

Childwall Church of England
Primary School



Science Handbook

Intent

Science education is one of the most important subjects in school due to its relevance to children's lives and the universally applicable problem-solving and critical thinking skills it uses and develops. These are lifelong skills that allow students to generate ideas, weigh decisions intelligently and even understand the evidence behind public policy-making. Teaching technological literacy, critical thinking and problem-solving through science education gives students the skills and knowledge they need to succeed in school and beyond. The Science National Curriculum identifies three key areas in which the children should be taught: knowledge and understanding; working scientifically and the application of science. Our school has a carefully planned science curriculum that ensures children, from Reception to Year 6, cover these three aims in an accessible, creative and engaging way.

Effective teaching of science offers pupils the opportunity to access a wealth of knowledge and information which contributes to a secure understanding of how and why things work the way they do. Science explains the mechanics and reasoning behind the daily function of complex systems, including the human body. Through secure teaching, pupils will use this knowledge to aid their understanding of new concepts, make well-informed decisions and pursue new interests.

Our science curriculum is full of awe and wonder – we push the boundaries in order to nurture thinking minds. Pupils develop an evidence-based way of understanding the world. Through our teaching, we cultivate curiosity as children develop the joy of discovery and the need to explore further; a successful science education enables them to become resilient, reflective and resourceful learners.

Our school endeavours to ensure that every child is given the opportunity to enjoy and make progress in science. In addition, the wider curriculum provides many opportunities to apply and deepen children's understanding of science.

Impact

Our science curriculum

- Ensures that all of our children have equal access to a broad and balanced mastery science curriculum which supports them to sequentially develop their knowledge, understanding and skills across all strands of the subject
- Responds to the unique value of every child and supports the formation of the whole person. It also helps embed the Christian Values of Excellence, Respect, Responsibility, Courage, Commitment, Co-operation, Inclusion and Initiative. It also promotes the British Values of Democracy, Tolerance, and Mutual Respect.

We want children to enjoy and value science and appreciate the range of skills it will provide them with. An essential part of the children becoming scientists is promoting curiosity and encouraging the children to ask questions.

By the end of KS2, our expectation is that children will be able to develop their own questions, plan different types of enquiries to answer those questions and communicate their findings in a variety of ways. Children will understand that part of science is failing and that problem solving helps us to overcome these failures. Children will have a clear understanding of how scientists, both past and present, have contributed to society's understanding of the world around them. They will understand the role that science and other STEM subjects play in solving some of the key problems facing the world, such as climate change.

Pupils are provided with a range of opportunities to showcase and communicate their ideas, research and findings. Teachers use a variety of assessment tools, including: pre and post learning unit tasks, pupil discussions about their learning and scrutiny of books by the Science Leadership Team and SLT to check for progress. Progress of our science curriculum is demonstrated through outcomes and the record of coverage in the process of achieving these outcomes. The use of TAPS and PLAN assessment materials and completion of CPD, supports teachers to ensure a robust and effective internal moderation process of the children's work, can take place.

Our Science Leadership Team can be contacted at science@childwallce.com

Implementation

Our school follows the National Curriculum which defines: the subjects taught, the knowledge, skills and understanding required in each subject and the structures required to ensure teaching and learning are balanced and consistent.

Our curriculum ensures 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 knowledge required to understand the **uses and implications** of science, today and for the future.

We believe that for the children to become scientists, they not only need knowledge, but also the skills to work scientifically and opportunities for skills and knowledge to be applied. The science leadership team has developed a curriculum plan that uses PZAZ science scheme, the Primary Assessment Network (PLAN) and Teaching and Assessment of Primary Science (TAPS) assessment materials. This provides clear guidance to all teaching staff on the progression and application of skills and knowledge expected for each topic, in each year group. Key vocabulary is identified for each science topic and it is expected that these keywords will be explored through teaching and be displayed on science working walls.

Big questions, key ideas and misconceptions are included within the curriculum planning; these promote discussion, challenge thinking and ensure the full coverage of all five types of scientific enquiry. Children have the opportunity to develop their science capital through extra-curricular activities such as, becoming a Science Ambassador, Science Club, specialist visitors, trips and specific science learning days. Childwall CE Primary School takes part in national science events such as British Science Week, The Great Science Share, Space Week, Science Future Week and STEM Week.

Although the majority of the science teaching is taught as a discrete subject, there is an expectation that all class teachers will promote and incorporate science across the wider curriculum. The implementation of this is monitored by the subject leaders. Class teachers are given regular CPD to ensure they have the skills and knowledge to be able to do this.

Promoting SMSC and British Values

Children will have opportunities to:

Spiritual Education

- Look for meaning and purpose in natural and physical phenomena
- Wonder about what is special about life
- An awareness of the scale of things from the smallest micro-organism to the largest
- The interdependence of all living things and materials of the Earth
- Emotional drive to know more and to wonder about the world
- Wonder at the vastness of space and the beauty of natural objects

Moral Education

- Pupils to become increasingly curious
- Development of open mindedness to the suggestions of others
- Scientific developments may give rise to moral dilemmas
- Considering the environment

Social Education

- Group practical work
- Team working skills and to taking responsibility
- Taking responsibility for their own and other people's safety
- Understanding that science has a major effect on the quality of our lives
- Consider the benefits of scientific developments and the social responsibility involved

Cultural Education

- Scientific discoveries as a part of our culture
- Scientific discoveries of other cultures
- Scientific discoveries by a wide range of men and women in many different cultures
- Environmental issues are central to science.

Democracy

- Take the views and opinions of others into account
- Take turns and instructions from others

The rule of law

- Understand the importance of safety rules when working scientifically
- Know that there are consequences in rules are not followed

Individual liberty

- Make choices when planning an investigation
- Others may have different points of view as to where to start

Tolerance

- Scientific discoveries have come from other cultures
- Religious beliefs often compete with scientific understanding

Mutual respect

- Work as a team
- Discuss findings

Offer support and advice to other



EYFS

The Early Years Foundation Stage Curriculum supports children's understanding of science through the planning and teaching of 'Understanding the World.' Children find out about objects, materials and living things using all of their senses looking at similarities, differences, patterns and change. Both the environment and skilled practitioners foster curiosity and encourage explorative play. Children are motivated to ask questions about why things happen and how things work. Our children are encouraged to use their natural environment around them to explore. Children enjoy spending time outdoors exploring mini-beasts and their habitats, observing the changing seasons, plants and animals. Children regularly participate in cookery and baking sessions which allows them to experience changes in state as ingredients are mixed, heated and cooled.

Planning

Our long-term planning ensures coverage of the National Curriculum and is responsive to the interests and needs of our children. In order to widen and deepen their essential knowledge, skills, understanding and behaviours our children continuously return to key concepts and skills in order to gain a deeper and more insightful understanding.



Topic Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	Plants, flowers, trees	Seasonal Change, Animals (nocturnal)	My Body, Materials and their properties	Magnets, Float and Sink	Habitats, Life Cycles	Changes of State, Liquids, Food, Hygiene and Exercise
Year 1	Seasonal Changes	Everyday Materials	Animals including humans		Plants	
Year 2	Animals including humans		Everyday Materials		Living things and their habitats	Plants
Year 3	Animals including humans	Rocks	Forces and Magnets	Light	Plants	
Year 4	Living things and their habitats	Animals including humans	States of matter	Sound	Electricity	
Year 5	Earth and Space	Forces		Properties and changes of Materials	Animals including humans	Living things and their habitats
Year 6	Animals including humans		Light and Electricity	Evolution and inheritance	Living things and their habitats	Electricity

Big Questions Overview

Year Group	Unit				
1	Seasonal Changes	Everyday Materials	Animals inc. Humans	Plants	
	What is it like in each season?	What are the things I use made from?	Do animals all have the same parts?	What ways can I identify a plant?	
2	Animals inc. Humans	Uses of Everyday Materials	Plants	Living Things	
	How do humans stay healthy?	Why do we make things out of certain materials?	What things do plants need to grow?	What features do animals that allow them to thrive in their environment?	
3	Animals inc Humans	Rocks	Forces	Light	Plants
	How can animals move? What is in food?	Why are there different rocks?	How do moving objects slow down? What materials are attracted to magnets?	What is a shadow?	What do different parts of a plant do?
4	Animals inc Humans	Electricity	States of Matter	Living Things	Sound
	What happens to food when we eat it?	What materials conduct electricity?	What happens when we heat solids? What happens to puddles after it rains?	What happens to living things when their habitats change?	How are sounds made?
5	Forces	Properties and Changes of Materials	Space	Animals inc Humans	Living Things
	How do machines work?	What is a mixture and how do I separate it into its parts?	Why does the Moon appear to change shape?	How do humans change as they get older?	How do living things make copies of themselves?
6	Animals inc Humans	Electricity	Light	Living Things	Evolution and Inheritance
	What affects the health of humans?	How do humans use electricity?	How does light travel?	How are living things grouped together?	What happens to species over a long time?

Knowledge Progression

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals including humans	<p>I know that different animals have different body parts (some have no legs, some have lots)</p> <p>I know that different animals like different foods and live in different places</p> <p>I know that some animals are big and some animals are small</p> <p>I know that butterflies do not start out looking like butterflies (undergo metamorphosis)</p> <p>I know how to talk about different places an animals might live</p> <p>I know that some animals hibernate</p> <p>I know that some animals are adapted to live under the sea and that humans are adapted to live on land</p> <p>I know that if I wash my hands then that will kill off germs</p> <p>I know about the importance of a healthy diet</p> <p>I know I cannot eat unhealthy foods like chips and pizza</p>	<p>I know how to describe and compare observable features of animals from a range of groups</p> <p>I know how to group animals according to what they eat</p> <p>I know how to identify and name a variety of common animals including fish, amphibians, reptiles, mammals and birds</p> <p>I know how to identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>I know how to name and locate parts of the human body, including those related to the senses</p> <p>I know how to describe and compare observable features of animals</p>	<p>I know how to name and locate parts of the human body, including those related to the senses and describe them</p> <p>I know how to describe the basic needs of animals for survival and the main changes as offspring from young animals, including humans, grow into adults</p> <p>I know how to group animals according to what they eat, describe how animals get their food from other animals and/or plants, and use simple</p>	<p>I know how 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</p> <p>I know how to identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p>I know how to describe the simple functions of the basic parts of the digestive system in humans</p> <p>I know how to identify the different types of teeth in humans and their simple functions</p> <p>I know how to construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p>I know how to describe the changes as humans develop to old age</p>	<p>I know how to identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>I know how to recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>I know how to describe the ways in which nutrients and water are transported within animals, including humans</p>

	<p>everyday and I need a variety of food I know about the importance of a healthy exercise regime I know that exercise is good for my body.</p>	<p>from a range of groups I know how to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) I know how to identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense I know how to take care of animals taken from their habitat and understand the need to return them safely to their homes I know how to use the vocabulary and identify: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth and teeth Vocab Humans and animals: head, neck, arms, elbows, legs, knees, face, ears,</p>	<p>food chains to describe these relationships I know how to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene I know how to describe the basic needs of animals, including humans, for survival (water, food and air) Vocab: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep I know how to describe the importance for humans of exercise, eating the right amounts of different</p>				
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		eyes, hair, mouth and teeth	types of food, and hygiene I know how to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene				
Everyday Materials	<p>I know that objects are made from different materials</p> <p>I know about similarities and differences in relation to places, objects, materials and living things</p> <p>I know how to about the features of my immediate environment and how environments might vary from one another</p> <p>I know how to make observations of animals and plants and explain why some things occur, and talk about changes</p>	<p>I know how to distinguish objects from materials, describe their properties, identify and group everyday materials</p> <p>I know how to distinguish between an object and the material from which it is made</p> <p>I know how to identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>I know how to describe the simple physical properties of a variety of everyday materials</p> <p>I know how to compare and group together a variety of</p>	<p>I know how to distinguish objects from materials, describe their properties, identify and group everyday materials and compare their suitability for different uses</p> <p>I know how to 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>I know how 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</p> <p>I know how to recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p>	

		<p>everyday materials on the basis of their simple physical properties</p> <p>Vocab</p> <p>Materials: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. brick, paper, fabrics, elastic, foil.</p>	<p>I know how to describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>			<p>I know how to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>I know how to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>I know how to demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>I know how to 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</p>	
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						bicarbonate of soda	
Light				<p>I know how to recognise that he/she needs light in order to see things and that dark is the absence of light</p> <p>I know how to notice that light is reflected from surfaces</p> <p>I know how to recognise that light from the sun can be dangerous and that there are ways to protect eyes</p> <p>I know how to find patterns in the way that the size of shadows change</p> <p>I know that it is not safe to look directly at the sun, even when wearing dark glasses</p>			<p>I know how to recognise that light appears to travel in straight lines</p> <p>I know how to 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</p> <p>I know how to 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</p> <p>I know how to use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>

<p style="text-align: center;">Magnets</p>	<p>I know that magnets are 'sticky' without being sticky. I know magnets stick to certain materials (metals) I know how to find an object which a magnet will stick to</p>			<p>I know how to compare how things move on different surfaces I know how to notice that some forces need contact between two objects, but magnetic forces can act at a distance I know how to 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 I know how to describe magnets as having two poles</p>			
<p style="text-align: center;">Electricity</p>					<p>I know how to identify common appliances that</p>		<p>I know how to associate the brightness of a lamp or the volume of a buzzer</p>

					<p>run on electricity</p> <p>I know how to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>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</p> <p>I know how to 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>I know how to recognise some common conductors and</p>		<p>with the number and voltage of cells used in the circuit</p> <p>I know how to 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>I know how to use recognised symbols when representing a simple circuit in a diagram</p>
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					insulators, and associate metals with being good conductors		
Seasonal changes	<p>I know how to identify that it is Autumn, Winter, Summer and Spring</p> <p>I know how to identify seasonal colours</p> <p>I know that lots of new life begins in the Spring time</p> <p>I know how to choose appropriate clothing for the seasons</p>	<p>I know how to observe and describe changes across the four seasons</p> <p>I know how to observe and describe weather associated with the seasons and how day length varies</p> <p>I know that it is not safe to look directly at the sun, even when wearing dark glasses</p>					
Plants	<p>I know that plants need sun to grow</p> <p>I know that plants need water to grow</p> <p>I know that most plants need soil and nutrients to grow</p>	<p>I know how to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</p>	<p>I know how to describe the basic needs of plants for survival and the impact of changing these and the main</p>	<p>I know how to identify and describe the functions of different parts of flowering plants: roots, stem/trunk,</p>			

	<p>I know some plants grow from seeds</p>	<p>I know how to identify and describe the basic structure of a variety of common flowering plants, including trees I know how to identify and name a variety of common wild and garden plants, including deciduous and evergreen trees <u>Vocab</u> Plants: leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem.</p>	<p>changes as seeds and bulbs grow into mature plants I know how to observe and describe how seeds and bulbs grow into mature plants I know how to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy <u>Vocab:</u> bulbs, germination, reproduction (questions that recognise growth), growth, survival</p>	<p>leaves and flowers I know how to 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 I know how to investigate the way in which water is transported within plants I know how to explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</p>			
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<p>Living things and their habitats</p>	<p>I know about similarities and differences in relation to living things and their habitats I know how to talk about the features of my own immediate environment and how environments might vary from one another I know how to make observations of animals and plants and explain why some things occur, and talk about changes.</p>		<p>I know how to identify whether things are alive, dead or have never lived I know how to explore and compare the differences between things that are living, dead, and things that have never been alive I know how to name different plants and animals and describe how they are suited to different habitats I know how to 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</p>		<p>I know how to recognise that living things can be grouped in a variety of ways I know how to explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment I know how to recognise that environments can change and that this can sometimes pose dangers and have an impact on living things</p>	<p>I know how to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird I know how to describe the life process of reproduction in some plants and animals</p>	<p>I know how to 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 I know how to give reasons for classifying plants and animals based on specific characteristics</p>
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plants, and how they depend on each other
I know how to identify and name a variety of plants and animals in their habitats, including micro-habitats
I know how to 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
Vocab:
Habitat: A natural environment or home of a variety of plants and animals
Micro-habitat: A very small habitat, for example for woodlice

			under stones, logs or leaf litter			
Rocks				<p>I know how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p> <p>I know how to describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>I know how to recognise that soils are made from rocks and organic matter.</p>		
Forces				<p>I know how to compare how things move on different surfaces</p> <p>I know how to notice that</p>	<p>I know how to explain that unsupported objects fall towards the Earth because of the force of gravity</p>	

				<p>some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>I know how to 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</p> <p>I know how to describe magnets as having two poles</p> <p>I know how to predict whether two magnets will attract or repel each other, depending on which poles are facing</p>		<p>acting between the Earth and the falling object</p> <p>I know how to identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>I know how to recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p> <p>I know how to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>I know how to describe the life process of reproduction in some plants and animals</p>	
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Sound

I know how to identify how sounds are made, associating some of them with something vibrating
I know how to recognise that vibrations from sounds travel through a medium to the ear
I know how to find patterns between the pitch of a sound and features of the object that produced it
I know how to find patterns between the volume of a sound and the strength of the vibrations that produced it
I know how to recognise that sounds get fainter as the distance from the sound source increases

States of matter

I know how to compare and group materials together, according to whether they are solids, liquids or gases
I know how to 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 ($^{\circ}\text{C}$)
I know how to identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature



**Earth and
Space**

I know how to describe the movement of the Earth, and other planets, relative to the Sun in the solar system
I know how to describe the movement of the Moon relative to the Earth
I know how to describe the Sun, Earth and Moon as approximately spherical bodies
I know how to use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky
I know that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).

						<p>I know that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p>	
<p>Evolution and inheritance</p>							<p>I know how 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 I know how to recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents I know how to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>

Famous Scientists

Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.

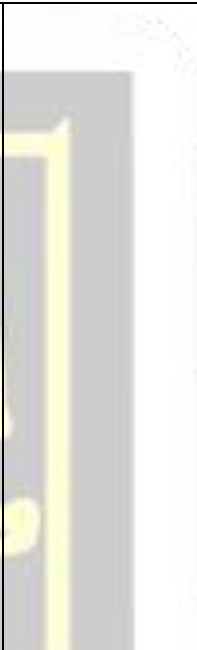
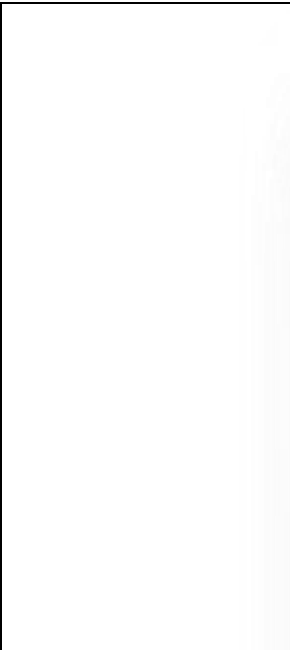
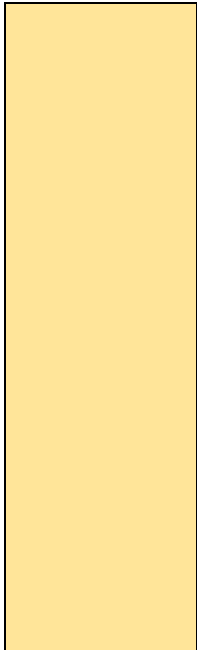
They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall

They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

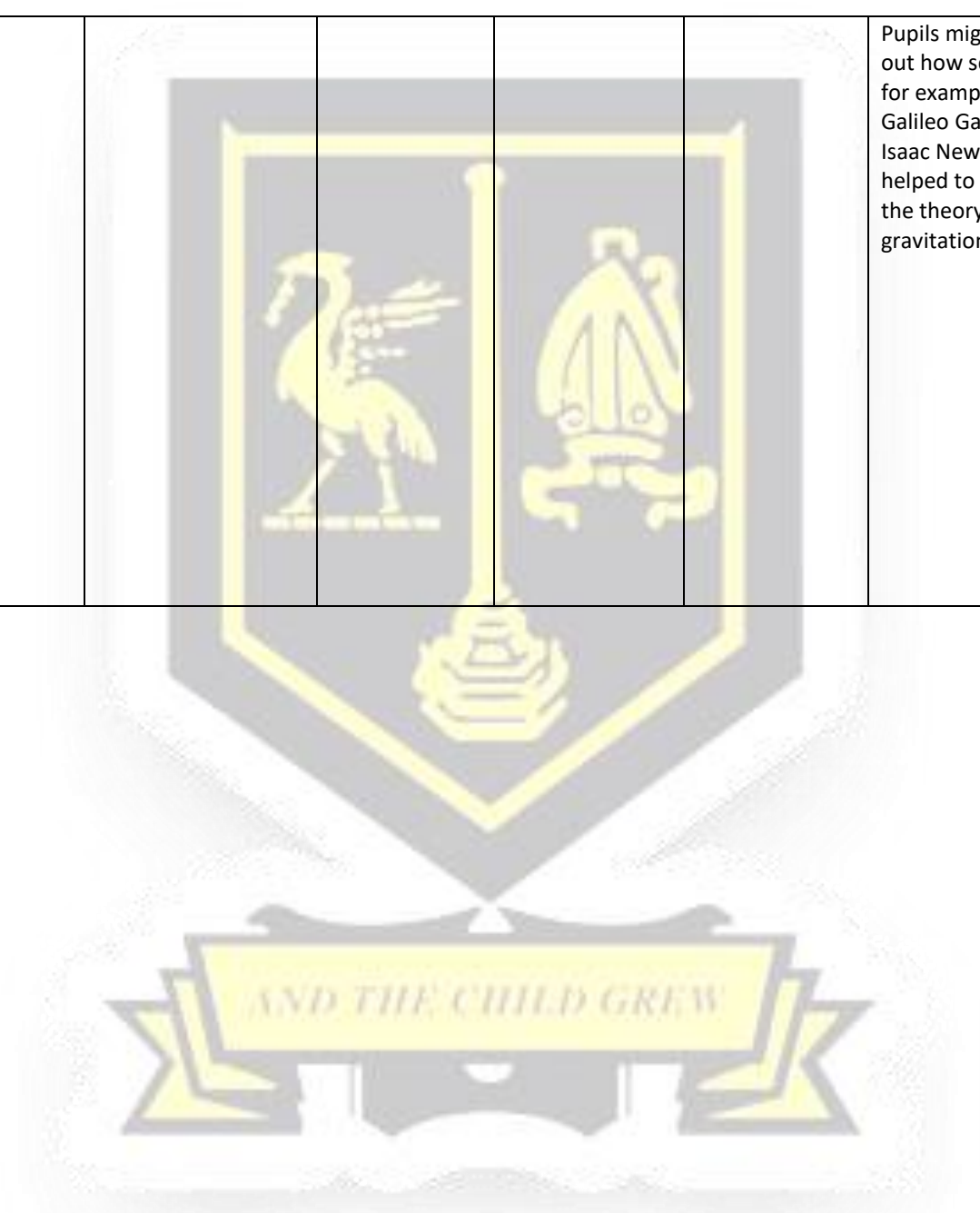
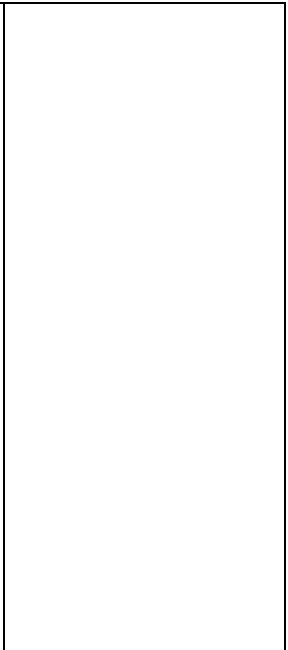
Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.

Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification

Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.



Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.



Working Scientifically Progression

Skills Progression	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Five types of experimental skills</p> <p>1. Observe over time</p> <p>2. Pattern seeking</p> <p>3. Identifying, classifying and grouping</p> <p>4. Comparative and Fair test</p> <p>5. Research using secondary sources</p>	<p>1. I can observe changes over time</p> <p>2. I can observe changes and patterns</p> <p>3. I can identify and classify</p> <p>4. I can perform simple tests</p> <p>4. I can perform a fair test with adult support</p>	<p>1. I can observe changes over time</p> <p>2. I can observe changes and patterns</p> <p>3. I can identify and classify</p> <p>4. I can perform simple tests</p> <p>4. I can perform a fair test with adult support</p>	<p>1. I can use simple equipment to observe closely including changes over time</p> <p>2. I can use observations and ideas to suggest answers to questions noticing similarities, differences and patterns</p> <p>3. I can identify, group and classify</p> <p>4. I can perform simple comparative tests</p> <p>5. I can gather and record</p>	<p>1. I can make systematic and careful observations over time</p> <p>2. I can ask questions surrounding patterns I have found in data.</p> <p>3. I can gather, record, classify and present data in a variety of ways</p> <p>4. I can set up simple practical enquiries, comparative and fair tests</p> <p>5. I can use secondary sources with adult support to help clarify results seen.</p>	<p>1. I can make systematic and careful observations over time, looking at similarities and differences.</p> <p>2. I can ask questions surrounding patterns I have found in data.</p> <p>3. I can gather, record, classify and present data in a variety of ways to help in answering questions</p> <p>4. I can set up simple practical enquiries, comparative and fair tests</p> <p>5. I can use secondary sources with</p>	<p>1. I can observe over time, asking pertinent questions about similarities and differences.</p> <p>2. I can ask questions surrounding patterns I have found in data as to why something I have observed has happened.</p> <p>3. I can classify, group and present data in a series of ways to help in answering questions</p> <p>4. I can take measurements, using a range of scientific equipment, with increasing accuracy and precision.</p>	<p>1. I can recognise things change over time, and can ask pertinent questions and suggest reasons for similarities and differences over time</p> <p>2. I can ask questions surrounding patterns I have found in data as to why something I have observed has happened.</p> <p>3. I can develop and use keys and other information to classify and describe objects in ways to help answer questions</p> <p>4. I can take measurements, using a range of scientific</p>

			data to help in answering questions including from secondary sources of information		adult support to help clarify results seen.	5. I can use secondary sources to help interpret results seen.	equipment, with increasing accuracy and precision, taking repeat readings when appropriate 5. I can use secondary sources to help interpret results seen.
Questions	I can ask simple questions	I can ask simple questions and recognise that they can be answered in different ways I can use my observations and ideas to suggest answers to questions I can communicate my ideas, what I can do and what I can find out	I can ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum I can communicate my ideas, what I can do and what I can find out in different ways	I can ask relevant questions to answer my questions in different ways using scientific language from the national curriculum. I can ask questions surrounding patterns I have found in data.	I can ask relevant questions and use different types of scientific enquiries to answer them using scientific language from the national curriculum I can ask questions surrounding patterns I have found in data. I can develop a deeper understanding through talk,	I can plan different types of scientific enquiries to answer questions, including recognising variables where necessary I can ask questions surrounding patterns I have found in data as to why something I have observed has happened. I can observe over time, asking pertinent	I can plan different types of scientific enquiries to answer my own or others' questions, including recognising and controlling variables where necessary I can recognise things change over time, and can ask pertinent questions and suggest reasons for similarities and differences over time

		in different ways			asking questions about scientific phenomena, analysing functions and interactions more systematically.	questions about similarities and differences.	
Using scientific equipment	<p>I can use magnifying glasses to look at objects in more detail</p> <p>I can measure out ingredients using scientific and mathematic equipment</p>	<p>I can use simple equipment to observe closely</p> <p>I can use hand lenses and egg timers</p>	<p>I can use simple equipment to observe closely including changes over time</p> <p>I can ask my own questions about what I notice</p> <p>I can use hand lenses and egg timers</p>	<p>I can set up simple practical enquiries, comparative and fair tests</p> <p>I can make systematic and careful observations over time</p> <p>I can take measurements using standard units, using a range of equipment.</p> <p>I can set up simple practical enquiries,</p>	<p>I can set up simple practical enquiries, comparative and fair tests</p> <p>I can take measurements, using a range of scientific equipment, with increasing accuracy and precision.</p>	<p>I can make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p>	<p>I can take measurements, using a range of scientific equipment, including thermometers and data loggers, with increasing accuracy and precision, taking repeat readings when appropriate</p> <p>I can make my own decisions and select the most appropriate type of scientific enquiry to use and recognise how to set up a comparative and fair test.</p>

				comparative and fair tests			
Recording data	I can record observations in ways that are important and meaningful to me.	I can gather and record data to help in answering questions I can use simple scientific language such as: with help	I can gather and record data to help in answering questions including from secondary sources of information	I can gather, record, classify and present data in a variety of ways. I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	I can gather, record, classify and present data in a variety of ways to help in answering questions I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs I can use test results to set up further comparative and fair tests	I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs I can use test results to make predictions to set up further comparative and fair tests



<p>Reporting on findings</p>				<p>I can report on findings from enquiries, using presentations of results and conclusions</p> <p>I can use results to draw simple conclusions.</p> <p>I can use secondary sources with adult support to help clarify results seen.</p>	<p>I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>I can use results to draw simple conclusions, make predictions for new values and suggest improvements.</p> <p>I can use secondary sources with adult support to help clarify results seen.</p> <p>I can classify, group and present data in a series of ways to help in</p>	<p>I can report and present findings from enquiries in oral and written forms such as displays and other presentations.</p> <p>I can use results to draw more complex conclusions, make predictions for new values and suggest improvements.</p> <p>I can use secondary sources to help interpret results seen.</p> <p>I can classify, group and present data in a series of ways to help in answering questions</p>	<p>I can 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</p> <p>I can use results to draw more complex conclusions, make predictions for new values and suggest improvements and raise further questions.</p> <p>I can use secondary sources to help interpret results seen.</p> <p>I can develop and use keys and</p>
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					answering questions		other information to classify and describe objects in ways to help answer questions
Using scientific evidence				I can identify differences, similarities or changes related to simple scientific ideas and processes I can use straightforward scientific evidence to answer questions or to support my findings	I can identify differences, similarities or changes related to simple scientific ideas and processes I can use straightforward scientific evidence to answer questions or to support my findings	I can identify scientific evidence that has been used to support or refute ideas or arguments	I can justify and evaluate my own and other people's scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources



Vocabulary Progression

Below is our vocabulary progression document. Vocabulary in red is some of the scientific language children will be exposed to in Year 7.

Working Scientifically Year 1	Plants	Animals including Humans	Animals including Humans	Materials	Seasonal Change
answers	bark	ankle	high/low	absorbent	season
beakers	berry	arms	hips	bendy/floppy	autumn
compare	blossom	back	knees	breaks/tears	cloud/cloudy
describe	branch	beak	legs	brick	cool/cold
different/differences	bulb	body	mouth	card/cardboard	day/night
equipment	flower	calm	nails	glass	hail/hailing
gather	fruit	chest	neck	hard	hot/warm
group	leaf/leaves	claw	nose	material	light/dark
measure	petal	ears	scales	metal	rain/rainy
observe	root	elbows	see/seeing	not see through	sleet
questions	seed	eyebrows	senses	object	snow/snowing
record	stalk	eyelashes	shoulders	paper	spring
results	stem	eyes	smell/smelling	plastic	storm
similar/similarities	trunk	face	tail	rock	summer
sort	vegetable	feathers	taste/tasting	rough	sun/sunny
test		feet	teeth	rubber	thunder
		fin	thigh	see through	weather
		fingers	toes	shiny	wind/windy
		fur	tongue	smooth	winter
		hair	touch/touching	soft	
		hands	wing	waterproof	
		head	wrist	wood	
		hear/hearing		wool	

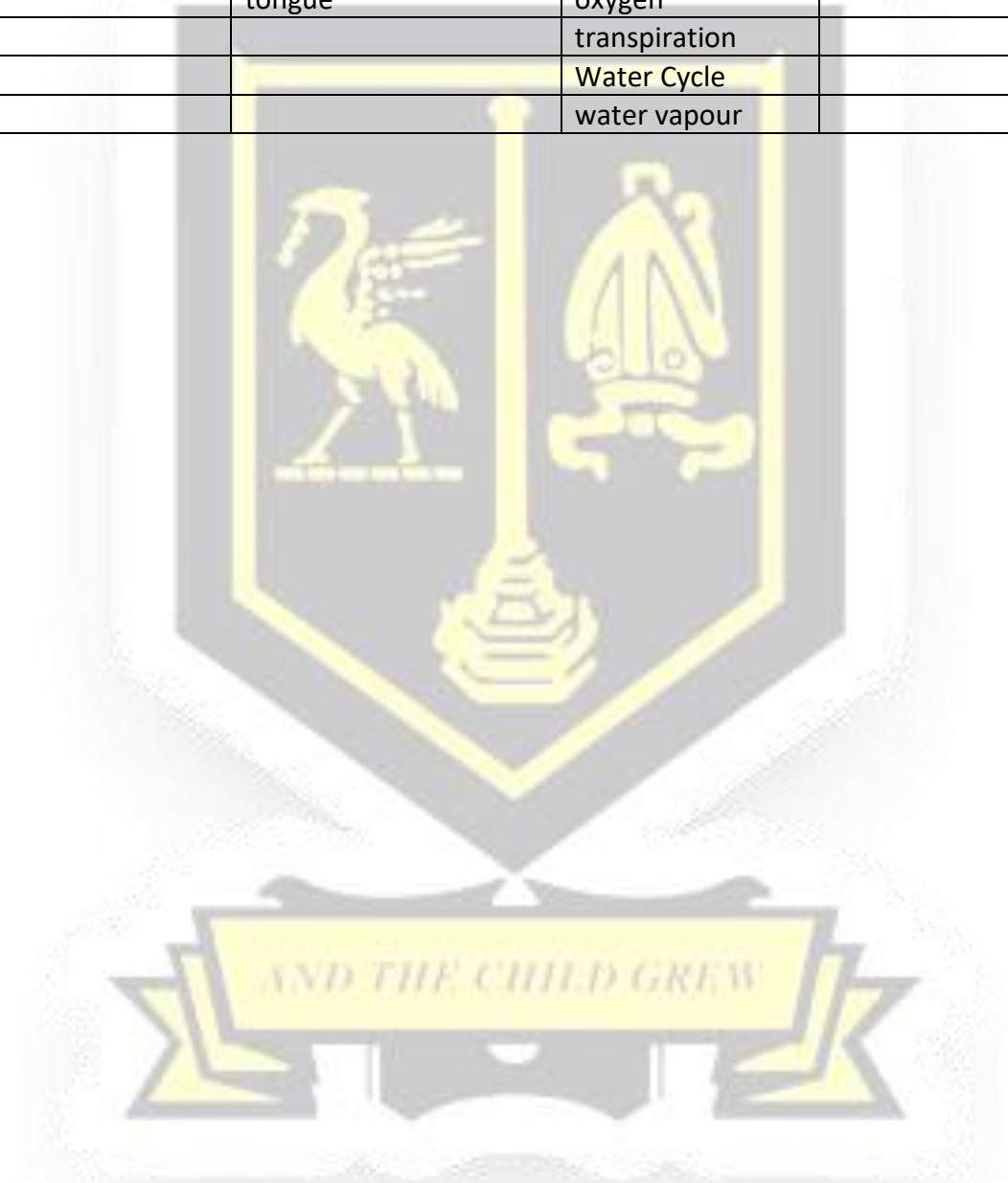
Working Scientifically Year 2	Plants	Animals including Humans	Materials	Materials	Living Things and Their Habitats
block diagram	bulbs	adults	absorbent	roll/rolling	dead
describe	damp/wet/dry	air	bend/bending	rough	depend
different/differences	dark/light	babies	brick	rubber	feed
explore	die	baby/toddler/child/teenager	card/cardboard	shape	food
group	earth	basic needs	changed	smooth	food chain
link	fully grown	bread/rice/potato/pasta	elastic	soft	grow
notice patterns	grow/growth	breathing	fabrics	squash/squashing	have offspring/young
observe	healthy	change	flexible	squeeze/squeezing	hot/warm/cool/cold
order	hot/warm/cool/cold	clean	foil	stretch/stretching	living
pictogram	light	drugs	glass	strong/weak	move
similar/similarities	seedling	exercise	hard	translucent	never been alive
table	seeds	food	material	transparent	shelter
tally chart	shoot	fruit and vegetable	metal	twist/twisting	
test	soil	grow	opaque	use/useful	
Venn diagram	water	healthy	paper	waterproof	
	wither/limp	hygiene	pinch/pinching	wood	
		meat/fish/egg/beans	plastic	wool	
		medicine	property		
		milk and dairy foods	pull/pulling		
		offspring	push/pushing		
		older/younger	reflective		
		survival	rigid		
		young	rock		



Working Scientifically Year 3	Plants	Animals including Humans	Rocks	Light	Force
accurate	air	balanced diet	absorb water	block	attract
answer	bark	bones	boulder	dark/darkness	bar magnet
bar charts	berry	bread/rice/potato/pasta	chalk	direct/direction	button magnet
changes	blossom	carbohydrates	chalky soil	light source	contact force
classify	branch	dietary fibre	clay soil	mirror	horseshoe magnet
comparative tests	bulb	fat	crystals	opaque	iron
conclusions	damp/wet/dry	food types	fossils	reflect	magnet
data/evidence/results	dark/light	fruit and vegetables	grains	reflective	magnetic force
differences	flower	joints	granite	shadow	magnetic material
equipment	fruit	meat/fish/egg/beans	hard/soft	translucent	metal
evidence	grow/growth	milk and dairy foods	let water through	transparent	non-contact force
fair test	healthy	movement	marble	ray	non-magnetic material
gather	leaf/leaves	muscles	peat		north pole
group	life cycle	nutrients	pebble		poles
identify	light	nutrition	rock		pull/pulling
keys	nutrients	protection	sandstone		push/pushing
link	petal	protein	sandy soil		repel
measure	pollination	ribs	slate		ring magnet
notice patterns	role	skeleton	soil		south pole
observations	root	skull	stone		steel
prediction	seed	sockets	texture		strength
questions	seed dispersal	spine/vertebra			
record	soil	support			
results	stalk	tendons			
similarities	stem	vitamins and minerals			
sort	trunk	water			
table	water	joints			
		organ			

Working Scientifically Year 4	Living Things and Their Habitat	Animals including Humans	Materials	Sound	Electricity
accurate	amphibians	anus	air	brass	appliances
conclusions	birds	molar	freeze	pitch	battery
gather	classification keys	prey	molten	tune	bright/dim
fair tests	environment	predator	melting point	volume	bulb
identify	fish	rectum	powder	percussion	buzzer
comparative tests	human impact	large intestine	evaporation	loud	cell
changes	invertebrates	food chain	cooled/cooling	quiet	circuit diagram
bar charts	mammals	herbivore	crystals	muffle	circuit symbol
classify	negative human impact	digestive system	condense	insulation	complete circuit
link	positive human impact	incisor	condensation	noise	components
data/evidence/results	reptiles	small intestine	degrees Celsius	sound	conductor
appearance	vertebrates	nutrients	solidify	travel	connect/connection
keys		pre-molar	grain/granular	instrument	crocodile clip
decrease		consumer	melt	sound source	electrical circuit
answer		saliva	change state	fainter	faster/slower
measure		stomach	solid	woodwind	insulator
increase		nutrition	states of matter	strength of vibrations	loose connection
differences		canines	heated/heating	vibrate/vibrations	mains
group		teeth	boil	strings	metal/non metal
equipment		rip/tear/chew/grind/cut	temperature		motor
observations		carnivore	precipitation		plug
order		mouth	boiling point		positive/negative
prediction		oesophagus	gas		short circuit
questions		producer	ice/water/steam		switch wire

record		omnivore	solid/liquid/gas		
results		tongue	oxygen		
similarities			transpiration		
table			Water Cycle		
			water vapour		



Working Scientifically Year 5	Living Things and Their Habitat	Materials	Materials	Forces and Magnets	Earth and Space
accuracy	amphibian	absorbent	solute	air resistance	'Dwarf' planet
accurate	asexual	burning	solution	attract	astronomical clocks
answer	bird	change state	solvent	earth	celestial body
bar charts	eggs	condensing	states of matter	fall	Earth
changes	fish	dissolve	stretchy	force	Jupiter
classification keys	germination	electrical conductivity	strong/weak	friction	Mars
classify	insect	evaporating	thermal conductivity	gears	Mercury
comparative tests	life cycle	filtering	translucent	gravity	Moon
conclusions	live young	flexible	transparent	levers	Neptune
controlled variable	mammal	gas	waterproof	magnet	night and day
data/evidence/results	pollen	hard		magnetic force	orbit
decrease	pollination	insoluble		mechanisms	planets
dependent variable	reproduction	liquid		moving surfaces	Pluto
differences	reptile	melting		pulleys	revolve
equipment	seed dispersal	mix/mixture		transfers	rotate
evidence	seed formation	non reflective		water resistance	Saturn
fair tests	stamen	opaque			shadow clocks
gather	stigma	particle			Solar System
group		reflective			sphere/spherical
identify		residue			spin
increase		reversible changes			Sun
independent variable		rigid			sundials
keys		rough			Uranus
line graphs		rusting			Venus
observations		sieving			
prediction		smooth			
questions		soft			
results		solid			
similarities		solubility			
variables		soluble			

Working Scientifically Year 6	Living Things and Their Habitat	Animals including Humans	Evolution	Light	Electricity
accuracy	amphibians	blood	adapted	absorb	appliances/device
answer	arachnid	blood vessels	adaptation	block	battery
bar charts	birds	carbon dioxide	characteristics	dark/darkness	bright/dim
changes	classification keys	circulatory system	environment	direct/direction	bulb
classification keys	Crustacean	diet	fossils	light source	buzzer
classify	environment	drugs	inherit	mirror	cell
comparative tests	fish	exercise	inheritance	opaque	circuit diagram
conclusions	fungus	heart	offspring	reflect	circuit symbol
controlled variable	insect	lifestyle	suited	reflective	complete circuit
data/evidence/results	invertebrates	lungs	suited/suitable	shadow	components
decrease	mammals	nutrients	vary/variation	translucent	conductor
dependent variable	micro-organisms	oxygen	genetic	transparent	connect/connection
differences	Mollusc	pumps		ray	crocodile clip
equipment	mushrooms	water		refraction	electrical circuit
evidence	organism	organ			loose connection
fair tests	reptiles				motor
gather	vertebrates				positive/negative
identify					short circuit
increase					switch
independent variable					terminal
measure					wire
microscope					
notice patterns					
observations					
opinion/fact					
order					
prediction					
results					
similarities					
variables					

Health & Safety and Safeguarding

Each of our units of study has a related risk assessment. This also includes the risk the experiments may pose to the environment, and the best ways to dispose of matter after experiments and investigations, in an environmentally friendly way. Evolve Risk Assessments are completed for all off site activities, with appropriate staff supervision ratios. Approved venues and transport are used.

Staff development

Our school maintains the culture, training, partnerships and levels of resources necessary to ensure the continuous development of all aspects of our science curriculum.

All new staff members are given copies of the Science Handbook. The Science coordinators provide a general overview of the scheme and explain the chosen approach. The coordinators are always available for further advice and support if necessary. As each member of staff works alongside another in a year group, advice from the experienced member of staff that you work alongside is also available.

All Trainee Teachers are also given copies of the handbook to ensure that there is a smooth consistency between their teaching and the standard expected at Childwall CE Primary School.

Both generic whole school and individual training are organised in response to any identified needs.

Resources

Science funding is allocated annually and includes elements to cover consumables and enrichment and development activities. General science equipment, reference books and other science resources are stored in school for all year groups to access. Outside agencies and organisations are used to further promote teaching and learning.

Childwall CE Primary School has a fantastic support system from parents, many of whom are often more than willing to visit school to share their specialist knowledge. This has been the central pillar in supporting our Careers in Science week.

Cross Curricular Links

English

There are many opportunities across all year groups for children to further develop their English skills through their science learning. Speaking and listening is an integral part of the way that science is taught at Hillside and children are encouraged to ask and answer questions and discuss observations made. Writing opportunities are planned to enable children to apply their skills for a range of purposes.

For example:

- writing non chronological reports about the topic studied
- writing explanations of phenomena observed
- recording findings using scientific vocabulary with accuracy
- designing menus for animals
- writing in response to a letter received asking for advice
- writing a diary to record the growth of a plant.

Mathematics

Maths naturally has clear scientific links, and through their learning, children are using and applying mathematical knowledge in examples such as:

- Creating tally charts to collect data
- presenting data through block graphs and bar charts
- using Venn diagrams to sort and classify objects/animals/materials
- using measures to carry out investigations
- reading scales when using scientific equipment
- understanding temperatures and negative numbers
- producing line graphs from a collection of continuous data.

Computing

Computing enhances our teaching of Science wherever appropriate in all key stages. The children use computing in a variety of ways such as

- researching using secondary sources
- word processing, and presenting information via PowerPoint
- collection of data using data logging apps
- the use of scientific apps such as Virtualitee, Science Journal and Plantsnap

- Opportunities to support science learning and recording through Purple Mash and greenscreen are utilised wherever appropriate.

Design and Technology

As part of our curriculum planning, science and DT links are increasingly evident. Many science objectives are now being developed and applied through the DT projects within in each year group. Examples of these links include:

- applying knowledge of a healthy eating through the food technology projects
- considering properties of materials when working with structures mechanisms and textiles
- applying an understanding of the nutritional value of foods
- observing reversible and irreversible changes and considering balanced diets during food projects
- applying their understanding of circuits during the electrical systems projects
- understanding the properties of materials when designing and making structures

Geography

Children reinforce their geographical knowledge and understanding when learning about topics in Science including

- habitats and climates
- states of matter and the water cycle
- Earth, sun and moon
- time zones
- seasons including the northern and southern hemisphere

Links with the social responsibility strand of Geography also provides opportunities for children to appreciate and understand how environments and habitats can be impacted upon.

History

As part of each unit of science, children are introduced to significant scientists from the past who have contributed and worked in that particular area of science. They learn about the impact that individuals from the past have had on developments in science and that scientific ideas are constantly changing as time passes. The cross-curricular links made in the design of the science curriculum ensures that it supports topics such as 'The Great Fire of London' in KS1 and 'Ancient Greeks' in KS2.

Growth Mindset

Growth Mindset teaching supports our children in developing their can-do attitudes. The learning completed during these lessons embeds the knowledge that children need to work hard, persevere and challenge themselves in order to achieve. Science reinforces the growth mindset of the children through asking and finding the answers to questions, learning new knowledge and skills, planning and carrying out a range of enquiries and being determined to find answers to 'burning questions' they may have. By developing these essential life skills, children can see that, with perseverance and a positive growth mindset, they have the skills they need, and that they can grow their skills to succeed.

Careers

At Childwall CE, there are many opportunities for the children to develop their understanding of science related careers. The enrichment opportunities are closely planned around promoting a love of STEM subjects and we regularly provide links with career opportunities through learning about scientists, both traditional and contemporary through lessons and meeting scientists through the STEM ambassador program. Our very successful 'Futures in Science Week' supported the growth of our children's science capital and exposed their knowledge of science related careers from nail technicians to marine biologists.

Assessment for learning

Assessment in Science is carried out both formatively during each lesson and summatively at the end of a topic, in order to gain an understanding of the children's achievements and the next steps for their progress. Opportunities for assessment are planned into lessons for elicitation of ideas, misconceptions of knowledge and working scientifically skills. Assessments are carried out in various forms, including observing, questioning, discussions and end of unit assessments, as appropriate to the age of the children and the nature of the topic. The assessment system provides concise information about each pupil within school in a way that is effective, relevant and manageable to all staff and allows tracking of each individual child's progress as they move on their journey through Childwall CE. We also assess the 'sticky knowledge' from previous year's learning to identify and address any knowledge gaps.

Enrichment

We place great importance on educational visits and visitors to enhance the Science curriculum. These visits allow our children to widen their science capital by making connections to what they have learned in class and securing their understanding of the topics through first hand experiences.

Science ambassadors are employed from Year 6 to plan and carry out their own demonstrations and investigations for children to be involved in, in order to enthuse and excite them and encourage a love of Science from a young age.

