

Lightmoor Village Primary School Progression of Knowledge and Skills in Science

Reception

EYFS – Knowledge and Understanding

Understanding the World

Reception Understanding of the world

Children will:

Have regular opportunities for outdoor play and exploration and hands on experience for smelling, touching and listening in the natural world. Take supported risks to encourage positive interaction with outside world.

Have opportunities to discuss how we care for the natural world and sing songs and join in with poems about the natural world.

Closely observe and draw pictures of the natural world including animals and plants.

Observe changes in the weather and features of seasonal changes

Be given opportunities to note and record the weather. Share texts about changing seasons and incorporate seasons and weather in play.

Children will observe how animal's behaviours change as the seasons do.

Explore natural processes through play; ice melting, floating and sinking, magnets, sound causing vibration, and light travelling through a transparent material.

Have opportunities to describe and comment on things they have seen outside including plants and animals.

Name and describe some plants and animals that they are likely to see. Encouraged to recognise these familiar plants and animals whilst outside.

Children know about similarities and differences in relation to places, objects, materials and living things.

They talk about the features of their own immediate environment and how environments might vary from one another.

To know that plants are living, that they grow and die.

Talk about changes.

	<p>Observe growth and decay over time and record changes verbally and visually.</p> <p>Notice and talk about shadows through play.</p>
Substantive knowledge	<p>Children will know – That not all materials melt, that plants live and die, that animals and humans live in habitats that are best for them, that what we see and hear changes over seasons, that people, places, objects and materials have similarities and differences.</p>
Disciplinary Knowledge (working scientifically)	<p>Ask and answer simple questions, use simple equipment to play and explore making observations. To develop ideas through play and exploration engaging in conversations, to begin to answer why and how questions, to ask questions to enhance own understanding.</p>

Outcomes

**Early learning goal –
Understanding the world**

Children will:

Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.

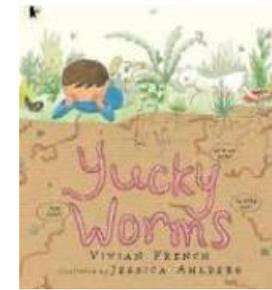
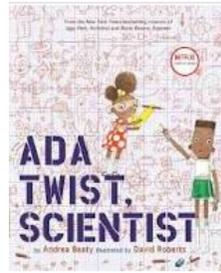
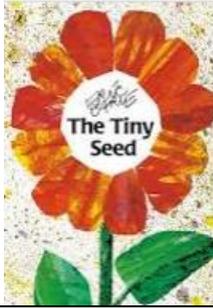
Explore the natural world around them, making observations and drawing pictures of animals and plants.

Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.

Understand some important processes and changes in the natural world around them including the seasons and changing states of matter.

<p>Vocabulary</p>	<p>face hair leg human knee animal arm fish elbow birds back head toes ear hands eye fingers mouth nose Plants tree leaf flower stem seed tree petals Sound, Light & Electricity loud quiet loud quiet volume sound</p>	<p>trunk fruit branch roots leaves bulb flowers seed stem Materials material wood glass paper hard soft material metal wood rock plastic hard glass soft paper fabric material smooth shiny rough Seasonal Changes Summer day Spring dark Autumn light Winter night Season Moon Sun Summer day Spring dark Autumn light Winter night</p>	<p>Season Moon Sun Summer day Spring dark Autumn light Winter night Season Moon Sun Earth & Space Earth Moon Sun star Earth Moon Planet space Sun star Sun Summer day Spring dark Autumn light Winter night</p>	<p>Season Moon Sun Summer day Spring dark Autumn light Winter night Season Moon Sun Earth & Space Earth Moon Sun star Earth Moon Planet space Sun star Sun Summer day Spring dark Autumn light Winter night</p>
<p>Diversity in science – significant scientists, discoveries and achievements from a range of cultures.</p>	<p>Enrichment opportunities</p> <p>Forest school</p> <p>Mary Anning</p>	<p>Local area</p>	<p>Reception garden and sensory garden</p>	<p>Visits to the farm</p>

Reading



Year 1

Year 1 – Knowledge and Understanding

	Seasonal Changes	Materials	Plants	Animals inc. Humans
<p>Year 1</p>	<p>Observe changes across the four seasons.</p> <p>Observe and describe weather associated with the seasons and how day length varies.</p>	<p>Distinguish between an object and the material from which it is made.</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</p> <p>Describe the simple physical properties of a variety of everyday materials.</p> <p>Compare & group together a variety of everyday materials on the basis of their simple physical properties.</p>	<p>Identify & name a variety of common wild & garden plants, including deciduous & evergreen trees.</p> <p>Identify and describe the basic structure of a variety of common flowering plants, including trees.</p>	<p>Group animals according to what they eat</p> <p>Identify, name, draw & label the basic parts of the human body and say which part of the body is associated with each sense.</p> <p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</p>

Vocabulary	<p>Plants Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud</p> <p>Animals Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves</p> <p>Senses Senses, touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue</p> <p>Materials Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through</p> <p>Seasons Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length, monsoon, <u>khareef</u>, thunder storm</p>
Substantive knowledge	<p style="text-align: center;">Children will know:</p> <p style="text-align: center;">The names and structure of common garden plants. The names, features characteristic of a range of common animals. The names of body parts and which sense they are associated with. Distinguish between an object and the material it is made from. Know the names and physical properties of everyday materials. Know the difference between the four seasons.</p>
Disciplinary Knowledge (working scientifically)	<p style="text-align: center;">Ask simple questions and recognise that they can be answered in different ways</p> <p style="text-align: center;">Use simple equipment to observe closely</p> <p style="text-align: center;">Use his/her observations and ideas to suggest answers to questions</p> <p style="text-align: center;">Identify and classify Perform simple tests</p> <p style="text-align: center;">Gather and record data to help in answering questions</p>
Outcomes	<p style="text-align: center;">Plants</p> <p style="text-align: center;">Plants usually grow from seed and bulbs. Flowering plants make seeds and reproduce and make more plants. Some plants die after producing seeds and others live for many generations.</p>

Use of Everyday Materials

There are different materials. Materials have describable properties. Different materials have different properties. Materials can be changed by physical force (twisting, bending, squashing and stretching).

Variation and Evolution

There is variation between all living things. Different animals and plants live in different places. Living things are adapted to survive in different habitats.

Pushes and Pulls

Pushing and pulling can make things move or stop speed up or slow down

Gathering and Presenting Evidence

Use simple equipment provided. Use a simple source to find answers. Investigate key concepts. Present findings using drawings and simple sentences.

Interpreting Results/Evidence Talk about the investigation / enquiry being carried out and discuss what they have found out. Make comparisons using simple scientific vocabulary. Use photographs / diagrams to record answers to how/why questions.

Explaining Write a simple sentence to describe what they observed / compared. Use scientific vocabulary to make comparisons. Link classroom experience to outside world. Discuss and compare with peers what happened and what they found out.

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Katherine Johnson

Forest school, garden centre visit, farm shop visit

Year 1 - Suggested Linked Texts (Reading Across the Curriculum)

Tree: Seasons Come, Seasons Go

(Patricia Hegarty and Britta Teckentrup)

One Year with Kipper

(Mick Inkpen)

After the Storm

(Nick Butterworth)

The Great Paper Caper

(Oliver Jeffers)

Who Sank the Boat

(Pamela Allen)

The Story of Cinderella

(Walt Disney)

RSPB: My First Book of Garden Birds

(Mike Unwin and Sarah Whittley)

Snail Trail

(Ruth Brown)

Superworm

A Little Guide to Wild Flowers

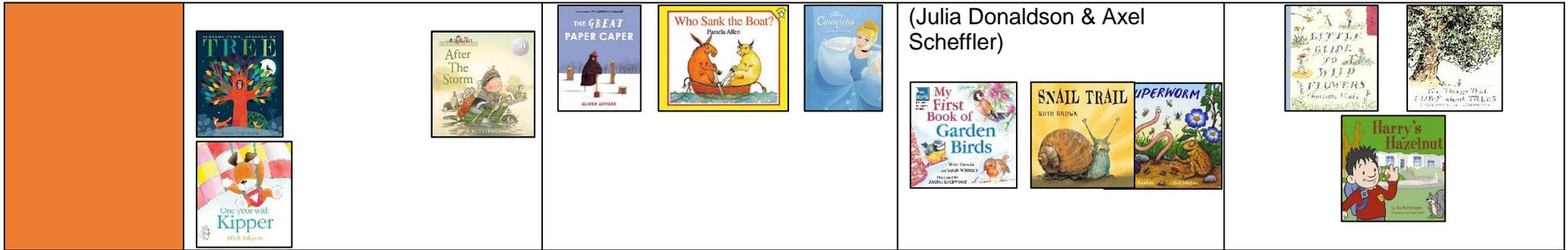
(Charlotte Voake)

The Things That I LOVE about TREES

(Chris Butterworth)

Harry's Hazelnut

(Ruth Parsons)



Year 2
Year 2 – Knowledge and Understanding

Year 2	Materials	Animals inc. Humans	Plants	Living Things & their Habitats
	<p>Identify & compare the suitability of a variety of everyday materials, including wood, metal, plastics, glass, brick, rock, paper and cardboard for particular uses.</p> <p>Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>	<p>Understand that animals, including humans, have offspring which grow into adults.</p> <p>Describe the basic needs of animals, including humans, for survival (water, food and air).</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Observe and describe how seeds and bulbs grow into mature plants.</p> <p>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>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.</p> <p>Explore and compare the differences between things that are living, dead, and things that have never been alive.</p> <p>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.</p> <p>Identify and name a variety of plants and animals in their habitats, including micro-habitats</p>

<p>Vocabulary</p>	<p>Living things and habitats Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc.</p> <p>Plants As for year 1 plus - light, shade, sun, warm, cool, water, grow, healthy, germinate</p> <p>Animals and humans Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)</p> <p>Materials Names of materials – increased range from year 1 Properties of materials - as for year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid, shape, push/pushing, pull/puling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching</p>
<p>Substantive knowledge</p>	<p style="text-align: center;">Children will know:</p> <p style="text-align: center;">That seeds grow into plants, and what they need to do this.</p> <p>Know that animals including humans have offspring that grow into adults. Know the basic needs for animals and humans to survive and be healthy. Know the difference between living, dead and never been alive. To know that habitats provide the basic needs for survival and know how a basic food chain works.</p> <p style="text-align: center;">Know that materials have different uses and compare suitability for this.</p> <p style="text-align: center;">Know that the shape some solid objects can be changed.</p>
<p>Disciplinary knowledge Working scientifically</p>	<p style="text-align: center;">Communicate his/her ideas what he/she does and what he/she finds out in a variety of ways</p> <p style="text-align: center;">Use simple equipment to observe closely including changes over time</p> <p style="text-align: center;">Use his/her observations and ideas to suggest answers to questions noticing similarities, differences and patterns Identify, group and classify</p> <p style="text-align: center;">Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the NC</p> <p style="text-align: center;">Compare simple comparative tests</p> <p style="text-align: center;">Gather and record data to help in answering questions including from secondary sources of information</p>
<p>Outcomes</p>	<p style="text-align: center;">Progression by the end of key stage 1</p> <p style="text-align: center;">Living Things and their Habitats</p> <p>Some things are living, some were once living but now dead and some things have never lived. Different animals and plants live in different places. Living things are adapted to survive in different habitats. There is variation between all living things. Environmental change can affect the plants and animals that live there.</p> <p>Plants Plants usually grow from seed and bulbs. Flowering plants make seeds to reproduce and make more plants. Some plants die after producing seed and others live for many generations. Plants need warmth, light and water to grow and survive.</p>

Animals Including Humans

Animals need food to survive. Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy. Exercise keeps animals' bodies in good condition and increases survival chances. Different animals move in different ways to help them survive. Animals grow until they reach maturity and then do not grow any larger. Animals reproduce new animals when they reach maturity.

Use of Everyday Materials

Materials have describable properties. Different materials have different properties. Materials can be changed by physical force (twisting, bending, squashing and stretching).

Variation and Evolution

Larger masses take bigger pushes and pulls to move or stop them. Bigger pushes and pulls have bigger effects. Pushing and pulling can change the shape of things.

Gathering and Presenting Evidence

Sort things into groups according to own criteria and choose a title for sorting. Record observations over time. Talk about different drawings and charts. Perform a simple test. Ask a simple question and consider how that question could be answered. Make simple measurements. Identify similarities and differences.

Interpreting Results/Evidence Talk about the investigation / enquiry being carried out and discuss what they have found out. Make comparisons using simple scientific vocabulary. Use photographs / diagrams to record answers to how/why questions. Use scientific vocabulary when making comparisons. Explain whether what happened was what they expected and if not why not. Collect data on templates provided.

Explaining Talk about their findings using the science vocabulary related to the key concept. Use diagrams, photos, pictures to show findings in a simple form. Use own observations to suggest why something happened.

George Washington Carver

Exploration of local area and immediate environment

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Enrichment opportunities

Year 2 - Suggested Linked Texts (Reading Across the Curriculum)

The Tin Forest
(Helen Ward)

Handa's Surprise
(Eileen Brown)

The Gruffalo
(Julia Donaldson)

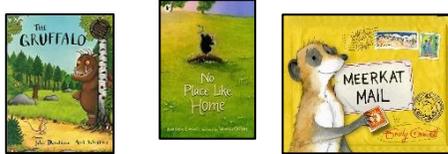
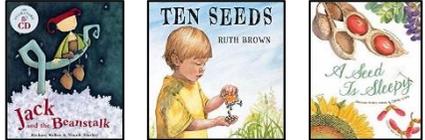
Jack and the Beanstalk
(Richard Walker)

Traction Man
(Mini Grey)

Once There Were Giants
(Martin Waddell and Penny Dale)

Meerkat Mail
(Emily Gravett)

Ten Seeds
(Ruth Brown)

	<p>Three Little Pigs (Lesley Sims)</p> 	<p>Tadpole's Promise (Jeanne Willis and Tony Ross)</p> 	<p>No Place Like Home (Jonathon Emmett)</p> 	<p>A Seed Is Sleepy (Dianna Aston)</p> 
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Year 3

Year 3 – Knowledge and Understanding

	Light	Forces and Magnets	Rocks	Plants	Animals inc. Humans
Year 3	<p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p>	<p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>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.</p> <p>Describe magnets as having two poles.</p>	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p> <p>Recognise that soils are made from rocks and organic matter.</p>	<p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>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.</p> <p>Invest the way in which water is transported within plants</p> <p>Explore the part of the flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</p>	<p>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.</p> <p>Identify that humans and some animals have skeletons and muscles for support, protection and movement.</p>

	<p>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>Find patterns in the way that the size of shadows change.</p>	<p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>			
	Famous scientists				
	<p>James Clerk Maxwell (Visible and Invisible Waves of Light)</p>	<p>William Gilbert (Theories on Magnetism)</p> <p>Andre Marie Ampere (Founder of Electro-Magnetism)</p>	<p>Mary Anning (Discovery of Fossils)</p> <p>Inge Lehmann (Earth's Mantle)</p>	<p>Jan Ingenhousz (Photosynthesis)</p> <p>Joseph Banks (Botanist)</p>	<p>Adelle Davis (20th Century Nutritionist)</p> <p>Marie Curie (Radiation / X-Rays)</p>
Vocabulary	<p>Plants Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal</p> <p>Light Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous</p> <p>Forces and magnets Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole</p> <p>Rocks and soils Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil</p> <p>Animals and humans Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints</p>				

Children will know:

The functions of different parts of plants. The role plants and pollination and seed dispersal plays in the life cycle of plants.
Know the requirements for plants to grow and how they differ from plant to plant.

Know how water is transported within plants.

Know that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food.

Know that humans and some other animals have skeletons and muscles for support, protection and movement.

Know how to group and compare rocks. Know how fossils are formed and how soil is made. Know that we need light to see, how shadows are formed and how they can be changed, that the light from the sun can be dangerous and that light is reflected from surfaces.

Know that things move differently on some surfaces, know that magnet forces can act at a distance, but some forces need contact, know that magnets attract or repel each other and know some magnetic materials, know that magnets have two poles and this will make a magnet attract or repel.

Substantive knowledge

Ask different types of questions and use different types of scientific enquiries to answer them

Make systematic and careful observations, and where appropriate, take accurate measurement using standard units, using a range of equipment, including thermometers and data loggers

Set up simple practical enquiries, comparative and fair tests

Gather, record, classify and present data in a variety of ways to help in answering questions

Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables

Report on findings from, including oral and written explanations, displays or presentations of results and conclusions

Use results to draw simple conclusions, make predictions and new values, suggest improvements and raise further questions

Identify differences, similarities or changes related to simple scientific ideas and processes

Use straightforward scientific evidence to answer questions or to support his/her findings

**Disciplinary knowledge
Working scientifically**

Progression Y3

Plants

Plants have roots to provide support and to draw moisture from the soil, through stems to take water to the rest of the plant. Leaves absorb sunlight and carbon dioxide through leaves. Plants make their own food in their leaves to provide them with energy, grow, repair and reproduce. The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of plants (mainly leaves). Flowering plants have evolved specific parts to carry out pollination, fertilisation and seed growth. Seed dispersal improves chances of enough seeds germinating and growing to mature plants. Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth.

Animals Including Humans

Movable joints connect bones. Muscles are connected to bones and move them when they contract. Many animals have skeletons to support their bodies and protect vital organs.

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.

Lights

Light comes from a source. Transparent materials let light through them and opaque materials do not let light through. Beams of light bounce off some materials. Shiny materials reflect light beams better than non-shiny materials. There must be light for us to see. Without light it is dark. We need light to see things, even shiny things.

Forces

Magnets exert attractive and repulsive forces (including non-contact forces) on each other. Magnets exert non-contact forces, which work through some materials. Magnets exert attractive forces on some materials. Magnetic forces are affected by: magnet strength, object mass, distance from object and object material.

Gathering and Presenting Evidence

Begin to raise their own questions about the world around them. Begin to make some decisions about which types of enquiry will be the best way of answering questions. Plan how to carry out a simple investigation. Begin to make systematic and careful observations. Decide what to observe and how long to collect observations. Measure accurately using equipment with which they are familiar. Record measurements on simple tables. Begin to help decide which variables to keep the same and which to change. Use simple keys. Decide upon criteria for sorting and classifying.

Interpreting Results/Evidence

Begin to collect data in a variety of ways, including labelled diagrams, bar charts and tables. Record findings using simple scientific vocabulary. Begin to communicate findings using simple scientific language. Suggest improvements to their test.

Explaining

Begin to draw simple conclusions based on the results of my enquiry. Answer my questions using the results of my enquiry. Begin to use my findings to make new predictions, suggest improvements and think of new questions. Begin to think of cause and effect in my explanations.

Outcomes

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Enrichment opportunities

Shropshire hills visit

James Clerk Maxwell
 (Visible and Invisible Waves of Light)
 William Gilbert
 (Theories on Magnetism) Andre Marie Ampere
 (Founder of Electro-Magnetism)
 Mary Anning
 (Discovery of Fossils) Inge Lehmann
 (Earth's Mantle)
 Jan Ingenhousz
 (Photosynthesis) Joseph Banks
 (Botanist)
 Adelle Davis
 (20th Century Nutritionist) Marie Curie
 (Radiation / X-Rays)

Year 3 - Suggested Linked Texts (Reading Across the Curriculum)

The Owl Who Was Afraid of the Dark
 (Jill Tomlinson)

The Dark
 (Lemony Snicket)

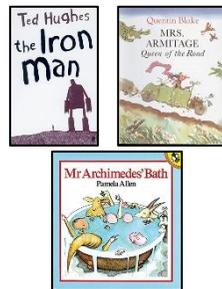
The Firework-Maker's Daughter
 (Philip Pullman)



The Iron Man
 (Ted Hughes)

Mrs Armitage: Queen of the Road
 (Quentin Blake)

Mr Archimedes' Bath
 (Pamela Allen)



The Pebble in My Pocket
 (Meredith Hooper)

Stone Girl, Bone Girl
 (Laurence Anholt)

The Street Beneath My Feet
 (Charlotte Guillain & Yuval Zommer)



The Story of Frog Belly Rat Bone
 (Timothy Basil Ering)

The Hidden Forest
 (Jeannie Baker)

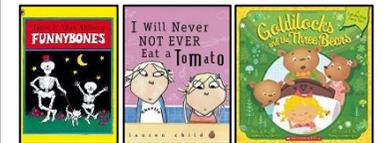
George and Flora's Secret Garden
 (Jo Elworthy)



Funnybones
 (Janet and Allan Ahlberg)

I Will Never Not Ever Eat a Tomato
 (Lauren Child)

Goldilocks and the Three Bears
 (Samantha Berger)



Year 4

Year 4 – Knowledge and Understanding

	Sound	States of Matter	Living Things and their Habitats	Electricity	Animals inc. Humans
Year 4	<p>Identify how sounds are made, associating some of them with something vibrating.</p> <p>Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases.</p>	<p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius.</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>Recognise that living things can be grouped in a variety of ways.</p> <p>Explore and use classification keys to help group, identify, and name a variety of living things in their local and wider environment.</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<p>Identify common appliances that run on electricity</p> <p>Construct a simple electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>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.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>Identify the different types of teeth in humans and their simple functions.</p> <p>Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>
Famous Scientists					

	<p>Aristotle (Sound Waves)</p> <p>Gaillileo Gailliei (Frequency and Pitch of Sound Waves)</p> <p>Alexander Graham Bell (Invented the Telephone)</p>	<p>Anders Celcius (Celcius Temperature Scale)</p> <p>Daniel Fahrenheit (Fahrenheit Temperature Scale / Invention of the Thermometer)</p>	<p>Cindy Looy (Environmental Change and Extinction)</p> <p>Jaques Cousteau (Marine Biologist)</p>	<p>Thomas Eddison (First Working Lightbulb)</p> <p>Joseph Swan (Incadesecant Light Bulb)</p>	<p>Ivan Pavlov (Digestive System Mechanisms)</p> <p>Joseph Lister (Discovered Antiseptics)</p>
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Vocabulary	Living things and habitats	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate
	Animals and humans	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain
	Electricity	Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol
	Sound	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation
	States of matter	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

Substantive knowledge	Children will know:	
	That living things can be grouped in a range of ways, to use a classification key to help group them and changes to the environment can pose dangers to them.	
	Know the functions of basic parts of the digestive system, know the simple functions and different types of teeth, know how a variety of food chains work.	
	Know what makes a material a solid, liquid or gas, and how states of matter can change.	
	Know the role of evaporation and condensation in the water cycle.	
	Know how sounds are made and what vibration is, Know how sounds change with distance,	
Know that common appliances run on electricity, know the parts of and how to make an electrical circuit, including a lamp and switch, know what materials make good conductors and insulators.		

<p>Disciplinary Knowledge (working scientifically)</p>	<p>Ask relevant questions and use different types of scientific enquiries to answer them Set up simple practical enquiries, comparative and fair tests Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers*Gather, record, classify and present data in a variety of ways to help in answering questions Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables Report on findings from, including oral and written explanations, displays or presentations of results and conclusions Use results to draw simple conclusions, make predictions and new values, suggest improvements and raise further questions</p> <p>Identify differences, similarities or changes related to simple scientific ideas and processes</p> <p>Use straightforward scientific evidence to answer questions or to support his/her findings</p>
<p>Outcomes</p>	<p>Progression Y4</p> <p>.Living Things and their Habitats Living things can be divided into groups based upon their characteristics. Different food chains occur in different habitats. Different organisms and habitats are affected by environmental change. Environmental change affects different habitats differently. Human activity significantly affects the environment.</p> <p>Animals Including Humans Different animals are adapted to eat different foods. Animals have teeth to help them eat. Different types of teeth do different jobs. Nutrients produced by plants move to primary consumers then to secondary consumers through food chains. Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body.</p> <p>State of Matter (Materials) Materials change state by heating and cooling. Some changes can be reversed and some cannot. When two or more substances are mixed and remain present the mixture can be separated. Heating causes changes of state. The temperature at which given substances change state are always the same. Materials can be divided into solids, liquids and gases. Solids, liquids and gases are described by observable properties.</p> <p>Electricity Electricity powers many common appliances. A source of electricity (mains or battery) is needed for electrical devices to work. Electricity sources push electricity round a circuit. More batteries will push the electricity round the circuit faster. Devices work harder when more electricity goes through them. Conductors allow electricity to flow easily and insulators don't. A complete circuit is needed for electricity to flow and devices to work.</p> <p>Exploring and Planning Raise their own questions about the world around them. Decide which different types of scientific enquiry to answer questions. Think about what they can measure and make accurate measurements. Plan how they will record results.</p> <p>Gathering and Presenting Evidence With increasing independence make systematic and careful observations. Measure accurately using new equipment. Present results in charts or graphs. Make systematic and careful observations over time. Help decide which variables to keep the same and which to change. Collect data in a variety of ways, including labelled diagrams, bar charts and tables.</p> <p>Interpreting Results/Evidence</p>

Look for patterns, changes, similarities and differences. Decide how to record and analyse data by selecting from a range of taught methods. Talk about and identify differences and similarities in the properties or behaviour of living things, materials and other scientific phenomena. Identify new questions arising from data. Make predictions for new values within or beyond the data they have collected.

Explaining

Draw simple conclusions based on the results of my enquiry. Answer my questions using the results of my enquiry. Use my findings to make new predictions, suggest improvements and think of new questions. Consider cause and effect in my explanations.

Aristotle
(Sound Waves)

Gailileo Galilei(Frequency and Pitch of Sound Waves)

Alexander Graham Bell(Invented the Telephone)
Anders Celcius(Celcius Temperature Scale)

Daniel Fahrenheit(Fahrenheit Temperature Scale / Invention of the Thermometer)

Cindy Looy(Environmental Change and Extinction)

Jaques Cousteau(Marine Biologist)
Thomas Eddison(First Working Lightbulb)

Joseph Swan(Incaledesecant Light Bulb)
Ivan Pavlov(Digestive System Mechanisms)

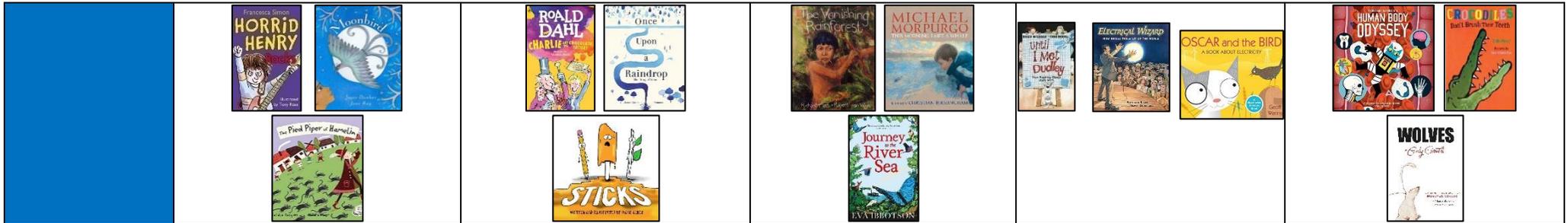
Joseph Lister(Discovered Antiseptics)
Visits to local museums in the Ironbridge Gorge

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Enrichment opportunities

Year 4 - Suggested Linked Texts (Reading Across the Curriculum)

<i>Horrid Henry Rocks</i> (Francesca Simon)	<i>Charlie and the Chocolate Factory</i> (Roald Dahl)	<i>The Vanishing Rainforest</i> (Richard Platt)	<i>Until I Met Dudley</i> (Roger McGough)	<i>Human Body Odyssey</i> (Werner Holzwarth)
<i>Moonbird</i> (Joyce Dunbar)	<i>Once Upon a Raindrop: The Story of Water</i> (James Carter)	<i>The Morning I Met a Whale</i> (Michael Morpurgo)	<i>Oscar and the Bird: A Book about Electricity</i> (Geoff Waring)	<i>Crocodiles Don't Brush Their Teeth</i> (Colin Fancy)
<i>The Pied Piper of Hamelin</i> (Natalia Vasquez)	<i>Sticks</i> (Diane Alber)	<i>Journey to the River Sea</i> (Eva Ibbotson)	<i>Electrical Wizard: How Nikola Tesla Lit Up the World</i> (Elizabeth Rusch)	<i>Wolves</i> (Emily Gravett)



Year 5

Year 5 – Knowledge and Understanding

	Forces and magnets	Earth and Space	Materials	Living Things and their Habitats	Animals including humans
Year 5	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction that act between moving surfaces.</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	<p>Describe the movement of the Earth, and the other planets, relative to the Sun in the solar system.</p> <p>Describe the movement of the Moon relative to the Earth.</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies.</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>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.</p> <p>Recognise that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>Describe the life process of reproduction in some plants and animals.</p>	<p>Describe the changes as humans develop to old age</p>

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.

Famous Scientists

Galileo Galilei
(Gravity and Acceleration)

Isaac Newton
(Gravitation)

Archimedes of Syracuse
(Levers)

Claudius Ptolemy and Nicolaus Copernicus
(Heliocentric vs Geocentric Universe)

Neil Armstrong
(First man on the Moon)

Helen Sharman
(First British astronaut)

Tim Peake
(First British ESA astronaut)

Spencer Silver, Arthur Fry and Alan Amron
(Post-It Notes)

Ruth Benerito
(Wrinkle-Free Cotton)

David Attenborough
(Naturalist and Nature Documentary Broadcaster)

James Brodie of Brodie
(Reproduction of Plants by Spores)

Thomas Young
(Wave Theory of Light)

Ibn al-Haytham (Alhazen)
(Light and our Eyes)

<p>Vocabulary</p>	<p>Earth and Space Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets</p> <p>Materials Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material</p> <p>Forces Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p> <p>Animals including humans Vocab to be decided alongside PSHE puberty topic</p> <p>Living things and habitats Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings</p>
<p>Substantive Knowledge</p>	<p style="text-align: center;">Children will know:</p> <p style="text-align: center;">The difference in life cycles, and know the life process of reproduction in some animals and plants. Know the changes in humans as they develop in old age.</p> <p style="text-align: center;">Know the difference between reversible and irreversible change and compare and group materials and substances based upon their properties.</p> <p style="text-align: center;">Know that gravity causes unsupported objects to fall, know the effects of a range of forces and how mechanisms can allow a smaller force to have a greater effect.</p> <p style="text-align: center;">Know how the movement of the Earth, and the other planets, relative to the Sun in the solar system.</p> <p style="text-align: center;">Know the movement of the moon relative to Earth, know that the Sun, Earth and Moon are approximately spherical bodies.</p> <p style="text-align: center;">Know how the Earth's rotation explains day and night and the apparent movement of the sun across the sky.</p>
<p>Disciplinary Knowledge (working scientifically)</p>	<p style="text-align: center;">Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary Take measurements using scientific equipment, with increasing accuracy and precision, taking repeat findings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p style="text-align: center;">Use test result to make predictions to set up further comparative and fair tests</p> <p style="text-align: center;">Report and present findings from enquiries including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations identify scientific evidence that has been used to support or refute ideas or arguments</p>
<p>Outcomes</p>	<p style="text-align: center;">Progression Y5</p> <p style="text-align: center;">.Living Things and their Habitats including animals Describe the changes as humans develop to old age. Describe differences in life cycles. Describe the life process of reproduction in some plants and animals</p> <p style="text-align: center;">Properties and Changes of Materials</p> <p style="text-align: center;">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.</p> <p style="text-align: center;">Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p>

Use knowledge of solids, liquids and gases to decide how mixtures might be separated.
Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials.

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 across the sky.

Forces

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.

Exploring and Planning

Begin to independently explore ideas and ask my own questions about scientific phenomena.

Begin to plan different types of scientific enquiry to answer questions.

Begin to decide which variables to control.

Gathering and Presenting Evidence

Make accurate and precise measurements. Decide what to observe, how long to observe for and whether to repeat them. Take accurate and precise measurements using standard units. Select equipment on my own and can explain how to use it accurately.

Set up a range of comparative and fair tests.

Begin to explain which variables need to be controlled and why.

Begin to suggest improvements to my test, giving reasons.

Begin to record data and results of increasing complexity. Begin to develop my own keys and other information records to classify and describe.

Interpreting Results/Evidence

Begin to draw scientific, causal conclusions using the results of an enquiry to justify my ideas.

Begin to communicate findings using detailed scientific language.

Explaining

Begin to explain my conclusion using scientific knowledge and understanding.

Begin to distinguish opinion and facts. Begin to use my findings to make predictions and set up further enquiries.

Begin to use abstract models to explain my ideas.

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Galileo Galilei (Gravity and Acceleration)

Isaac Newton (Gravitation)

Archimedes of Syracuse (Levers)

Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe)

Neil Armstrong (First man on the Moon)

Helen Sharman (First British astronaut)

Enrichment opportunities

Tim Peake (First British ESA astronaut)
 Spencer Silver,
 Arthur Fry and Alan Amron (Post-It Notes)

Ruth Benerito (Wrinkle-Free Cotton)
 David Attenborough (Naturalist and Nature Documentary Broadcaster)

James Brodie of Brodie (Reproduction of Plants by Spores)
 Thomas Young (Wave Theory of Light)

Ibn al-Haytham (Alhazen) (Light and our Eyes)
 Visit to enginuity, links with local secondary schools.

Year 5 - Suggested Linked Texts (Reading Across the Curriculum)

The Enormous Turnip
 (Katie Daynes)

Leonardo's Dream
 (Hans de Beer)

The Aerodynamics of Biscuits
 (Clare Helen Welsh)



The Skies Above My Eyes
 (Charlotte Guillain & Yuval Zommer)

George's Secret Key to the Universe
 (Lucy and Stephen Hawking with Christophe Galfard)

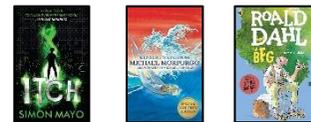
The Way Back Home
 (Oliver Jeffers)



Itch
 (Simon Mayo)

Kensuke's Kingdom
 (Michael Morpurgo)

The BFG
 (Roald Dahl)



Charlotte's Web
 (E.B. White)

The Land of Neverbelieve
 (Norman Messenger)

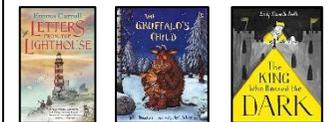
Mummy Laid an Egg
 (Babette Cole)



Letters from the Lighthouse
 (Emma Carroll)

The Gruffalo's Child
 (Julia Donaldson)

The King Who Banned the Dark
 (Emily Haworth-Booth)



Year 6
Year 6– Knowledge and Understanding

Year 6	Living Things and their Habitats	Evolution and Inheritance	Animals inc. Humans	Light	Electricity
	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.	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.	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.	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 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.	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 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
	Famous Scientists				
	Carl Linnaeus (Identifying, Naming and Classifying Organisms)	Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection) Jane Goodall (Chimpanzees)	Justus von Liebig (Theories of Nutrition and Metabolism) Sir Richard Doll (Linking Smoking and Health Problems) Leonardo Da Vinci (Anatomy)		

<p>Vocabulary</p>	<p>Electricity Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage - NB Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words cells and batteries are now used interchangeably</p> <p>Light As for year 3 plus straight lines, light rays.</p> <p>Living things and habitats Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering</p> <p>Evolution and Inheritance Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p> <p>Animals including humans Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</p>
<p>Substantive knowledge</p>	<p style="text-align: center;">Children will know:</p> <p>How to classify plants and animals based upon specific characteristics, know the main parts of the human circulatory system, and the functions of the heart, blood vessels and blood.</p> <p style="padding-left: 40px;">Know the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p style="padding-left: 80px;">Know how water and nutrients are transported within bodies.</p> <p style="padding-left: 80px;">Know how light travels, and how we see things because of this.</p> <p>Know how the voltage of cells used in a circuit, and the position of a switch will affect the brightness of a bulb, or sound of a buzzer.</p> <p style="padding-left: 40px;">Know how to record circuits using symbols.</p> <p style="padding-left: 40px;">Know that animals and plants have adapted overtime and why this might lead to evolution.</p> <p style="padding-left: 40px;">Know that fossils provide information about what inhabited the world millions of years ago.</p> <p style="padding-left: 40px;">Know that living things produce offspring of the same kind, however they vary and are not identical.</p>
<p>Disciplinary Knowledge (working scientifically)</p>	<p>Plan different types of scientific enquiries to answer their own or others questions, including recognising and controlling variables where necessary</p> <p>Take measurements, using scientific equipment, with increasing accuracy and precision, taking repeat findings when appropriate</p> <p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p style="padding-left: 40px;">Use test result to make predictions to set up further comparative and fair tests</p> <p>Report and present findings from enquiries including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</p> <p style="padding-left: 40px;">Identify scientific evidence that has been used to support or refute ideas or arguments</p>

Outcomes

Progression by the end of key stage 2

Animals Including Humans

Identify and name the main parts of the human circulatory system. 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.

Living Things and their Habitats

Describe how living things are classified into broad groups according to common observable characteristics, similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.

Evolution and Inheritance

Recognise that living things have changed over time. Recognise 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.

Light

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. 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. Use recognised symbols when representing a simple circuit in a diagram.

Electricity

Associate the brightness of a bulb or the volume of a buzzer with the number and voltage of cells in a circuit. Compare and give reasons for variations in how components function.

Exploring and Planning

Plan different types of scientific enquiry to answer questions. Decide which variables to control.

Gathering and Presenting Evidence Make accurate and precise measurements. Decide what to observe, how long to observe for and whether to repeat them. Take accurate and precise measurements using standard units N, g, kg, mm, cm, mins, seconds, cm²V, km/h, m per sec, m/ sec. Select equipment on my own and can explain how to use it accurately. Record data and results of increasing complexity. Choose how best to present data. Communicate findings using detailed scientific language.

Interpreting Results/Evidence

Draw scientific, causal conclusions using the results of an enquiry to justify my ideas. Distinguish opinion and facts. Use my findings to make predictions and set up further enquiries.

Explaining

Explain my conclusion using scientific knowledge and understanding. Begin to use abstract models to explain my ideas. Explain my ideas with scientific reasons. Use scientific conventions eg trends, rogue result, support prediction.

Diversity in science – significant scientists, discoveries and achievements from a range of cultures.

Enrichment opportunities

Carl Linnaeus (Identifying, Naming and Classifying Organisms)

Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection)

Jane Goodall (Chimpanzees)

Justus von Liebig (Theories of Nutrition and Metabolism)

Sir Richard Doll (Linking Smoking and Health Problems)

Leonardo Da Vinci (Anatomy)

Visit to local museums, Ironbridge, ~Shrewsbury and think tank.

Links with local secondary schools.

Year 6 - Suggested Linked Texts (Reading Across the Curriculum)

Beetle Boy
(M G Leonard)

Insect Soup
(Barry Louis Polisar)

Fur and Feathers
(Janet Halfmann)



One Smart Fish
(Christopher Wormell)

The Molliebird
(Jules Pottle)

Our Family Tree
(Lisa Westberg Peters)



Pig-Heart Boy
(Malorie Blackman)

Skellig
(David Almond)

A Heart Pumping Adventure
(Heather Manley)



Hair in Funny Places
(Babette Cole)

Giant
(Kate Scott)

You're Only Old Once!
(Dr. Seuss)

