

Ayresome Primary Science Curriculum 2022-23



Intent

At Ayresome Primary School, we aim to equip children with the knowledge required to use and implement Science today, tomorrow and for their futures. We offer a high-quality Science curriculum, which evokes curiosity, excitement and understanding about the world through the specific disciplines of biology, chemistry and physics whilst supporting the fundamental British Values.

Children are given a variety of opportunities to problem solve and build an understanding of the world for themselves within and outside of the classroom, articulating and sharing ideas both independently, collaboratively and as a class. Building key knowledge and understanding concepts within our Science curriculum, we ensure our pupils recognise the power of rational explanation through using rich scientific vocabulary, develop a sense of curiosity about natural phenomena and develop respect for the environment and living things, including themselves and each other. We are proud to hold The Primary Science Quality Mark Award (PSQM) and our curriculum is developed to build upon this practice, knowledge and understanding.

The school follows the 'Snap Science' scheme of work, implemented in September 2022, which develops pupils' understanding of nature, processes and methods of Science through a variety of different scientific enquiries, which stimulates thinking and allows them to answer questions posed about the world around them. Pupils are encouraged to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying, carrying out simple comparative tests, and investigating using secondary sources of information. In addition, the school has implemented a progression of knowledge and skills science framework in the areas of chemistry, physics and biology highlighting children's yearly progress of the skills and knowledge that they build upon within the Science curriculum.

The curriculum also ensures progression of skills and cumulative learning, building on and supporting the children's metacognitive learning strategies through effective pedagogical and vocabulary rich teaching. Subject specific vocabulary is taught and built upon as topics are revisited to ensure conceptual understanding in order to be used accurately and precisely. We know that our children learn through enquiry-based learning, thus science at Ayresome Primary has been structured to ensure that our children have first-hand science experiences from the beginning of their learning journey. This allows for independent exploration and investigation that then leads to progression of communication. Our curriculum is enriched with scientific enquiry using our own school environment (for example, the school's green spaces), educational visits and whole school workshops. A Science Week is timetabled into the year and is an opportunity for the children to apply taught skills for scientific enquiry, learning about a scientist and recording and evaluating results from experiments.

Implementation

Our Science curriculum is progressive throughout the whole school;

- Based upon the 2014 Primary National Curriculum, which provides a broad framework and outlines the knowledge and skills and taught in each Key Stage. Supported by the use of Snap Science to help build our curriculum.
- All topics taught have an introduction which provides teachers with a clear explanation of the science they need to understand and in each lesson key information is highlighted at relevant points.



- All units of work include a section in the introduction where commonly held misconceptions are listed so that teachers can ensure that they are addressed.
- Topics are designed to ensure that key ideas and the vocabulary to express them are revisited over the course of a series of lessons and are built on as topics progress between years and Key Stages.
- Effective formative assessment is built into every lesson so that teachers are aware of children's developing knowledge and understanding, and their use of skills. They are supported to identify any gaps in learning and provide appropriate feedback to consolidate and build on key knowledge and skills. In the Reflect and Review part of the lesson children summarise what they have learned and use the success criteria to assess how well they have done and their next steps. The Evidence of Learning section provides clear guidance for teachers to indicate things children say, write, draw and do regarding achievement of the learning intention.
- The built-in online tracker facilitates the quick recording of children's achievements against the National Curriculum objectives at the end of a module using evidence from lessons. At the end of the Key Stage individual pupil records are automatically aggregated to ensure simple and accurate completion of statutory assessment records.
- Teaching focuses on enabling children to think as scientists.
- Science provides excellent opportunities to enhance the learning of more able pupils through the investigations, analysing sources and writing extending pieces.
- Children have the opportunity to attend an extra-curricular after-school STEM club.
- Classroom environments reflect the topic the children are learning, which then immerse the children in relevant vocabulary as well as visual stimulus for their learning.

Impact

- Our curriculum utilises Snap Science, which is constructed to ensure broad and deep engagement of the Programme of Study for Science and that assessment strategies and resources measure what children have been taught and learned – not through separately designed tests.
- Lessons are differentiated to ensure that all children can work appropriately towards achieving the learning intention, with support provided for children with lower prior attainment in reading, writing and maths.
- Lessons all lead to children representing or expressing their learning in shareable outcomes.
- The Snap Science framework is shaped by a clear progression of science knowledge and skills from Foundation Stage to Y6, and beyond, ensuring that transition between Key Stages is smooth and effective.

Cultural capital in Science at Ayesome Primary School

Through science we aim to provide our children with experiences and opportunities to explore the world around them, ask questions and take part in interesting and stimulating experiences. This will include a variety of exploring, experimenting and discussions. The aim is for our pupils at Ayesome Primary School to leave with the knowledge to think, act and speak like a scientist and value the transference of these skills into their everyday life, in education and beyond.

Science progression in EYFS:

	<u>Understanding the world: The world</u>
2-year-old	<p>Can talk about some of the things that they have observed such as plants, animals, natural and found objects.</p> <p>Enjoys playing with small world reconstructions, building on first hand experiences e.g. visiting farms, walking by a river.</p>
Nursery	<p>Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world.</p> <p>Talks about why things happen and how things work.</p> <p>Developing an understanding of growth, decay and changes over time.</p> <p>Shows care and concerns for living things and the environment.</p> <p>Begin to understand the effect their behaviour can have on the environment.</p>
Reception	<p>Looks closely at similarities, differences, patterns and change in nature.</p> <p>Knows about similarities and differences in relation to places, objects, materials and living things.</p> <p>Talks about the features of their own immediate environment and how environments might vary from one another.</p> <p>Makes observations of animals and plants and explains why some things occur, and talks about changes.</p> <p>Early Learning Goal: The Natural World</p> <p>Explore the natural world around them making observations and drawing pictures of animals and plants.</p> <p>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.</p> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>

YEAR 1



Working scientifically:	<ul style="list-style-type: none"> • Asking simple questions and recognising that they can be answered in different ways • Observing closely, using simple equipment • Performing simple tests • Identifying and classifying • Gathering and recording data to help in answering questions • Using their observations and ideas to suggest answers to questions 			
Topic Titles	Looking at Animals OCW: Animal Antics	Everyday Materials	Plant Detectives OCW: Plants	Using our Senses OCW: Sensing Seasons
NC Unit	Animals including Humans	Materials	Plants	Seasons
NC Statements	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. <ul style="list-style-type: none"> • Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock, • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials based on their simple properties 	<ul style="list-style-type: none"> • 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. • Identify and name the roots, trunk, branches and leaves of trees. 	<ul style="list-style-type: none"> • Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies.

<p style="text-align: center;">Key Learning</p>	<ul style="list-style-type: none"> • Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them. • Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. • Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. • Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body. 	<ul style="list-style-type: none"> • All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. • Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties. 	<ul style="list-style-type: none"> • Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. • Plants have common parts, but they vary between the different types of plants. • Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring. 	<ul style="list-style-type: none"> • In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again. • The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. • The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.
<p style="text-align: center;">Vocabulary</p>	<p>Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow</p>	<p>Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque</p>	<p>Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen</p>	<p>Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature</p>

Prior and Future Learning	<p>In Early Years children should:</p> <ul style="list-style-type: none"> • be able to identify different parts of their body. • Have some understanding of healthy food and the need for variety in their diets. • Be able to show care and concern for living things. • Know the effects exercise has on their bodies. • Have some understanding of growth and change. • Can talk about things they have observed including animals <p>In Year 2 children will:</p> <ul style="list-style-type: none"> • Know that animals, including humans, have offspring which grow into adults • Know the basic stages in a life cycle for animals, including humans. • Find out 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. 	<p>In Early Years children should:</p> <ul style="list-style-type: none"> • be able to ask questions about the place they live. • Talk about why things happen and how things work. • Discuss the things they have observed such as natural and found objects. • Manipulates materials to achieve a planned effect. <p>In Year 2 children will:</p> <ul style="list-style-type: none"> • 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 shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>In EYFS Children should:</p> <ul style="list-style-type: none"> • Make observations of plants • Know some names of plants, trees and flowers • May be able to name and describe different plants, trees and flowers • Show some care for their world around them <p>In Year 2 Children will:</p> <ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy. 	<p>In Early Years children should:</p> <ul style="list-style-type: none"> • Developing an understanding of change. • Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes). • Look closely at similarities, differences, patterns and change. • Comments and questions about the place they live or the natural world. <p>In Year 3 children will:</p> <ul style="list-style-type: none"> • 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 a solid object. • Find patterns in the way that the sizes of shadows change.
Key Scientists	<p>Chris Packham (Animal Conservationist)</p>	<p>William Addis (Toothbrush Inventor)</p> <p>Charles Mackintosh (Waterproof coat)</p> <p>John McAdam (roads)</p>	<p>Beatrix Potter (Author & Botanist)</p>	<p>Dr Steve Lyons (Extreme Weather)</p> <p>Holly Green (Meteorologist)</p>

YEAR 2

Working scientifically:	<ul style="list-style-type: none"> • Asking simple questions and recognising that they can be answered in different ways • Observing closely, using simple equipment • Performing simple tests • Identifying and classifying • Gathering and recording data to help in answering questions • Using their observations and ideas to suggest answers to questions 			
Topic Titles	Take Care Growing Up	Materials: Good Choices Materials: Shaping Up	The Apprentice Gardener	What is your habitat?
NC Unit	Animals	Materials	Plants	Living Things & Their Habitats
NC Statements	<ul style="list-style-type: none"> • Know that animals, including humans, have offspring which grow into adults. • Know the basic stages in a life cycle for animals, including humans. • Find out 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. 	<ul style="list-style-type: none"> • 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 shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy. 	<ul style="list-style-type: none"> • Explore and compare the difference 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 micro habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Key Learning</p>	<ul style="list-style-type: none"> • Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles. • All animals, including humans, have the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. To grow into healthy adults, they also need the right amounts and types of food and exercise. • Good hygiene is also important in preventing infections and illnesses. 	<ul style="list-style-type: none"> • All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. • When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. • A material can be suitable for different purposes and an object can be made of different materials. • Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness. 	<ul style="list-style-type: none"> • Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. • Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. • Plants also need different amounts of water and space to grow well and stay healthy. 	<ul style="list-style-type: none"> • All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (This is a simplification, but appropriate for Year 2 children.) • An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels). • Animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. • Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain.
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Vocabulary</p>	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade</p>	<p>Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons</p>	<p>Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight.</p>	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade</p>

Prior and Future Learning	<p>In Year 1 children should:</p> <ul style="list-style-type: none"> 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. <p>In Year 3 children will:</p> <ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement: 	<p>In Year 1 children should:</p> <ul style="list-style-type: none"> Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock, Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials based on their simple properties. <p>In Year 3 children will:</p> <ul style="list-style-type: none"> Compare and group together different kinds of rocks based on 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. 	<p>In Year 1 Children should:</p> <ul style="list-style-type: none"> 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. Identify and name the roots, trunk, branches and leaves of trees. <p>In Year 3 Children will:</p> <ul style="list-style-type: none"> Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants Know the way in which water is transported between plants 	<p>In Early Years children should:</p> <ul style="list-style-type: none"> Comments and questions about the place they live or the natural world. Shows care and concern for living things and the environment. Can talk about things they have observed such as plants and animals. Notices features of objects in their environment. Comments and asks questions about their familiar world. <p>In Year 4 children will:</p> <ul style="list-style-type: none"> 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. Know and label the features of a river Recognise that environments can change and that this can sometimes pose danger to living things.
Key Scientists	<p>Steve Irwin (Crocodile Hunter)</p> <p>Robert Winston (Human Scientist)</p>	<p>William Addis (Toothbrush Inventor)</p> <p>Charles Mackintosh (Waterproof coat)</p> <p>John McAdam (roads)</p>	<p>Agnes Arber (Botanist)</p> <p>Alan Titchmarsh (Botanist & Gardener)</p>	<p>Liz Bonnin (Conservationist)</p>

YEAR 3



Working scientifically:	<ul style="list-style-type: none"> • Asking relevant questions and using different types of scientific enquiries to answer them • Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • Setting up simple practical enquiries, comparative and fair tests • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • Using straightforward scientific evidence to answer questions or to support their findings • Identifying differences, similarities or changes related to simple scientific ideas and processes • <i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</i> • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions 				
	Topic Titles	Amazing Bodies	How does your garden grow?	Rock Detectives	Can you see me?
NC Unit	Animals including Humans	Plants	Rocks (Materials)	Light	Forces (& Magnetism)

<p>NC Statements</p>	<ul style="list-style-type: none"> • Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. • Know how nutrients, water and oxygen are transported within animals and humans. • Know about the importance of a nutritious, balanced diet. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. 	<ul style="list-style-type: none"> • Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers • Explore the part flowers play in a flowering plants life cycle, including pollination, seed formation and seed dispersal • Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants • Know the way in which water is transported between plants 	<ul style="list-style-type: none"> • Compare and group together different kinds of rocks based on 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 	<ul style="list-style-type: none"> • 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 a solid object. • Find patterns in the way that the sizes of shadows change. 	<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets with attract or repel each other, depending on which poles are facing.
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<p style="text-align: center;">Key Learning</p>	<ul style="list-style-type: none"> • Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients. • Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support. 	<ul style="list-style-type: none"> • Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. • The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. • The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). • This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth. 	<ul style="list-style-type: none"> • Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. • Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. 	<ul style="list-style-type: none"> • We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. • The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. • Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface. 	<ul style="list-style-type: none"> • A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. • A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.
<p style="text-align: center;">Vocabulary</p>	<p>Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax</p>	<p>Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll</p>	<p>Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, topsoil, sub soil, base rock.</p>	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.</p>	<p>Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass</p>

Prior and Future Learning	<p>In Year 2 children should:</p> <ul style="list-style-type: none"> • Know that animals, including humans, have offspring which grow into adults • Know the basic stages in a life cycle for animals, including humans. • Find out 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. <p>In Year 4 children will:</p> <ul style="list-style-type: none"> • 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 	<p>In Year 2 Children should:</p> <ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy. <p>In Year 6 Children will:</p> <ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things • 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 can lead to evolution. 	<p>In Year 2 children should:</p> <ul style="list-style-type: none"> • 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 shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. <p>Children may:</p> <ul style="list-style-type: none"> • May have some understanding of a variety of different rocks in the natural world. • Some understanding of what soil is. (how to identify soil etc) • May have some knowledge of what a fossil is. <p>In Year 4 children will:</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 heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. <p>In Year 6 children will:</p> <ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living 	<p>In Year 1 children should have:</p> <ul style="list-style-type: none"> • Observed changes across the four seasons • Observed and describe weather associated with the seasons and how day length varies. <p>Children may:</p> <ul style="list-style-type: none"> • have some knowledge of where light comes from. • have seen their shadows and may know they appear when it is sunny. • Have some understanding of a reflection. • May understand they need light to be able to see things. <p>In Year 6 children will:</p> <ul style="list-style-type: none"> • 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. • Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. 	<p>In Year 2 children:</p> <ul style="list-style-type: none"> • May have an awareness of how to make things stop and start, using simple pushes and pulls. • They may know about floating and sinking. <p>In Year 5 children will:</p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. • Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect. • 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 • Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
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			things that inhabited the Earth millions of years ago.		
Key Scientist	Adelle Davis (20th Century Nutritionist) Marie Curie (Radiation / X-Rays)	Jan Ingenhousz (Photosynthesis) Joseph Banks (Botanist)	Mary Anning (Discovery of Fossils) Inge Lehmann (Earth's Mantle)	James Clerk Maxwell (Visible and Invisible Waves of Light)	William Gilbert (Theories on Magnetism) Andre Marie Ampere (Founder of Electro-Magnetism)

YEAR 4

Working scientifically:	<ul style="list-style-type: none"> • Asking relevant questions and using different types of scientific enquiries to answer them • Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • Setting up simple practical enquiries, comparative and fair tests • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • Using straightforward scientific evidence to answer questions or to support their findings • Identifying differences, similarities or changes related to simple scientific ideas and processes • <i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</i> • Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions 				
	Topic Titles	Who am I? Human Impact	Where does all that food go?	In a State	Good Vibrations
NC Unit	Living things and their habitats	Animals including humans	States of matter	Sound	Electricity

NC Statements	<ul style="list-style-type: none"> • 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 danger to living things. 	<ul style="list-style-type: none"> • 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 	<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 heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 	<ul style="list-style-type: none"> • Know how sound is made associating some of them with vibrating. • Know what happens to a sound as it travels from its source to our ears. • Know the correlation between the volume of a sound and the strength of the vibrations that produced it. • Know how sound travels from a source to our ears. • Know the correlation between pitch and the object producing a sound. 	<ul style="list-style-type: none"> • 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 a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. • Know the difference between a conductor and an insulator, giving examples of each. • Safety when using electricity.
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Key Learning	<ul style="list-style-type: none"> • Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things. • Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year. 	<ul style="list-style-type: none"> • Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. • The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet. • Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). 	<ul style="list-style-type: none"> • A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. • Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100°C. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to 	<ul style="list-style-type: none"> • A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. • The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively. • Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds. 	<ul style="list-style-type: none"> • Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off. • Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.
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			<p>a liquid caused by cooling.</p> <ul style="list-style-type: none"> Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. 		
Vocabulary	Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.	Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer.	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,	Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.	Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component.

<p>Prior and Future Learning</p>	<p>In Year 2, children should:</p> <ul style="list-style-type: none"> • Explore and compare the difference 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 micro habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food. <p>In Year 5:</p> <ul style="list-style-type: none"> • 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. 	<p>In Year 3 children should:</p> <ul style="list-style-type: none"> • Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. • Know how nutrients, water and oxygen are transported within animals and humans. • Know about the importance of a nutritious, balanced diet. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement <p>In Year 5 children will:</p> <ul style="list-style-type: none"> • Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. • Know the differences between different life cycles. • Know the process of reproduction in plants. • Know the process of reproduction in animals 	<p>In KS1 children should:</p> <ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • 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. • Compare and group together a variety of everyday materials based on 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. <p>In Year 5 children will:</p> <ul style="list-style-type: none"> • Compare and group together everyday materials based on 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 	<p>In KS1 children:</p> <ul style="list-style-type: none"> • May have some understanding that objects make different sounds. • Some understanding that they use their ears to hear sounds. • Know about their different senses. <p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> • frequencies of sound waves measured in hertz (Hz), echoes, reflection and absorption of sound • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals. 	<p>In Early Years children:</p> <ul style="list-style-type: none"> • May have some understanding that objects need electricity to work. • May understand that a switch will turn something on or off. <p>In Year 6 children will:</p> <ul style="list-style-type: none"> • 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.
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			<p>through filtering, sieving and evaporating.</p> <ul style="list-style-type: none"> • Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals 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 this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda. 		
Key Scientists	<p>Cindy Looy (Environmental Change and Extinction)</p> <p>Jaques Cousteau (Marine Biologist)</p>	<p>Ivan Pavlov (Digestive System Mechanisms)</p> <p>Joseph Lister (Discovered Antiseptics)</p>	<p>Anders Celsius (Celsius Temperature Scale)</p> <p>Daniel Fahrenheit (Fahrenheit Temperature Scale / Invention of the Thermometer)</p>	<p>Aristotle (Sound Waves)</p> <p>Gailileo Galilei (Frequency and Pitch of Sound Waves)</p> <p>Alexander Graham Bell (Invented the Telephone)</p>	

YEAR 5

Working scientifically:	<ul style="list-style-type: none"> • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scattergraphs, bar and line graphs • Identifying scientific evidence that has been used to support or refute ideas or arguments • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Using test results to make predictions to set up further comparative and fair tests 				
Topic Title	Reproduction in Animals and Plants	Circle of Life	Get Sorted Everyday Materials Marvellous Mixtures Materials: All Change	The Earth and Beyond	Feel the Force
NC Unit	Living things and their habitats	Animals including Humans	Properties and changes in materials	Earth and space	Forces
NC Statements	<ul style="list-style-type: none"> • Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. • Know the process of reproduction in plants. • Know the process of reproduction in animals. 	<ul style="list-style-type: none"> • Describe the changes as humans develop to old age. 	<ul style="list-style-type: none"> • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. • 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. 	<ul style="list-style-type: none"> • 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 • Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. • Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.

Key Learning	<ul style="list-style-type: none"> As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects. 	<ul style="list-style-type: none"> When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below: <ul style="list-style-type: none"> statutory guidance on Physical health and mental wellbeing (primary and secondary). Other useful guidance includes: Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education Briefing on human development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education 	<ul style="list-style-type: none"> Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. 	<p>The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365$\frac{1}{4}$ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.</p>	<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.</p> <p>Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.</p> <p>A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p>
Vocabulary	Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant	Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection	Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.	Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley.

Prior and Future Learning	<p>In Year 4 children should:</p> <ul style="list-style-type: none"> • Construct and interpret a variety of food chains, identifying producers, predators and prey • 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 micro habitats. <p>In Year 6:</p> <ul style="list-style-type: none"> • Classify living things into broad groups according to observable characteristics and based on similarities and differences. • Give reasons for classifying plants and animals based on specific characteristics. 	<p>In Year 4 children should:</p> <ul style="list-style-type: none"> • 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. <p>In Year 6:</p> <ul style="list-style-type: none"> • 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. 	<p>In KS1 children should:</p> <ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • 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. • Compare and group together a variety of everyday materials based on 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. <p>In Year 5 children will:</p> <ul style="list-style-type: none"> • Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. • Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic. 	<p>In Key Stage 1 and in Year 3 children should:</p> <ul style="list-style-type: none"> • Understand changes in weather patterns and seasons. • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing <p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> • Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance 	<p>In Year 3 children should:</p> <ul style="list-style-type: none"> • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials based on 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. <p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> • opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface • forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) • change depending on direction of force and its size.
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Key Scientists	<p>James Brodie of Brodie (Reproduction of Plants by Spores)</p> <p>David Attenborough (Naturalist and Nature Documentary Broadcaster)</p>	<p>Dr Steve Jones (Geneticist)</p> <p>Prof Robert Winston (Human Scientist)</p>	<p>Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes)</p> <p>Ruth Benerito (Wrinkle-Free Cotton)</p>	<p>Neil Armstrong (First man on the Moon)</p> <p>Helen Sharman (First British astronaut)</p> <p>Tim Peake (First British ESA astronaut)</p>	<p>Galileo Galilei (Gravity and Acceleration)</p> <p>Isaac Newton (Gravitation)</p> <p>Archimedes of Syracuse (Levers)</p>

YEAR 6

Working scientifically:	<ul style="list-style-type: none"> • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scattergraphs, bar and line graphs • Identifying scientific evidence that has been used to support or refute ideas or arguments • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Using test results to make predictions to set up further comparative and fair tests 				
Topic Title	The Nature Library	Body Pump Body Health	Everything Changes	Light Up Your World	Danger! Low Voltage
NC Unit	Living things and their habitats	Animals including Humans	Evolution and Inheritance	Light	Electricity
NC Statements	<ul style="list-style-type: none"> • Classify living things into broad groups according to observable characteristics and based on similarities and differences. • Give reasons for classifying plants and animals based on specific characteristics. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Know about evolution and can explain what it is. • Know how fossils can be used to find out about the past. • 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- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago 	<ul style="list-style-type: none"> • 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. • Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. 	<ul style="list-style-type: none"> • 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 Learning	<ul style="list-style-type: none"> • Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. • Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. • Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants. 	<ul style="list-style-type: none"> • The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system. • Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how we fit and how we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE. 	<ul style="list-style-type: none"> • All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. • Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution. 	<ul style="list-style-type: none"> • Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. • Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object. 	<ul style="list-style-type: none"> • Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. • Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. You can use recognised circuit symbols to draw simple circuit diagrams.
Vocabulary	<p>Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.</p>	<p>Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.</p>	<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,</p>	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction</p>	<p>Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.</p>

Prior and Future Learning	<p>In Year 4, children should:</p> <ul style="list-style-type: none"> • 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 danger to living things. <p>In Key Stage 3 children will learn about:</p> <ul style="list-style-type: none"> • the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere • the adaptations of leaves for photosynthesis. • the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • the importance of plant reproduction through insect pollination in human food security • how organisms affect, and are affected by, their environment, including the accumulation of toxic materials. 	<p>In Year 5 children should:</p> <ul style="list-style-type: none"> • Describe the changes as humans develop to old age. <p>In Key Stage 3 children will learn about:</p> <ul style="list-style-type: none"> • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. • the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) • calculations of energy requirements in a healthy daily diet • the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases • the structure and functions of the gas exchange system in humans, including adaptations to function • the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. 	<p>From Key Stages 1 & 2, children should:</p> <ul style="list-style-type: none"> • Understand there is a variety of life on Earth • Know that some animal's differences are important to their survival • Know how animals and plants reproduce • Know how fossils form over time <p>In Key Stage 3 children will learn about:</p> <ul style="list-style-type: none"> • heredity as the process by which genetic information is transmitted from one generation to the next • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection • changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction • the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. 	<p>In Year 3 children should:</p> <ul style="list-style-type: none"> • 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 a solid object. • Find patterns in the way that the sizes of shadows change. <p>In Key Stage 3, children will learn about:</p> <ul style="list-style-type: none"> • the similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light • the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface • use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the human eye • light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras • colours and the different frequencies of light, white light and prisms (qualitative only); 	<p>In Year 4, children should:</p> <ul style="list-style-type: none"> • 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 a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. • Know the difference between a conductor and an insulator, giving examples of each. • Safety when using electricity. <p>In Key Stage Three children will learn:</p> <ul style="list-style-type: none"> • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge • Potential difference measured in volts, battery and bulb ratings, resistance measured in ohms, as the ratio of potential difference (p.d.) to current • Differences in resistance between conducting and
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				differential colour effects in absorption and diffuse reflection.	insulating components (quantitative). <ul style="list-style-type: none"> • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • The idea of electric field, forces acting across the space between objects not in contact.
Key Scientists	Carl Linnaeus (Identifying, Naming and Classifying Organisms)	Sir Richard Doll (Linking Smoking and Health Problems) Leonardo Da Vinci (Anatomy)	Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection) Jane Goodall (Chimpanzees)		Alessandro Volta (Electrical Battery) Nicola Tesla (Alternating Currents)



KS3 Science:

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

GCSE Science:

Science is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate the achievements of science in showing how the complex and diverse phenomena of the natural world can be described in terms of a number of key ideas relating to the sciences which are inter-linked, and which are of universal application.

These key ideas include:

- the use of conceptual models and theories to make sense of the observed diversity of natural phenomena
- the assumption that every effect has one or more cause
- that change is driven by interactions between different objects and systems
- that many such interactions occur over a distance and over time
- that science progresses through a cycle of hypothesis, practical experimentation, observation, theory development and review
- that quantitative analysis is a central element both of many theories and of scientific methods of inquiry.

The sciences should be taught in ways that ensure students have the knowledge to enable them to develop curiosity about the natural world, insight into working scientifically, and appreciation of the relevance of science to their everyday lives, so that students:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
- develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them;
- develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments;
- develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.

Careers

These careers link with taught topics across the science curriculum, teachers may choose to link a scientist/career to their taught topic.

Animals including Humans	Earth and Space	Electricity
<ul style="list-style-type: none"> • Water quality scientist • Operating Department Practitioner • Sports Scientist • Biological Anthropologist • Geneticist • Medical Physicist • Chemist • Zoologist 	<ul style="list-style-type: none"> • Astronomer • Solar Array Manufacturing Engineer • Satellite Communications Engineer • Satellite Engineer • Aerospace Engineer • Astronaut • Read more • Astrophysicist • Chemist 	<ul style="list-style-type: none"> • Electronics Engineering Technician • Solar Energy Engineer • Electrical Technician • Systems Engineer • Power Plant Operator • Broadcast Engineer • IT Systems Analyst • Network Engineer • Control Systems Engineer
Evolution and Inheritance	Forces and Magnets	Light and Sight
<ul style="list-style-type: none"> • Biological Anthropologist • Geneticist • Ecologist • Evolutionary Biologist • Biologist 	<ul style="list-style-type: none"> • Electrical Power Technician • Chemical Physicist • Robotics Engineer • Magnet Engineer 	<ul style="list-style-type: none"> • Lighting Technician • Optometrist • Ophthalmologist • Physicist • Optical Engineer • Electrical Engineer
Plants	Rocks	Sound
<ul style="list-style-type: none"> • Soil Scientist • Plant Geneticist • Environmental Scientist • Conservation Scientist • Botanist • Bioprocessing Engineer 	<ul style="list-style-type: none"> • Petroleum Geologist • Mining Geologist • Mineralogist • Geologist 	<ul style="list-style-type: none"> • Live Sound Engineer • Music Producer • Acoustics Engineer • Medical Physicist • Sound Engineer
States of Matter	Living things and their Habitats	Everyday Materials
<ul style="list-style-type: none"> • Crystallographer • Nanotechnologist • Chemist • Diagnostic Molecular Scientist • Fluid Dynamicist 	<ul style="list-style-type: none"> • Water quality scientist • Wildlife Technician • Wildlife Biologist • Wetland Biologist • Taxidermist • Primatologist • Palaeontologist • Biostatistician • Animal Behaviourist 	<ul style="list-style-type: none"> • Colour Technologist • Systems Engineer • Design Engineer • Polymer Scientist • Metallurgist • Product/Process Development Scientist • Materials Scientist