

St Columb Major Academy: Science Curriculum Progressions



The National Curriculum states:

KS1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Y3/4

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. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Y5/6

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. Pupils should read, spell and pronounce scientific vocabulary correctly.

Science Curriculum: NC Programmes of Study

	FS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Working Scientifically (Scientific Enquiry)	Dev Matters: Characteristics of Effective Learning UW: The World (30-50 & 40-60)	KS1 Working Scientifically PoS		Lower KS2 Working Scientifically PoS		Upper KS2 Working Scientifically PoS	
Life Processes and Living Things	UW: The World (30-50 & 40-60)	Plants Animals, including humans	Plants Animals, including humans Living things & their habitats	Plants Animals, including humans	Animals, including humans Living Things & their habitats	Animals, including humans Living Things & their habitats	Animals, including humans Living Things & their habitats Evolution & Inheritance
Materials and their Properties	UW: The World (30-50 & 40-60)	Everyday materials	Uses of everyday materials	Rocks	States of Matter	Properties & changes of materials	
Physical Processes	UW: The World (30-50 & 40-60)	Seasonal changes		Light Forces and Magnets	Sound Electricity	Earth & Space Forces	Light Electricity

Science Curriculum: Progression of Skills & Knowledge for Working Scientifically

	FS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Questioning & Enquiring	<p>Characteristics of Effective Learning Finding out and exploring:</p> <ul style="list-style-type: none"> •Showing curiosity about objects, events and people •Using senses to explore the world around them •Engaging in open-ended activity •Showing particular interests <p>Being willing to 'have a go'</p> <ul style="list-style-type: none"> •Initiating activities •Seeking challenge •Showing a 'can do' attitude •Taking a risk, engaging in new experiences, and learning by trial and error 	<p>Ask simple questions & begin to understand there may be more than one answer To begin to discuss ideas about how to find things out.</p>	<p>Ask simple questions and recognise that they can be answered in different ways To discuss ideas about how to find things out.</p>	<p>Begin to develop an understanding of whether a question is relevant. Begin to develop ideas for the best way to answer questions and plan scientific enquiries with support. Plan for simple practical enquiries, with support to ensure they are comparative/fair, starting to consider variable factors, time scales etc</p>	<p>Ask relevant questions Discriminate between ideas for the best way to answer questions and plan scientific enquiries, explaining reasons for choice Plan & set up simple practical enquiries, comparative and fair tests, considering variable factors, time scales, etc and giving reasons for choice</p>	<p>Begin to plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Begin to ask their own scientific questions, explore their own ideas, etc based on a more systematic scientific approach Plan and carry out scientific investigations to answer scientific enquiries, selecting the equipment and format to ensure how best to get the necessary results with some direction from the teacher. Begin to recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Ask their own scientific questions, explore their own ideas, etc based on a more systematic scientific approach Plan and carry out scientific investigations to answer their own scientific enquiries, selecting the equipment and format to ensure how best to get the necessary results. Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</p>
Measuring & Recording	<p>Being involved and concentrating</p> <ul style="list-style-type: none"> •Maintaining focus on their activity for a period of time •Showing high levels of energy, fascination •Not easily distracted •Paying attention to details <p>Keeping on trying</p> <ul style="list-style-type: none"> •Persisting with activity when challenges occur •Showing a belief that more effort or a different approach will pay off •Bouncing back after difficulties <p>Having their own ideas</p> <ul style="list-style-type: none"> •Thinking of ideas •Finding ways to solve problems •Finding new ways to do things 	<p>Perform simple tests with support Begin to observe closely, sometimes using simple equipment: *To observe changes over time. *To know how to use simple equipment safely with support. *Use simple measurements and equipment with support With prompting, suggest how findings could be recorded Begin to record simple data with support, to help in answering questions: *To say what I am looking for and what I am measuring.</p>	<p>Perform simple tests Observe closely, using simple equipment where necessary: *To observe changes over time and, with guidance, begin to notice patterns and relationships *Suggest ways they could record their findings Gather & record data to help in answering questions: *To say what I am looking for and what I am measuring. *To know how to use simple equipment safely. *Use simple measurements and equipment with increasing independence *Begin to progress from non-standard units</p>	<p>To carry out investigations, ensuring attention to detail when measuring and recording results with support. Make systematic and careful observations, with support when necessary Learn to use or improve use of a range of measuring equipment *Begin to take accurate measurements using a range of equipment, with support *Begin to gather the relevant data in an increasing number of ways Record and present data in a variety of ways to help in answering questions, with support where necessary Begin to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p>	<p>To carry out investigations and fair/ comparative tests with as much accuracy as possible so results aren't compromised Make systematic and careful observations Use a range of measuring equipment with increased confidence and select appropriately for the task: *Take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers *Gather the relevant data in a variety of ways Record 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</p>	<p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, and begin to understand the purpose of taking repeat readings Through discussion, consider the best ways to record data and results from investigations (scientific diagrams and labels, classification keys, tables, and bar charts) and implement this, with support as necessary, widening range used</p>	<p>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.</p>
Concluding	<p>Making links</p> <ul style="list-style-type: none"> •Making links and noticing patterns in their experience •Making predictions •Testing their ideas •Developing ideas of grouping, sequences, cause and effect <p>Choosing ways to do things</p> <ul style="list-style-type: none"> •Planning, making decisions about how to approach a task, solve a problem and reach a goal •Checking how well their activities are going •Changing strategy as needed •Reviewing how well the approach worked 	<p>Identify and classify with some support: *To begin to use observations to identify, compare and describe. *To begin to use simple features to compare and sort/group with help. Use observations & ideas to suggest answers to questions with support. Begin to communicate their findings: *Begin to talk about what they have found out and how they found it out - what happened/what surprised them/what they would do differently next time</p>	<p>Identify and classify: *Use observations to identify, compare and describe. *Use simple features to compare, group and sort, explaining criteria used. Use observations & ideas to suggest answers to questions with support, working towards doing so independently. Communicate their findings in a range of ways. Talk about what they have found out and how they found it out - what happened/ what surprised them/what they would do differently next time - and record some of this in a written/pictorial form.</p>	<p>Begin to identify patterns in results Begin to identify differences, similarities or changes related to simple scientific ideas and processes, with support if necessary To begin to make classifications from observations, data, etc and explain criteria & reasons Report on findings from enquiries, including oral and simple written explanations, displays or presentations of results and conclusions, individually or as part of a group</p>	<p>Identify patterns in results Identify differences, similarities or changes related to simple scientific ideas and processes Make classifications from observations, data, etc and explain reasoning clearly and with detail Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p>	<p>To sort, group and classify using evidence of increasing complexity or using multiple features Begin to use and develop keys and other information records to identify, classify and describe living things and materials. Develop ways and confidence when 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 Begin to draw conclusions and identify scientific evidence. Know which evidence proves a scientific point</p>	<p>Use observations, results, data etc of increasing complexity to sort and classify, using detailed evidence to clearly explain reasoning Use and develop keys and other information records to identify, classify and describe living things and materials. Report and present 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 Draw conclusions and identify scientific evidence. Know which evidence proves a scientific point</p>
Evaluating	<p>UW - The World 30-50 Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. •Can talk about some of the things they have observed such as plants, animals, natural and found objects.</p>			<p>Use results to draw simple conclusions (identifying patterns/linking cause & effect), make predictions for new values, suggest improvements and raise further questions, with support where necessary</p>	<p>Use results to draw simple conclusions (identifying patterns/linking cause & effect), make predictions for new values, suggest improvements and raise further questions</p>	<p>Begin to suggest improvements to methods and give reasons. Discuss test results and use them to make predictions to set up further comparative and fair tests Begin to separate opinion from fact.</p>	<p>Suggest improvements to methods and give reasons. Use test results to make predictions to set up further comparative and fair tests Separate opinion from fact.</p>
Research	<p>•Talks about why things happen and how things work. 40-60 •Looks closely at similarities, differences, patterns and change.</p>	<p>Begin to find age-appropriate information from books and computers with help.</p>	<p>Can find age-appropriate information from books and computers, sometimes with help.</p>	<p>Begin to recognise when and how secondary sources might help to answer questions that cannot be answered through practical investigations and where to go to find the info needed</p>	<p>Use straightforward scientific evidence to answer questions or to support their findings. Use secondary sources to help to answer questions that cannot be answered through practical investigations, understanding where to go to find the information needed. E.g. internet, books.</p>	<p>Begin to identify scientific evidence that has been used to support or refute ideas or arguments. Begin to recognise which secondary sources will be most useful to research their ideas and choose the most appropriate method for research.</p>	<p>Identify scientific evidence that has been used to support or refute ideas or arguments. Recognise which secondary sources will be most useful to research their ideas and choose the most appropriate method for research.</p>
Vocab		<p>Begin to use simple scientific language when recording and communicating their findings. Use comparative language with support when sorting and grouping objects, materials and living things.</p>	<p>Use simple scientific language when recording and communicating their findings. Use comparative language when sorting and grouping objects, materials and living things.</p>	<p>Begin to use some scientific language to talk and, later, write about what they have found out. Begin to use relevant scientific language. Begin to use comparative and superlative language</p>	<p>Use some scientific language to talk and, later, write about what they have found out. Use relevant scientific language. Use comparative and superlative language</p>	<p><u>Begin to</u> read, spell and pronounce a widening range of more complex scientific vocabulary correctly. Begin to use relevant scientific language and illustrations to discuss, communicate and justify scientific ideas and talk about how scientific ideas have developed over time.</p>	<p>Read, spell and pronounce more complex scientific vocabulary correctly. Use relevant scientific language and illustrations to discuss, communicate and justify scientific ideas and talk about how scientific ideas have developed over time.</p>

Science Curriculum: Definitions of key terms from working scientifically statements

Working scientifically term/phrase	Definition
Begin to	Pupils should work towards achieving the stated objective across the academic year (or 2 years). They would start the year having support from the teacher to meet the objective through teacher modelling, input and support during activity. As the year progressed (end of spring term/summer term), pupils would demonstrate that working scientifically statement independently for the majority of activities that involve working scientifically.
Simple questions	Pupils might ask simple questions when investigating with the aim of then discovering if their question was correct. For example, they might be looking at a selection of materials and ask questions like, "Is it stretchy?"
Simple practical enquiries	A practical investigation that can be carried out with simple equipment and isn't too complicated. For example, using a ramp, four different surfaces and measuring tape to investigate friction. A simple practical enquiry would incorporate fair testing but nothing more advanced than this e.g. controlling variables.
Simple tests	Simple tests are practical investigations carried out across year 1 and 2 which involve testing and making a conclusion. Materials and steps for the investigation would be simple. An example of this could be designing and building an egg box, choosing the best materials for the design before testing them by dropping the box.
Simple equipment	Simple equipment would be used in year 1 and 2 practical investigations to carry out measurements and observations. For example, the children might measure the distance a rocket they had made travelled using measuring tape.
Simple scientific language	Subject specific language that matches the content of the unit being taught e.g. describing a material as soft in year 2 but using the word property to say that a material insulates heat.
Age appropriate information	Researching and using information from books and/or the internet that matches the year group and can be comprehended by that year group.
Widening range of vocabulary	Learning and using more scientific language that is relevant to the unit they are covering within their year group. This widening range of language would be progressing in complexity e.g. explaining in year 4 that a material has changed state but referring to this as an irreversible change in year 5.
Simple written explanation	Writing a conclusion based on a practical investigation. A simple explanation would involve explaining what they observed happening in the experiment with some use of simple scientific vocabulary and a basic explanation of why e.g. Teacher: Why do you think it went different distances on the surfaces? The wool was fluffy and slowed the car down. The wood was smooth and didn't slow it down.

Science Curriculum: Progression of Skills & Knowledge for Life Processes and Living Things

	FS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants	<p>UW - The World: 30-50 *Comments & asks questions about aspects of their familiar world *can talk about some of the things they have observed *talks about why things happen *develops an understanding of growth, decay and changes over time *shows care & concern for living things in the environment 40-60 *looks closely at similarities, differences, pattern & change</p>	<p>*identify and name a variety of common wild and garden plants, including deciduous and evergreen trees *identify and describe the basic structure of a variety of common flowering plants, including trees</p>	<p>*observe and describe how seeds and bulbs grow into mature plants *find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</p>	<p>*identify & describe the functions of diff parts of flowering plants: roots, stem/trunk, leaves, flowers *explore the requirements of plants for life & growth (air, light, water, nutrients from soil, room to grow) and how they vary from plant to plant *investigate the way 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</p>			
Animals, including humans	<p>*know about similarities & differences in relation to living things *talk about the features of their own environment and how environments might vary from one another *make observations of animals & plants and explain why some things occur, and talk about changes.</p>	<p>*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, mammals) *identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	<p>*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, air) *describe the importance for humans of exercise, eating the rights amounts of different types of food, and hygiene</p>	<p>*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</p>	<p>*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</p>	<p>*describe the changes as humans develop to old age</p>	<p>*identify and name the main part 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>
Living Things and their habitats			<p>*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 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 micro-habitats *describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name simple sources of food</p>		<p>*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</p>	<p>*describe the differences in the life cycles of a mammal, amphibian, insect and bird *describe the life process of reproduction in some plants and animals</p>	<p>*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</p>
Evolution and Inheritance							<p>*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 adaption may lead to evolution</p>

Science Curriculum: Progression of Skills & Knowledge for Materials and their Properties

FS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>UW - The World:</p> <p>30-50</p> <ul style="list-style-type: none"> *Comments & asks questions about aspects of their familiar world *can talk about some of the things they have observed *talks about why things happen <p>40-60</p> <ul style="list-style-type: none"> *know about similarities and differences in relation to objects and materials *looks closely at similarities, differences, pattern & change *talk about the features of their own environment and how environments might vary from one another 	<p>Everyday Materials</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 *compare and group together a variety of everyday materials on the basis of their simple physical properties 	<p>Uses of Everyday Materials</p> <ul style="list-style-type: none"> *identify and compare the suitability 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 	<p>Rocks</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 	<p>States of Matter</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 	<p>Properties and Changes of Materials</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 *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 	

Science Curriculum: Progression of Skills & Knowledge for Physical Processes

	FS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light	<p>UW - The World: 30-50 *Comments & asks questions about aspects of their familiar world *can talk about some of the things they have observed *talks about why things happen and how things work</p> <p>40-60 *looks closely at similarities, differences, pattern & change *know about similarities & differences in relation to objects</p>			<p>*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</p>			<p>*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.</p>
Sound					<p>*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.</p>		
Electricity					<p>*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.</p>		<p>*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.</p>
Forces and Magnets				<p>*compare how things move on different surfaces *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 other *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</p>		<p>*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</p>	
Earth & Space		<p>Seasonal Changes *observe changes across the four seasons *observe and describe weather associated with the seasons and how day length varies.</p>				<p>*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.</p>	