

Banks Lane Infant & Nursery

Science Curriculum



Intention

Science teaches us about the wonder of the world and helps us to explain what happens, how things behave and to analyse reasons. By learning about the work of scientists, we can recognise our values in their work and understand that we can make a difference to our world.

Collaboration | Effort | Excellence | Respect
And that we can make a difference

Progression from EYFS to KS1

By the end of EYFS, children will: Explore the natural world around them, making observations and drawing pictures of animals and plants. They will know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. They will understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Pupils will manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. They will also make comments about what they have heard and ask questions to clarify their understanding.

By the end of KS1: Previous learning will be built upon further as children experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. Children will be encouraged to use their curiosity to ask questions about what they notice and will be supported to develop their understanding of scientific ideas by using different types of scientific enquiry. Children will 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. Children will learn to work scientifically by attaining the disciplinary knowledge and thinking like scientists.

Science Experiences & Opportunities (Cultural Capital)

British Science Week - Potty Science assemblies and clubs - Science Workshops - International Day for Women and Girls in Science - Health Month - RSPB Big School Birdwatch - Study of famous people selected as inspirational role models: *Mary Anning, Stephen Hawking, Mae Jemison, Sir David Attenborough*

Knowledge in Science

Science is knowledge of our world, including the natural world and the humanly-constructed world, and includes two types of knowledge - 'substantive knowledge' and 'fingertip knowledge':

Substantive Concepts are concepts concerned with the subject matter of science, such as **animals including humans, plants, materials, seasonal changes, living things and their habitats, forces and magnets, states of matter, light, sound, rocks, Earth and space, electricity and evolution and inheritance**. They are embedded throughout the curriculum so that each one is planned to be encountered multiple times. Substantive concepts are best understood with repeated encounters in specific, meaningful contexts, rather than being taught in an abstract way.

Fingertip knowledge is the knowledge of the key facts and dates which pupils need in their minds, or at their fingertips, whilst undertaking scientific enquiries. Fingertip knowledge must be taught and pupils must retain it during their enquiry. However, gaining this type of knowledge is not the ultimate long term aim of the primary classroom, and it may not be needed beyond the current topic.

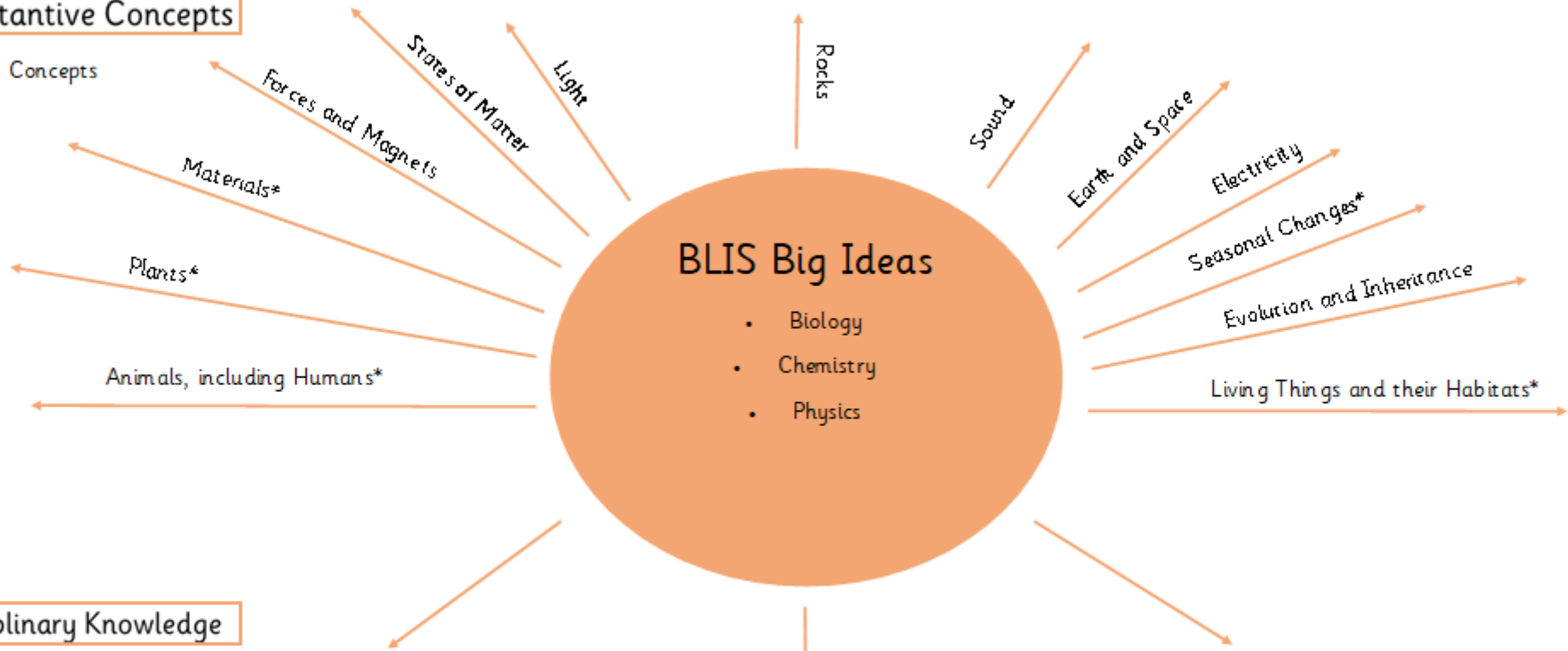
Disciplinary knowledge is concerned with developing scientific rational and critical thinking within enquiry, and can be categorised into 6 disciplinary concepts that are systematically developed in our science curriculum, which are often referred to as 'Working Scientifically' in the National Curriculum.

- **Asking Questions** – asking questions that can be answered using a scientific enquiry
- **Observing** – using senses to make observations about the enquiry
- **Measuring** – using measuring equipment correctly and precisely
- **Recording** – using tables, drawings and other means to record observations and measurements
- **Concluding** – interpreting and communicating data to say what we found out
- **Evaluating** – reflecting on the success of the enquiry approach and identifying further questions for enquiry

Fingertip Knowledge

Substantive Concepts

* - KS1 Concepts



Disciplinary Knowledge

EYFS

- Asking questions
- Observing
- Measuring
- Recording
- Concluding
- Evaluating

KS1

- Asking questions
- Observing
- Measuring
- Recording
- Concluding
- Evaluating

Lower KS2

- Asking questions
- Observing
- Measuring
- Recording
- Concluding
- Evaluating

EY Overview of Progression

Educational Programme-EYFS Framework

Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.

Nursery Development Matters

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Begin to make sense of their own life-story and family's history.
- Explore how things work.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.
- Make healthy choices about food, drink, activity and toothbrushing.
- Understand 'why' questions, like: "Why do you think the caterpillar got so fat?"

Reception Development Matters

- Explore the natural world around them.
- Describe what they see, hear and feel while they are outside.
- Recognise some environments that are different to the one in which they live.
- Understand the effect of changing seasons on the natural world around them.
- Know and talk about the different factors that support their overall health and wellbeing e.g. regular physical activity, healthy eating, toothbrushing, sensible amounts of 'screen time', having a good sleep routine, being a safe pedestrian.
- Learn new vocabulary.
- Ask questions to find out more and to check what has been said to them.
- Articulate their ideas and thoughts in well-formed sentences.
- Describe events in some detail.
- Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen.
- Use new vocabulary in different contexts.

Early Learning Goals

Listening, Attention and Understanding

- Make comments about what they have heard and ask questions to clarify their understanding.

Managing Self

- Manage their own basic hygiene and personal needs including dressing, going to the toilet and understanding the importance of healthy food choices.

The Natural World

- Explore the natural world around them, making observations and drawing pictures of animals and plants.
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

	Nursery	Reception	Year 1	Year 2
Autumn	<p>How marvellous am I? / Why do leaves turn crispy?</p> <p>Animals, excluding Humans Living things and their Habitats Sound Materials, including changing materials</p>	<p>Adventure Awaits! / It's Not Just a Toy!</p> <p>Seasonal Changes Humans Forces</p>	<p>The Land Before Time / Into the Woods</p> <p>Plants Animals including Humans Seasonal Changes</p>	<p>London's Burning! / What the Dickens?</p> <p>Plants Uses of Everyday Materials</p>
Spring	<p>Where does the snow go? / How does that building stay up?</p> <p>Humans Electricity Materials, including changing materials Sound</p>	<p>...To the Rescue! / I Can Sing a Rainbow</p> <p>Seasonal Changes Materials, including changing materials Earth and Space Humans Animals, excluding Humans Living things and their Habitats Light</p>	<p>Once Upon a Time / Marvellous Monarchs</p> <p>Plants Animals including Humans Seasonal Changes Materials</p>	<p>Where the Dragons Dance / Into the Wild</p> <p>Plants Living Things and their Habitats Animals including Humans</p>
Summer	<p>How does your garden grow? / Where does the sun go at night?</p> <p>Plants Light Forces Living things and their Habitats</p>	<p>Shiver Me Timbers! / 3, 2, 1, Blast Off!</p> <p>Seasonal Changes Materials, including changing materials Forces Earth and Space</p>	<p>There's No Place Like Home / What a Wonderful World!</p> <p>Animals including Humans Seasonal Changes Materials</p>	<p>Into the Wild / It's a Bugs Life!</p> <p>Plants Living Things and their Habitats Animals including Humans</p>

Big Ideas (Key Concepts)

Big Ideas (concepts) that underpin all scientific enquiry	EYFS	KS1	KS2 (what we are preparing our children for)
<p>Biology</p> <p>Plants*</p> <p>Animals, including Humans*</p> <p>Living Things and their Habitats*</p>	<p>Nursery:</p> <ul style="list-style-type: none"> • use all of their senses in hands-on exploration of natural materials; • talk about what they can see, using a wide vocabulary; • plant seeds and care for growing plants; • understand the key features of the life cycle of a plant and an animal; • begin to understand the need to respect and care for the natural environment and all living things; • make healthy choices about food, drink, activity and tooth brushing. <p>Reception:</p> <ul style="list-style-type: none"> • explore the natural world around them; • describe what they can see, hear and feel when outside; • recognise that some environments are different to the one in which they live; • ask questions to find out more and to check what has been said to them; • manage their basic hygiene and personal needs, including dressing, undressing, going to the toilet, oral health and understanding the importance of healthy food choices. 	<p>Year 1:</p> <ul style="list-style-type: none"> • name a variety of animals, including fish, amphibians, reptiles, birds and mammals; • know how to classify a range of animals by amphibian, reptile, mammal, fish and birds; • name a variety of common animals that are carnivores, herbivores and omnivore; • know and classify animals by what they eat (carnivore, herbivore and omnivore); • know how to sort by living and non-living things; • know the name of parts of the human body (head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) that can be seen; • know which part of the body is associated with each sense; • know and name the petals, stem, leaves and root of a plant; • know and can name the roots, trunk, branches and leaves of a tree; • know and can name a variety of common wild and garden plants; • name deciduous and evergreen trees. <p>Year 2:</p> <ul style="list-style-type: none"> • classify things by living, dead or never lived; 	<p>Year 3:</p> <ul style="list-style-type: none"> • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat; • identify that humans and some other animals have skeletons and muscles for support, protection and movement; • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers; • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant; • investigate the way in which water is transported within plants explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

		<ul style="list-style-type: none"> • know how a specific habitat provides for the basic needs of things living there (plants and animals); • match living things to their habitat; • name some different sources of food for animals; • know about and can explain a simple food chain; • know the basic stages in a life cycle for animals, including humans; • know that animals have offspring which grow into adults; • describe the basic needs of animals for survival (water, food and air); • know why exercise, a balanced diet and good hygiene are important for humans; • know and can explain how seeds and bulbs grow into plants; • know what plants need in order to grow and stay healthy (water, light & suitable temperature). 	
<p>Chemistry</p> <p>Everyday Materials (and their uses)*</p> <p>States of Matter</p>	<p>Across EYFS:</p> <ul style="list-style-type: none"> • explore materials with different properties; • explore collections of materials with similar and/or different properties; • talk about the differences between materials and changes they notice. 	<p>Year 1:</p> <ul style="list-style-type: none"> • know the name of the materials an object is made from; • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock; • know about the properties of everyday materials; • compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>Year 2:</p> <ul style="list-style-type: none"> • know how materials can be changed by squashing, bending, twisting and stretching; • know why a material might or might 	<p>Year 4:</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 happened in degrees Celsius; • know the part played by evaporation and condensation in the water cycle and associate evaporation with temperature.

		not be used for a specific job	
<p>Physics</p> <p>Forces and Magnets</p> <p>Seasonal Changes*</p> <p>Light</p>	<p>Nursery:</p> <ul style="list-style-type: none"> • explore how things work; • explore and talk about different forces I can feel. <p>Reception:</p> <ul style="list-style-type: none"> • understand the effect of changing seasons on the natural world around them. 	<p>Year 1:</p> <ul style="list-style-type: none"> • name the seasons; • know about the type of weather in each season; • describe how day length varies. 	<p>Year 3:</p> <ul style="list-style-type: none"> • know about and can describe how objects move on different surfaces; • know how some forces require contact and others work at a distance (such as magnets); • observe how magnets attract and repel (and other materials); • predict whether magnets will attract or repel based on direction of poles; • compare & group together everyday materials based on whether they are attracted to magnet & identify some magnetic materials; • describe magnets as having two different poles; • recognise that we 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 my 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.

Disciplinary Knowledge: Scientific Enquiry

	EYFS	KS1	Lower KS2
	Characteristics of Effective Learning	Working Scientifically	Working Scientifically
Asking Questions	<p>Show curiosity and ask questions</p> <p>Nursery: While playing and exploring, children will begin to ask “...I wonder” questions. With support, the children think of ideas for answering their questions.</p> <p>Reception: While playing and exploring, the children ask ‘I wonder...’ questions. With support, the children develop their ideas for answering their questions.</p>	<p>Asking simple questions and recognising that they can be answered in different ways</p> <p>While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.</p> <p>The children answer questions developed with the teacher often through a scenario.</p> <p>The children are involved in planning how to use resources provided to answer the questions using different types of scientific enquiry, helping them to recognise that there are different ways in which questions can be</p>	<p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <p>The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.</p> <p>The children answer questions posed by the teacher.</p> <p>Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.</p>

<p>Observing & Measuring</p>	<p>Make observations using their senses and simple equipment</p> <p>Make direct comparisons</p> <p>Identify, sort and group</p> <p>Nursery: With support, the children will explore the natural and made world using their senses. With support, the children use magnifying glasses or tablets with magnifiers to make observations. The children explore using beakers/scoops etc. They make comparisons between objects (“This leaf is bigger than that one.”) and quantities (“There are more flowers on this one.”). While playing and exploring, the children select and use resources for a particular task. With support, the children sort and group objects.</p> <p>Reception: The children explore the natural and made world using their senses. The children use magnifying glasses or tablets with magnifiers to make observations. The children use smaller pieces of equipment such as syringes and pipettes. With support, the children make comparisons, using hands and feet and other non-standard measures e.g. building blocks and beakers. While playing and exploring, the children, try out using resources to answer a question. The children test things out to make comparisons e.g. Does the red car go further than the blue car? They identify and name objects by matching them with pictures. The children sort and group objects, sometimes using their own criteria.</p>	<p>Making observations and taking measurements</p> <p>Engaging in practical enquiry to answer questions</p> <p><i>Observing closely, using simple equipment:</i> Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. They begin to take measurements, initially by comparisons, then using non-standard units.</p> <p><i>Performing simple tests:</i> The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.</p> <p><i>Identifying and classifying:</i> Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.</p>	<p>Making observations and taking measurements</p> <p>Engaging in practical enquiry to answer questions</p> <p><i>Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers:</i> The children make systematic and careful observations. They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.</p> <p><i>Setting up simple practical enquiries, including comparative and fair tests:</i> The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.</p>
<p>Recording</p>	<p>Record their observations by drawing, taking photographs, using sorting rings or boxes and, in Reception, on simple tick sheets</p>	<p>Gathering and recording data to help in answering questions</p> <p>The children record their observations e.g. using photographs, videos, drawings, labelled diagrams</p>	<p>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Recording findings using simple scientific</p>

	<p>Nursery: With support, the children talk about what they have observed. They sometimes draw and make marks to record their observations. With support, they use sorting rings and boxes.</p> <p>Reception: The children, sometimes, draw and write simple labels to record their observations. With support, they record their observations and comparisons e.g. using simple prepared tables, taking photographs, using sorting rings and boxes.</p>	<p>or in writing.</p> <p>They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.</p> <p>They classify using simple prepared tables and sorting rings.</p>	<p>language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.</p> <p>Children are supported to present the same data in different ways in order to help with answering the question.</p>
<p>Concluding & Evaluating</p>	<p>Use their observations to help them to answer their questions</p> <p>Nursery: With support, the children demonstrate and talk about what they have done and noticed. With support, the children notice how they made a difference to an outcome, e.g. “My car went further when I pushed it harder.”, and answer the question, where appropriate. With support, the children make comparisons between objects e.g. “My plant is taller than Sarah’s.”.</p> <p>Reception: The children talk about what they have observed. The children demonstrate and talk about what they have found out. They, sometimes, talk about what they have found out from secondary sources, including non-fiction texts. The children notice and talk about how they made a difference to an outcome e.g. “My car went further when I pushed it harder.” The children make direct</p>	<p>Using their observations and ideas to suggest answers to questions</p> <p>Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.</p> <p>The children recognise ‘biggest and smallest’, ‘best and worst’ etc. from their data.</p>	<p>Using straightforward scientific evidence to answer questions or to support their findings</p> <p>Children answer their own and others’ questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.</p> <p>Identifying differences, similarities or changes related to simple scientific ideas and processes</p> <p>Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>They draw conclusions based on their evidence and current subject knowledge.</p> <p>Using results to draw simple conclusions,</p>

comparisons or use their recorded observations to communicate what they have found out and answer the question, where appropriate.

make predictions for new values, suggest improvements and raise further questions

They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.

Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.

Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.

