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**Year 1 Plants**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<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>	<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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Plants grow from seeds/bulbs</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> </ul>	<p>Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen</p>	<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>• Why do seeds look different?</li> <li>• Can plants grow as big in the shade?</li> <li>• What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?</li> </ul>

### Year 2 Plants

National Curriculum Objectives	Prior Learning	Future Learning
<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>	<p>In Year 1 Children should:</p> <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>	<p>In Year 3 Children will:</p> <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 plant's 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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• Plants grow from seeds/bulbs</li> <li>• Plants need light, water and warmth to grow and survive</li> <li>• Flowers make seeds to make more plants (reproduce)</li> <li>• Plants are important</li> <li>• We need plants to survive (to clean air, to eat)</li> <li>• We can eat different parts of the plants (leaves, stems, roots, seeds, fruit)</li> </ul>	<p>Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight.</p>	<ul style="list-style-type: none"> <li>• Do cress produce seeds, how could we find out?</li> <li>• Do all plants produce flowers and seeds?</li> <li>• What is different between freshly cut and planted flowers?</li> <li>• Do plants flower all year round?</li> <li>• What are flowers for?</li> <li>• What happens to a plant after it has produced seeds?</li> </ul>

**Year 3 Plants**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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 plant's 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>	<p>In year 2 children should:</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>	<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</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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<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> <li>• Seeds contain enough food for the plant's initial growth</li> </ul>	<p>Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll</p>	<ul style="list-style-type: none"> <li>• How do plants reproduce?</li> <li>• Do all flowers look the same?</li> <li>• How do insects know which flowers to pollinate?</li> <li>• Why do flowers smell?</li> <li>• What do seeds do?</li> <li>• Can a plant live without its leaves?</li> <li>• Do grass/trees make flowers?</li> <li>• What conditions are perfect for a seed to grow?</li> <li>• Where do weeds come from?</li> <li>• How does the space between seeds affect how well they grow?</li> <li>• Does seed size match plant size?</li> <li>• Do plants take in water through their roots?</li> <li>• How does water move through the plant?</li> <li>• How do plants make their food?</li> <li>• How does light affect plant growth?</li> <li>• How does a plant get carbon dioxide?</li> </ul>

Year 1 Animals, including Humans		
National Curriculum Objectives	Prior Learning	Future Learning
<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> </ul>	<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>In Year 2 children will:</p> <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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>There are many different animals with different characteristics.</li> <li>Animals have senses to help individuals survive. When animals sense things they are able to respond.</li> <li>Animals need food to survive.</li> <li>Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.</li> </ul>	<p>Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow</p>	<ul style="list-style-type: none"> <li>What do animals eat?</li> <li>Do all animals eat the same food?</li> <li>Which of our senses is the most accurate at identifying food?</li> <li>Do all animals hunt?</li> <li>Why are animals different colours and patterns?</li> </ul>

Year 2 Animals, including Humans		
National Curriculum Objectives	Prior Learning	Future Learning
<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>	<p>In year 1 children should:</p> <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> </ul>	<p>In Year 3 children will:</p> <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 how nutrients, water and oxygen are transported within animals and humans.</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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• Animals move in order to survive.</li> <li>• Different animals move in different ways to help them survive.</li> <li>• Exercise keeps animal's bodies in good condition and increases survival chances.</li> <li>• All animals eventually die.</li> <li>• Animals reproduce new animals when they reach maturity.</li> <li>• Animals grow until maturity and then do not grow any larger</li> </ul>	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,</p>	<ul style="list-style-type: none"> <li>• How long do should my pets live for?</li> <li>• Do all animals grow and live the same way?</li> <li>• Do bigger animals live longer?</li> <li>• Why are we all different heights?</li> <li>• How and why do we grow and change?</li> </ul>

Year 3 Animals, including Humans		
National Curriculum Objectives	Prior Learning	Future Learning
<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 how nutrients, water and oxygen are transported within animals and humans.</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>	<p>In year 2 children should:</p> <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>	<p>In Year 4 children will:</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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>Different animals are adapted to eat different foods.</li> <li>Many animals have skeletons to support their bodies and protect vital organs.</li> <li>Muscles are connected to bones and move them when they contract.</li> <li>Movable joints connect bones.</li> </ul>	<p>Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax</p>	<ul style="list-style-type: none"> <li>Why do we need a skeleton?</li> <li>What types of skeleton are there?</li> <li>Are all skeletons the same?</li> <li>Can something survive without a skeleton?</li> <li>What happens if we break a bone?</li> <li>How do we move?</li> <li>Are bones that are bigger, stronger?</li> <li>Why do we need joints?</li> <li>Why do muscles get tired?</li> <li>Can we 'break' muscles?</li> </ul>

<b>Year 4 Animals, including Humans</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>In year 3 children should:</p> <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 how nutrients, water and oxygen are transported within animals and humans.</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>	<p>In Year 5 children will:</p> <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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>Animals have teeth to help them eat.</li> <li>Different types of teeth do different jobs.</li> <li>Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood.</li> <li>The blood takes nutrients around the body.</li> <li>Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.</li> </ul>	<p>Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer</p>	<ul style="list-style-type: none"> <li>What different types of food are there?</li> <li>Why do we need a variety of different foods?</li> <li>Do all organisms eat the same things?</li> <li>Why do some people need different diets? (weightlifter vs marathon runner)</li> <li>Why are teeth important?</li> <li>What happens to our food?</li> <li>What is our digestive system?</li> <li>How does our food turn into poo and wee?</li> </ul>

<b>Year 5 Animals, including Humans</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<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>	<p>In Year 6 children will:</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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Different animals mature at different rates and live to different ages.</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> </ul>	<p>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,</p>	<ul style="list-style-type: none"> <li>• What do humans look like?</li> <li>• Do all animal embryos look the same?</li> <li>• How do humans change?</li> <li>• Why do humans change?</li> <li>• What causes puberty?</li> <li>• What changes do we go through during puberty?</li> <li>• Are there any patterns between vertebrate animals and their gestation periods?</li> </ul>

**Year 6 Animals, including Humans**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>In year 4 children should:</p> <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>	<p>In Key Stage 3 children will:</p> <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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• The heart pumps blood around the body.</li> <li>• Oxygen is breathed into the lungs where it is absorbed by the blood.</li> <li>• Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)</li> </ul>	<p>Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.</p>	<ul style="list-style-type: none"> <li>• Why do we need oxygen?</li> <li>• How do we breathe?</li> <li>• Do fish and plants breathe?</li> <li>• Do all living things need oxygen?</li> <li>• How does the size of a person's lungs affect their lung capacity?</li> <li>• Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?</li> <li>• Why do we have blood? How does our heart work?</li> <li>• How does size of muscle affect our pulse rate?</li> <li>• How does exercise effect our pulse rate?</li> <li>• How might the circulatory system of an elephant, a hummingbird, or a polar bear differ?</li> <li>• Is the air you breathe out, the same as that you breathe in?</li> </ul>

<b>Year 6 Evolution and Inheritance</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>From Key Stages 1 &amp; 2, children should:</p> <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>	<p>In Key Stage 3 children will learn about:</p> <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 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<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> </ul> <p><i>NB: The following could be duplicated in Year 6 Living things and their habitats.</i></p> <ul style="list-style-type: none"> <li>• Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so.</li> <li>• Organisms reproduce and offspring have similar characteristic patterns.</li> <li>• Variation exists within a population (and between offspring of some plants)</li> <li>• Competition exists for resources and mates</li> </ul>	<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,</p>	<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> <li>• What reasons do animals become extinct?</li> <li>• Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely?</li> <li>• How did Darwin come up with the theory?</li> <li>• Why was his theory not initially accepted?</li> </ul>

<b>Year 2 Living things and their Habitats</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>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>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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Some things are living, some were once living but now dead and some things never lived.</li> <li>• There is variation between living things.</li> <li>• Different animals and plants live in different places. Living things are adapted to survive in different habitats.</li> <li>• Environmental change can affect plants and animals that live there.</li> </ul>	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,</p>	<ul style="list-style-type: none"> <li>• How do animals eat?</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> <li>• Why do animals and plants like to live in different places?</li> <li>• How do seasons affect our animals and plants?</li> <li>• Which animals hibernate and why?</li> <li>• Why do snails hibernate, but slugs do not?</li> <li>• How do habitats change over our school year?</li> </ul>

<b>Year 4 Living things and their Habitats</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<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>In Year 5 children will:</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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>Living things can be divided into groups based upon their characteristics</li> <li>Environmental change affects different habitats differently</li> <li>Different organisms are affected differently by environmental change</li> <li>Different food chains occur in different habitats</li> <li>Human activity significantly affects the environment</li> </ul>	<p>Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.</p>	<ul style="list-style-type: none"> <li>What food chains and webs are there in our local habitat?</li> <li>How does energy move through the food chain?</li> <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>

**Year 5 Living things and their Habitats**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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 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> <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>	<p>In Year 6 children will:</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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Different animals mature at different rates and live to different ages.</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> <li>• Environmental change can affect how well an organism is suited to its environment.</li> <li>• Different types of organisms have different lifecycles.</li> </ul>	<p>Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant</p>	<ul style="list-style-type: none"> <li>• What is a life cycle? What types of life cycles are there?</li> <li>• Are life cycles the same?</li> <li>• Do plants reproduce in the same ways as us?</li> <li>• How do plants spread their seeds?</li> </ul>

**Year 6 Living things and their Habitats**

National Curriculum Objectives	Prior Learning	Future Learning
<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>In Year 5 children should:</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 Key Stage 3 children will:</p> <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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• Variation exists within a population (and between offspring of some plants) – <i>NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance.</i></li> <li>• Organisms best suited to their environment are more likely to survive long enough to reproduce.</li> <li>• Organisms are best adapted to reproduce are more likely to do so.</li> <li>• Organisms reproduce and offspring have similar characteristic patterns.</li> <li>• Competition exists for resources and mates</li> </ul>	<p>Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.</p>	<ul 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>• How do animals change over time?</li> <li>• Why does variation exist?</li> <li>• What happens if animals of different species breed? (hybrids)</li> <li>• What happens to house plants outside?</li> <li>• What are microorganisms?</li> <li>• How can we prevent the spread of disease?</li> <li>• Why do animals and plants compete – and what for?</li> </ul>

<b>Year 4 Electricity</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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 a lamp will light in a simple series circuit, based on whether 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 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>	<p>In Early Years children:</p> <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>	<p>In Year 6 children will:</p> <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>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>A source of electricity (mains or battery) is needed for electrical devices to work.</li> <li>Electricity sources push electricity round a circuit.</li> <li>More batteries will push the electricity round the circuit faster.</li> <li>Devices work harder when more electricity goes through them.</li> <li>A complete circuit is needed for electricity to flow and devices to work.</li> <li>Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators.</li> </ul>	<p>Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component.</p>	<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>What electricity do I use?</li> <li>In which ways can we 'get' electricity?(mains/plugs/batteries/wireless)</li> <li>How do we make electricity?</li> <li>How do batteries work?</li> <li>How quickly can batteries run out? Does this make a difference depending on number of components?</li> <li>How does the number of batteries added to the circuit affect a device?</li> <li>What materials can carry electricity? (conductors/insulators)</li> </ul>

**Year 6 Electricity**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>In Year 4 children should:</p> <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 a lamp will light in a simple series circuit, based on whether 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 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>	<p>In Key Stage 3 children will:</p> <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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.'</li> <li>• The greater the current flowing through a device the harder it works.</li> <li>• Current is how much electricity is flowing round a circuit.</li> <li>• When current flows through wires heat is released. The greater the current, the more heat is released.</li> </ul>	<p>Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.</p>	<ul style="list-style-type: none"> <li>• Do all batteries push as hard as each other?</li> <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>• Are all types of wires as good as conducting electricity?</li> <li>• Why are wires insulated in plastic? Does type of material make a difference?</li> <li>• Does length of wire make a difference?</li> <li>• Does the type of circuit affect how the components work/long the battery lasts?</li> <li>• What renewable ways can we generate electricity?</li> <li>• How does current affect heat?</li> <li>• What are the dangers of a short circuit?</li> </ul>

**Year 3 - Forces**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</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 based on 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>	<p>In Year 2 children:</p> <ul style="list-style-type: none"> <li>• May have an awareness of how to make things stop and start, using simple pushes and pulls.</li> <li>• They may know about floating and sinking.</li> <li>• Be aware of different materials and some of their properties.</li> </ul>	<p>In Year 5 children will:</p> <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>
<p><b>Sticky Knowledge</b></p> <ul style="list-style-type: none"> <li>• Magnets exert attractive and repulsive forces on each other.</li> <li>• Magnets exert non-contact forces, which work through some materials.</li> <li>• Magnets exert attractive forces on some materials.</li> <li>• Magnet forces are affected by magnet strength, object mass, distance from object and object material.</li> </ul>	<p><b>Vocabulary</b></p> <p>Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass</p>	<p><b>Key Questions</b></p> <ul style="list-style-type: none"> <li>• What are magnetic materials? How can we find out?</li> <li>• Can I make a magnetic material non-magnetic?</li> <li>• How far away does a magnet have to be before it attracts a magnetic material?</li> <li>• How far away can the magnetic attraction between two magnets be experiences?</li> <li>• Is the repulsive force the same size?</li> <li>• How is the magnetic attraction of repulsion force affected by putting materials between the magnets?</li> <li>• Are bigger magnets stronger?</li> </ul>

**Year 5 - Forces**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</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>	<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 based on 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>	<p>In Key Stage 3 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way.</li> <li>• Friction is a force against motion caused by two surfaces rubbing against each other.</li> <li>• Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move</li> </ul>	<p>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley.</p>	<ul style="list-style-type: none"> <li>• What is a force?</li> <li>• How can a force act on an object?</li> <li>• How can we see forces?</li> <li>• How can we measure forces?</li> <li>• How does the saltiness (salinity) of water affect the water resistance?</li> <li>• How does the length of a piece of a paper helicopter’s wings affect the time it takes to fall?</li> <li>• How does adding holes to a parachute affect the time it takes to fall?</li> </ul>

**Year 5 – Earth and Space**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>In Key Stage 1 and in Year 3 children should:</p> <ul style="list-style-type: none"> <li>• Understand changes in weather patterns and seasons.</li> <li>• Understand that Neil Armstrong was the first man on the moon.</li> <li>• Understand that the sun is a light source that reflects off the moon.</li> <li>• Find patterns in the way that the sizes of shadows change.</li> <li>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> </ul>	<p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> <li>• Gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10 \text{ N/kg}</math>, 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance.</li> <li>• Objects with larger masses exert bigger gravitational forces.</li> <li>• Objects like planets, moons and stars spin.</li> <li>• Smaller mass objects like planets orbit large mass objects like stars.</li> <li>• Stars produce vast amounts of heat and light.</li> <li>• All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.</li> </ul>	<p>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.</p>	<ul style="list-style-type: none"> <li>• How does temperature/size/day length/year length change as you get closer/further to the sun?</li> <li>• How does distance from a light source affect how much light hits an object?</li> <li>• Does having more moons result in more light hitting a planet? How could you test this?</li> <li>• How does speed/size of a meteorite affect the size of the moon crater formed?</li> <li>• If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth’s surface only 6x greater than at the surface of the moon?</li> <li>• Why do we have day/night/months/years /seasons? Why does day length change?</li> <li>• Why does shadow size change over the course of a day?</li> </ul>

**Year 1 – Energy (Seasons and how they change)**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<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>	<p>In Early Years children should:</p> <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>	<p>In Year 3 children will:</p> <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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Weather can change</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> <li>• There are four seasons: Spring, Summer, Autumn, Winter</li> </ul>	<p>Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature</p>	<ul style="list-style-type: none"> <li>• Do countries with higher temperatures have less rain?</li> <li>• How does rainfall and temperature change over time in our school grounds?</li> <li>• Which leaf is the strongest/best shade cover/best at directing water? What do you notice about different leaves?</li> <li>• What purpose to leaves serve for a tree?</li> <li>• Why do you think leaves turn brown in Winter?</li> <li>• What colours can we find outside? Does this change across the seasons?</li> <li>• What effect does rain have on the environment?</li> <li>• What would happen if there was too much rain?</li> <li>• What would happen if there wasn't enough rain?</li> </ul>

**Year 3 – Energy (Light)**

National Curriculum Objectives	Prior Learning	Future Learning
<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>• In Year 1 children should have:</li> <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><i>Children may:</i></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>• understand they need light to be able to see things.</li> </ul>	<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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• There must be light for us to see. Without light it is dark.</li> <li>• We need light to see things even shiny things.</li> <li>• Transparent materials let light travel through them, and opaque materials don't let light through.</li> <li>• Beams of light bounce off some materials (reflection).</li> <li>• Shiny materials reflect light beams better than non-shiny materials.</li> <li>• Light comes from a source</li> </ul>	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.</p>	<ul style="list-style-type: none"> <li>• How does distance from a light source affect how bright it looks?</li> <li>• How does being in darkness affect your sense of hearing?</li> <li>• What colour would be the best to make a safety jacket from?</li> <li>• How does the colour of a material affect how reflective it is?</li> <li>• What would be the best material to make a blind for a baby's room?</li> <li>• How does thickness of a material affect how much light can pass through it?</li> <li>• How many pieces of tracing paper are as translucent as a single piece of white paper?</li> <li>• How can we change the darkness, size and shape of a shadow?</li> </ul>

### Year 4 – Energy (Sound)

National Curriculum Objectives	Prior Learning	Future Learning
<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>	<p>In KS1 children:</p> <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>	<p>In KS3 children will learn about:</p> <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 loudspeakers, 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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• Sound travels from its source in all directions and we hear it when it travels to our ears.</li> <li>• Sound travel can be blocked.</li> <li>• Sound spreads out as it travels.</li> <li>• Changing the shape, size and material of an object will change the sound it produces.</li> <li>• Sound is produced when an object vibrates.</li> <li>• Sound moves through all materials by making them vibrate.</li> <li>• Changing the way an object vibrates changes its sound.</li> <li>• Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds.</li> <li>• Faster vibrations (higher frequencies) produce higher pitched sounds</li> </ul>	<p>Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.</p>	<ul style="list-style-type: none"> <li>• How can you change the volume of a sound?</li> <li>• How does the size of an ear trumpet affect the volume of sound detected?</li> <li>• How does the type of material affect how well it blocks a sound?</li> <li>• How does thickness of material affect how well it blocks a sound?</li> <li>• Which materials vibrate better and produce louder sounds? Can we identify any patterns?</li> <li>• Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test)</li> <li>• How does length of the tube (when making a straw oboe) affect the pitch and volume?</li> <li>• Can you predict the relative pitch of tuning forks from the patterns of ripples they make in the water?</li> </ul>

**Year 6 – Energy (Light)**

National Curriculum Objectives	Prior Learning	Future Learning
<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>	<p>In year 3 children should:</p> <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>	<p>In Key Stage 3, children will learn about:</p> <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>
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> <li>• Animals see light sources when light travels from the source into their eyes.</li> <li>• Animals see objects when light is reflected off that object and enters their eyes.</li> <li>• Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light, so we do not see the beam.</li> <li>• Light travels in straight lines</li> </ul>	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction</p>	<ul style="list-style-type: none"> <li>• How does the size of an object affect the size of a shadow? How does the distance between the light and the object change the size of a shadow? How does the distance between the object and the size of the screen affect the size of a shadow?</li> <li>• How would a solar eclipse be different if: - The moon was a different size? - The earth span faster or slower? - The sun was larger or smaller? - If the earth and moon were the same size but further away in the solar system?</li> <li>• How does the amount of aluminium foil scrunched affect how much light is scattered?</li> <li>• How does the amount of polishing affect how well a piece of metal scatters light?</li> </ul>

<b>Year 1 - Materials</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</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 based on their simple properties</li> </ul>	<p>In Early Years children should:</p> <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>	<p>In Year 2 children will:</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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• There are many different materials that have different describable and measurable 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>	<p>Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque,</p>	<ul style="list-style-type: none"> <li>• Which rocks are the least crumbly?</li> <li>• Which materials absorb the most water?</li> <li>• Which type of brick would be the easiest to drag to make a pyramid?</li> <li>• Which material would be the strongest to use as a floor tile?</li> <li>• Which fabric would make the softest blanket?</li> <li>• The baby has spilt her drink, which material would absorb the drink the best?</li> <li>• We want to make a slippery slide; which liquid would be best to use?</li> <li>• Which wrapping papers are strong enough to wrap and send a present?</li> <li>• Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime?</li> <li>• Which plastic would be flexible enough to make a belt?</li> </ul>

**Year 2 - Materials**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</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>	<p>In Year 1 children should:</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, 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 based on their simple properties</li> </ul>	<p>In Year 3 children will:</p> <ul style="list-style-type: none"> <li>Compare and group together different kinds of rocks based on 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>Materials can be changed by physical force (twisting, bending, squashing and stretching)</li> </ul>	<p>Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons,</p>	<ul style="list-style-type: none"> <li>Which rocks are the least crumbly?</li> <li>Which materials absorb the most water?</li> <li>Which type of brick would be the easiest to drag to make a pyramid?</li> <li>Which material would be the strongest to use as a floor tile?</li> <li>Which fabric would make the softest blanket?</li> <li>The baby has spilt her drink, which material would absorb the drink the best?</li> <li>Which chocolate will melt the fastest on a warm plate (a model of a warm hand)</li> <li>Which wrapping papers are strong enough to wrap and send a present?</li> <li>Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime?</li> <li>Which plastic would be flexible enough to make a belt?</li> </ul>

<b>Year 3 – Materials – Rocks/Fossils</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks based on 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>	<p>In Year 1 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><i>Children may:</i></p> <ul style="list-style-type: none"> <li>• have some understanding of a variety of different rocks in the natural world.</li> <li>• have some understanding of what soil is. (how to identify soil etc)</li> <li>• have some knowledge of what a fossil is.</li> </ul>	<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. In Year 6 children will:</li> <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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• There are different types of rock.</li> <li>• There are different types of soil.</li> <li>• Soils change over time.</li> <li>• Different plants grow in different soils.</li> <li>• Fossils tell us what has happened before.</li> <li>• Fossils provide evidence.</li> <li>• Palaeontologists use Fossils to find out about the past.</li> <li>• Fossils provide evidence that living things have changed over time.</li> </ul>	<p>Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, topsoil, sub soil, base rock.</p>	<ul style="list-style-type: none"> <li>• How are the soils different?</li> <li>• Which do you think has best drainage?</li> <li>• How might the soil be different the further down we dig?</li> <li>• What rock is best for a kitchen chopping board? What might be the issues with various materials and what they must withstand?</li> <li>• What types of rocks are there?</li> <li>• How do rocks change?</li> <li>• Why do you think worms are important to the creation of soil?</li> <li>• How can we use composting to make our own soil?</li> <li>• Does it currently look like real soil?</li> <li>• How long do you think this process will take and why?</li> <li>• How are fossils created?</li> <li>• Why do fossils help us find out about historical events?</li> </ul>

**Year 4 – Materials**

<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</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. In Year 6 children will:</li> <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>	<p>In KS1 children should:</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 based on 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>In Year 5 children will:</p> <ul style="list-style-type: none"> <li>• Compare and group together everyday materials based on 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 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>• Solids, liquids and gases are described by observable properties.</li> <li>• Materials can be divided into solids, liquids and gases.</li> <li>• Heating causes solids to melt into liquids and liquids evaporate into gases. Cooling causes gases to condense into liquids and liquids to freeze into solids.</li> <li>• The temperature at which given substances change state are always the same.</li> </ul>	<p>Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,</p>	<ul style="list-style-type: none"> <li>• How does the amount of water added to flour affect its state?</li> <li>• How does the amount of detergent added to water affect how slippery it is?</li> <li>• How does the temperature affect how viscous a liquid is (use cooking oil)?</li> <li>• Place a peach in a glass of lemonade and watch it spin. Why does it behave that way, and can you prove it?</li> <li>• How does the material sprinkled on ice and snow affect how quickly it melts?</li> <li>• What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature?</li> </ul>

<b>Year 5 – Materials (Mixtures and Separation)</b>		
<b>National Curriculum Objectives</b>	<b>Prior Learning</b>	<b>Future Learning</b>
<ul style="list-style-type: none"> <li>Compare and group together everyday materials based on 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 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>	<p>In Year 4 children should:</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. In Year 6 children will:</li> <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>	<p>In Year 5 children will:</p> <ul style="list-style-type: none"> <li>Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</li> <li>Give reasons based on evidence from comparative and fair tests, for the 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>
<b>Sticky Knowledge</b>	<b>Vocabulary</b>	<b>Key Questions</b>
<ul style="list-style-type: none"> <li>When two or more substances are mixed and remain present the mixture can be separated.</li> <li>Some changes can be reversed, and some cannot.</li> <li>Materials change state by heating and cooling.</li> </ul>	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,	<ul style="list-style-type: none"> <li>What are mixtures?</li> <li>What does dissolve mean?</li> <li>Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?</li> <li>How does the amount of water used affect how much sugar will dissolve in it?</li> <li>Which sweets dissolve in water?</li> <li>How can we separate mixtures?</li> <li>How can we clean our dirty water?</li> </ul>

Year 5 – Materials (Changes)		
National Curriculum Objectives	Prior Learning	Future Learning
<ul style="list-style-type: none"> <li>Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</li> <li>comparative and fair tests, for the 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>	<p>In Year 4 children should:</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. In Year 6 children will:</li> <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>	<p>In KS3 children will learn about:</p> <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>
Sticky Knowledge	Vocabulary	Key Questions
<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>	<p>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.</p>	<ul style="list-style-type: none"> <li>The key question we want children to interrogate is “have we made a new substance?”</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 was not 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> </ul>

