

### The Ryde School Substantive and Disciplinary Knowledge Map

Key Stage 1 National Curriculum Strands						
<b>KS1 Working Scientifically</b> <ul style="list-style-type: none"> <li>● Asking simple questions and recognising that they can be answered in different ways</li> <li>● Observing closely, using simple equipment</li> <li>● Performing simple tests</li> <li>● Identifying and classifying</li> <li>● Using their observations and ideas to suggest answers to questions</li> <li>● Gathering and recording data to help in answering questions.</li> </ul>	Year 1					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including Humans	Plants	Everyday Materials	Seasonal Changes		
	Year 2					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including humans	Living things and their habitats	Plants	Everyday Materials		
Lower Key Stage 2 National Curriculum Strands						
<b>Lower KS2 Working Scientifically</b> <ul style="list-style-type: none"> <li>● asking relevant questions and using different types of scientific enquiries to answer them</li> <li>● Setting up simple practical enquiries, comparative and fair tests</li> <li>● Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>● Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>● Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>● Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>● Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>● Identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>● Using straightforward scientific evidence to answer questions or to support their findings</li> </ul>	Year 3					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including Humans	Plants	Rocks	Forces	Light	
	Year 4					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including humans	Living things and their habitats	States of Matter	Electricity	Sound	
Upper Key Stage 2 National Curriculum Strands						
<b>Upper KS2 Working Scientifically</b> <ul style="list-style-type: none"> <li>● planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>● taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</li> <li>● recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>● using test results to make predictions to set up further comparative and fair tests</li> <li>● 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</li> <li>● identifying scientific evidence that has been used to support or refute ideas or arguments</li> </ul>	Year 1					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including Humans	Living things and their habitats	Properties and Changes in Materials	Forces	Earth in Space	
	Year 2					
	<b>Biology</b>		<b>Chemistry</b>	<b>Physics</b>		
	Animals, including humans	Living things and their habitats	Evolution and Inheritance		Electricity (Circuits)	Light

Year 1	Substantive Knowledge			
	Seasons	Materials	Animals, Including Humans	Plants
<p>KS1 End Points (NC)</p> <ul style="list-style-type: none"> <li>● Has experienced and observed phenomena, having looked more closely at the natural and humanly constructed world around them.</li> <li>● Shows curiosity, asking questions about what they have noticed.</li> <li>● Has developed understanding of scientific ideas through the use of different types of scientific enquiry to answer own questions, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information.</li> <li>● Is beginning to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.</li> </ul>	<ul style="list-style-type: none"> <li>● Knows when each of the four seasons occurs</li> <li>● Knows that days are longer in summer (sunshine hours) than in winter</li> <li>● Observe changes across the four seasons</li> <li>● Observe and describe weather associated with the seasons.</li> <li>● Knows and can describe the features/weather of different seasons and how they change through the year</li> </ul>	<ul style="list-style-type: none"> <li>● Distinguish between an object and the material from which it is made</li> <li>● Can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock (and others)</li> <li>● Describe the simple physical properties of a variety of everyday materials</li> <li>● Compare and group together a variety of everyday materials on the basis of their simple physical properties</li> <li>● Know how the properties of a material can make it useful for a range of different purposes (for example, plastic is waterproof so it can be used to coat fabric for clothing but can also be used for outdoor play equipment)</li> <li>● Knows that different materials can share the same properties (for example glass and plastic can both be transparent)</li> </ul>	<ul style="list-style-type: none"> <li>● Knows and can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals e.g. cat, robin, adder, frog, salmon.</li> <li>● Knows and can identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>● Can identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</li> <li>● Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> <li>● Know the animals that can be found in the local environment habitats.</li> </ul>	<ul style="list-style-type: none"> <li>● Knows and can identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>● Knows and can identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ul>
Disciplinary				
	Seasons	Materials	Animals, Including Humans	Plants
<p>KS1 Skills End Points (Working scientifically):</p> <ul style="list-style-type: none"> <li>● Asks simple questions and recognises that they can be answered in different ways.</li> <li>● Observes closely, using simple equipment.</li> <li>● Performs simple tests.</li> <li>● Can identify and classify</li> <li>● Uses their observations and ideas to suggest answers to questions.</li> <li>● Gathers and records data to help in answering questions</li> </ul>	<ul style="list-style-type: none"> <li>● Gather and record data about weather conditions in autumn, drawing on observation and using simple equipment (such as a container to measure rainfall)</li> <li>● Use data to create a pictogram and use this to describe changes in day length over the seasons.</li> <li>● Use their evidence to describe some other features of the weather, surroundings, themselves, animals, and plants found in autumn.</li> <li>● Demonstrate their knowledge in different ways e.g. creating seasonal artwork, creating a pictogram (and use this to ask and answer related questions)</li> <li>● Present this information in tables and charts to compare the weather across the seasons</li> <li>● Collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans</li> </ul>	<p>Compare and group together a variety of everyday materials on the basis of their simple physical properties.</p> <ul style="list-style-type: none"> <li>● Classify objects made of one material in different ways e.g. a group of objects made of metal.</li> <li>● Classify one type of object made from a range of materials e.g. a collection of spoons made of different materials.</li> <li>● Chosen an appropriate method for testing an object for a particular property.</li> <li>● Use their test evidence to answer the questions about properties e.g. Which cloth is the most absorbent?</li> <li>● Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters</li> </ul>	<ul style="list-style-type: none"> <li>● Make first hand close observations of animals from each of the groups</li> <li>● Compare the structure of two animals from the same or different group e.g wings, feathers, vertebrates/invertebrates.</li> <li>● Classify animals using a range of features e.g. lay eggs/give birth to live young. herbivore, omnivore (these terms do not have to be explicitly taught).</li> <li>● Identify animals by matching statements to named images.</li> <li>● Take measurements of parts of the body and present results in a table to interpret.</li> <li>● Conduct simple sense experiments. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match?</li> </ul>	<ul style="list-style-type: none"> <li>● Can sort and group parts of plants using similarities and differences e.g. the shape of leaves, the colour of the flower/blossom.</li> <li>● Can use simple charts and Venn diagrams etc. to identify and classify plants.</li> <li>● Use photographs and their own observations to talk about how plants change over time (e.g. seed to sapling to tree) and over the year (deciduous and fruit bearing trees).</li> <li>● Plant seeds and observe how they grow and change by making simple observations.</li> <li>● Point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green, the leaves may be different shapes</li> </ul>
<p>LOTG Activities</p>				

Year 2	Substantive Knowledge			
<p>KS1 End Points (NC)</p> <ul style="list-style-type: none"> <li>● Has experienced and observed phenomena, having looked more closely at the natural and humanly constructed world around them.</li> <li>● Shows curiosity, asking questions about what they have noticed.</li> <li>● Has developed understanding of scientific ideas through the use of different types of scientific enquiry to answer own questions, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information.</li> <li>● Is beginning to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.</li> </ul>	Animals Including humans	Use of everyday materials	Living Things and their habitats	Plants
	<ul style="list-style-type: none"> <li>● Can describe how animals including humans have offspring which grow into adults, using the appropriate names for the stages</li> <li>● Knows that to survive animals need sunlight, water, air, food and a suitable habitat (including shelter for protection from predators and the environment.</li> <li>● Knows that exercise is important to humans and can explain why.</li> <li>● Knows the different food groups and the benefits of each as part of a healthy, balanced diet</li> <li>● Knows which food groups common foods belong to.</li> <li>● Knows about general hygiene and its importance and can state examples of hygienic practice</li> </ul>	<ul style="list-style-type: none"> <li>● Knows and can explain why some materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard are particularly suited to specific purposes.</li> <li>● Knows how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> <li>● Knows the difference between materials that are transparent, translucent and opaque.</li> </ul>	<ul style="list-style-type: none"> <li>● Knows and can explain the differences between things that are living, dead, and things that have never been alive</li> <li>● Knows that most living things live in habitats to which they are suited.</li> <li>● Knows and can describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</li> <li>● Knows and can name a variety of plants and animals in their habitats, including micro-habitats.</li> <li>● Knows and can describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and make the different sources of food.</li> </ul>	<ul style="list-style-type: none"> <li>● Knows that plants may grow from either seeds or bulbs.</li> <li>● Knows that seeds and bulbs can germinate and then grow into seedlings and then continue to grow into mature plants.</li> <li>● Knows that mature plants may have flowers which then develop into seeds, berries and fruits etc.</li> <li>● Knows that seeds and bulbs need to be planted at particular times of the year and will germinate and grow at different rates.</li> <li>● Knows that some plants are better suited to growing in full sun and some grow better in partial and full shade.</li> <li>● Knows that plants need water, light and a suitable temperature to grow and stay healthy</li> </ul>
Disciplinary				
<p>KS1 Skills End Points (Working scientifically):</p> <ul style="list-style-type: none"> <li>● Asks simple questions and recognises that they can be answered in different ways.</li> <li>● Observes closely, using simple equipment.</li> <li>● Performs simple tests.</li> <li>● Can identify and classify</li> <li>● Uses their observations and ideas to suggest answers to questions.</li> <li>● Gathers and records data to help in answering questions</li> </ul>	Animals Including humans	Materials	Living Things and their habitats	Plants
	<ul style="list-style-type: none"> <li>● Investigate the effect of exercise on their bodies</li> <li>● Classify food in a range of ways, including using the Eatwell guide</li> <li>● Investigate washing hands, using glitter gel</li> <li>● Describe, using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child</li> <li>● Measure/observe how animals, including humans, grow.</li> <li>● Collate what they know about looking after a baby/animal by creating a parenting/pet owners' guide</li> <li>● Explain how development and health might be affected by differing conditions and needs being met/not met</li> <li>● Ask questions and use secondary sources to find out about the life cycles of some animals</li> <li>● Observe animals growing over a period of time e.g. chicks, caterpillars, a baby</li> <li>● Ask questions of a parent about how they look after their baby</li> <li>● Ask pet owners questions about how they look after their pet</li> </ul>	<ul style="list-style-type: none"> <li>● Classify and sort materials by their properties e.g. manmade, natural</li> <li>● Investigate and observe what happens to different materials during testing and use this to inform explanation of their properties</li> <li>● Investigate which materials are fit for a purpose e.g. What is the best material for an umbrella?</li> <li>● Explain from their observations how materials change when a force is exerted on them by squashing, bending, twisting and stretching.</li> <li>● Investigate the transparency of objects, recording class data in a table and drawing simple conclusions from the findings.</li> <li>● Ask and answer questions about everyday materials</li> </ul>	<ul style="list-style-type: none"> <li>● Explore the outside environment regularly to find objects that are living, dead and have never lived</li> <li>● Classify objects found in the local environment</li> <li>● Observe animals and plants carefully, drawing and labelling diagrams</li> <li>● Create simple food chains for a familiar local habitat from first hand observation and research</li> <li>● Create simple food chains from information given e.g. in picture books (Gruffalo etc.)</li> <li>● Can sort into living, dead and never lived</li> <li>● Can give key features that mean the animal or plant is suited to its microhabitat</li> <li>● Using a food chain can explain what animals eat</li> <li>● Can explain in simple terms why an animal or plant is suited to a habitat</li> </ul>	<ul style="list-style-type: none"> <li>● Make close observations of seeds and bulbs</li> <li>● Classify seeds and bulbs</li> <li>● Research and plan when and how to plant a range of seeds and bulbs</li> <li>● Look after the plants as they grow – weeding, thinning, watering etc.</li> <li>● Make close observations and measurements of their plants growing from seeds and bulbs</li> <li>● Make comparisons between plants as they grow</li> <li>● Can spot similarities and difference between bulbs and seeds</li> </ul>
LOT Activities				

Year 3	Substantive Knowledge				
	Rocks	Animals including humans	Magnets and forces	Plants	Light
<p>Lower KS2 End Points (NC):</p> <ul style="list-style-type: none"> <li>● Has broadened their scientific view of the world around them through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living and non-living things and familiar environments and by beginning to develop ideas about functions, relationships and interactions.</li> <li>● Asks their own questions about what they observe and is able to make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.</li> <li>● Draws simple conclusions and uses some scientific language, to both and write about what they have found out.</li> <li>● Reads and spells scientific vocabulary correctly and with confidence, using their growing word and spelling knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>● Rock is a naturally occurring material.</li> <li>● There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties.</li> <li>● Rocks can be hard or soft. They have different sizes of grain or crystal.</li> <li>● Rocks can be different shapes and sizes (stones, pebbles, boulders) and some absorb water.</li> <li>● Knows, in simple terms, how fossils are formed when things that have lived are trapped within rock.</li> <li>● Knows that soils are made from rocks and organic matter.</li> <li>* Rocks/Fossil Workshop.</li> </ul>	<ul style="list-style-type: none"> <li>● Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need.</li> <li>● Food contains a range of different nutrients that are needed by the body to stay healthy – carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water.</li> <li>● A piece of food will often provide a range of nutrients.</li> <li>● Humans and some other animals have skeletons and muscles which help them move and provide protection and support</li> <li>* Different parts of the body have special functions.</li> </ul>	<ul style="list-style-type: none"> <li>● Knows that friction affects the way that things move on different surfaces</li> <li>● Knows that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>● Knows that magnets attract or repel each other and attract some materials and not others</li> <li>● Knows and can describe magnets as having two poles</li> <li>● Knows whether two magnets will attract or repel each other, depending on which poles are facing.</li> <li>* predict whether 2 magnets will attract or repel each other, depending on which poles are facing</li> </ul>	<ul style="list-style-type: none"> <li>● Knows and can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</li> <li>● Knows 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.</li> <li>● Knows through investigation, the ways in which water is transported within plants</li> <li>● Knows the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</li> </ul>	<ul style="list-style-type: none"> <li>● Knows that light is needed to see things and that dark is the absence of light</li> <li>● Knows that light is reflected from surfaces</li> <li>● knows that light from the sun can be dangerous and that there are ways to protect the eyes</li> <li>● knows that shadows are formed when the light from a light source is blocked by an opaque object.</li> <li>● Knows and can explain some of the reasons why the size of shadows changes.</li> <li>● Knows how the shadows of transparent, opaque and translucent materials vary</li> </ul>
Disciplinary					
	Rocks	Animals including humans	Magnets and forces	Plants	Light
<p>Lower KS2 Skills (Working Scientifically) End Points:</p> <ul style="list-style-type: none"> <li>● Asks relevant questions and use different types of scientific enquiries to answer them.</li> <li>● Sets up simple practical enquiries, comparative and fair tests.</li> <li>● Makes systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</li> <li>● Gathers, records, classifies and presents data in a variety of ways to help in answering questions.</li> <li>● Records findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>● Reports on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> <li>● Uses results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</li> <li>● Identifies differences, similarities or changes related to simple scientific ideas and processes.</li> <li>● Use straightforward scientific evidence to answer questions or to support their findings</li> </ul>	<ul style="list-style-type: none"> <li>● Can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>● Can devise tests to explore the properties of rocks and use data to rank the rocks</li> <li>● Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily</li> <li>● Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc.</li> <li>● Can identify plant/animal matter and rocks in samples of soil</li> <li>● Can devise a test to explore the water retention of soils</li> </ul>	<ul style="list-style-type: none"> <li>● Classify food in a range of ways</li> <li>● Use food labels to explore the nutritional content of a range of food items</li> <li>● Use secondary sources to find out the types of food that contain different nutrients</li> <li>● Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks?</li> <li>● Plan a daily diet contain a good balance of nutrients and record and present findings</li> <li>● Explore the nutrients contained in fast food</li> <li>● Use secondary sources to research the parts and functions of the skeleton</li> <li>● Investigate pattern seeking questions such as ; Can people with longer legs run faster?; Can people with bigger hands catch a ball better?</li> <li>● Compare, contrast, sort and classify skeletons of different animals</li> </ul>	<p>Magnets and forces</p> <ul style="list-style-type: none"> <li>● Record and report on findings from investigations, involving how things move on different surfaces*</li> <li>● Compare and group materials following magnetic testing, recording findings and use the outcome to answer questions about which materials are magnetic. E.g. is all metal magnetic?</li> <li>● Make and investigate predictions on whether two magnets will attract or repel, depending on which poles are facing.</li> </ul>	<ul style="list-style-type: none"> <li>● Observe what happens to plants over time when the leaves or roots are removed.</li> <li>● Observe the effect of putting cut white carnations or celery in coloured water.</li> <li>● Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space.</li> <li>● Spot flowers, seeds, berries and fruits outside throughout the year.</li> <li>● Observe flowers carefully to identify the pollen</li> <li>● Observe flowers being visited by pollinators e.g. bees and butterflies in the summer.</li> <li>● Observe seeds being blown from the trees e.g. sycamore seeds.</li> <li>● Research different types of seed dispersal.</li> <li>● Classify seeds in a range of ways including by how they are dispersed.</li> <li>● Create a new species of flowering plant <ul style="list-style-type: none"> <li>● Can explain observations made during investigations.</li> <li>● Can look at the features of seeds to decide on their method of dispersal.</li> <li>● Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Observe and identify changes to the size and orientation of shadows, relative to their proximity to the light source.</li> <li>● Observe and identify the difference in shadows of opaque, translucent and transparent objects/materials.</li> <li>● Observe how shadows are formed and affected by different circumstances.</li> <li>● To notice that light can be reflected off surfaces and Replace with 'investigate the visibility of different materials (eg shiny; foil, mirrors and matt; sugar paper) in a darker environment according to which reflect most light.'</li> <li>● Investigate the size of shadows according to times of day and year, by tracing shadows outside and comparing differences.</li> <li>● Classify materials according to opaque, transparent and translucent.</li> <li>● Use oral and written explanations to report on why shadows are formed and how the length and size of a shadow can be changed.</li> <li>● Investigates questions related to an object and the shadow it will cause..*</li> </ul>
LOTC Activities					

Year 4	Substantive Knowledge				
<p>Lower KS2 End Points (NC):</p> <ul style="list-style-type: none"> <li>● Has broadened their scientific view of the world around them through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living and non-living things and familiar environments and by beginning to develop ideas about functions, relationships and interactions.</li> <li>● Asks their own questions about what they observe and is able to make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.</li> <li>● Draws simple conclusions and uses some scientific language, to both and write about what they have found out.</li> <li>● Reads and spells scientific vocabulary correctly and with confidence, using their growing word and spelling knowledge.</li> </ul>	<p>Living Things and their habitats</p> <ul style="list-style-type: none"> <li>● Knows that living things can be grouped in a variety of ways.</li> <li>● Knows and can name living things in a range of habitats.</li> <li>● Knows and can relate the key adaptational features of an organism to the known features of its habitat.</li> <li>● Knows and can give examples of how an environment may change both naturally and due to human impact.</li> </ul>	<p>Animals including humans</p> <ul style="list-style-type: none"> <li>● Knows the basic parts of the digestive system in humans.</li> <li>● Knows and can identify the different types of teeth in humans and their simple functions.</li> <li>● Pupils might work scientifically by: comparing the teeth of carnivores and herbivores and suggesting reasons for differences; finding out what damages teeth and how to look after them.</li> <li>● Knows which organisms are producers, predators and prey and apply to the construction and interpretation of food chains.</li> </ul>	<p>Electricity</p> <ul style="list-style-type: none"> <li>● Can identify and name appliances that require electricity to function</li> <li>● Knows the basic parts of a circuit, including cells, wires, bulbs, switches and buzzers</li> <li>● Knows that for an appliance to work within a circuit, it has to be part of a complete loop with a battery.</li> <li>● Knows that a switch in a circuit is a temporary break in an otherwise 'complete circuit'.</li> <li>● All metals conduct electricity but some, such as aluminium and titanium, are relatively poor conductors.</li> <li>● Knows the recognised symbols used to represent components of a circuit and uses these to represent a circuit pictorially.</li> </ul>	<p>Sound</p> <ul style="list-style-type: none"> <li>● Knows how sounds are made, associating some of them with vibrating.</li> <li>● Knows how sound travels from a source to our ears.</li> <li>● Knows the correlation between pitch and the object.</li> <li>● Knows the correlation between the volume of a sound and the strength of the vibrations that produced it.</li> <li>● Know that sounds get fainter as the distance from the sound source increases</li> </ul>	<p>States of matter</p> <ul style="list-style-type: none"> <li>● Knows how to distinguish between a solid, liquid and gas.</li> <li>● Knows that some materials change state when they are heated or cooled.</li> <li>● Knows the temperatures at which ice, water and water vapour change state.</li> <li>● Knows the part played by evaporation and condensation in the water cycle.</li> </ul>
<b>Disciplinary</b>					
<p>Lower KS2 Skills (Working Scientifically) End Points:</p> <ul style="list-style-type: none"> <li>● Asks relevant questions and use different types of scientific enquiries to answer them.</li> <li>● Sets up simple practical enquiries, comparative and fair tests.</li> <li>● Makes systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</li> <li>● Gathers, records, classifies and presents data in a variety of ways to help in answering questions.</li> <li>● Records findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>● Reports on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> <li>● Uses results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</li> <li>● Identifies differences, similarities or changes related to simple scientific ideas and processes.</li> <li>● Use straightforward scientific evidence to answer questions or to support their findings</li> </ul>	<p>Living Things and their habitats</p> <ul style="list-style-type: none"> <li>● Ask questions about the habitats on the school grounds.</li> <li>● Observe plants and animals in different habitats throughout the year and use recordings to compare and contrast the living things observed.</li> <li>● Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li> <li>● Classify living things found in different habitats based on their features.</li> <li>● Create a simple identification key based on observable features.</li> <li>● Use research to explore human impact on the local environment e.g. litter, tree planting</li> <li>● Use secondary sources to find out about how environments may naturally change.</li> <li>● Use secondary sources to find out about human impact, both positive</li> </ul>	<p>Animals including humans</p> <ul style="list-style-type: none"> <li>● Construct and interpret a variety of food chains, identifying producers, predators and prey.</li> <li>● Can create food chains based on research.</li> <li>● Identifies differences, and similarities of different types of teeth according to herbivore, omnivore and carnivore.</li> <li>● Can record the teeth in their mouth (make a dental record).</li> <li>● recreate the human stomach and observe representation of how food breaks down.</li> <li>● Label the different parts of the digestive system</li> </ul>	<p>Electricity</p> <ul style="list-style-type: none"> <li>● Construct and investigate a range of circuits.</li> <li>● Investigate which materials can be used instead of wires to make a circuit .</li> <li>● Classify materials that conduct electricity and those that don't following investigation and record findings..*</li> <li>● Investigate the effect of a switch and combinations of switches in simple circuits.</li> <li>● Investigate switches and consider variations for specific uses, such as a pressure switch for a burglar alarm.</li> <li>● Apply their knowledge of conductors and insulators to design and make different types of switch.</li> </ul>	<p>Sound</p> <ul style="list-style-type: none"> <li>● Experiment with at least three different instruments to observe and explore volume and pitch.</li> <li>● Make predictions and draw conclusions about the pitch and volume of sounds.*</li> <li>● Note how vibrations make sounds of different volumes and travel to our ears.</li> <li>● Identify and show how sound travels through particles and into the ear.</li> <li>● Make own instruments that produce a range of pitches.</li> </ul>	<p>States of matter</p> <ul style="list-style-type: none"> <li>● Observe closely and classify a range of solids and liquids.</li> <li>● Explore making gases visible</li> <li>● Classify materials according to whether they are solids, liquids and gases.</li> <li>● Observe a range of materials melting.</li> <li>● Investigate how to melt ice more quickly.</li> <li>● Observe the changes that are non-reversible relating (common ingredients).</li> <li>● Investigate melting point of different materials.</li> <li>● Explore freezing different liquids.</li> <li>● Observe and measure temperature of icy water, tap water, hot water.</li> <li>● Observe water evaporating and condensing.</li> <li>● Set up investigations to explore changing the rate of evaporation.*</li> <li>● Use secondary sources to find out about the water cycle.*</li> <li>● Using their data, can explain what affects how quickly a solid melts.</li> <li>● From their data, can explain how to speed up or slow down evaporation.</li> <li>● Present learning about the water cycle in a</li> </ul>

	and negative, on environments and write a report on this.				range of ways e.g. diagrams, explanation text, story of a water droplet.
LOTC Activities	Observing living things in the school grounds.	Trying to get a dentist visit!	Link to Computing/D&T: Using crumbles		

Year 5	Substantive Knowledge			
	The Earth and Space	Materials: changing State	Living Things and their habitats / Animals including Humans	Forces
<ul style="list-style-type: none"> <li>Has developed a deeper understanding of a wide range of scientific ideas through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.</li> <li>Has encountered more abstract ideas and is beginning to recognise how these help them to understand and predict how the world operates.</li> <li>Is beginning to recognise that scientific ideas change over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative fair tests and finding things out using a wide range of secondary sources of information.</li> <li>Is able to draw conclusions based on their data and observations, using evidence to justify their ideas and their scientific knowledge and understanding to explain their findings.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Earth takes 365¼ days to complete its orbit around the Sun.</li> <li>The Earth rotates (spins) on its axis every 24 hours.</li> <li>As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night). As the Earth rotates the Sun appears to move across the sky.</li> <li>The Moon is a celestial body that orbits a planet (the Earth). It takes about 28 days to complete its orbit.</li> <li>To know some other planets also have moons (e.g. Jupiter)</li> <li>The Sun, Earth and Moon are approximately spherical.</li> </ul>	<ul style="list-style-type: none"> <li>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</li> <li>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.</li> <li>Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.</li> <li>Mixtures can be separated by filtering, sieving and evaporation.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Knows and can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>Knows and can describe the life processes of reproduction in some plants (including the pollination process) and animals</li> <li>Knows that bulbs, tubers, runners and plantlets are examples of plant reproduction involving only one parent</li> <li>find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.</li> <li>describe the changes as humans develop to old age. [This will also be covered in PSHE]</li> </ul>	<ul style="list-style-type: none"> <li>Knows that unsupported objects fall to Earth because of the force of gravity acting between the earth and the falling object</li> <li>Knows and can identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>Knows that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. [This will also be covered in D&amp;T]</li> </ul>
<ul style="list-style-type: none"> <li>Plans different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</li> <li>Takes measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</li> <li>Records data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</li> <li>Reports and presents 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.</li> <li>Uses test results to make predictions to set up further comparative and fair tests.</li> <li>Identifies scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>	<ul style="list-style-type: none"> <li>Use secondary resources to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth.</li> <li>Use secondary resources to create a model to show why day and night occur</li> <li>Make first-hand observations of how shadows caused by the Sun change through the day</li> <li>Make a sundial and report on findings following observation of the changing place of the shadow, making conclusions as to what this demonstrates and how the sundial was used to indicate the time.</li> <li>Research time zones and compare the time of day at different places on the Earth through internet links</li> <li>Consider the views of scientists in the past (e.g. Ptolemy, Alhazen and Copernicus) and how evidence was used to deduce the shapes and movements of the</li> </ul>	<ul style="list-style-type: none"> <li>Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat</li> <li>Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate</li> <li>Investigate rates of dissolving by carrying out comparative and fair test and records findings (and comparative)</li> <li>Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture</li> <li>Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning</li> <li>Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?</li> <li>Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)</li> </ul>	<ul style="list-style-type: none"> <li>Grow and observe plants that reproduce asexually e.g. strawberries, spider plant, potatoes</li> <li>Organise mammals into different groups - sea and land and marsupials and use scientific evidence to refute/support correct/incorrect statements (such as 'dolphins are fish').</li> <li>Draw and label appropriate scientific diagrams following use of secondary sources and first hand observations relating to the life cycle of a range of animals and humans</li> <li>Compare and contrast the life cycles of different living things and present findings identify which insects complete which type of metamorphosis and present findings identify the key differences between some amphibians – for example, toads and frogs, and present findings in different forms.</li> <li>Use data to compare and find patterns, for example to compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth/Look for patterns between the size of an animal and its expected life span)</li> <li>Research the life and work of Jane Goodall and the impact on the scientific community</li> </ul>	<ul style="list-style-type: none"> <li>Investigate the pull on different objects using a newton meter and record forces in Newtons (N).</li> <li>Report on conclusions relating to an object's mass and its weight in Newtons.</li> <li>Investigate the effect of friction in a range of contexts .</li> <li>Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water.</li> <li>Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats.</li> <li>Explore how levers, pulleys and gears work.</li> <li>Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravity.</li> </ul>

	Earth, Moon and planets before space travel.			
LOTC Activities				

Year 6	Substantive Knowledge				
Living things and their habitats	Animals Including humans – circulatory system	Light	Evolution and Inheritance	Electricity	
<ul style="list-style-type: none"> <li>Has developed a deeper understanding of a wide range of scientific ideas through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.</li> <li>Has encountered more abstract ideas and is beginning to recognise how these help them to understand and predict how the world operates.</li> <li>Is beginning to recognise that scientific ideas change over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative fair tests and finding things out using a wide range of secondary sources of information.</li> <li>Is able to draw conclusions based on their data and observations, using evidence to justify their ideas and their scientific knowledge and understanding to explain their findings.</li> </ul>	<ul style="list-style-type: none"> <li>Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.</li> <li>Living things can be formally grouped according to characteristics.</li> <li>Children will learn that the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided.</li> <li>Animals can be divided into two main groups – vertebrates and invertebrates. Each group has common characteristics.</li> </ul> <p><i>Some of the reproduction part of this unit will be taught in PSHE.</i></p>	<ul style="list-style-type: none"> <li>Can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</li> <li>Recognise the impact of diet, exercise, drugs and lifestyle on the way the body functions</li> <li>Knows and can describe the way in which nutrients and water are transported within animals, including humans</li> </ul>	<ul style="list-style-type: none"> <li>Light appears to travel in straight lines.</li> <li>Knows and can explain that objects are seen because they give out or reflect light into the eye.</li> <li>Knows and can 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.</li> <li>Knows and can explain, with reference to how light travels, why shadows have the same shape as the objects that cast them.</li> </ul>	<ul style="list-style-type: none"> <li>All living things have offspring of the same kind. The offspring are not identical to their parents and vary.</li> <li>Plants and animals have characteristics that make them suited (adapted) to their environment.</li> <li>If the environment changes rapidly some variations may not suit the new environment and will die. If it changes slowly, animals and plants with variations that are best suited survive and reproduce.</li> <li>Over a very long period of time these characteristics may be so different that a new species is created. This is evolution.</li> <li>Fossils give us evidence of what lived on the Earth millions of years ago scientists such as Darwin and Wallace observed how living things changed overtime.</li> </ul>	<ul style="list-style-type: none"> <li>That the brightness of a bulb, or the volume of a buzzer, correlates with the voltage of cells used in the circuit.</li> <li>Knows and can give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>Knows the effect of adding more components to a circuit with one cell and the effect of adding multiple cells.</li> <li>Knows and can use the recognised symbols to represent a simple circuit in a diagram.</li> </ul>
<ul style="list-style-type: none"> <li>Plans different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</li> <li>Takes measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</li> <li>Records data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</li> <li>Reports and presents 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.</li> <li>Uses test results to make predictions to set up further comparative and fair tests.</li> <li>Identifies scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>	<ul style="list-style-type: none"> <li>Classify plants and animals and record conclusions from the use of classification keys.</li> <li>Use information about the characteristics of an unknown animal or plant to assign it to a group.</li> <li>Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important.</li> <li>Research an unfamiliar animal or plant using its characteristics to establish where it belongs in the classification system.</li> </ul>	<ul style="list-style-type: none"> <li>Plan and conduct a scientific enquiry to identify different food groups.</li> <li>Use labelled diagrams to support understanding of how nutrients and oxygen are delivered around the body.</li> <li>Use information to identify the main components of the heart.</li> <li>Predict what will happen to the heart during exercise.</li> <li>Construct and analyse the variables that make a fair test.</li> <li>Conduct a fair investigation on the effects of exercise on the heart.</li> <li>Use scientific equipment to track results and record data using tables and graphs. **</li> <li>Analyse whole class data after investigation to compare and reflect on findings and draw conclusions.</li> <li>Use information acquired to write a scientific report on how the human circulatory system works.</li> </ul>	<ul style="list-style-type: none"> <li>Plan and conduct a test to investigate how light travels and explain/present the findings.</li> <li>Investigate the use of mirrors to reflect light and record using straight line diagrams to indicate the direction of light.</li> <li>Use mirrors, torches and protractors to demonstrate and record how light is reflected in a mirror and how we see ourselves in a mirror. – Create periscopes.</li> <li>Investigate how shadows change shape, display results on graph.</li> </ul>	<ul style="list-style-type: none"> <li>Follow lines of enquiry to support Explanation of the process of evolution.</li> <li>Demonstrate an understanding, with specific examples, of how an animal or plant has evolved over time e.g. penguin, peppered moth.</li> <li>Identify characteristics that will make a plant or animal suited or not suited to a particular habitat.</li> <li>Compare the ideas of Charles Darwin and Alfred Wallace on evolution.</li> <li>Research the work of Mary Anning and understand how this provided evidence of evolution.</li> <li>Referring to and using examples of fossil evidence that support the theory of evolution.</li> </ul>	<ul style="list-style-type: none"> <li>Draw circuit diagrams of a range of simple series circuits, using recognised symbols.</li> <li>Share structures of circuits using circuit diagrams with recognised symbols</li> <li>Make electric circuits and demonstrate, following investigation, how variation in the working of particular components can be changed.</li> <li>Plan and select resources for a fair scientific enquiry, deciding which variables to control.</li> <li>Construct simple series circuit, to help them to answer questions about what happens when they try different components. Evaluate and explain their investigation, results and conclusions.</li> </ul>
LOTC Activities					