Science Banks Road Infant and Nursery School

Intent:

At Banks Road our intent is to provide a rich, stimulating and engaging science education that develops and fosters curiosity, inspires awe and wonder and develops an enthusiasm for science. Through our science curriculum, we strive to develop and encourage**: curiosity, scientific thinking, problem solving skills, scientific knowledge and understanding and inquiry and investigative skills.** We aim to foster and promote collaboration and teamwork whilst emphasizing the importance of caring for the environment. Each year group will follow our threads of learning, ensuring skills, knowledge and vocabulary are built upon carefully each year. Our teachers deliver exciting and engaging lessons with a hands-on approach. We aim to nurture young scientists who are curious and confident who are capable of applying their scientific understanding to the world around them.

Disadvantaged/SEND - We understand our SEND children's unique strengths and needs. We have high expectations of our SEND children and provide tailored support, whilst maintaining inclusive learning and developing pupil independence.

Implementation:

Each year group has a set of progressive skills developed by all staff from F1 to Year 2. This provides clear steps in learning, to ensure that the planning and teaching throughout school is progressive with increasing depth and challenge as children move through the year groups. In **Foundation Stage** we aim to nurture the children's natural curiosity about the world around them and encourage a sense of awe and wonder. We embed science with cross-curricular topics/themes. We ensure a balance between child initiated play based activities and adult led experiences to support their learning.

In **KS1** we encourage children to make connections between scientific concepts and their everyday life. Science lessons involve problem solving, reasoning and critical thinking skills. For all of our learners throughout school, we provide a range of opportunities for children to engage in first hand experiences including outdoor learning (forest school and OPAL), visits to local environments and practical, interactive experiments and investigations. We use a range of resources including digital media, books, equipment, real-life objects to stimulate curiosity and support scientific investigation.

Disadvantaged/SEND – We enable our SEND children to access our science curriculum through adapting lesson activities and resourcing when appropriate to deliver inclusive, quality first teaching.

Impact:

At Banks Road Infant and Nursery School we recognise that an outstanding Science curriculum has a considerable impact on our children's learning, development and progress in their academic journey. Our science curriculum will promote and encourage curiosity, problem solving skills and investigation skills. Science progress is measured through a child's ability to know more, remember more and explain more. This is measured in different ways. The use of key questions ensures opportunities are built into the lesson for ongoing assessment. The impact will also be evident in the way our children ask questions and make connections between their observations and their scientific ideas. The learning environment across school will be consistent with science technical vocabulary displayed, spoken and used by all learners. Therefore, the impact of our science curriculum will ensure our children feel confident in their science knowledge and enquiry skills and will be excited about science. They will show how they are actively curious to learn more and will see the relevance of what they learn in science to real life situations and the importance of science in the real world.

Disadvantaged/SEND – Investigating, observing and having their own ideas gives pupils a real sense of achievement. They benefit from experiencing their own progress and taking responsibility for their own learning. Children enjoy the practical application of their scientific ideas. Plus, their personal engagement with their learning improves attention span, patience, persistence and commitment.

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Substantive and disciplinary knowledge

Substantive knowledge in science is based on the knowledge of our key elements of learning (plants, animals including humans, everyday materials and uses of, seasonal changes, living things and their habitats). All of these elements will be taught from nursery to Year 2 through the use of first-hand practical experiences as well as secondary resources such as books, photographs and videos. Scientific vocabulary is taught explicitly and will be deliberately practised and applied through the key elements. Substantive knowledge is the carefully sequenced, factual knowledge that we learn through our curriculum; teaching often involves hands -on activities, experiments and explorations that help cement our substantive knowledge in a practical content. Substantive knowledge cannot be learnt in isolation, but requires prior knowledge that enables us to make sense of what we have learnt.

Disciplinary knowledge in science is the way in which we learn. In Science we learn through experiencing and observing phenomena, looking more closely at the world around them, being curious and asking questions, observing changes and noticing patterns, grouping and classifying and carrying out tests. Disciplinary knowledge in science will equip the children to develop a sense of curiosity, scientific inquiry and reasoning to promote exploration and discovery.

Procedural Knowledge in science is the skills and processes needed for the children to explore, experiment and investigate the world around them. It is knowing how to do science! (Eg observing, gathering data, conducting investigations, using tools and equipment, recording and communication findings, predicting and hypothesising, reflecting on findings and working collaboratively.)

Vocabulary is crucial to academic success for our children. Tier 3 vocabulary is mapped out throughout our curriculum in order to ensure progression and ambition.

The understanding of knowledge has been carefully sequenced to build year-on-year. This is clearly outlined in our **progression of knowledge and threads of learning planning.**

Our **Sticky Knowledge** for science outlines the key knowledge that we want our children to know and remember from each unit of work. This incorporates key vocabulary, knowledge, practical skills used and key questions**. Retrieval** is built into every lesson and **spaced retrieval** each term using the learning wall and sticky knowledge books.

In **EYFS**, the children have daily access to a variety of resources, materials and experiences which they can explore to enhance their curiosity and understanding of the world. Provision is carefully planned to suit the interests of the children, whilst developing the necessary foundation skills. Through on-going observations of the children, the adults have an in-depth knowledge about each child's development. This ensures that the adults facilitating learning know each child's next steps and can give the children the learning opportunity and experience they need to develop their scientific skills.

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Component Plan

	Term 1	Term 2	Term 3	Term 4 Science Week	Term 5	Term 6
Early Years	Talk about what I see. Explore different materials and begin to describe them.	Exploring how things work. Explore collections of materials with similar and or different properties. Sorting collections of materials. Drawing pictures of plants. Explore the weather and seasons.	Explore how things work. Demonstrate caring behaviours towards living things. Beginning to show curiosity through questions Taking interest in different materials and how they can be changed. Exploring seasons and weather related to that season Potion making – mixing powder paints and water – mixing colours, experimenting with how much powder/water. How to take care of a plant – growing a bean	**Experiments** Flowers Skittles Conditions for bean growth Dancing raisins Pipette – volcanoes with vinegar, bicarb. Exploring changes of chocolate/ice when cooled. How do we keep healthy? Food, drink, brushing teeth, exercise, sensible screen time.	Animals – naming farm, wild and pets. How animals grow and change. Drawing pictures of animals. Recognise that animals have similarities and differences. Exploring weather and seasons	Exploring the natural world and noticing similarities and differences between contrasting environments. Know some environments are different to the one in which they live.
KS1	Investigation Skills Learning to work scientifically. Investigation: Which material is best to get rid of germs? Learning about fair testing, hypothesising and drawing a conclusion.	Materials Naming objects and the materials they are made from. Natural and man-made materials, properties and uses. How the shapes of some solid objects can be changed. Investigations: Suitable materials to design and build a boat. Investigation: Waterproof materials Investigation: To explore why a material might be useful for a specific job.	Animals including Humans Keeping healthy, exercise, food, good hygiene Basic growth and parts of humas Process of growth in humans Investigation: Exercise and Heart Rate. Which exercise will make my heart beat the fastest? How seasons affect the weather and observe how day length varies.	**All Living Things and their Habitats.** Identify common animals (birds, fish, amphibians, reptiles, mammals, invertebrates) Animal offspring Life cycles Suitability of habitats Science Week: Investigation: Which biscuit is best for dunking tea?	**All Living Things and their Habitats.** Habitats and their suitability. Animals and plants depend on each other. What animals need to survive. Seasons	**Plants** Identify and name common plants. Plant seeds and observe changes. Parts of a plant and their function. Basic needs of a plant. Seasons – summer Investigation – Plants in different enviroments.

Progression of Knowledge and Threads of Learning

	THREADS OF LEARNING				
	Plants	**Animals including Humans**	**Living Things and Habitats**	**Everyday Materials**	**Seasonal Changes**
FS1	**Substantive Knowledge** Know that plants change as they grow. Understand the key features of the life cycle of a plant and an animal. **Disciplinary Knowledge:** Plant seeds and care for growing plants.	**Substantive Knowledge** Know that changes occur when animals grow. Know some ways we can stay healthy. **Disciplinary Knowledge:** Make healthy choices about food, drink, activity and tooth brushing.	**Substantive Knowledge** Know that living things have similarities and differences. Know that it is important to respect and care for our environment. **Disciplinary Knowledge:** Begin to take actions to care for the environment	**Substantive Knowledge** Know that there are similarities and differences in relation to materials and objects and can talk about some of these. Know that some things feel warm and others feel cold. **Disciplinary Knowledge:** Use all of 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.	**Substantive Knowledge** Know the names of some weather types and seasons. **Disciplinary Knowledge:** Use their sense to explore the weather and seasonal change. Talk about what they see using a wide vocabulary.
FS2					

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	Substantive Knowledge: Know that plants grow and are usually green. Know that living things have similarities and differences. Know some similarities and differences between contrasting environments. **Disciplinary Knowledge:** Explore the natural world around them, making observations and drawing pictures of animals and plants. Use experiences and texts to compare.	**Substantive Knowledge:** Know that we need specific things to be healthy: exercise, healthy food, sleep, toothbrushing, sensible screen time, being a safe pedestrian. **Disciplinary Knowledge:** Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. Explore the natural world around them, making observations and drawing pictures of plants and animals.	**Substantive Knowledge:** Know the features of their own immediate environment might very from one another. Know some environments that are different to the one in which they live. Know some similarities and differences between contrasting environments. **Disciplinary Knowledge:** Describe what they see, hear and feel while they are outside. Explore the natural world around them, making observation and drawing pictures of animals and plants.	**Substantive Knowledge:** Know that solids melt when heated. Know that liquids freeze. **Disciplinary Knowledge:** Explore the natural world around them. Explore and observe changes e.g. materials changing state	**Substantive Knowledge:** Know some features of different seasons. **Disciplinary Knowledge:** Understand the effect of changing seasons on the natural world around them. Describe what they see, hear and feel while they are outside. Explore the natural world around them, making observations and drawing pictures of plants and animals. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.
YEAR 1	**Plants**	**Animals including Humans**	**Living Things and Habitats**	**Everyday Materials**	**Seasons**

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	Substantive Knowledge: Know that plants can grow in different places. Know that there are deciduous and evergreen trees. Know that flowering plants and trees have a basic structure and name parts. Name the petals, stem, leaf, bulb, flower, seed, stem and the root of a plant. Identify and name a range of common plants and trees. Recognise deciduous and evergreen trees. Name the trunk, branches and roots of a tree. Describe the parts of a plant (root, stem, leaves and flowers) **Disciplinary Knowledge:** Observe plants closely Identify different plants and trees Use simple equipment Perform a simple test	**Substantive Knowledge:** Know that there are a variety of different common animals and there are differences between them. Know that there are basic parts of the human body. Know that there are differences between carnivores, herbivores and omnivores. Identify and name a variety of common animals (birds, fish, amphibians, reptiles, mammals, invertebrates) Name basic parts of the human body they can see and link them to the sense. Name parts of an animal's structure e.g. feathers, beak. **Disciplinary Knowledge Threads:** Draw and label basic parts of the human body. Classify animals by what they eat (h, o, carnivore) Compare the body structure of different animals.		**Substantive Knowledge:** Know that there is a difference between an object and the material from which it is made like wool and jumpers. Identify and name everyday materials, including wood, plastic, glass, metal, water and rock. Describe materials using their properties, using specific scientific words. Explain why a material might be useful for a specific job. **Disciplinary Knowledge:** Classify materials into groups by a given criteria. Perform simple tests e.g. bending, twisting, heating and cooling materials. Observe closely things that are similar and different between materials.	**Substantive Knowledge:** Know that the weather and environment changes across the four seasons. Know that day length varies. Name the four seasons in order. Talk about weather variation in different parts of the world? **Disciplinary Knowledge:** Observe changes inc the weather across the four seasons. Observe how day length varies. Use observations to find answers to their questions Gather and record data to help in answering questions
YEAR 2	**Plants**	**Animals including Humans**	**Living Things and Their Habitats**	**Everyday Materials**	**Seasonal Changes**

	Substantive Knowledge: Know that plants grow from seeds and bulbs. Know that plants grow and mature. Know that seeds need water, light and suitable temperature to grow and stay healthy. **Disciplinary Knowledge Threads:** Perform a simple test to find out what plants need to grow and mature and stay healthy Observe plants closely using equipment	**Substantive Knowledge Threads:** Know that animals, including humans, have offspring which grow into adults. Know that humans and animals have basic needs for survival. Know that exercise is important for humans. Know that hygiene is important for humans. Know that eating the right amounts of different types of foods is important. **Disciplinary Knowledge:** Describe what animals need to survive. Explain that animals grow and reproduce. Explain why animals have offspring which grow into adults. Describe the life cycle of some living things (e.g. egg, chick, chicken). Explain the basic needs of animals, including humans for survival? (water, food, air). Describe why exercise, balanced diet and hygiene are important for humans. Explain that animals reproduce in different ways.	**Substantive Knowledge:** Know that something that is living, dead or never been alive has different characteristics. Know that different habitats provide for different needs including microhabitats. Describe a range of different habitats. Know that animals and plants depend on each other. Know that animals obtain their food from plants. Know and describe some of the life processes common to plants and animals, including humans. Name some characteristics of an animal that help it to live in a particular habitat. Describe what animals need to survive and link this to their habitats. **Disciplinary Knowledge:** Match certain living things to the habitats they are found in. Identify whether something is living, dead or never been alive.	**Substantive Knowledge Threads:** Know that some materials including wood, metal, plastic, glass, brick, rock, paper and cardboard are more suitable for a specific task than others. Describe the simple physical properties of a variety of everyday materials. Describe the properties of different materials using words like, transparent or opaque, flexible etc. Say which materials are natural and which are manmade. **Disciplinary Knowledge:** Compare and group together a variety of materials based on their simple physical properties. Classify materials into groups and say why they have sorted them in that way. Find out how the shapes of solid objects can be changed (squashing, bending, twisting, stretching) Find out about people who developed useful new materials (John Dunlop,	

			Perform a test to show how a specific living thing is suited to its habitat Gathering and recording data when performing a simple test	Charles Macintosh, John McAdam) Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, cardboard for particular uses.	

Sticky Knowledge/Retrieval

Sticky knowledge refers to key information that is not only well understood but also easily retained and recalled over time. This concept is crucial as it enhances pupils' ability to apply their knowledge in varied contexts, facilitating deeper comprehension and long-term retention. It incorporates key vocabulary, knowledge, key questions and considerations.

Sticky knowledge combines a variety of methods to support pupils' retention: immediate retrieval, short term memory and spaced retrieval; each method playing a significant part in the children's memory and ability to retain key learning, knowledge and skills.

At Banks Road sticky knowledge tasks are planned thoroughly to ensure appropriate coverage of all wider curriculum subjects and the units and key learning within them.

In Foundation Stage time is set aside at the beginning of each session to focus on previous learning and there are sessions each day to focus on sticky knowledge tasks, primarily through their use of floorbooks and learning journey walls.

In Key Stage One retrieval is built into the start of every lesson and spaced retrieval is planned each half term using the learning walls and daily retrieval discussions.

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Assessment Criteria

EYFS	
Communication and Language ➢ I can make comments about what I have heard and ask questions to clarify my understanding.	**PSED** ➢ I understand the importance of healthy food choices.
Understanding the World (The Natural World) ➢ I can explore the natural world around me, making observations and drawing pictures of animals and plants. ➢ I know some similarities and differences between the natural world around me and contrasting environments (from experiences and what has been read in class) ➢ I can understand some important processes and changes in the natural world around me, including the seasons and changing states of matter.	
YEAR 1	
Plants ➢ I can name a variety of common wild and garden plants including deciduous and evergreen trees.	**Animals including Humans** ➢ I can name and locate parts of the human body, including those related to the senses

➢ I can describe the basic structure of common flowering plants including trees.	➢ I can describe and compare the observable features of animals from a range of groups ➢ I can group animals according to what they eat
<u>Seasonal Changes</u> ➢ I can describe seasonal changes (seasons and varying day length)	<u>Materials</u> ➢ I can distinguish objects from materials, describe their properties, identify and group everyday materials
YEAR 2	
<u>Plants</u> ➢ I can describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants	<u>Animals including Humans</u> ➢ I can describe the importance of exercise, a balanced diet and hygiene for humans ➢ I can describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults
<u>Living Things and their Habitats</u> ➢ I can identify whether things are alive, dead or have never lived ➢ I can describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships ➢ I can name different plants and animals and describe how they are suited to different habitats.	<u>Materials</u> ➢ I can distinguish objects from materials, describe their properties, identify and group everyday materials and compare their suitability for different uses

<table>
<tr><th colspan="2">WORKING SCIENTIFICALLY</th></tr>
<tr><td colspan="2">Using the correct scientific language, I can:</td></tr>
<tr><td rowspan="5">use different types of scientific enquiry to gather and record data to answer questions:</td><td>Observing changes over time</td></tr>
<tr><td>Noticing patterns</td></tr>
<tr><td>Grouping and classifying things</td></tr>
<tr><td>Carrying out simple comparative test</td></tr>
<tr><td>Finding things out using secondary sources of information</td></tr>
<tr><td colspan="2">communicate my ideas, what I do and what I find out in a variety of ways</td></tr>
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