comparative and fair tests. -reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. -identifying scientific evidence that has been used to support or refute ideas or arguments.	
		Y3 Animals, including humans	Y4 States of matter	Y5	Y6 Light
Programme of study	Autumn 2	Pupils should be taught to: -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. -identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Pupils should be taught to: -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.	See Autumn 1	Pupils should be taught to: -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.
Key vocabulary		Skeleton Muscle Vertebrate Invertebrate Endoskeleton Exoskeleton Hydrostatic Nutrition	Material Solid Liquid Gas Matter State Temperature Degrees Celsius Evaporation Condensation Water Cycle		Reflect Dark Light Shadow Transparent Translucent Opaque Spectrum Ultraviolet light

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		Y3 Light	Y4 Electricity	Y5 Earth and Space	Y6 Living things & their habitats
Programme of Study	Spring 1	Pupils should be taught to: -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.	Pupils should be taught to: -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.	Pupils should be taught to: -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.	Pupils should be taught to: -describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals -give reasons for classifying plants and animals based on specific characteristics.

Key Vocabulary:		Dark Light Shadow Transparent Translucent Opaque Spectrum Ultraviolet light Reflect	Series circuit Bulb Wire Buzzer Switch Conductor Insulator Cell Battery	Solar Solar system Gravity Lunar Spherical body Calendar Star Planet Galaxy Universe	Classification Microorganism Characteristic Species
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		Y3 Forces & magnets	Y4 Animals, including humans	Y5 Forces	Y6 Evolution & Inheritance

Programme of Study	Spring 2	Pupils should be taught to: -compare how things move on different surfaces -notice that some forces need contact between two 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 two poles -predict whether two magnets will attract or repel each other, depending on which poles are facing.	Pupils should be taught to: -describe the simple functions of the basic parts of the digestive system in humans -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.	Pupils should be taught to: -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.	Pupils should be taught to: -recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago -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 that adaptation may lead to evolution.
Key Vocabulary:		Magnetic force Poles Pull Push Attract Repel Friction	Digestive system Teeth Molar Canine Incisors plaque Predator Prey producer	Gravity Resistance Friction Mechanism Lever Pulley Gear	Evolution Inheritance Hereditary Genetics DNA Charles Darwin

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		Y3 Plants	Y4 Living things & habitats	Y5 Animals, including humans	Y6 Animals, including humans
Programme of Study	Summer 1	Pupils should be taught to: -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.	Pupils should be taught to: -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.	Pupils should be taught to: -describe the changes as humans develop to old age	Pupils should be taught to: -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.
Key Vocabulary:		Stem Flower Leaf Root Pollination Seed Dispersal Nutrient	Classification Environment Mammal Bird Reptile Amphibian Fish Vertebrate Invertebrate habitat	Birth Reproduction Growth Puberty	Circulatory system Cardiovascular Blood vessels Veins Arteries Diet Nutrients minerals

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		Y3	Y4	Y5 Living things & habitats	Y6
Programme of Study		See Summer 1	See Summer 1	Pupils should be taught to: -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.	See Summer 1
	Key Vocabulary:			Life cycle Mammal Amphibian Reptile Bird Fish Insect Vertebrate Invertebrate Reproduction	

Working Scientifically

- asking relevant questions and using different types of scientific enquiries to answer them.
- setting up simple practical enquiries, comparative and fair tests.
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

- planning 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.
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- using test results to make predictions to set up further comparative and fair tests.
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- identifying scientific evidence that has been used to support or refute ideas or arguments.