Sparkenhoe Science Curriculum

Subject Rationale

Children begin school with some general knowledge of the world around them. They may know some different animals, possible weather changes and describe some basic features of materials. Children from an inner city catchment may have limited life experiences from which to develop their curiosity and understanding of the world.
Throughout their time at Sparkenhoe, children have a wide range of experiences to widen their horizons, allowing them to make links in their learning and better comprehend the world around them.
By the end of their time at primary school. children will be able to: classify different animals based on key characteristics; they will have some understanding of how animals reproduce; will be aware of a variety of habitats and will be able to explain how animals are adapted to these. Children will also be able to outline ways in which to adopt a healthy lifestyle, be able to explain the function of different parts of the human body and recognise how the body changes over time. Through a variety of different topics, the children will know the different parts of a plant, their jobs and how plants grow. Applying this knowledge enables children to be able to explain the process of reproduction in plants. Through working scientifically, children will be aware of the key components required to conduct different scientific enquiries. They will be able to hypothesise, plan, carry out, observe and record information. Finally they will be able to use this information as evidence for or against their initial ideas. Children will look at the role of prominent and relevant scientists in real world developments. Children will have developed key skills and knowledge so that they have a deeper understanding of the world we live in and can engage positively with science at secondary school and in the future. Children will also have a good understanding of science in the world we live in and opportunities available to them in this field in the future.

Organisation

In the Foundation Stage, Science is taught through exploration of different topics and through provision. Children develop their understanding through planned and child initiated activities. In KS1 and KS2, Science is taught through units of work with 9 units across KS1 and 19 across KS2. These combine the skills and knowledge of the National Curriculum into topics that include learning through investigations and learning about the work of specific scientists. In Year 1, Science is combined with the either Art, DT, Geography or History as part of their Topic Curriculum. One of the Science units in Year 1, Seasonal Change, is taught throughout the year, with lessons in each 7 week block. This is to ensure that the children are able to experience the changes in the seasons' first hand. For the rest of the school, Science is taught in discrete units that have a tangible, meaningful outcome in order to give the work purpose. Sometimes this outcome is shared with computing, sometimes with Topic, depending on where it is most relevant. Lessons are taught in 50 minute blocks with two lessons a week. However, teachers have the flexibility to reorganise timetables where it would make a more effective learning experience, for example an investigation may take up a whole afternoon.

Each unit has a Medium Term plan, which details the rationale of the unit, the progression from previous linked units taught lower down the school and all the relevant objectives where appropriate. Science is a semi-spiral curriculum, some units are taught throughout the all year groups (Animals including Humans), some in more than one year group (Electricity in Year 4 and 6) and some that only in one year group (Earth and Space). To ensure progression across different year groups where a topic is taught more than once, the National Curriculum has been broken down into incremental statements. Working scientifically is taught in all year groups. In order to ensure progression, these objectives have been broken down into systematic steps. As well as through lessons, children learn about science through assemblies, morning discussions and world events and news.

Foundation Stage

Through a variety of planned and changing topics that are related to the children's interests, the children will:

	Foundation 1	Foundation 2
Understanding the World The Natural World	• Use their senses in hands on explorations of natural materials. • Explore collections of materials with similar and different properties. • Talk about what they see. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of an animals and plant. • Begin to understand the need to respect and care for the natural environment and living things. • Explore and talk about forces they can feel. • Talk about the differences between materials and changes they notice.	• Explore the natural world around them. • Describe what they can see, hear and feel outside. • Recognise some environments that are different to one where they live. • Understand the effect of changing seasons on the natural world around them. • Make observations and draw pictures of animals and plants. • Know some similarities between the natural world around them and contrasting environments. • Understand some important processes and changes in the natural world including the seasons and changing states of matter.
Personal, Social and Emotional Development Managing Self	• Become increasingly independent in managing their own care needs, e.g. brushing teeth, using the toilet, washing and drying hands. • Make healthy choices about food, drink, activity and tooth brushing.	• Manage their own needs around personal hygiene, including dressing and going to the toilet and understands the importance of healthy food choices. • Know and talk about the different factors that support overall health and well-being, e.g. having a good sleep routine. being a safe pedestrian.

Key Stage 1

In KS1, the majority of learning is through hands on practical experiences with some use of books, photographs and videos. The children begin to use simple scientific vocabulary and share their ideas in different ways. Children experience different types of scientific enquiry to answer questions.

	Block 1	Block 2	Block 3	Block 4	Block 5
Year 1	Animals including humans Topic: We Are Britain Children learn some of the wildlife of Britain and use a table to name and group a variety of different animals into their animal classifications. They will learn about and make simple observations of omnivores, carnivores and herbivores. They will use details such as simple features and characteristics. Children will name, draw and label basic parts of the human body. Children will link body parts to senses through exploring food. Outcome: Display	Materials 1 Topic: Hot Wheels Children will explore, name, discuss and ask and answer questions about everyday materials. They will become familiar with the names of materials and will be able to distinguish between an object and the material from which it is made. They will make observations and describe, compare and discuss materials in term of their properties using accurate scientific vocabulary. They will investigate different materials to find out which ones are suitable for making their Soap Box carts, recording and analysing results. Outcome: Which materials are best for making carts?	Animals 2 Topic: Sensational Safaris Children learn a wider range of animals and where they live. Linking to the previous unit, children will be able to identify and name a wider variety of common animals including fish, amphibians, reptiles, birds and mammals. They will be able to identify and name a variety of common animals that are carnivores, herbivores and omnivores and describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). Outcome: Assembly	Materials 2 Topic: Castles. Children will look at a range of different materials to establish what would be the ideal ones to use for the construction of different parts of a castle, from the structure itself, to the drawbridge, gates, curtains and soft furnishings. They will further distinguish between an object and the material from which it is made and identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. The children will describe the simple physical properties of a variety of everyday materials and compare and group together a variety of everyday materials on the basis of their simple physical properties. Outcome: Which material would make the best?	Plants Topic: The Great Outdoors Children will learn the common names of flowers and trees. They will be able to label parts of a plant and will use the school grounds to explore and answer questions about plants. They will make some observations using simple equipment such as magnifying glasses. They will understand that leaves grow in the spring and fall in autumn. Children will learn that most plants need seeds to grow and will plant seeds and observe how they grow. Using the school grounds, and further afield if possible, they will identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Outcome: What plants are around us?
	Seasonal Change Children will observe and discuss changes across all seasons. They will understand what we mean by seasons and weather. They will gather and record data using a bar graph based on a week's weather. Children should also be taught what a thermometer is and how they are used and investigate different temperatures in different seasons. They will learn some of the features of different seasons such as ice and snow, sunshine and rain and day length. They will use a floor book to record observations and mark the changes.				

Year 2	<u>Use of everyday materials</u> Children learn to identify and discuss the uses of different everyday materials and become familiar with how some materials are used for more than one thing. They will identify a wide range of materials and sort them into groups (wood, glass, plastic, metal, rubber, stone, and paper). They will plan and conduct a range of investigations to explore the properties of material, including strength and translucency, and will begin to draw conclusions based on their experiments. They will use their learning to find out what materials are best suited for making a range of different puppets, from shadow puppets to marionettes linking to their Topic Puppets. Outcome: Which materials is best for different types of puppets?	<u>Animals including humans</u> Children learn that animals including humans have offspring that change and grow. They will explore the life cycles of different species and a basic human life cycle. They will learn about the basic needs of animals and humans (food, shelter, water and oxygen). Children will learn the importance of exercise, investigating and recording heart rate. They will be able to explain food groups and the importance of eating a balanced diet in order to stay healthy. The children will learn about hygiene, with a focus on washing hands and how to keep their body, hair and teeth clean. This unit will culminate with the children organising a Healthy Living Day to explain to Year 1 and F2 children how and why they should keep healthy. Outcome: Heathy Living Day	<u>All living things and their habitats</u> Children will recap and extend their understanding of life processes. They will apply their understanding of this to objects and identify if they are living, non-living or never lived. They will ask and answer questions that help them to become familiar with the life processes that are common to all living things. Children will move on to explore and identify the animals and plants from the following habitats: dessert, rainforest, woodlands, grassland, oceans and glacier. They will identify that most living things live in habitats to which they are suited, describe how different habitats provide for the basic needs of different kinds of animals and plants and learn how they depend on each other. They will identify why some animals are more suited to certain habitats and describe how animals obtain their food from plants and other animals, using the idea of a simple food chain. Outcome: Shoe box habitat		<u>Plants</u> Children learn that seeds are needed to germinate into mature plants. They will build on their knowledge of planting seeds, investigating that plants need water, light, nutrients and warmth to grow. They will explore different seeds and how their roots grow in various ways. They will investigate how well seeds germinate with or without water and also investigate how light impacts on the growth of a plant. They will be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants. Outcome: Class botany book
Within the science progression map and medium term plans, objectives are broken down into incremental statements to ensure skills and knowledge are built upon and progression is clear. For example, in the Animals unit, Year 1 children recap their work in F2 about lifecycles and extend it to other living things. They build upon their knowledge of the human body and extend this to thinking about maintaining a healthy body. Children develop their observational skills and begin to record ideas.					

Key Stage 2

As the children move through Key Stage 2, they broaden their view of the world around them through exploring topics in more depth. They begin to develop their own ideas and ask their own questions. They begin to make decisions about the best types of scientific enquiry to answer questions and carry out simple comparative and fair tests. They draw simple conclusions using scientific language. By the time children leave, they will have developed a deeper understanding of a wide range f scientific ideas and encountered more abstract ideas. They will select the most appropriate way to answer questions and carry out more complex comparative and fair tests. They will draw conclusions based on data and findings and use evidence to justify ideas.

	Block 1	Block 2	Block 3	Block 4	Block 5
Year 3	Materials – Rocks Children learn about different kinds of rocks and soils, including those in the local environment. They compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. They will be able to describe in simple terms how fossils are formed when things that have lived are trapped within rock. Through observation children will recognise that soils are made from rocks and organic matter. Children will carry out comparative tests to investigate properties of different rocks. This will be linked with the Stone Age topic and the use of tools. Outcome: Which rock makes the best tools?	Animals including humans Children learn about the importance of nutrition and the main body parts associated with the skeleton and muscles. They find out how different parts of the body have special functions. They will identify that humans and some other animals have skeletons and muscles for support, protection and movement and that they need the right types and amount of nutrition from what they eat. The children will investigate which muscles are used during different activities. They will carry out fair tests and investigate whether the length of legs affects the ability to jump further. Outcome: Diet and training advice sheets for a chosen sport.	Forces and magnets Children learn that forces are around us and explore the behaviour and everyday uses of different magnets. They will observe how magnets attract or repel each other and attract some materials and not others. They will also 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. Children will be able to describe magnets as having two poles and predict whether two magnets will attract or repel each other, depending on which poles are facing. They will carry out fair tests to investigate the strength of different magnets. Outcome: Magnetic game	Plants Children will know, describe and explain different parts of a flower and their functions (roots, stem, leaves and flowers). They will know that plants need water, light and nutrients to grow and be able to explain how these vary from plant to plant. They will explore the role of flowers in the life cycle of flowering plants, including pollination and seed formation. Through investigation they will also observe the ways in which water is transported within plants. Outcome: Growing competition	Light Children will explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They will learn about why it is important to protect their eyes from bright lights, that light is needed to see things and that dark is the absence of light. They will investigate, locate and measure, shadows, finding how they are formed and what causes the shadows to change. Outcome: Sunglasses and sundials

Year 4	<u>Animals including humans</u> Children learn the main body parts associated with the digestive system (mouth, tongue, teeth, oesophagus, stomach, and small and large intestine) and understand their special functions. They will be able to describe the digestive system by listing the parts in order of the digestive process. They will look specifically at the teeth of humans and which teeth carry out which functions. They will use this knowledge when looking at animals, explaining how they can tell what animals eats by looking at the teeth they have. The unit will also cover food chains and the children will be able to place animals in a variety of chains according to their habitats and whether they are producers, consumers, predators, and prey. Outcome: Digestive system models	<u>States of matter</u> Children will explore a variety of everyday materials and know the states of matter. They will compare different objects and group them according to whether they are solids, liquids, or gasses. They will conduct experiments to observe how objects can change states. The children will use thermometers and observe water as a solid, a liquid and a gas. They will record the changes to water when it is heated or cooled. The children will investigate the water cycle, being able to describe the processes involved and understand how it is a continual event and draw links between temperature and evaporation. Outcome: Melted wax art	<u>Electricity</u> Children identify where electricity is used and learn about safety when dealing with electricity and how to conserve and be safe whilst at home. They will construct simple series circuits, naming and identifying parts. They will experiment with different components (bulbs, buzzers, motors and switches) and use circuits to create simple devices such as lights. They will explore the effect use of different components and amounts of batteries and switches has. The children will draw circuits as a pictorial representation and learn about conductivity and what the properties of conductors and insulators are. They will use this knowledge to make predictions about different materials and their conductivity and test these out in a circuit, recording their results. Outcome: Working circuit for lighthouse	<u>All living things and their habitats</u> Children will identify and study plants and animals in their local habitat. They will learn how a habitat can change and how this can have an impact on the animal and plant life there, both positive and negative. They will research ways in which they can help habitats and what other ways they can keep environments from changing. Children will explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. They will recognise that things can be grouped in multiple ways and sometimes fall into different categories. Children will explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. They will classify vertebrates into groups such as fish, amphibians, reptiles, birds, and mammals, and invertebrates into snails and slugs, worms, spiders, and insects. Outcome: Persuasive leaflet	<u>Sound</u> Children will explore and identify the way sound is made through vibration in a range of different musical instruments from around the world. They will be able to explain how vibrations travel to the ear through a medium to make the sound. They will investigate how the pitch and volume of sounds can be changed in a variety of ways. They will make observations about the patterns and links between the pitch of the sound created and the features of the instrument which is creating it. They will carry out fair tests to investigate variables that how alter volume and pitch. Outcome: Create a piece of music

Year 5	Properties and changes of materials Children build upon their understanding of materials by exploring and comparing the properties of a broad range of materials. Children will be able to explain the uses of everyday materials using new vocabulary e.g. transparency, hardness, solubility. They will explore reversible changes including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. They will be able to suggest how materials can be separated and plan and carry out fair tests. They will explore changes that are irreversible (for example, burning, rusting) and other reactions (for example, vinegar with bicarbonate of soda). Outcome: Class book	Earth and Space Children learn about the planets and how they move (relative to the sun) in our solar system. They will learn that the Sun is a star at the centre of our solar system and be able to name the eight planets and explain why Pluto was re classified and understand what these bodies are. They will be able to explain the terms solar system, galaxy and universe in basic terms. They will learn about how day and night occurs using key words such as rotate, axis and orbit. The children will be able to explain how the moon moves relative to Earth and why it appears to change shape in the sky. Outcome: Space Vlog	Animals including humans Children will be able to create a timeline to indicate stages in the growth and development of humans. They will be able to explain what changes occur at the different life stages, recognising that all humans will experience them differently due to varying factors. Children will learn about the changes experienced as part of puberty, acknowledging that these may occur differently and at different times for different individuals. Living things and their habitats Children will observe and explain life-cycle changes in a variety of living things including insects, birds, mammals and amphibians, plants in the vegetable garden or flower border and animals in the local environment. They will be able to list similarities and differences between the different life cycles. The children will find out about different types of reproduction, including sexual and asexual reproduction in plants and sexual reproduction in animals.	Animals including Humans 2 Children will explore and answer questions that help them to understand how the circulatory system enables the body to function. They will learn the functions of the heart and lungs and how oxygen is pumped through the body and waste products are removed. They learn how to keep their bodies healthy and how their bodies might be damaged, including how some drugs and other substances can be harmful to the human body such as alcohol, sugar and cigarettes. Children will carry out fair tests to investigate the effect of exercise on heart rate.	Forces Children explore falling objects and raise questions about the effects of air resistance. They will explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They will compare the rate at which each item falls and refer back to the concept of air resistance to explain their findings. Children will be exposed to forces that make things begin to move, get faster or slow down and identify the effects of air resistance, water resistance and friction. They will become familiar with and recognise the importance of the word 'gravity', and understand what it is. They will begin to understand water resistance and engage with investigations to explore the amount of water resistance acting on different objects. Children will recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. Outcome: Children's TV show

Year 6	<u>Electricity</u> Children build on previous learning and recap how a completed circuit is created and the components needed to make one. They learn how a circuit works and investigate which components are crucial for the circuit. The children are challenged to ask questions based on what they know and do not know about circuits and construct a series of circuits, investigating what happens when they try different components. They will plan and carry out fair tests to investigate the effect use of different components and amounts of batteries and other components has. Using this knowledge, the children learn how to represent a simple circuit in a diagram using recognised symbols and are able to explain their understanding of a circuit by drawing their own circuit diagrams explaining why it does or does not work. Outcome: Rudimentary security system	<u>Evolution and Inheritance</u> The children are introduced to the idea that characteristics are passed from parents to their offspring using examples of animals, well known celebrities and their children and their own photographs. They find out more about how living things on earth have changed over time and explore Darwin's theory of evolution by discussing Darwin's observation of finches over time and explore other examples of natural selection.	<u>Living things and their habitats</u> Children learn how to classify different living things based on their different characteristics and why classifying living things is crucial due to the amount of species. Through direct observations where possible, the children will classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They will then explore classification through a scientific branching database and will create their own using their understanding of different vertebrates and invertebrates. They will move onto discover why certain animals need certain characteristics based on their habitats and food supply and why certain animals are not found in some areas of the world. They are then introduced to the idea of the five-kingdoms of living things and explore the broad groupings, such as Protista, bacteria, fungi, plants and animals which can be subdivided and explore how every living thing is grouped into one of the five kingdoms.	<u>Light</u> Children explore the way that light behaves and travels in straight lines and use this to explain how we see. Children use different materials to reflect light. They observe the way in which these reflect and refract light and build on their understanding of shadows and how they are formed. They plan and carry out an investigation based on the size of shadows and the distance from light sources. The children also discover the light spectrum using prisms to refract light and will explore the variation of colours that make up light. They will explore how humans see objects and why we see certain colours. Outcome: Periscope and pinhole camera	
Within the science progression map and medium term plans, objectives are broken down into incremental statements to ensure skills and knowledge are built upon and progression is clear. For example the Year 6 Living Things and their habitats unit builds upon the previous work in Year 2, 4 and 5, however it also looks at classification which the children have encountered in looking at different materials in previous years. In Year 1 and 4 the children briefly encountered classifying animals. This unit combines and furthers both of these areas of learning.					