



**Year 1 – Plants**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up & Key Questions for knowledge build up		Key Vocabulary	
<ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>Identify and describe the basic structure of a variety of common flowering plants.</li> <li>Identify and name the roots, trunk, branches and leaves of trees.</li> </ul>		<ul style="list-style-type: none"> <li>Plants grow from seeds/bulbs and have different parts</li> <li>Plants need light and water to grow and survive</li> <li>Plants are important</li> <li>We can eat lots of plants</li> <li>Trees have 4 main parts</li> </ul> <ol style="list-style-type: none"> <li>Can I plant a seed?</li> <li>Can I name the parts of a plant grown from a seed?</li> <li>Can I explain what plants need to grow?</li> <li>Can I explain why plants are important?</li> </ol>		Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen	
				Key Scientists	Linked Texts
				Beatrix Potter (Author & Botanist)	<p><b><i>Tree: Seasons Come, Seasons Go</i></b> (Patricia Hegarty and Britta Teckentrup)</p> <p><b><i>A Little Guide to Wild Flowers</i></b> (Charlotte Voake)</p> <p><b><i>The Things That I LOVE about TREES</i></b> (Chris Butterworth)</p> <p><b><i>Harry's Hazelnut</i></b> (Ruth Parsons)</p>
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<p>In EYFS Children should:</p> <ul style="list-style-type: none"> <li>Make observations of plants</li> <li>Know some names of plants, trees and flowers</li> <li>May be able to name and describe different plants, trees and flowers</li> <li>Show some care for their world around them</li> </ul>		<ul style="list-style-type: none"> <li>How do Plants grow?</li> <li>What do Plants need to grow?</li> <li>Do all plants need water?</li> <li>Are all plants green?</li> <li>Can plants grow as big in the shade?</li> <li>Name the parts of a flower</li> <li>Name the parts of a tree</li> </ul>		<p>In Year 2 Children will:</p> <ul style="list-style-type: none"> <li>Observe and describe how seeds and bulbs grow into mature plants.</li> <li>Find out and describe how plants need water, light and warmth to grow and stay healthy.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>Which type of compost grows the tallest sunflower?</p> <p>Which tree has the biggest leaves?</p>	How can we sort the leaves that we collected on our walk?	<p>How does a daffodil bulb change over the year?</p> <p>How does my sunflower change each week?</p> <p>How does the oak tree change over the year?</p>	<p>Do trees with bigger leaves lose their leaves first in autumn?</p> <p>Is there a pattern in where we find moss growing in the school grounds?</p>	<p>What are the most common British plants and where can we find them?</p> <p>How did Beatrix Potter help our understanding of mushrooms and toadstools?</p>	What do plants need to survive?



**Year 2 – Plants**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Observe and describe how seeds and bulbs grow into mature plants.</li> <li>Find out and describe how plants need water, light and warmth to grow and stay healthy.</li> </ul>		<ul style="list-style-type: none"> <li>Plants need light, water and warmth to grow and survive</li> </ul> 1. Can I give my seed the right conditions for growth? 2. Can I explain how my plant has changed?		Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight.	
				Key Scientists	Linked Texts
				Agnes Arber (Botanist)  Alan Titchmarsh (Botanist & Gardener)	<b>The Tin Forest</b> <i>(Helen Ward)</i>  <b>Jack and the Beanstalk</b> <i>(Richard Walker)</i>  <b>Ten Seeds</b> <i>(Ruth Brown)</i>  <b>A Seed Is Sleepy</b> (Dianna Aston)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
In Year 1 Children should: <ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>Identify and describe the basic structure of a variety of common flowering plants.</li> <li>Identify and name the roots, trunk, branches and leaves of trees.</li> </ul>		As y1 Quiz +  1. What conditions does a plant need to survive?		In Year 3 Children will: <ul style="list-style-type: none"> <li>Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers</li> <li>Explore the part flowers play in a flowering plants life cycle, including: pollination, seed formation and seed dispersal</li> <li>Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants</li> <li>Know the way in which water is transported between plants</li> </ul>	
Scientific Enquiry					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
Do cress seeds grow quicker inside or outside?	How can we identify the trees that we observed on our tree hunt?	What happens to my bean after I have planted it?	Do bigger seeds grow into bigger plants?	How does a cactus survive in a desert with no water?	What should I do to grow a healthy plant?



**Year 3 – Plants**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers</li> <li>Explore the part flowers play in a flowering plants life cycle, including: pollination, seed formation and seed dispersal</li> <li>Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants</li> <li>Know the way in which water is transported between plants</li> </ul>	<ul style="list-style-type: none"> <li>Plants are producers, they make their own food.</li> <li>Their leaves absorb sunlight and carbon dioxide</li> <li>Plants have roots, which provide support and draw water from the soil</li> <li>Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production</li> <li>Seed dispersal improves a plants chances of successful reproduction</li> <li>Seeds/bulbs require the right conditions to germinate and grow.</li> </ul> <p>1. Can I explain how plants make their ow food?            2. Can I explain the functions of the different parts of a plant/flower?            3. Can I explain different types of seed dispersal?</p>	Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll	
		Key Scientists	Linked Texts
		<b>Jan Ingenhousz</b> (Photosynthesis)  <b>Joseph Banks</b> (Botanist)	<b>The Hidden Forest</b> (Jeannie Baker)  <b>George and Flora's Secret Garden</b> (Jo Elworthy)
Prior Learning	Pre/Post Learning Quiz Questions	Future Learning	
<b>In Year 2 Children should:</b> <ul style="list-style-type: none"> <li>Observe and describe how seeds and bulbs grow into mature plants.</li> <li>Find out and describe how plants need water, light and warmth to grow and stay healthy.</li> </ul>	As Y1/2 + <ul style="list-style-type: none"> <li>How do plants reproduce?</li> <li>What conditions are perfect for a seed to grow?</li> <li>How do plants make their food?</li> <li>How does light affect plant growth?</li> </ul>	In Year 6 (whilst learning about evolution and inheritance) Children will: <ul style="list-style-type: none"> <li>Recognise that living things have changed over time and that fossils provide information about living things</li> <li>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation can lead to evolution.</li> </ul>	

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<b>How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?</b>  <b>Which conditions help seeds germinate faster?</b>	How many different ways can you group our seed collection?	What happens to celery when it is left in a glass of coloured water?  How do flowers in a vase change over time?	What colour flowers do pollinate insects prefer?	What are all the different ways that seeds disperse?	Why do plants have flowers?



**Year 1 – Animals, including Humans**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. ☐</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> <li>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> </ul>		<ul style="list-style-type: none"> <li>There are many different animals with different characteristics.               <ul style="list-style-type: none"> <li>Fish, amphibians, reptiles, birds and mammals.</li> </ul> </li> <li>Some animals are carnivores, some herbivores and some are omnivores.</li> <li>The body parts associated with senses can be labelled on a body map.</li> </ul> <p>1. Can I identify different animals and say if they are fish, amphibians, reptiles, birds and mammals?            2. Can I explain what carnivores, herbivores and omnivores eat?            3. Can I label ears, nose, skin, eyes on a body map?</p>		Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow	
				Key Scientists	Linked Texts
				Chris Packham (Animal Conservationist)	<b>One Year with Kipper</b> (Mick Inkpen)  <b>Snail Trail</b> (Ruth Brown)  <b>Superworm</b> (Julia Donaldson & Axel Scheffler)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<p>In Early Years children should: ☐</p> <ul style="list-style-type: none"> <li>be able to identify different parts of their body.</li> <li>Have some understanding of healthy food and the need for variety in their diets. ☐</li> <li>Be able to show care and concern for living things. ☐</li> <li>Know the effects exercise has on their bodies.</li> <li>Have some understanding of growth and change. ☐</li> <li>Can talk about things they have observed including animals</li> </ul>		<p>1. Can you give an example of a Fish, amphibians, reptiles, bird and mammals?            2. What is a herbivore?            3. What is an omnivore?            4. What is a carnivore?            5. What are the 5 senses? Can you label them on a body?</p>		<p>In Year 2 children will: ☐</p> <ul style="list-style-type: none"> <li>Notice that animals, including humans, have offspring which grow into adults</li> <li>Find out and describe the basic needs of animals, including humans, for survival (water, food and air). •</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	
Scientific Enquiry					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
Is our sense of smell better when we can't see?	How can we organise all the zoo animals?  What are the names for all the parts of our bodies?	How does my height change over the year?	Do you get better at smelling as you get older?	Do all animals have the same senses as humans?	What do the living things have in common?



**Year 2 – Animals, including Humans**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Notice that animals, including humans, have offspring which grow into adults</li> <li>Find out and describe the basic needs of animals, including humans, for survival (water, food and air).</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	<ul style="list-style-type: none"> <li>Animals and humans have babies that grown into adults.</li> <li>Animals and humans air, water, shelter and food to survive.</li> <li>Healthy diet and exercise is important.</li> </ul> <ol style="list-style-type: none"> <li>Can I match the baby to its mother?</li> <li>Can I explain what humans and animals need to survive?</li> <li>Can I explain why exercise is important?</li> <li>Can I explain why a varied diet is important?</li> </ol>	Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, sea shore, woodland, ocean, rainforest, conditions, desert, damp, shade,	
		Key Scientists	Linked Texts
		Steve Irwin (Crocodile Hunter)  Robert Winston (Human Scientist)  Joe Wicks (Personal Trainer)	<i><b>The Gruffalo</b></i> (Julia Donaldson)  <i><b>Meerkat Mail</b></i> (Emily Gravett)  <i><b>Tadpole's Promise</b></i> (Jeanne Willis and Tony Ross)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<b>In Year 1 children should:</b> <ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> <li>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> </ul>	<ol style="list-style-type: none"> <li>Match the baby to its mother.</li> <li>Name the 4 main things humans and animals need to survive.</li> <li>Why is exercise important for the body?</li> <li>Why is exercise important for the mind?</li> <li>What are the different food groups?</li> <li>Why is a varied diet important?</li> </ol>	<b>In Year 3 children will:</b> <ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.</li> <li>Know about the importance of a nutritious, balanced diet.</li> <li>Identify that humans and some other animals have skeletons and muscles for support, protection and movement:</li> </ul>

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<b>Do amphibians have more in common with reptiles or fish?</b>  <b>Do bananas make us run faster?</b>	Which offspring belongs to which animal?  How would you group things to show which are living, dead, or have never been alive?	How does a tadpole change over time?  How much food and drink do I have over a week?	Which age group of children wash their hands the most in a day?	What food do you need in a healthy diet and why?  What do you need to do to look after a pet dog/cat/lizard and keep it healthy?	Do living things change or stay the same?



**Year 3 – Animals, including Humans**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. ☐</li> <li>Know about the importance of a nutritious, balanced diet. ☐</li> <li>Identify that humans and some other animals have skeletons and muscles for support, protection and movement:</li> </ul>		<ul style="list-style-type: none"> <li>Different food groups provides different things.</li> <li>Humans and some other animals have skeletons and muscles for support, protection and movement.</li> </ul> <ol style="list-style-type: none"> <li>Can I explain what the different food groups provide?</li> <li>Can I explain what the purpose of the skeleton is?</li> <li>Can I explain differences between animal and human skeletons?</li> <li>Can I explain the purpose of muscles?</li> </ol>		Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax,	
				Key Scientists	Linked Texts
				<b>Adelle Davis</b> (20 <sup>th</sup> Century Nutritionist)  <b>Marie Curie</b> (Radiation / X-Rays)	<b>The Story of Frog Belly Rat Bone</b> (Timothy Basil Ering)  <b>Funnybones</b> (Janet and Allan Ahlberg)  <b>I Will Never Not Ever Eat a Tomato</b> (Lauren Child)  <b>Goldilocks and the Three Bears</b> (Samantha Berger)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
In Year 2 children should: ☐ <ul style="list-style-type: none"> <li>Know that animals, including humans, have offspring which grow into adults ☐</li> <li>Know the basic stages in a life cycle for animals, including humans. ☐</li> <li>Find out and describe the basic needs of animals, including humans, for survival (water, food and air).</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>		Y2 Quiz + <ul style="list-style-type: none"> <li>Why do we need a skeleton?</li> <li>Are all skeletons the same?</li> <li>Why do muscles get tired?</li> <li>Can we 'break' muscles?</li> <li>What do the different food groups provide?</li> </ul>		In Year 4 children will: ☐ <ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system in humans.</li> <li>Identify the different types of teeth in humans and their simple functions.</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh?  How does the skull circumference of a girl compare with that of a boy?	How do the skeletons of different animals compare?	How does our skeleton change over time? (from birth to death)	Do male humans have larger skulls than female humans?	Why do different types of vitamins keep us healthy and which foods can we find them in?	What is a healthy diet and why is it important?



**Year 4 - Animals, including Humans**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system in humans.</li> <li>Identify the different types of teeth in humans and their simple functions.</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>		<ul style="list-style-type: none"> <li>The functions of the digestive system.</li> <li>There are 5 main types of teeth that have different functions</li> <li>Food chains consist of producers, predators and prey.</li> </ul> <ol style="list-style-type: none"> <li>Can I explain what happens when we eat food?</li> <li>Can I explain why we have different types of teeth?</li> <li>Can I answer questions about food chains?</li> <li>Can I create my own food chain?</li> </ol>		Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer.	
				Key Scientists	Linked Texts
				<b>Ivan Pavlov</b> (Digestive System Mechanisms)	<b>Human Body Odyssey</b> (Werner Holzwarth)
				<b>Joseph Lister</b> (Discovered Antiseptics)	<b>Crocodiles Don't Brush Their Teeth</b> (Colin Fancy)
					<b>Wolves</b> (Emily Gravett)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In Year 3 children should:</b> <ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.</li> <li>Know about the importance of a nutritious, balanced diet.</li> <li>Identify that humans and some other animals have skeletons and muscles for support, protection and movement:</li> </ul>		Y2,3 Quiz + <ul style="list-style-type: none"> <li>Why are teeth important?</li> <li>What happens to our food when we eat?</li> <li>What is our digestive system?</li> <li>How does our food turn into poo and wee?</li> </ul>		In Year 5 (living things and their habitats) children will: <ul style="list-style-type: none"> <li>Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.</li> <li>Know the differences between different life cycles.</li> <li>Know the process of reproduction in plants.</li> <li>Know the process of reproduction in animals</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<b>In our class, are omnivores taller than vegetarians?</b>	What are the names for all the organs involved in the digestive system?  How can we organise teeth into groups?	How does an egg shell change when it is left in cola?	Are foods that are high in energy always high in sugar?	How do dentists fix broken teeth?	What do our bodies do with the food we eat?



**Year 5 – Animals, including Humans & Living things and their habitats**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary					
<ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age.</li> <li>Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.</li> <li>Know the differences between different life cycles.</li> <li>Know the process of reproduction in plants.</li> <li>Know the process of reproduction in animals.</li> </ul>	<ul style="list-style-type: none"> <li>Our bodies change as we grow older.</li> <li>Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction</li> <li>Hormones control these changes; which can be physical and/or emotional.</li> <li>Some organisms reproduce sexually where offspring inherit information from both parents.</li> <li>Some organisms reproduce asexually by making a copy of a single parent.</li> </ul> <p>1. Can I explain how our bodies change as we grow older?            2. Can I discuss what happens during puberty?            3. Can I explain how plants and animals reproduce?</p>	<p>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant</p> <table border="1" data-bbox="1301 384 2114 411"> <tr> <th data-bbox="1301 384 1693 411">Key Scientists</th> <th data-bbox="1693 384 2114 411">Linked Texts</th> </tr> <tr> <td data-bbox="1301 411 1693 758"> <p><b>David Attenborough</b> (Naturalist and Nature Documentary Broadcaster)</p> <p><b>James Brodie of Brodie</b> (Reproduction of Plants by Spores)</p> </td> <td data-bbox="1693 411 2114 758"> <p><i><b>The Land of Neverbelieve</b></i> (Norman Messenger)</p> <p><i><b>Mummy Laid an Egg</b></i> (Babette Cole)</p> <p><i><b>Hair in Funny Places</b></i> (Babette Cole)</p> <p><i><b>Giant</b></i> (Kate Scott)</p> <p><i><b>You're Only Old Once!</b></i> (Dr. Seuss)</p> </td> </tr> </table>		Key Scientists	Linked Texts	<p><b>David Attenborough</b> (Naturalist and Nature Documentary Broadcaster)</p> <p><b>James Brodie of Brodie</b> (Reproduction of Plants by Spores)</p>	<p><i><b>The Land of Neverbelieve</b></i> (Norman Messenger)</p> <p><i><b>Mummy Laid an Egg</b></i> (Babette Cole)</p> <p><i><b>Hair in Funny Places</b></i> (Babette Cole)</p> <p><i><b>Giant</b></i> (Kate Scott)</p> <p><i><b>You're Only Old Once!</b></i> (Dr. Seuss)</p>
Key Scientists	Linked Texts						
<p><b>David Attenborough</b> (Naturalist and Nature Documentary Broadcaster)</p> <p><b>James Brodie of Brodie</b> (Reproduction of Plants by Spores)</p>	<p><i><b>The Land of Neverbelieve</b></i> (Norman Messenger)</p> <p><i><b>Mummy Laid an Egg</b></i> (Babette Cole)</p> <p><i><b>Hair in Funny Places</b></i> (Babette Cole)</p> <p><i><b>Giant</b></i> (Kate Scott)</p> <p><i><b>You're Only Old Once!</b></i> (Dr. Seuss)</p>						
Prior Learning	Pre/Post Learning Quiz Questions	Future Learning					
<p>In Year 4 children should: ☐</p> <ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system in humans.</li> <li>Identify the different types of teeth in humans and their simple functions.</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	<ul style="list-style-type: none"> <li>How do humans change?</li> <li>What is a life cycle? What types of life cycles are there?</li> <li>Are life cycles the same?</li> <li>What causes puberty?</li> <li>What changes do we go through during puberty?</li> <li>Do plants reproduce in the same ways as us?</li> <li>How do plants spread their seeds?</li> </ul>	<p>In Year 6: ☐</p> <ul style="list-style-type: none"> <li>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 their bodies function.</li> <li>Describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>					

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p><b>How does the level of salt affect how quickly brine shrimp hatch?</b></p> <p><b>How does age affect a human's reaction time?</b></p> <p><b>Who grows the fastest, girls or boys?</b></p>	<p>Can you identify all the stages in the human life cycle?</p> <p>Compare this collection of animals based on similarities and differences in their lifecycle.</p>	<p>How do brine shrimp change over their lifetime?</p> <p>How does a bean change as it germinates?</p> <p>How do different animal embryos change?</p>	<p>Is there a relationship between a mammal's size and its gestation period?</p>	<p>What are the differences between the life cycle of an insect and a mammal?</p> <p>Why do people get grey/white hair when they get older?</p>	<p>Do all plants and animals reproduce in the same way?</p>





**Year 6 – Animals, including Humans**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>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 their bodies function.</li> <li>Describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>	<ul style="list-style-type: none"> <li>The main parts of the circulatory system and functions.</li> <li>A balanced diet is needed for a healthy body and mind.</li> <li>How nutrients and water are transported within animals and humans.</li> </ul> <ol style="list-style-type: none"> <li>Can I name the main parts of the circulatory system?</li> <li>Can I explain what a balanced diet is?</li> <li>Can I explain how nutrients and water are transported within humans and animals?</li> </ol>	Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.	
		Key Scientists	Linked Texts
		<b>Justus von Liebig</b> (Theories of Nutrition and Metabolism)  <b>Sir Richard Doll</b> (Linking Smoking and Health Problems)  <b>Leonardo Da Vinci</b> (Anatomy)	<b><i>Pig-Heart Boy</i></b> (Malorie Blackman)  <b><i>Skellig</i></b> (David Almond)  <b><i>A Heart Pumping Adventure</i></b> (Heather Manley)
Prior Learning	Pre/Post Learning Quiz Questions	Future Learning	
<b>In Year 5 children should:</b> <ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age.</li> <li>Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.</li> <li>Know the differences between different life cycles.</li> <li>Know the process of reproduction in plants.</li> <li>Know the process of reproduction in animals.</li> </ul>	Y4,5 Quiz + <ul style="list-style-type: none"> <li>Why do we need oxygen?</li> <li>How do we breathe?</li> <li>Why do we have blood?</li> <li>How does our heart work?</li> <li>How are water and nutrients transported around the body?</li> </ul>	In Key Stage 3 children will learn about: <ul style="list-style-type: none"> <li>the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</li> <li>the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>calculations of energy requirements in a healthy daily diet</li> <li>the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</li> <li>the structure and functions of the gas exchange system in humans, including adaptations to function</li> <li>the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</li> </ul>	

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<b>How does the length of time we exercise for affect our heart rate?</b>  <b>Can exercising regularly affect your lung capacity?</b>  <b>Which type of exercise has the greatest effect on our heart rate?</b>	Which organs of the body make up the circulation system, and where are they found?	How does my heart rate change over the day?  How much exercise do I do in a week?	Is there a pattern between what we eat for breakfast and how fast we can run?	How have our ideas about disease and medicine changed over time?	Why does my heart beat?



### Year 6 – Evolution & Inheritance

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Know about evolution and can explain what it is.</li> <li>Know how fossils can be used to find out about the past.</li> <li>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> </ul>		<ul style="list-style-type: none"> <li>Life cycles have evolved to help organisms survive to adulthood.</li> <li>Over time the characteristics that are most suited to the environment become increasingly common.</li> <li>Fossils can be used in different ways to find out about the past.</li> <li>Similarities can be found in offspring of humans and animals.</li> </ul> <p>1. Can I find similarities between offspring and their parents?            2. Can I explain how life cycles have evolved over time?            3. Can I use fossils in different ways and discover new things based on what I find?</p>		Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,	
				Key Scientists	Linked Texts
				<b>Charles Darwin and Alfred Russel Wallace</b> (Theory of Evolution by Natural Selection)  <b>Jane Goodall</b> (Chimpanzees)	<b>One Smart Fish</b> <i>(Christopher Wormell)</i>  <b>The Molliebird</b> <i>(Jules Pottle)</i>  <b>Our Family Tree</b> <i>(Lisa Westberg Peters)</i>
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
From Key Stages 1 & 2, children should: <ul style="list-style-type: none"> <li>Understand there is a variety of life on Earth</li> <li>Know that some animal's differences are important to their survival</li> <li>Know how animals and plants reproduce</li> <li>Know how fossils form over time</li> </ul>		Also look at y345 animals and plants unit for basic questions + <ul style="list-style-type: none"> <li>Why are we all different?</li> <li>What is variation, and why is it important?</li> <li>How did life begin on Earth?</li> <li>How do we change?</li> <li>What is evolution?</li> <li>What evidence is there for evolution?</li> <li>How does evolution happen?</li> </ul>		In Key Stage 3 children will learn about: ☒ <ul style="list-style-type: none"> <li>heredity as the process by which genetic information is transmitted from one generation to the next</li> <li>the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</li> <li>the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection</li> <li>changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction</li> <li>the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</li> </ul>	
Scientific Enquiry					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<b>What is the most common eye colour in our class?</b>	Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different?  Can you classify these observations into evidence for the idea of evolution, and evidence against?	How has the skeleton of the horse changed over time?	Is there a pattern between the size and shape of a bird's beak and the food it will eat?	What happened when Charles Darwin visited the Galapagos islands?  What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?	What is evolution, how does it happen and how do scientists know?



**Year 2 – Living Things & their Habitats**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Explore and compare the difference between things that are living, dead and things that have never been alive.</li> <li>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.</li> <li>Identify and name a variety of plants and animals in their habitats, including micro habitats.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.</li> </ul>		<ul style="list-style-type: none"> <li>Some things are living, dead and some have never lived.</li> <li>Habitats differ based on a living thing needs.</li> <li>Some things are living, some were once living but now dead and some things never lived.</li> <li>Animals find their food in their habitats in different ways. .</li> </ul> <p>1. Can I explain the difference between things that are living, have lived and have never lived?            2. Can I explain how different habitats provide for different living things?            3. Can I explain how animals use their habitat to find food?</p>		Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, sea shore, woodland, ocean, rainforest, conditions, desert, damp, shade,	
				Key Scientists	Linked Texts
				Terry Nutkins (TV Presenter)	<i><b>The Gruffalo</b></i> (Julia Donaldson)
Liz Bonnin (Conservationist)	<i><b>Meerkat Mail</b></i> (Emily Gravett)				
				<i><b>No Place Like Home</b></i> (Jonathon Emmett)	
Prior Learning		Key Question(s)		Future Learning	
<p>In Early Years children should:</p> <ul style="list-style-type: none"> <li>Comments and questions about the place they live or the natural world.</li> <li>Shows care and concern for living things and the environment.</li> <li>Can talk about things they have observed such as plants and animals.</li> <li>Notices features of objects in their environment.</li> <li>Comments and asks questions about their familiar world.</li> </ul>		<p>See also Y1 animals and plants +</p> <ul style="list-style-type: none"> <li>How do you know if something is living?</li> <li>How do you know if something has died?</li> <li>How do you know if something is not a living thing?</li> <li>What different habitats can you think of?</li> <li>Do all animals eat the same thing?</li> <li>Which animals hunt, and which animals are hunted? Why?</li> <li>What animals live in our school environment?</li> <li>How are animals and plants 'adapted' to live in their habitats</li> </ul>		<p>In Year 4 children will: ☒</p> <ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways.</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>Know and label the features of a river</li> <li>Recognise that environments can change and that this can sometimes pose danger to living things.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>Which pets are the easiest to look after?</p> <p>Is there the same level of light in the evergreen wood compared with the deciduous wood?</p>	How would you group these plants and animals based on what habitat you would find them in?	How does the school pond change over the year?	<p>What conditions do woodlice prefer to live in?</p> <p>Which habitat do worms prefer – where can we find the most worms?</p>	<p>How are the animals in Australia different to the ones that we find in Britain?</p> <p>How does the habitat of the Arctic compare with the habitat of the rainforest?</p> <p>What ideas did botanist Arthur Tansley have about habitats in 1935?</p>	Why do different animals live in different places?



**Year 4 - Living Things & their Habitats**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary		
<ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways.</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>Recognise that environments can change and that this can sometimes pose danger to living things.</li> </ul>	<ul style="list-style-type: none"> <li>Living things can be divided into groups based upon their characteristics</li> <li>Classification keys can be used to group and organise living things.</li> <li>Some environmental changes pose a danger to living things.</li> </ul> <p>1. Can I group living things? 2. Can I read a classification key? 3. Can I create a classification key? 4. Can I understand the dangers that pose a threat to animals in my</p>	Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.		
		<table border="1"> <tr> <td>Key Scientists</td> <td>Linked Texts</td> </tr> <tr> <td> <b>Cindy Looy</b> (Environmental Change and Extinction)   <b>Jaques Cousteau</b> (Marine Biologist)               </td> <td> <b><i>The Vanishing Rainforest</i></b> (Richard Platt)   <b><i>The Morning I Met a Whale</i></b> (Michael Morpurgo)   <b><i>Journey to the River Sea</i></b> (Eva Ibbotson)               </td> </tr> </table>	Key Scientists	Linked Texts
Key Scientists	Linked Texts			
<b>Cindy Looy</b> (Environmental Change and Extinction)  <b>Jaques Cousteau</b> (Marine Biologist)	<b><i>The Vanishing Rainforest</i></b> (Richard Platt)  <b><i>The Morning I Met a Whale</i></b> (Michael Morpurgo)  <b><i>Journey to the River Sea</i></b> (Eva Ibbotson)			
Prior Learning	Pre/Post Learning Quiz Questions	Future Learning		
<p>In Year 2, children should:</p> <ul style="list-style-type: none"> <li>Explore and compare the difference between things that are living, dead and things that have never been alive.</li> <li>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.</li> <li>Identify and name a variety of plants and animals in their habitats, including micro habitats.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.</li> </ul>	<p>Also see y2 +</p> <ul style="list-style-type: none"> <li>How does removal of one species from an environment, affect others? (keystone species)</li> <li>How does environmental change affect different organisms?</li> <li>What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers)</li> <li>How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?)</li> </ul>	<p>In Year 5 (Animals, Including Humans):</p> <ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>Describe the life process of reproduction in some plants and animals.</li> </ul> <p>In Year 6 (Living things &amp; their Habitats):</p> <ul style="list-style-type: none"> <li>Classify living things into broad groups according to observable characteristics and based on similarities and differences.</li> <li>Give reasons for classifying plants and animals based on specific characteristics.</li> </ul>		

**Scientific Enquiry**

<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<p><b>Does the amount of light affect how many woodlice move around?</b></p>	<p>Can we use the classification keys to identify all the animals found in our sch grounds?</p>	<p>How does the variety of invertebrates on the school field change over the year?</p>	<p>How has the use of insecticides affected bee population?</p>	<p>Why are people cutting down the rainforests and what effect does that have?</p>	<p>Are living things in danger?</p>



**Year 6 – Living Things & their Habitats**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Classify living things into broad groups according to observable characteristics and based on similarities and differences.</li> <li>Give reasons for classifying plants and animals based on specific characteristics.</li> </ul>		<ul style="list-style-type: none"> <li>Classify living things into broad groups according to observable characteristics and based on similarities and differences.</li> <li>Give reasons for classifying plants and animals based on specific characteristics.</li> </ul> <p>1. Can I classify living things (plants and animals) based on their characteristics based on similarities and differences? (Focus on animals and plants that are difficult to classify e.g. penguins, whales and breeds of platypus)</p> <p>2. Can I give reasons for my classifications?</p>		Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.	
				Key Scientists	Linked Texts
				<b>Carl Linnaeus</b> (Identifying, Naming and Classifying Organisms)	<b>Beetle Boy</b> <i>(M G Leonard)</i>  <b>Insect Soup</b> <i>(Barry Louis Polisar)</i>  <b>Fur and Feathers</b> <i>(Janet Halfmann)</i>
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<p>In Year 4, children should:</p> <ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways.</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> </ul> <p>Recognise that environments can change and that this can sometimes pose danger to living things.</p>		See also y4 classification work + <ol style="list-style-type: none"> <li>Why do we need to classify living things?</li> <li>How do we classify?</li> <li>What are the difficulties with classification? (penguins, whales, platypus)</li> <li>Why does variation exist?</li> <li>What happens if animals of different species breed? (hybrids)</li> <li>Why do animals and plants compete – and what for?</li> </ol>		In Key Stage 3 children will learn about: <ul style="list-style-type: none"> <li>the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>the adaptations of leaves for photosynthesis.</li> <li>the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>the importance of plant reproduction through insect pollination in human food security</li> <li>how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>How does the temperature affect how much gas is produced by yeast?</p> <p>Which is the most common invertebrate on our school playing field?</p>	How would you make a classification key for vertebrates/invertebrates or microorganisms?	What happens to a piece of bread if you leave it on the windowsill for two weeks?	Do all flowers have the same number of petals?	What do different types of microorganisms do? Are they always harmful?	In what ways can we sort living things?



### Year 4 – Electricity

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary			
<ul style="list-style-type: none"> <li>Identify common appliances that run on electricity.</li> <li>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</li> <li>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.</li> <li>Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.</li> <li>Know the difference between a conductor and an insulator; giving examples of each.</li> <li>Safety when using electricity.</li> </ul>	<ul style="list-style-type: none"> <li>Common appliance around the home run on electricity.</li> <li>What a series circuit is and the components that make it.</li> <li>Troubleshoot circuits when a bulb is not lit.</li> <li>Make and use a simple switch.</li> <li>A conductor allows electricity to pass.</li> <li>An insulator does not pass electricity.</li> <li>Electrical safety.</li> </ul> <ol style="list-style-type: none"> <li>1. Can I make a series circuit?</li> <li>2. Can I label a series circuit?</li> <li>3. Can I find and fix fault in a series circuit?</li> <li>4. Can I make a switch?</li> <li>5. Can I explain the difference between an insulator and a conductor?</li> <li>6. Can I tell others how to stay safe around electricity?</li> </ol>	Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component.			
		Key Scientists	Linked Texts		
		Thomas Edison (First Working Lightbulb)  Joseph Swan (Incandescent Light Bulb)	Until I Met Dudley (Roger McGough)  Oscar and the Bird: A Book about Electricity (Geoff Waring)  Electrical Wizard: How Nikola Tesla Lit Up the World (Elizabeth Rusch)		
Prior Learning	Pre/Post Learning Quiz Questions	Future Learning			
<b>In Early Years children:</b> <ul style="list-style-type: none"> <li>May have some understanding that objects need electricity to work.</li> <li>May understand that a switch will turn something on or off.</li> </ul>	<ul style="list-style-type: none"> <li>What would life be like without electricity?</li> <li>What sorts of things use/need electricity?</li> <li>In which ways can we 'get' electricity? (mains/plugs/batteries/wireless)</li> <li>What materials can carry electricity? (conductors/insulators)</li> </ul>	In Year 6 children will: <ul style="list-style-type: none"> <li>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> <li>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>Use recognised symbols when representing a simple circuit in a diagram.</li> </ul>			
<b>Scientific Enquiry</b>					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<b>How does the thickness of a conducting material affect how bright the lamp is?</b>  <b>Which metal is the best conductor of electricity?</b>	How would you group these electrical devices based on where the electricity comes from?	How long does a battery light a torch for?	Which room has the most electrical sockets in a house?	How has electricity changed the way we live?  How does a light bulb work?	What can we do with electricity?



**Year 6 - Electricity**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> <li>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>Use recognised symbols when representing a simple circuit in a diagram.</li> </ul>	<ul style="list-style-type: none"> <li>Several things affect the brightness of a bulb, volume of a buzzer and speed of a motor.</li> <li>Symbols for components in a circuit.</li> </ul> <ol style="list-style-type: none"> <li>Can I explain why a bulb is lighter or dimmer in a circuit?</li> <li>Can I draw a series circuit using the correct symbols?</li> <li>Can I investigate the speed of a motor?</li> </ol>	Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.	
		Key Scientists	Linked Texts
		Alessandro Volta (Electrical Battery)  Nicola Tesla (Alternating Currents)	Goodnight Mister Tom (Michelle Magorian)  Blackout (John Rocco)  Hitler's Canary (Sandi Toksvig)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
In Year 4, children should: <ul style="list-style-type: none"> <li><b>Identify common appliances that run on electricity.</b></li> <li><b>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</b></li> <li><b>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.</b></li> <li><b>Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.</b></li> <li><b>Know the difference between a conductor and an insulator; giving examples of each.</b></li> <li><b>Safety when using electricity.</b></li> </ul>	See y4 quiz + <ul style="list-style-type: none"> <li>How does the voltage of a battery affect how much current is pushed?</li> <li>How does the length of time I leave the current flowing for affect the brightness of the bulb?</li> <li>How does number of bulbs affect the brightness of a bulb?</li> <li>Does the type of circuit affect how the components work/long the battery lasts?</li> </ul>	In Key Stage Three children will learn: <ul style="list-style-type: none"> <li>Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</li> <li>Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</li> <li>Differences in resistance between conducting and insulating components (quantitative).</li> <li>Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects</li> <li>The idea of electric field, forces acting across the space between objects not in contact.</li> </ul>

**Scientific Enquiry**

<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<b>How does the voltage of the batteries in a circuit affect the brightness of the lamp?</b> <b>How does the voltage of the batteries in a circuit affect the volume of the buzzer?</b> <b>Which make of battery lasts the longest?</b> <b>Which type of fruit makes the best fruity battery?</b>	How would you group electrical components and appliances based on what electricity makes them do?	How does brightness of bulb change as the battery runs out?  How can we measure how quickly a battery is used up?	Does the temperature of a light bulb go up the longer it is on?	How has our understanding of electricity changed over time?	Can we vary the effects of electricity?



**Year 2 – Forces**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<b>There are no specified National Curriculum Objectives for forces at KS1</b>		<ul style="list-style-type: none"> <li>Pushing and pulling can make things move faster or slower.</li> <li>Things can move in different ways.</li> <li>Bigger pushes and pulls have bigger effects</li> <li>Objects sink and float</li> </ul> <p>1. Can I push or pull an object to make it move? 2. Can I identify which objects sink and float?</p>		Force, push, pull, surface, attract, repel, compass	
				Key Scientists	Linked Texts
				The Wright Brothers (Airoplanes)  Henry Ford (Cars)	Traction Man (Mini Grey)  Three Little Pigs (Lesley Sims)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In Early Years children should:</b> <ul style="list-style-type: none"> <li>know about similarities and differences in relation to places, objects, materials and living things.</li> <li>talk about the features of their own immediate environment and how environments might vary from one another.</li> <li>make observations of animals and plants and explain why some things occur, and talk about changes.</li> </ul>		<ul style="list-style-type: none"> <li>How can we move objects?</li> <li>How can we change the way an object moves?</li> </ul>		<b>In Year 3 children will:</b> <ul style="list-style-type: none"> <li>Compare how things move on different surfaces.</li> <li>Know how a simple pulley works and use making lifting an object simpler</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>Observe how magnets attract and repel each other and attract some materials and not others.</li> <li>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.</li> <li>Describe magnets as having two poles.</li> <li>Predict whether two magnets with attract or repel each other, depending on which poles are facing.</li> </ul>	
Scientific Enquiry					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
Which material would be best for the roof of the little pig's house?	Which materials will float and which will sink?	Would a paper boat float forever?	How does changing the force change the speed of a toy car?	Why do objects float or sink?	Why do things move?





**Year 3 – Forces (& Magnetism)**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Compare how things move on different surfaces.</li> <li>Know how a simple pulley works and use making lifting an object simpler</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>Observe how magnets attract and repel each other and attract some materials and not others.</li> <li>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.</li> <li>Describe magnets as having two poles.</li> <li>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<ul style="list-style-type: none"> <li>Surfaces affect the way things move on them.</li> <li>Pulleys make an object easier to life.</li> <li>Magnetic forces can act at a distance.</li> <li>Magnets attract and repel each other and some attract and repel different materials.</li> <li>Magnets have two poles.</li> </ul> <p>1: Can I test which surfaces have the most friction?            2: Can I explain how a pulley works?            3: Can I test which materials are magnetic?            4: Can I group objects while testing if they are magnetic?            5: Can I make predictions about if materials are magnetic?</p>	Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass	
		Key Scientists	Linked Texts
		William Gilbert (Theories on Magnetism)  Andre Marie Ampere (Founder of Electro-Magnetism)	The Iron Man (Ted Hughes)  Mrs Armitage: Queen of the Road (Quentin Blake)  Mr Archimedes' Bath (Pamela Allen)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<b>In Year 2 children:</b> <ul style="list-style-type: none"> <li>Have an awareness of how to make things stop and start, using simple pushes and pulls.</li> <li>They know about floating and sinking.</li> </ul>	Y2 + <ul style="list-style-type: none"> <li>What are magnetic materials? How can we find out?</li> <li>How far away does a magnet have to be before it attracts a magnetic material?</li> <li>Which surface is the best for racing cars on?</li> <li>What is a pulley?</li> <li>Magnets have two what?</li> </ul>	<b>In Year 5 children will:</b> <ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.</li> <li>Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.</li> <li>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> <li>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</li> <li>Describe the movement of the Moon relative to the Earth</li> <li>Describe the Sun, Earth and Moon as approximately spherical bodies</li> <li>Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</li> </ul>

**Scientific Enquiry**

<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
Which surface is best to stop you slipping?	Which materials are magnetic?	If we magnetise a pin, how long does it stay magnetised for?	Do magnetic materials always conduct electricity?  Does the size and shape of a magnet affect how strong it is?	How have our ideas about forces changed over time?  How does a compass work?	How can we move magnets?



**Year 5 - Forces**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.</li> <li>Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.</li> <li>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>	<ul style="list-style-type: none"> <li>Gravity is a force where unsupported objects fall to the floor</li> <li>Air resistance is a force</li> <li>Water resistance is a force</li> <li>Friction is a force</li> <li>Levers, pulleys and gears allow a smaller force to have a greater effect.</li> </ul> <ol style="list-style-type: none"> <li>Can I identify forces acting on objects as gravity?</li> <li>Can I explain the effects of water resistance?</li> <li>Can I explain the effects of air resistance?</li> <li>Can I explain the effects of friction?</li> <li>Can I make and explain how levers, pulleys and gears work?</li> </ol>	Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley.	
		Key Scientists	Linked Texts
		Galileo Galilei (Gravity and Acceleration)  Isaac Newton (Gravitation)  Archimedes of Syracuse (Levers)  John Walker (The Match)	The Enormous Turnip (Katie Daynes)  Leonardo's Dream (Hans de Beer)  The Aerodynamics of Biscuits (Clare Helen Welsh)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<p>In Year 3 children should:</p> <ul style="list-style-type: none"> <li>Compare how things move on different surfaces.</li> <li>Know how a simple pulley works and use making lifting an object simpler</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>Observe how magnets attract and repel each other and attract some materials and not others.</li> <li>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.</li> <li>Describe magnets as having two poles.</li> <li>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<ul style="list-style-type: none"> <li>What is a force?</li> <li>How does the changing the shape of a piece of plasticine affect water resistance?</li> <li>How does adding holes to a parachute affect the time it takes to fall?</li> <li>How can we use levers to lift more?</li> <li>What is the most effective way to move an object?</li> <li>How do see-saws work?</li> <li>Can you create a pulley system to lift a given load?</li> </ul>	<p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> <li>opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</li> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size.</li> </ul>

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>How does the angle of launch affect how far a paper rocket will go?</p> <p>How does the surface area of an object affect the time it takes to sink?</p>	<p>Can you label and name all the forces acting on the objects in each of these situations?</p>	<p>How long does a pendulum swing for before it stops?</p>	<p>Do all objects fall through water in the same way?</p> <p>How does surface area of parachute affect the time it takes to fall?</p>	<p>How do submarines sink if they are full of air?</p>	<p>How and why do objects move?</p>



**Year 5 - Earth & Space**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</li> <li>Describe the movement of the Moon relative to the Earth</li> <li>Describe the Sun, Earth and Moon as approximately spherical bodies</li> <li>Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</li> </ul>		<ul style="list-style-type: none"> <li>How planets, move in relation to the sun.</li> <li>How the moon and Earth move.</li> <li>The Earth and Moon are spherical bodies.</li> <li>Day and night occur because of the Earth's rotation.</li> </ul> <ol style="list-style-type: none"> <li>Where are the planets?</li> <li>How do the Earth and moon move?</li> <li>Why do we have night and day?</li> </ol>		Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.	
				Key Scientists	Linked Texts
				<b>Claudius Ptolemy and Nicolaus Copernicus</b> (Heliocentric vs Geocentric Universe)	<i>The Skies Above My Eyes</i> (Charlotte Guillain & Yuval Zommer)
				<b>Neil Armstrong</b> (First man on the Moon)	<i>George's Secret Key to the Universe</i> (Lucy and Stephen Hawking with Christophe Galfard)
				<b>Helen Sharman</b> (First British astronaut)	<i>The Way Back Home</i> (Oliver Jeffers)
				<b>Tim Peake</b> (First British ESA astronaut)	
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In Key Stage 1 and in Year 3 children should:</b> <ul style="list-style-type: none"> <li>Understand changes in weather patterns and seasons.</li> <li>Compare how things move on different surfaces.</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing</li> </ul>		<ol style="list-style-type: none"> <li>Name the planets in order.</li> <li>How does the Earth move in relation to the moon?</li> <li>What shape are the planets?</li> <li>Why does day and night occur?</li> </ol>		In KS3 children will learn about: <ul style="list-style-type: none"> <li>Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</li> <li>Our Sun as a star, other stars in our galaxy, other galaxies</li> <li>The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
How does the length of daylight hours change in each season?	How could you organise all the objects in the solar system into groups?	Can you observe and identify all the phases in the cycle of the Moon?	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	What unusual objects did Jocelyn Bell Burnell discover?  How do astronomers know what stars are made of?  How have our ideas about the solar system changed over time?	Sun, Earth & Moon: What is moving and how do we know?



**Year 1 - (ENERGY) Seasons and How they Change**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Observe changes across the four seasons</li> <li>Observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<ul style="list-style-type: none"> <li>There are 4 seasons</li> <li>There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc</li> <li>Days are longer and hotter in the summer</li> <li>Days are shorter and colder in the winter</li> </ul> <p>1. What are the 4 seasons? 2. How is summer different to winter?</p>	Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature	
		Key Scientists	Linked Texts
		Dr Steve Lyons (Extreme Weather)  Holly Green (Meteorologist)	Tree: Seasons Come, Seasons Go (Patricia Hegarty and Britta Teckentrup)  One Year with Kipper (Mick Inkpen)  After the Storm (Nick Butterworth)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<b>In Early Years children should:</b> <ul style="list-style-type: none"> <li>Developing an understanding of change.</li> <li>Observe and explain why certain things may occur (e.g leaves falling off trees, weather changes).</li> <li>Look closely at similarities, differences, patterns and change.</li> <li>Comments and questions about the place they live or the natural world.</li> </ul>	<ol style="list-style-type: none"> <li>What are the 4 different seasons?</li> <li>What types of weather can you think of?</li> <li>In winter the nights get darker earlier/later?</li> <li>In summer the night get lighter earlier/later?</li> </ol>	In Year 3 children will: <ul style="list-style-type: none"> <li>Recognise that they need light in order to see things and that dark is the absence of light.</li> <li>Notice that light is reflected from surfaces.</li> <li>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</li> <li>Find patterns in the way that the sizes of shadows change.</li> </ul>

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
In which season does it rain the most?	How could you organise all the objects in the solar system into groups?	How does the colour of a UV bead change over the day?	Does the wind always blow the same way?	Are there plants that are in flower in every season? What are they?	What is it like in Winter, Spring, Summer and Autumn?



**Year 3 – (ENERGY) Light & Sight**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Recognise that they need light in order to see things and that dark is the absence of light.</li> <li>Notice that light is reflected from surfaces.</li> <li>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</li> <li>Find patterns in the way that the sizes of shadows change.</li> </ul>		<ul style="list-style-type: none"> <li>Light is needed to see things.</li> <li>Light is reflected from surfaces.</li> <li>Light from the sun can be dangerous.</li> <li>Shadows are formed when the light from the sun is blocked by a solid object.</li> <li>Shadows change size and shape.</li> </ul> <p>1. How do we see? 2. Why is the sun dangerous? 3. How are shadows formed?</p>		<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.</p>	
				Key Scientists	Linked Texts
				<p><b>James Clerk Maxwell</b> (Visible and Invisible Waves of Light)</p>	<p>The Owl Who Was Afraid of the Dark (Jill Tomlinson)</p> <p>The Dark (Lemony Snicket)</p> <p>The Firework-Maker's Daughter (Philip Pullman)</p>
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<p><b>In Year 1 children should have:</b></p> <ul style="list-style-type: none"> <li>Observed changes across the four seasons</li> <li>Observed and describe weather associated with the seasons and how day length varies.</li> </ul> <p><b>Children may:</b></p> <ul style="list-style-type: none"> <li>have some knowledge of where light comes from.</li> <li>have seen their shadows and may know they appear when it is sunny.</li> <li>Have some understanding of a reflection.</li> <li>May understand they need light to be able to see things.</li> </ul>		<ol style="list-style-type: none"> <li>What do you need to be able to see something?</li> <li>Light can be reflected from ___?</li> <li>Never look at the sun because ____</li> <li>Sun cream is important because ____</li> <li>Shadows are formed when ____</li> <li>Shadows change shape when ____</li> </ol>		<p>In Year 6 children will:</p> <ul style="list-style-type: none"> <li>Recognise that light appears to travel in straight lines.</li> <li>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.</li> <li>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>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> <li>Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>How does the distance between the shadow puppet and the screen affect the size of the shadow?</p> <p>Which pair of sunglasses will be best at protecting our eyes?</p>	<p>How would you organise these light sources into natural and artificial sources?</p>	<p>When is our classroom darkest?</p> <p>Is the Sun the same brightness all day?</p>	<p>Are you more likely to have bad eye sight and to wear glasses if you are older?</p>	<p>How does the Sun make light?</p>	<p>What is a shadow?</p>



**Year 4 - (ENERGY) Sound**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Know how sound is made associating some of them with vibrating.</li> <li>Know what happens to a sound as it travels from its source to our ears.</li> <li>Know the correlation between the volume of a sound and the strength of the vibrations that produced it.</li> <li>Know how sound travels from a source to our ears.</li> <li>Know the correlation between pitch and the object producing a sound.</li> </ul>		<ul style="list-style-type: none"> <li>Sound waves are caused by vibrations.</li> <li>Sound travels differently to our ears.</li> <li>Volume changes as the vibrations change.</li> <li>Pitch is dependent on the object producing a sound.</li> </ul> <p>1. How does sound travel? 2. How are louder sounds made? 3. How can we change the pitch of a sound?</p>		Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.	
				Key Scientists	Linked Texts
				<b>Aristotle</b> (Sound Waves)  <b>Galileo Galilei</b> (Frequency and Pitch of Sound Waves)  <b>Alexander Graham Bell</b> (Invented the Telephone)	<b>Horrid Henry Rocks</b> (Francesca Simon)  <b>Moonbird</b> (Joyce Dunbar)  <b>The Pied Piper of Hamelin</b> (Natalia Vasquez)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In KS1 children:</b> <ul style="list-style-type: none"> <li>May have some understanding that objects make different sounds.</li> <li>Some understanding that they use their ears to hear sounds.</li> <li>Know about their different senses.</li> </ul>		<ol style="list-style-type: none"> <li>How are sounds made?</li> <li>How does sound travel?</li> <li>How can louder and quieter sounds be made?</li> <li>Higher and lower pitches are made when_____</li> </ol>		<b>In KS3 children will learn about:</b> <ul style="list-style-type: none"> <li>frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> <li>sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>auditory range of humans and animals.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>How does the volume of a drum change as you move further away from it?</p> <p>How does the length of a guitar string/tuning fork affect the pitch of the sound?</p> <p>Are two ears better than one?</p>	Which material is best to use for muffling sound in ear defenders?	When is our classroom the quietest?	Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?	Do all animals have the same hearing range?	How can we make different sounds?



**Year 6 – (ENERGY) Light and Sight**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Recognise that light appears to travel in straight lines.</li> <li>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.</li> <li>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>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> <li>Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.</li> </ul>		<ul style="list-style-type: none"> <li>Light travels in straight lines and light is reflected into our eyes.</li> <li>Light travels to our eyes. Light is reflected from objects to our eyes.</li> <li>Shadows are cast because light travels in straight lines.</li> <li>How some optical instruments work.</li> </ul> <ol style="list-style-type: none"> <li>How does light travel?</li> <li>How are shadows formed?</li> <li>How do optical instruments work?</li> </ol>		Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction  Key Scientists   Linked Texts	
		<b>Thomas Young</b> (Wave Theory of Light)  <b>Ibn al-Haytham (Alhazen)</b> (Light and our Eyes)  Percy Shaw (The Cats Eye)		<i>Letters from the Lighthouse</i> (Emma Carroll)  <i>The Gruffalo's Child</i> (Julia Donaldson)  <i>The King Who Banned the Dark</i> (Emily Haworth-Booth)	
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
In Year 3 children should: <ul style="list-style-type: none"> <li>Recognise that they need light in order to see things and that dark is the absence of light.</li> <li>Notice that light is reflected from surfaces.</li> <li>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</li> <li>Find patterns in the way that the sizes of shadows change.</li> </ul>		<ol style="list-style-type: none"> <li>How does light travel?</li> <li>Light is reflected from objects to our eyes.</li> <li>How are shadows formed?</li> <li>How does a periscope work?</li> </ol>		In Key Stage 3, children will learn about: <ul style="list-style-type: none"> <li>the similarities and differences between light waves and waves in matter</li> <li>light waves travelling through a vacuum; speed of light</li> <li>the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science</li> <li>use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras</li> <li>colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?  Which material is most reflective?	Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?	Does the temperature of a light bulb go up the longer it is on?  How does my shadow change over the day?	Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom?	Why do some people need to wear glasses to see clearly?  How do our eyes adapt to different conditions?	Why does my shadow change length over the course of a day?



**Year 1 – Materials**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> <li>Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock,</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 properties</li> </ul>		<ul style="list-style-type: none"> <li>There are many different materials that have different properties.</li> <li>Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass).</li> <li>The properties of a material determine whether they are suitable for a purpose.</li> </ul> 1. What are different materials made of? 2. How are materials different?		Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque,	
				Key Scientists	Linked Texts
				William Addis (Toothbrush Inventor)  Charles Mackintosh (Waterproof coat)  John MacAdam (roads)	<i><b>The Great Paper Caper</b></i> <i>(Oliver Jeffers)</i>  <i><b>Who Sank the Boat</b></i> <i>(Pamela Allen)</i>  <i><b>The Story of Cinderella</b></i> <i>(Walt Disney)</i>
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In Early Years children should:</b> <ul style="list-style-type: none"> <li>be able to ask questions about the place they live.</li> <li>Talk about why things happen and how things work.</li> <li>Discuss the things they have observed such as natural and found objects.</li> <li>Manipulates materials to achieve a planned effect.</li> </ul>		1. What different materials can you think of? 2. How can these objects be grouped? 3. The best material for a window would be _____ 4. The best material for a t shirt is _____		<b>In Year 2 children will:</b> <ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
Which materials are the most flexible?  Which materials are the most absorbent?	We need to choose a material to make an umbrella. Which materials are waterproof?	What happens to materials over time if we bury them in the ground?  What happens to shaving foam over time?	Is there a pattern in the types of materials that are used to make objects in a school?	How are bricks made?  Which materials can be recycled?	What are the things I use made from?





**Year 2 – Materials**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>		<ul style="list-style-type: none"> <li>Materials have different properties and suitability.</li> <li>Some materials can be changed by squashing, bending, twisting and stretching.</li> </ul> 1. What are different materials? 2. How can materials be changed?		Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons,  Key Scientists	
				William Addis (Toothbrush Inventor)  Charles Mackintosh (Waterproof coat)  John MacAdam (roads)	Linked Texts  <i><b>The Tin Forest</b></i> (Helen Ward)  <i><b>Traction Man</b></i> (Mini Grey)  <i><b>Three Little Pigs</b></i> (Lesley Sims)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<b>In Year 1 children should:</b> <ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> <li>Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock.</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 properties.</li> </ul>		Y1 Quiz + 1. wood is..... 2. plastic is..... 3. paper is... 4. glass is... 5. Some materials can be changed e.g.		In Year 3 children will: <ul style="list-style-type: none"> <li>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>Recognise that soils are made from rocks and organic matter.</li> </ul>	
Scientific Enquiry					
<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<b>Which shapes make the strongest paper bridge?</b>  <b>Which material would be best for the roof of the little pig's house?</b>	Which materials will float and which will sink?  Which materials will let electricity go through them, and which will not?  Which materials are shiny and which are dull?	How long do bubble bath bubbles last for?  What will happen to our snowman?	How do materials change with heat? <i>leave outside in sunshine/windowsill/radiator</i>  How does amount of water affect the strength of a kitchen towel?	<b>How have the materials we use changed over time?</b>  <b>How are plastics made?</b>	Can we change materials?  How do we choose the best material?



**Year 3 – Materials (Rocks)**

National Curriculum Objectives		Essential Knowledge & Key Questions for Knowledge Build Up		Vocabulary	
<ul style="list-style-type: none"> <li>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>Recognise that soils are made from rocks and organic matter</li> </ul>		<ul style="list-style-type: none"> <li>There are different types of rock.</li> <li>There are different types of soil.</li> <li>What fossils are.</li> <li>Fossils tell us what has happened before.</li> <li>Fossils provide evidence.</li> </ul> <p>1. What are the different types of rock? 2. What are the different types of soil? 3. What do fossils tell us?</p>		Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, top soil, sub soil, base rock.	
				Key Scientists	Linked Texts
				<b>Mary Anning</b> (Discovery of Fossils)  <b>Inge Lehmann</b> (Earth's Mantle)	<b><i>The Pebble in My Pocket</i></b> (Meredith Hooper)  <b><i>Stone Girl, Bone Girl</i></b> (Laurence Anholt)  <b><i>The Street Beneath My Feet</i></b> (Charlotte Guillain & Yuval Zommer)
Prior Learning		Pre/Post Learning Quiz Questions		Future Learning	
<p>In Year 2 children should:</p> <ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul> <p>Children may:</p> <ul style="list-style-type: none"> <li>May have some understanding of a variety of different rocks in the natural world.</li> <li>Some understanding of what soil is. (how to identify soil etc)</li> <li>May have some knowledge of what a fossil is.</li> </ul>		<p>Y12+</p> <p>1. What are the different types of rock? 2. What are the different types of soil? 3. Why are fossils useful? 4. How are fossils made?</p>		<p>In Year 4 children will:</p> <ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul> <p>In Year 6 children will:</p> <ul style="list-style-type: none"> <li>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</li> </ul>	
Scientific Enquiry					
Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<p>How does adding different amounts of sand to soil affect how quickly water drains through it?</p> <p>Which soil absorbs the most water?</p>	Can you use the identification key to find out the name of each of the rocks in your collection?	<p>How does tumbling change a rock over time?</p> <p>What happens when water keeps dripping on a sandcastle?</p>	Is there a pattern in where we find volcanos on planet Earth?	Who was Mary Anning and what did she discover?	What are rocks and soils like?



**Year 4 – Materials - Solids, Liquids & Gases**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<ul style="list-style-type: none"> <li>Identify solids, liquids and gases.</li> <li>Materials change state.</li> <li>Evaporation and condensation play a part in the water cycle.</li> </ul> <p>1. What are solids, liquids and gases? 2. How do materials change state? 3. What is the water cycle?</p>	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,	
		Key Scientists	Linked Texts
		<b>Anders Celcius</b> (Celcius Temperature Scale)  <b>Daniel Fahrenheit</b> (Fahrenheit Temperature Scale / Invention of the Thermometer)	<b>Once Upon a Raindrop: The Story of Water</b> (James Carter)  <b>Sticks</b> (Diane Alber)

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<p><b>In KS1 children should:</b></p> <ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> <li>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</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>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	<p>Quiz 3 +</p> <ol style="list-style-type: none"> <li>Name a solid, liquid and a gas.</li> <li>How can solids, liquids and gases change state?</li> <li>What happens in the water cycle?</li> <li>What is condensation?</li> <li>What is evaporation?</li> </ol>	<p>In Year 5 children will:</p> <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>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</li> <li>Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> <li>Give reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including wood, metals and plastic.</li> <li>Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</li> </ul>

**Scientific Enquiry**

<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<p>How does the mass of a block of ice affect how long it takes to melt?</p> <p>How does the surface area of water affect how long it takes to evaporate?</p> <p>Does seawater evaporate faster than fresh water?</p>	<p>Can you group these materials and objects into solids, liquids, and gases?</p> <p>How would you sort these objects/materials based on their temperature?</p>	<p>Which material is best for keeping our hot chocolate warm?</p> <p>How does the level of water in a glass change when left on the windowsill?</p>	<p>Is there a pattern in how long it takes different sized ice lollies to melt?</p> <p>How does evaporation rate change as you add more salt to your water?</p>	<p>What are hurricanes, and why do they happen?</p>	<p>Where do ice cubes go when they disappear? Why does it rain and hail?</p>



### Year 5 – Materials (Mixtures & Separation)

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary		
<ul style="list-style-type: none"> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> <li>• Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</li> <li>• Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> </ul>	<ul style="list-style-type: none"> <li>• The temperature effects the rate of evaporation in the water cycle.</li> <li>• Some materials dissolve and some can be recovered from a solution.</li> <li>• Some mixtures can be separated.</li> </ul> <p>1. How does temperature effect evaporation? 2. Which materials can dissolve? 3. Which materials can be separated?</p>	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,		
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Key Scientists</td> <td style="width: 50%;">Linked Texts</td> </tr> <tr> <td> <b>Spencer Silver,</b>  <b>Arthur Fry and Alan Amron</b>            (Post-It Notes)   <b>Ruth Benerito</b>            (Wrinkle-Free Cotton)         </td> <td> <i><b>Itch</b></i>  <i>(Simon Mayo)</i>   <i><b>Kensuke's Kingdom</b></i>  <i>(Michael Morpurgo)</i>   <i><b>The BFG</b></i>  <i>(Roald Dahl)</i> </td> </tr> </table>	Key Scientists	Linked Texts
Key Scientists	Linked Texts			
<b>Spencer Silver,</b> <b>Arthur Fry and Alan Amron</b> (Post-It Notes)  <b>Ruth Benerito</b> (Wrinkle-Free Cotton)	<i><b>Itch</b></i> <i>(Simon Mayo)</i>  <i><b>Kensuke's Kingdom</b></i> <i>(Michael Morpurgo)</i>  <i><b>The BFG</b></i> <i>(Roald Dahl)</i>			
<b>Prior Learning</b>	<b>Pre/Post Learning Quiz Questions</b>	<b>Future Learning</b>		
<b>In KS1 children should:</b> <ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made.</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</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>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	Y4 quiz + 1. Name the different parts of the water cycle. 2. What does dissolve mean? 3. Which materials dissolve? 4. Which materials can be seerated	In KS3 children will be taught about: <input type="checkbox"/> the order of metals and carbon in the reactivity series <input type="checkbox"/> the use of carbon in obtaining metals from metal oxides <input type="checkbox"/> properties of ceramics, polymers and composites (qualitative).		

#### **Scientific Enquiry**

<u>Comparative tests</u>	<u>Identify &amp; Classify</u>	<u>Observation over time</u>	<u>Pattern Seeking</u>	<u>Research</u>	<u>Enquiry Question</u>
<b>How does the temperature of tea affect how long it takes for a sugar cube to dissolve?</b>  <b>Which type of sugar dissolves the fastest?</b>	Can you group these materials based on whether they are transparent or not?	How does a container of salt water change over time?  How does a sugar cube change as it is put in a glass of water?	Do all stretchy materials stretch in the same way?  How does temperature affect how much solute we can dissolve?	What are microplastics and why are they harming the planet?	How can we separate a mixture of water, iron filings, salt and sand?



**Materials (Changes)**

National Curriculum Objectives	Essential Knowledge & Key Questions for Knowledge Build Up	Vocabulary	
<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>comparative and fair tests, for the particular uses of everyday materials, including wood, metals and plastic.</li> <li>Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda</li> </ul>	<ul style="list-style-type: none"> <li>All matter (including gas) has mass.</li> <li>Sometimes mixed substances react to make a new substance. These changes are usually irreversible.</li> <li>Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible.</li> <li>Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature)</li> <li>If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)</li> </ul>	Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.	
		Key Scientists	Linked Texts
		<b>Spencer Silver,</b> <b>Arthur Fry and Alan Amron</b> (Post-It Notes)  <b>Ruth Benerito</b> (Wrinkle-Free Cotton)	<b><i>Itch</i></b> <i>(Simon Mayo)</i>  <b><i>Kensuke's Kingdom</i></b> <i>(Michael Morpurgo)</i>  <b><i>The BFG</i></b> <i>(Roald Dahl)</i>

Prior Learning	Pre/Post Learning Quiz Questions	Future Learning
<b>In Year 4 children should:</b> <ul style="list-style-type: none"> <li>Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<ul style="list-style-type: none"> <li>The key question we want children to interrogate is "have we made a new substance?"               <ul style="list-style-type: none"> <li>Wet clay → air-dried clay → fired clay.</li> <li>Flour and water → dough → bread</li> </ul> </li> <li>Add sugar to fizzy water; it fizzes up. Has a new substance been made? (No, the gas was dissolved in the water and adding sugar made it become undissolved)</li> <li>Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes the gas was not in the vinegar as it wasn't fizzy, so it must have been made)</li> <li>Add water to instant snow.</li> <li>Use lemon juice as an invisible ink, heating gently makes the ink visible. Is this a new substance?</li> <li>When water is added to jelly and it is set, is it a new substance.</li> <li>When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently?</li> </ul>	In KS3 children will learn about: <ul style="list-style-type: none"> <li>the concept of a pure substance mixtures, including dissolving</li> <li>diffusion in terms of the particle model</li> <li>simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography</li> <li>the identification of pure substances</li> </ul>

**Scientific Enquiry**

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	Enquiry Question
<b>Which material rusts fastest/slowest?</b>  <b>How can we change the 'jellyness' of jelly?</b>	Can you identify and classify these reactions and changes into reversible, and irreversible? Can you describe their groups similarities and differences?	How does a nail in salt water change over time?	What patterns can you notice in different reactions?  How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction?	What are smart materials and how can they help us?	How can we change materials reversibly and irreversibly?