Livingstone Road Primary Federation

Together We Can
Learn Laugh Dream Grow

Curriculum
Science — Knowledge & Skills Progression

Intent / Aims

Our Science curriculum provides the foundations for understanding the world through building up a body of key foundational knowledge and concepts. Children develop a sense of excitement and curiosity about the natural world. The themes of working scientifically, materials and changes run throughout every year group.

This teaching of Science ensures that children:

- Develop scientific knowledge and conceptual understanding.
- Develop and understanding of the nature, processes and methods of science.
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

The coverage within EYFS guides children to make sense of their physical world through hands on, real life experiences and the beginning skills of observation and questioning.

Within KS1 children look more closely at the world around them.. They develop their understanding of scientific ideas and use language to talk about what they have found out.

Within lower KS2 children are given a range of scientific experiences to enable them to raise their own questions about the world around them. They begin to make their own decisions about the most appropriate type of scientific enquiry and use relevant scientific language communicate their findings .

Within upper KS2, children use their science experiences to explore ideas and raise different kinds of questions. They select and plan the most appropriate type of scientific enquiry to use to answer scientific questions. They use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and talk about how scientific ideas have developed over time

Implementation

Children are offered a wide range of teaching techniques in science. Using the environment and physical experiments ensures that children are able to see the process that they are learning about in their natural state. They are taught high quality vocabulary to support their science learning in which they will be able to use in a variety of scenarios . This vocabulary is displayed in the learning environment and is easily accessible for children to use and children will hear this vocabulary being used by adults and peers around them. Pupils will be taught to read, spell and pronounce scientific vocabulary correctly. All lessons start with discussion of prior knowledge and teaches children how to use this prior knowledge to further extend their findings. Adults guide children through their experimentation and support key skills to ensure they are working scientifically. The children use a set of symbols which have been created to reflect working scientifically enquiry and are able to use these symbols to identify which scientific skill they have used such as observation and fair testing.

Impact

The impact of our Science curriculum will be that children will be curious and motivated by natural phenomena around us. Children will be inquisitive and observant and ask relevant questions of the processes around them. They will have a deep understanding of how they can find out the answers to the questions they may have about the world around them.

Impact will be measured by skilled questioning throughout lessons and assessment against the L.O of each lesson.

By the end of EY

Working scientifically—observational skills

Materials—

Changes—different weathers

By the end of KS1

Materials: be able to identify, name and compare the suitability a variety of everyday materials, and describe their physical properties

Living Things: know that habitats provide for the basic needs of different kinds of animals and plants, and that animals obtain their food from plants and other animals. Know the basic structure of a variety of common plants, including trees, and their basic requirements for healthy growth.

Animals Including Humans: know about the basic needs of animals, including humans, for survival and the importance of exercise, nutrition, and hygiene. Notice that animals, including humans, have offspring which grow into adults.

Changes:

By the end of KS2

Physical Science: Be able to group materials on the basis of their properties, including states of matter, hardness, solubility, transparency, conductivity, and response to magnets. Know that dissolving, mixing, and changes of state are reversible changes, and that changes resulting in the formation of new materials are mostly irreversible. In line with NC, pupils will develop key scientific knowledge of electricity, light and sound, and relate this to how we see and hear. Understand the effects of magnetic forces, gravity, air resistance, water resistance and friction. Describe the movement of the Earth, other planets, and the Moon. Explain how day and night are created.

Living Things: Know 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. Know the life process of reproduction in some plants and animals and describe the differences in life cycles. Understand the concepts of inheritance, adaption and evolution.

Animals Including Humans: Identify, name, and describe the functions of the main parts of the digestive and circulatory systems, and the human skeleton. Recognise the impact of diet, exercise, drugs and lifestyle on the way human bodies function. Know about producers, predators and prey within food chains.

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Plants	Explore the natural world around them.	identify and name a variety of common wild and garden plants, including deciduous and evergreen trees identify and describe the basic structure of a variety of common flowering plants, including trees	observe and describe how seeds and bulbs grow into mature plants find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	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.			
Key vocab		familiar with common names of flowers, examples of deciduous and evergreen trees, plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem).	Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants.	roots, stem trunk, leaves flowers nutrients life cycle pollination germinate ovary ovule petal photosynthesis seed dispersal sepals stamin style stigma			
Working scientifically		comparing and contrasting familiar plants; describing how they were able to identify and group them, drawing trees. Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; observing closely, perhaps using magnifying glasses, and drawing diagrams showing the parts of different plants and compare and contrast what they have found out about different plants.	observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy	Compare the effect of different factors on plant growth; observe the different stages of plant life cycles over a period of time; observe how water is transported in plants			

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Animals including humans		identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals identify and name a variety of common animals that are carnivores, herbivores and omnivores	notice that animals, including humans, have offspring which grow into adults find out about and describe the basic needs of animals, including humans, for survival (water, food and air) describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.	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.	describe the simple functions of the basic parts of the digestive system in humans identify the different types of teeth in humans and their simple functions construct and interpret a variety of food chains, identifying producers, predators and prey.	describe the changes as humans develop to old age.	identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans.
Key vocab		describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.	Nutrient protein fat balanced diet carbohydrate exoskeleton joint muscle vertebrate invertebrate herbivore omnivore carnivore parts of skeleton	digestive system food chains, producers, predators and prey. , mouth, tongue, teeth, oesophagus, stomach and small and large intestine carnivore herbivore, canine incisor molar decay	Gestation puberty pregnant adolescence menstruation life expectancy	Heart lungs blood oxygen carbon dioxide vein artery capillary oxygenated deoxygenated pulse rate addiction nutrients drug
Working scientifically		opportunities to learn the names through games, actions, songs and rhymes using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells	observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions	Identify and group animals with and without skeletons and observie and compare their movement; exploring ideas about what would happen if humans did not have skeletons. Compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. Research different food groups and how they keep us healthy	Compare the teeth of carnivores and herbivores, suggest reasons for differences; investigate what damages teeth and how to look after them.	Observe the changes experienced in puberty. research the gestation periods of other animals and comparing them with humans;	exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

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Everyday materials		identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock describe the simple physical properties of a variety of everyday materials distinguish between an object and the material from which it is made compare and group together a variety of everyday materials on the basis of their simple physical properties.	identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.			compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	
Key vocab		Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/ smooth; bendy/not bendy; waterproof/ not waterproof; absorbent/not absorbent; opaque/transparent Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil				conductor: Insulator, solution solute solvent: dissolve: evaporate mixture: soluble Insoluble: Filter reversible/physical change chemical change	
Working scientifically		Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'	comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.			carrying out tests to answer questions compare materials observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. research and discuss how chemical changes have an impact on our lives, for example, cooinging,	

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Seasonal Changes	Understanding the effect of changings season on the natural world around them.	observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies.					
Key vocab		Pupils should observe and talk about changes in the weather and the seasons.					
Working sci-entifically		making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.					

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Living Things and Their Habitats	Describe what they see, hear and feel whilst outside.		explore and compare the differences between things that are living, dead, and things that have never been alive identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other identify and name a variety of plants and animals in their habitats, including microhabitats 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.		recognise that living things can be grouped in a variety of ways explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment recognise that environments can change and that this can sometimes pose dangers to living things.	describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird describe the life process of reproduction in some plants and animals.	describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals give reasons for classifying plants and animals based on specific characteristics
Key vocab			be introduced to the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).		vertebrate fish, amphibians, reptiles, birds, and mammals; invertebrates flowering plants non-flowering plants	bulb, fertilization, pollination, larva, sexual reproduction, asexual reproduction, gestation, metamorphosis, sperm, external / internal fertilisation, propagate. Revise parts of flower	organism, species, genus, flora, fauna, vertebrate, invertebrate, insect, mammal, amphibian, fish, bird, reptile, fungi, mushroom, toadstool, fermentation, microbe, bacteria, protist
Working scientifically			sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts		Use and produce simple keys to explore and identify local plants and animals; Answer questions based on observations of animals	Observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world asking questions and suggesting reasons for similarities and differences. Compare how different animals reproduce and grow.	use classification systems and keys to identify some animals and plants in the immediate environment. research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

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Rocks				compare and group together different kinds of rocks on the basis of their appearance and simple physical properties describe in simple terms how fossils are formed when things that have lived are trapped within rock recognise that soils are made from rocks and organic matter			
Key vocab				Mineral, rock, permeable, impermeable, crystals, magma, sediment, sedimentary, fossil, extinct, palaeontology, granite, igneous, metamorphic, soil, marble, sand, clay, limestone.			
Working scientifically				Explore and observe properties of rocks. Use a hand lenses to help identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Explore different soils and identify similarities and differences between them . Raise and answer questions about the way soils are formed.			

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Light				recognise that they need light in order to see things and that dark is the absence of light notice that light is reflected from surfaces recognise that light from the sun can be dangerous and that there are ways to protect their eyes recognise that shadows are formed when the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change.			recognise that light appears to travel in straight lines use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Key vocab				reflect shadow light dark light source opaque translucent transparent			ray, reflection, refraction, transparent, translucent, opaque, light spectrum,
Working scientifically				explore what happens when light reflects off a mirror or other reflective surfaces: answer questions about how light behaves. measure, shadows, and find out how they are formed : look for patterns in what happens to shadows when the light source moves or the distance between the light source and the object			investigate the relationship between light sources, objects and shadows by using shadow puppets. explore a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

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Forces				compare how things move on different surfaces notice that some forces need contact between two objects, but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.		explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	
Key vocab				attract, compass, contact, force, iron, magnetic, pole, repel, magnet, prediction, iron		friction gravity, weight, newton, air resistance, water resistance, reliable, force meter, lever, spring, gear, pulley:	
Working scientifically				Compare how different things move and group; Carrying out tests to find out how far things move on different surfaces; gather and record data to find answers their questions; exploring the strengths of different magnets ; sort materials into those that are magnetic and those that are not; look for patterns in the way that magnets behave in relation to each other: identify how these properties make magnets useful in everyday items		explore falling objects and raise questions about the effects of air resistance. explore the effects of friction on movement and find out how it slows or stops moving objects, explore the effects of levers, pulleys and simple machines on movement. carrying out fair tests explore resistance in air and water	

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Sound					identify how sounds are made, associating some of them with something vibrating recognise that vibrations from sounds travel through a medium to the ear find patterns between the pitch of a sound and features of the object that produced it find patterns between the volume of a sound and the strength of the vibrations that produced it recognise that sounds get fainter as the distance from the sound source increases		
Key vocab					vibration, volume, pitch. waves, music		
Working scientifically					Find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.		

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Electricity					identify common appliances that run on electricity construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors		associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches use recognised symbols when representing a simple circuit in a diagram.
Key vocab					circuit, positive/negative, cell, battery, bulbs, buzzers, switches, conductors, insulators, component, series		component, cell, complete, electron, renewable, solar, fuse, blow, filament, cell, battery bulbs, buzzers, switches series
Working scientifically					Observe patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit. draw the circuit as a pictorial representation		construct simple series circuits, to help them to answer questions (series not parallel) represent a simple circuit in a diagram using recognised symbols. systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit

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Earth and Space						describe the movement of the Earth, and other planets, relative to the Sun in the solar system describe the movement of the Moon relative to the Earth describe the Sun, Earth and Moon as approximately spherical bodies use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun	
Key vocab						Sun Earth star solar planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto) moon orbit	
Working scientifically						Compare the time of day at different places creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day;	

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Evolution and Inheritance							recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Key vocab							Evolution inheritance offspring adaption characteristics variation palaeontologist fossil
Working scientifically							observing and raising questions about local animals and how they are adapted to their environment; Compare how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers