

Goodrich Primary School Science Progression Document by Topic



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SCIENCE

Enquiry Approaches used to teach					
Comparative test	Identify and Classify	Observation over time	Pattern seeking	Research	Problem solving assessment opportunities

Overview KS1 (Milestone 1)

SCIENCE	Each Year (Special Days)	Year A	Year B
AUTUMN 1	Seasonal change	Materials	Plants
AUTUMN 2	Seasonal change	Seasonal Change	Seasonal Change
SPRING 1	Seasonal change Science Week	Animals including humans	Materials
SPRING 2	Seasonal change	Plants	Animals including humans
SUMMER 1	Seasonal change	Living things and their habitats	Living things and their habitats
SUMMER 2	Seasonal change	Awe and Wonder Famous scientist	Awe and Wonder Famous scientist

Overview WOODPECKERS KS2- Years 3&4 (Milestone 2)

SCIENCE	Each Year (Special Days)	Year A	Year B
AUTUMN 1		Animals including humans	Animals including humans
AUTUMN 2		Light and Sound	Light and Sound
SPRING 1	Science Week	Forces and Magnets	Materials - Rocks
SPRING 2		Plants	Plants
SUMMER 1		Materials - Rocks	Living things and their habitats
SUMMER 2		Living things and their habitats	Forces and Magnets

Overview OWLS KS2- Years 4&5 (Milestone 2/3)

SCIENCE	Each Year (Special Days)	Year A	Year B
AUTUMN 1		Animals including humans	Earth and Space
AUTUMN 2		Electricity	Electricity
SPRING 1	Science Week	Forces	Forces
SPRING 2		Earth and Space	Animals including humans
SUMMER 1		Materials -State of Matter	Living things and their habitats
SUMMER 2		Living things and their habitats	Materials – State of Matter

Overview PEREGRINES KS2- Years 5&6 (Milestone 3)

SCIENCE	Each Year (Special Days)	Year A	Year B
AUTUMN 1		Materials – Mixture, separation and change	Materials – Mixture, separation and change
AUTUMN 2		Animals including humans	Animals including humans
SPRING 1	Science Week	Light and Sound	Light and Sound
SPRING 2		Electricity	Electricity
SUMMER 1		Living things and their habitats	Living things and their habitats
SUMMER 2		Evolution and Inheritance	Evolution and Inheritance

Wrens - Plants

National Curriculum Objectives in Wrens	Prior Learning	Future Learning in Robins
<p>EYFS:</p> <ul style="list-style-type: none"> • Make observations of plants • Know some names of plants, trees and flowers • May be able to name and describe different plants, trees and flowers • Show some care for their world around them <p>Year 1</p> <ul style="list-style-type: none"> • Identify and describe the basic structure of a variety of common flowering plants. • Identify and name the roots, trunk, branches and leaves of trees. 		<p>Year 1</p> <ul style="list-style-type: none"> • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants. <p>Year 2:</p> <ul style="list-style-type: none"> • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and warmth to grow and stay healthy.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Plants need light and water to grow and survive • Plants are important • We can eat lots of plants 	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, evergreen, observe, grow, compare, record, temperature, predict, measure, warmth, sunlight.	<ul style="list-style-type: none"> • How do Plants grow? • What do Plants need to grow? • Do all plants need water? • Are all plants green? • Why do seeds look different? • Can plants grow as big in the shade? • What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
Which type of compost grows the tallest sunflower? Which tree has the biggest leaves?	How can we sort the leaves that we collected on our walk?	How does a daffodil bulb change over the year? How does my sunflower change each week? How does the oak tree change over the year?	Do trees with bigger leaves lose their leaves first in autumn? Is there a pattern in where we find moss growing in the school grounds?	What are the most common British plants and where can we find them? How did Beatrix Potter help our understanding of mushrooms and toadstools?	How many types of plant are there?

Robins - Plants

National Curriculum Objectives in Robins	Prior Learning in Wrens	Future Learning in Woodpeckers
<p>Year 1</p> <ul style="list-style-type: none"> Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants. <p>Year 2:</p> <ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and warmth to grow and stay healthy. 	<p>EYFS:</p> <ul style="list-style-type: none"> Make observations of plants Know some names of plants, trees and flowers May be able to name and describe different plants, trees and flowers Show some care for their world around them <p>Year 1</p> <ul style="list-style-type: none"> Identify and describe the basic structure of a variety of common flowering plants. Identify and name the roots, trunk, branches and leaves of trees. 	<p>In Year 3 Children will:</p> <ul style="list-style-type: none"> Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants Know the way in which water is transported between plants
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Describe how seeds and bulbs grow into mature plants. Describe how plants need water, light and suitable temperature to grow and stay healthy Identify the basic structure of a common flowering plant and tree (e.g. leaves, flower, petal, fruit, root, bulb, seed, trunk, branches, stem) 	<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"> Do cress produce seeds, how could we find out? Do all plants produce flowers and seeds? What happens to a plant after it has produced seeds? What is different between freshly cut and planted flowers? Do plants flower all year round? What are flowers for?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
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?

Woodpeckers - Plants

National Curriculum Objectives in Woodpeckers	Prior Learning in Robins	Future Learning in Peregrines
<p>Year 3:</p> <ul style="list-style-type: none"> Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants Know the way in which water is transported between plants 	<p>Year 1</p> <ul style="list-style-type: none"> Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants. <p>Year 2:</p> <ul style="list-style-type: none"> Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and warmth to grow and stay healthy. 	<p>Year 6:</p> <ul style="list-style-type: none"> Recognise that living things have changed over time and that fossils provide information about living things Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation can lead to evolution.
<p>Sticky Knowledge</p>	<p>Vocabulary</p>	<p>Key Questions</p>
<ul style="list-style-type: none"> Name part of a plant and explain its function. Know what a plant needs to survive and that different plants may vary e.g. daffodil and a cactus. 	<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"> How do plants reproduce? Do all flowers look the same? How do insects know which flowers to pollinate? Why do flowers smell? What do seeds do? Can a plant live without its leaves? Do grass/trees make flowers? What conditions are perfect for a seed to grow? Where do weeds come from? How does the space between seeds affect how well they grow? Does seed size match plant size? Do plants take in water through their roots? How does water move through the plant? How do plants make their food? How does light affect plant growth? How does a plant get carbon dioxide?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?</p> <p>Which conditions help seeds germinate faster?</p>	<p>Identify and Classify</p> <p>How many ways can you group our seed collection?</p>	<p>Observation over time</p> <p>What happens to celery when it is left in a glass of coloured water?</p> <p>How do flowers in a vase change over time?</p>	<p>Pattern Seeking</p> <p>What colour flowers do pollinating insects prefer?</p>	<p>Research</p> <p>What are all the different ways that seeds disperse?</p>	<p>Big Question Assessment Opportunity</p> <p>Why do plants have flowers?</p>
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Wrens - Animals, including Humans		
National Curriculum Objectives in Wrens	Prior Learning	Future Learning on Robins
<p>EYFS</p> <ul style="list-style-type: none"> Be able to identify different parts of their body. Have some understanding of healthy food and the need for variety in their diets. Be able to show care and concern for living things. Know the effects exercise has on their bodies. Have some understanding of growth and change. Can talk about things they have observed including animals <p>Year 1</p> <ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores 		<p>Year 1:</p> <ul style="list-style-type: none"> Identify and name a variety of common animals that are carnivores, herbivores and omnivores <p>Year 2:</p> <ul style="list-style-type: none"> Know that animals, including humans, have offspring which grow into adults Know the basic stages in a life cycle for animals, including humans. Find out and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> There are many different animals with different characteristics. Animals need food to survive. 	Amphibians, birds, fish, mammals, reptiles, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow	<ul style="list-style-type: none"> What do animals eat? Do all animals eat the same food? Which of our senses is the most accurate at identifying food? Why are animals different colours and patterns?

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
Is our sense of smell better when we cannot 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?	How does my height change over the year?	How does my height change over the year?	What are animals like?

Robins - Animals, including Humans

National Curriculum Objectives in Robins	Prior Learning in Wrens	Future Learning in Woodpeckers
<p>Year 1:</p> <ul style="list-style-type: none"> Identify and name a variety of common animals that are carnivores, herbivores and omnivores <p>Year 2:</p> <ul style="list-style-type: none"> Know that animals, including humans, have offspring which grow into adults Know the basic stages in a life cycle for animals, including humans. Find out and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	<p>EYFS</p> <ul style="list-style-type: none"> Be able to identify different parts of their body. Have some understanding of healthy food and the need for variety in their diets. Be able to show care and concern for living things. Know the effects exercise has on their bodies. Have some understanding of growth and change. Can talk about things they have observed including animals <p>Year 1</p> <ul style="list-style-type: none"> Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores 	<p>Year 3:</p> <ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy. Know that animals have different diets and can explain what those differences might be (carnivores, herbivores and omnivores) Know the basic stages of an animals life cycle. 	<p>Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, 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"> How long do should my pets live for? Do all animals grow and live the same way? Do bigger animals live longer? Why are we all different heights? How and why do we grow and change? Do all animals hunt?

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
Do amphibians have more in common with reptiles or fish? Do bananas make us run faster?	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?

Woodpeckers - Animals, including Humans

National Curriculum Objectives in Woodpeckers	Prior Learning in Robins	Future Learning in Owls
<p>Year 3</p> <ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement. <p>Year 4</p> <ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. 	<p>Year 1:</p> <ul style="list-style-type: none"> Identify and name a variety of common animals that are carnivores, herbivores and omnivores <p>Year 2:</p> <ul style="list-style-type: none"> Know that animals, including humans, have offspring which grow into adults Know the basic stages in a life cycle for animals, including humans. Find out and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 	<p>Year 4</p> <ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Year 5</p> <ul style="list-style-type: none"> Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. Know the differences between different life cycles.
<p>Sticky Knowledge</p>	<p>Vocabulary</p>	<p>Key Questions</p>
<ul style="list-style-type: none"> Different animals are adapted to eat different foods. Know about the importance of a nutritious, balanced diet. 	<p>Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax, digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver</p>	<ul style="list-style-type: none"> Why do we need a skeleton? What types of skeleton are there? Are all skeletons the same? Can something survive without a skeleton? What happens if we break a bone? How do we move? Are bones that are bigger, stronger? Why do we need joints? Why do muscles get tired? Can we 'break' muscles? What happens to our food? What is our digestive system? How does our food turn into poo and wee?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
<p>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?</p>	<p>How do the skeletons of different animals compare? What are the names for all the organs involved in the digestive system?</p>	<p>How does our skeleton change over time? (from birth to death)</p>	<p>Do male humans have larger skulls than female humans?</p>	<p>Why do different types of vitamins keep us healthy and which foods can we find them in?</p>	<p>Why do animals have skeletons? What is a healthy diet and why is it important? What do our bodies do with the food we eat?</p>

Owls Animals, including Humans		
National Curriculum Objectives in Owls	Prior Learning in Woodpeckers	Future Learning in Peregrines
<p>Year 4</p> <ul style="list-style-type: none"> Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Year 5</p> <ul style="list-style-type: none"> Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. Know the differences between different life cycles. Know the process of reproduction in plants. 	<p>Year 3</p> <ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. Identify that humans and some other animals have skeletons and muscles for support, protection and movement. <p>Year 4</p> <ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans. 	<p>Year 5:</p> <ul style="list-style-type: none"> Know the process of reproduction in plants. <p>Year 6:</p> <ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Know that different animals have different life cycles and be able to describe two different life cycles. 	Herbivore, Carnivore, tooth, canine, incisor, molar, premolar, producer, consumer, Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,	<ul style="list-style-type: none"> Why do some people need different diets? (weightlifter vs marathon runner) Why are teeth important? What do humans look like? Do all animal embryos look the same? How do humans change? • Why do humans change? What causes puberty? What changes do we go through during puberty? Are there any patterns between vertebrate animals and their gestation periods?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>How does age affect a human's reaction time? Who grows the fastest, girls or boys?</p>	<p>Identify and Classify</p> <p>How can we organise teeth into groups? Can you identify all the stages in the human life cycle?</p>	<p>Observation over time</p> <p>How does an eggshell change when it is left in cola? How do different animal embryos change?</p>	<p>Pattern Seeking</p> <p>Are foods that are high in energy always high in sugar? Is there a relationship between a mammal's size and its gestation period?</p>	<p>Research</p> <p>How do dentists fix broken teeth? Why do people get grey/white hair when they get older?</p>	<p>Big Question Assessment Opportunity</p> <p>Why and how does the human body change over time?</p>
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Peregrines Animals, including Humans

National Curriculum Objectives in Peregrines	Prior Learning in Owls	Future Learning
<p>Year 5:</p> <ul style="list-style-type: none"> Know the process of reproduction in animals. <p>Year 6:</p> <ul style="list-style-type: none"> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.. 	<p>Year 4</p> <ul style="list-style-type: none"> Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Year 5</p> <ul style="list-style-type: none"> Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. Know the differences between different life cycles. Know the process of reproduction in animals. 	<p>In Key Stage 3 children will:</p> <ul style="list-style-type: none"> the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalyts) calculations of energy requirements in a healthy daily diet the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases the structure and functions of the gas exchange system in humans, including adaptations to function the effects of recreational drugs (including substance misuse) on behaviour, health and life processes
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> The heart pumps blood around the body. Oxygen is breathed into the lungs where it is absorbed by the blood. 	<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"> Why do we need oxygen? How do we breathe? Do fish and plants breathe? Do all living things need oxygen? How does the size of a person’s lungs affect their lung capacity? Are there ways to increase/decrease our lung capacity? Is lung capacity fixed? Why do we have blood? How does our heart work? How does size of muscle affect our pulse rate? How does exercise effect our pulse rate? How might the circulatory system of an elephant, a hummingbird, or a polar bear differ? Is the air you breathe out, the same as that you breathe in?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>How does the length of time we exercise for affect our heart rate? Can exercising regularly affect your lung capacity? Which type of exercise has the greatest effect on our heart rate?</p>	<p>Identify and Classify</p> <p>Which organs of the body make up the circulation system, and where are they found?</p>	<p>Observation over time</p> <p>Which organs of the body make up the circulation system, and where are they found?</p>	<p>Pattern Seeking</p> <p>Is there a pattern between what we eat for breakfast and how fast we can run?</p>	<p>Research</p> <p>How have our ideas about disease and medicine changed over time?</p>	<p>Big Question Assessment Opportunity</p> <p>How do our choices affect how our bodies work? Why does my heart beat?</p>
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Peregrines Evolution and Inheritance

National Curriculum Objectives	Prior Learning	Future Learning
<ul style="list-style-type: none"> • Know about evolution and can explain what it is. • Know how fossils can be used to find out about the past. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago 	<p>From Key Stages 1 & 2, children should:</p> <ul style="list-style-type: none"> • Understand there is a variety of life on Earth • Know that some animal's differences are important to their survival • Know how animals and plants reproduce • Know how fossils form over time 	<p>In Key Stage 3 children will learn about:</p> <ul style="list-style-type: none"> • heredity as the process by which genetic information is transmitted from one generation to the next • the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction • the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Life cycles have evolved to help organisms survive to adulthood and be able to give an example. 	<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,</p>	<ul style="list-style-type: none"> • Why are we all different? • What is variation, and why is it important? • How did life begin on Earth? • How do we change? • What is evolution? • What evidence is there for evolution? • How does evolution happen? • What reasons do animals become extinct? • Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely? • How did Darwin come up with the theory? • Why was his theory not initially accepted?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
What is the most common eye colour in our class?	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?

Wrens Living things and their Habitats

National Curriculum Objectives in Wrens	Prior Learning	Future Learning in Robins
<p>EYFS:</p> <ul style="list-style-type: none"> • Comments and questions about the place they live or the natural world. • Shows care and concern for living things and the environment. • Can talk about things they have observed such as plants and animals. • Notices features of objects in their environment. • Comments and asks questions about their familiar world. 		<p>Year 2:</p> <ul style="list-style-type: none"> • Explore and compare the difference between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Some things are living, some were once living but now dead and some things never lived. 	<p>Living, dead, never alive, food, leaf litter, shelter, seashore, woodland, ocean, rainforest, desert, damp, shade,</p>	<ul style="list-style-type: none"> • How do animals eat? • Do all animals eat the same thing? • What animals live in our school environment? • Why do animals and plants like to live in different places? • How do seasons affect our animals and plants?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>Which pets are the easiest to look after?</p>	<p>Identify and Classify</p> <p>How would you group these plants and animals?</p>	<p>Observation over time</p> <p>How do the school plants change over the year?</p>	<p>Pattern Seeking</p> <p>What conditions do minibeast like to live in within the school grounds?</p>	<p>Research</p> <p>How do seasons affect our animals and plants?</p>	<p>Big Question Assessment Opportunity</p> <p>Why do animals and plants like to live in different places?</p>
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Robins Living things and their Habitats

National Curriculum Objectives in Robins	Prior Learning in Wrens	Future Learning Woodpeckers
<p>Year 2</p> <ul style="list-style-type: none"> • Explore and compare the difference between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food. 	<p>EYFS:</p> <ul style="list-style-type: none"> • Comments and questions about the place they live or the natural world. • Shows care and concern for living things and the environment. • Can talk about things they have observed such as plants and animals. • Notices features of objects in their environment. • Comments and asks questions about their familiar world. 	<p>Year 4I:</p> <ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Know and label the features of a river • Recognise that environments can change and that this can sometimes pose danger to living things.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Different animals and plants live in different places. Living things are adapted to survive in different habitats. 	<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"> • How to animals eat? • Do all animals eat the same thing? • Which animals hunt, and which animals are hunted? Why? • What animals live in our school environment? • How are animals and plants ‘adapted’ to live in their habitats? • Why do animals and plants like to live in different places? • How do seasons affect our animals and plants? • Which animals hibernate and why? • Why do snails hibernate, but slugs do not? • How to habitats change over our school year?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>Which pets are the easiest to look after? Is there the same level of light in the evergreen wood compared with the deciduous wood?</p>	<p>Identify and Classify</p> <p>How would you group these plants and animals based on what habitat you would find them in?</p>	<p>Observation over time</p> <p>How does the school pond change over the year?</p>	<p>Pattern Seeking</p> <p>What conditions do woodlice prefer to live in? Which habitat do worms prefer – where can we find the most worms?</p>	<p>Research</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>	<p>Big Question Assessment Opportunity</p> <p>Why do different animals live in different places?</p>
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Woodpeckers Living things and their Habitats

National Curriculum Objectives in Woodpeckers	Prior Learning in Robins	Future Learning in Owls
<p>Year 4</p> <ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose danger to living things. 	<p>Year 2:</p> <ul style="list-style-type: none"> • Explore and compare the difference between things that are living, dead and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food. 	<p>Year 5:</p> <ul style="list-style-type: none"> • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Know that living things can be grouped in different ways. • Give examples of different habitats and give an example of how changes might affect a habitat. 	<p>Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.</p>	<ul style="list-style-type: none"> • What food chains and webs are there in our local habitat? • How does energy move through the food chain? • How does removal of one species from an environment, affect others? (keystone species) • How does environmental change affect different organisms? • What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers) • How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?)

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>Does the amount of light affect how many woodlice move around? How does the average temperature of the pond water change in each season?</p>	<p>Identify and Classify</p> <p>Can we use the classification keys to identify all the animals that we caught pond dipping?</p>	<p>Observation over time</p> <p>How does the variety of invertebrates on the school field change over the year?</p>	<p>Pattern Seeking</p> <p>How has the use of insecticides affected bee population?</p>	<p>Research</p> <p>Why are people cutting down the rainforests and what effect does that have?</p>	<p>Big Question Assessment Opportunity</p> <p>Are living things in danger?</p>
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Owls Living things and their Habitats

National Curriculum Objectives in Owls	Prior Learning in Woodpeckers	Future Learning in Peregrines
<p>Year 5</p> <ul style="list-style-type: none"> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals. 	<p>Year 4:</p> <ul style="list-style-type: none"> Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Know and label the features of a river Recognise that environments can change and that this can sometimes pose danger to living things. 	<p>Year 6:</p> <ul style="list-style-type: none"> Classify living things into broad groups according to observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Know that different living things have different life cycles and can give an example including how it reproduces. 	<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"> What is a life cycle? What types of life cycles are there? Are life cycles the same? Do plants reproduce in the same ways as us? How do plants spread their seeds?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
<p>How does the level of salt affect how quickly brine shrimp hatch?</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? How does a bean change as it germinates?</p>	<p>Is there are relationship between number of petals and number of stamens?</p>	<p>What are the differences between the life cycle of an insect and a mammal?</p>	<p>Do all plants and animals reproduce in the same way?</p>

Peregrines Living things and their Habitats

National Curriculum Objectives in Peregrines	Prior Learning in Owls	Future Learning
<p>Year 6</p> <ul style="list-style-type: none"> Classify living things into broad groups according to observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics. 	<p>Year 5:</p> <ul style="list-style-type: none"> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals. 	<p>In Key Stage 3 children will:</p> <ul style="list-style-type: none"> the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere the adaptations of leaves for photosynthesis. the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops the importance of plant reproduction through insect pollination in human food security how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.
<p>Sticky Knowledge</p>	<p>Vocabulary</p>	<p>Key Questions</p>
<ul style="list-style-type: none"> 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> 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. Organisms reproduce and offspring have similar characteristic patterns. Competition exists for resources and mates Recognise that organisms best suited to their environment are more likely to survive and reproduce and give an example. 	<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"> Why do we need to classify living things? How do we classify? What are the difficulties with classification? (penguins, whales, platypus) Why does variation exist? What happens if animals of different species breed? (hybrids) How do animals change over time? What happens to house plants outside? What are microorganisms? How can we prevent the spread of disease? Why do animals and plants compete – and what for?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>How does the temperature affect how much gas is produced by yeast? Which is the most common invertebrate on our school playing field?</p>	<p>Identify and Classify</p> <p>How would you make a classification key for vertebrates/invertebrates or microorganisms?</p>	<p>Observation over time</p> <p>What happens to a piece of bread if you leave it on the windowsill for two weeks?</p>	<p>Pattern Seeking</p> <p>Do all flowers have the same number of petals?</p>	<p>Research</p> <p>What do different types of microorganisms do? Are they always harmful?</p>	<p>Big Question Assessment Opportunity</p> <p>In what ways can we sort living things?</p>
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Owls - Electricity

National Curriculum Objectives in Owls	Prior Learning in Wrens	Future Learning in Peregrines
<p>Year 4</p> <ul style="list-style-type: none"> • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. • Know the difference between a conductor and an insulator, giving examples of each. • Safety when using electricity. 	<p>EYFS:</p> <ul style="list-style-type: none"> • May have some understanding that objects need • electricity to work. • May understand that a switch will turn something on or off. 	<p>Year 6I:</p> <ul style="list-style-type: none"> • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Know how to make a complete circuit and be able to explain how it works. • Can give examples of conductors and insulators 	<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"> • What would life be like without electricity? • What sorts of things use/need electricity? • What electricity do I use? • In which ways can we 'get' electricity?(mains/plugs/batteries/wireless) • How do we make electricity? • How do batteries work? • How quickly can batteries run out? Does this make a difference depending on number of components? • How does the number of batteries added to the circuit affect a device? • What materials can carry electricity? (conductors/insulators)

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
How does the thickness of a conducting material affect how bright the lamp is? Which metal is the best conductor of electricity?	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?

Peregrines - Electricity

National Curriculum Objectives in Peregrines	Prior Learning in Owls	Future Learning
<ul style="list-style-type: none"> • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram. 	<p>In Year 4 children should:</p> <ul style="list-style-type: none"> • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. • Know the difference between a conductor and an insulator, giving examples of each. • Safety when using electricity. 	<p>In Key Stage 3 children will:</p> <ul style="list-style-type: none"> • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge • Potential difference measured in volts, battery and bulb ratings, resistance measured in ohms, as the ratio of potential difference (p.d.) to current • Differences in resistance between conducting and insulating components (quantitative). • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • The idea of electric field, forces acting across the space between objects not in contact.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Know how to make a bulb brighter or dimmer in a circuit. • Know that electricity is measured in voltage and current. 	<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"> • Do all batteries push as hard as each other? • How does the voltage of a battery affect how much current is pushed? • How does the length of time I leave the current flowing for affect the brightness of the bulb? • How does number of bulbs affect the brightness of a bulb? • Are all types of wires as good as conducting electricity? • Why are wires insulated in plastic? Does type of material make a difference? • Does the type of circuit affect how the components work/long the battery lasts? • What renewable ways can we generate electricity? • How does current affect heat? • What are the dangers of a short circuit?

Teaching Ideas and Methods of Approach

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

National Curriculum Objectives in Woodpeckers	Prior Learning in KS1	Future Learning in Owls
<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets with attract or repel each other, depending on which poles are facing 	<ul style="list-style-type: none"> • May have an awareness of how to make things stop and start, using simple pushes and pulls. • They may know about floating and sinking. 	<p>Year 5:</p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. • Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Magnets exert attractive and repulsive forces on each other. • Can give example of some magnetic and non-magnetic materials. 	<p>Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass</p>	<ul style="list-style-type: none"> • What are magnetic materials? How can we find out? • Can I make a magnetic material non-magnetic? • How far away does a magnet have to be before it attracts a magnetic material? • How far away can the magnetic attraction between two magnets be experiences? • Is the repulsive force the same size? • How is the magnetic attraction of repulsion force affected by putting materials between the magnets? • Are bigger magnets stronger? • How could you use magnets to measure the number of pages in a book?

Teaching Ideas and Methods of Approach

<p>Comparative test</p> <p>How does the mass of an object affect how much force is needed to make it move? Which magnet is strongest? Which surface is best to stop you slipping?</p>	<p>Identify and Classify</p> <p>Which materials are magnetic?</p>	<p>Observation over time</p> <p>If we magnetise a pin, how long does it stay magnetised for?</p>	<p>Pattern Seeking</p> <p>Do magnetic materials always conduct electricity? Does the size and shape of a magnet affect how strong it is?</p>	<p>Research</p> <p>How have our ideas about forces changed over time? How does a compass work?</p>	<p>Big Question Assessment Opportunity</p> <p>How can we move magnets?</p>
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Owls - Forces

National Curriculum Objectives in Owls	Prior Learning in Woodpeckers	Future Learning
<ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives. • Identify the effects of air resistance, water resistance and friction, which act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect. 	<p>Year 3:</p> <ul style="list-style-type: none"> • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets with attract or repel each other, depending on which poles are facing. 	<p>In Key Stage 3 children will learn about:</p> <ul style="list-style-type: none"> • opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface • forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) • change depending on direction of force and its size
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Recognise that there are different forces and can give some examples. 	<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"> • What is a force? • How can a force act on an object? • How can we see forces? • How can we measure forces? • How does the saltiness (salinity) of water affect the water resistance? • How does the length of a piece of a paper helicopter's wings affect the time it takes to fall? • How does adding holes to a parachute affect the time it takes to fall?

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

Owls – Earth and Space

National Curriculum Objectives	Prior Learning	Future Learning
<ul style="list-style-type: none"> • Describe the movement of the Earth, and other planets, relative to the Sun in the solar system • Describe the movement of the Moon relative to the Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Describe the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky 	<p>In Key Stage 1 and in Year 3 children should:</p> <ul style="list-style-type: none"> • Understand changes in weather patterns and seasons. • Understand that Neil Armstrong was the first man on the moon. • Understand that the sun is a light source that reflects off the moon. • Find patterns in the way that the sizes of shadows change. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. 	<p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> • Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth’s tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance
Sticky Knowledge	Vocabulary	Key Questions
<p>Be able to describe the relationship between the sun, earth and the moon.</p>	<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"> • How does temperature/size/day length/year length change as you get closer/further to the sun? • How does distance from a light source affect how much light hits an object? • Does having more moons result in more light hitting a planet? How could you test this? • How does speed/size of a meteorite affect the size of the moon crater formed? • 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? • Why do we have day/night/months/years /seasons? Why does day length change? • Why does shadow size change over the course of a day?

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
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?

Wrens – Energy (Seasons and how they change)

National Curriculum Objectives in Wrens	Prior Learning	Future Learning in Robins
<ul style="list-style-type: none"> • Developing an understanding of change. • Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes). • Look closely at similarities, differences, patterns and change. <p>Comments and questions about the place they live or the natural world.</p>		<p>Year 1:</p> <ul style="list-style-type: none"> • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Weather can change • There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc • There are four seasons: Spring, Summer, Autumn, Winter 	<p>Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature</p>	<ul style="list-style-type: none"> • What colours can we find outside? Does this change across the seasons? • What effect does rain have on the environment? • What would happen if there was too much rain? • What would happen if there wasn't enough rain?

Teaching Ideas and Methods of Approach

Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
<p>In which season does the sun shine the most?</p>	<p>How could you organise natural objects found outside into groups?</p>	<p>What happens to trees throughout the year?</p>	<p>What patterns can you see in nature?</p>	<p>Which animals hibernate? How do they prepare and where do they sleep?</p>	<p>What is it like in Winter, Spring, Summer and Autumn?</p>

Robins – Energy (Seasons and how they change)

National Curriculum Objectives in Robins	Prior Learning in Wrens	Future Learning Woodpeckers
<ul style="list-style-type: none"> • Observe and describe weather associated with the seasons and how day length varies. 	<p>In Early Years children should:</p> <ul style="list-style-type: none"> • Developing an understanding of change. • Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes). • Look closely at similarities, differences, patterns and change. • Comments and questions about the place they live or the natural world. 	<p>Year 3:</p> <ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change. • Know how sound is made associating some of them with vibrating. • Know what happens to a sound as it travels from its source to our ears. •
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • Weather can change • There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc • Days are longer and hotter in the summer • Days are shorter and colder in the winter • There are four seasons: Spring, Summer, Autumn, Winter 	<p>Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature</p>	<ul style="list-style-type: none"> • Do countries with higher temperatures have less rain? • How does rainfall and temperature change over time in our school grounds? • Which leaf is the strongest/best shade cover/best at directing water? What do you notice about different leaves? • What purpose to leaves serve for a tree? • Why do you think leaves turn brown in Winter? • What colours can we find outside? Does this change across the seasons? • What effect does rain have on the environment? • What would happen if there was too much rain? • What would happen if there wasn't enough rain?

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
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?

Woodpeckers – Energy (Light and Sound)

National Curriculum Objectives in Woodpeckers	Prior Learning in Robins	Future Learning in Peregrines
<ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change. • Know how sound is made associating some of them with vibrating. • Know what happens to a sound as it travels from its source to our ears. 	<p>Year 1:</p> <ul style="list-style-type: none"> • Observed changes across the four seasons • Observed and describe weather associated with the seasons and how day length varies. <p><i>Children may:</i></p> <ul style="list-style-type: none"> • have some knowledge of where light comes from. • have seen their shadows and may know they appear when it is sunny. • have some understanding of a reflection. • understand they need light to be able to see things. • May have some understanding that objects make different sounds. • Some understanding that they use their ears to hear sounds. • Know about their different senses. 	<p>Year 6:</p> <ul style="list-style-type: none"> • Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. • Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. <p>Year 4</p> <ul style="list-style-type: none"> • Know the correlation between the volume of a sound and the strength of the vibrations that produced it. • Know how sound travels from a source to our ears. • Know the correlation between pitch and the object producing a sound.
Sticky Knowledge	Vocabulary	Key Questions

<ul style="list-style-type: none"> • Light comes from a source and give examples. • Know that light can be reflected and be able to give examples of reflective and non-reflective materials. • Sound travels from its source in all directions and we hear it when it travels to our ears. • Sound is produced when an object vibrates. 	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.</p> <p>Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.</p>	<ul style="list-style-type: none"> • How does distance from a light source affect how bright it looks? • How does being in darkness affect your sense of hearing? • What colour would be the best to make a safety jacket from? • How does the colour of a material affect how reflective it is? • What would be the best material to make a blind for a baby’s room? • How does thickness of a material affect how much light can pass through it? • How many pieces of tracing paper are as translucent as a single piece of white paper? • How can we change the darkness, size and shape of a shadow? • Which materials vibrate better and produce louder sounds? Can we identify any patterns? • Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test)
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Teaching Ideas and Methods of Approach					
<p>Comparative test</p> <p>How does the distance between the shadow puppet and the screen affect the size of the shadow? Which pair of sunglasses will be best at protecting our eyes?</p> <p>How does the volume of a drum change as you move further away from it? How does the length of a guitar string/tuning fork affect the pitch of the sound?</p>	<p>Identify and Classify</p> <p>How would you organise these light sources into natural and artificial sources?</p>	<p>Observation over time</p> <p>When is our classroom darkest? Is the Sun the same brightness all day?</p> <p>When is our classroom the quietest?</p>	<p>Pattern Seeking</p> <p>Are you more likely to have bad eyesight and to wear glasses if you are older?</p> <p>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?</p>	<p>Research</p> <p>How does the Sun make light?</p>	<p>Big Question Assessment Opportunity</p> <p>What is a shadow?</p> <p>How can we make different sounds?</p>

Year 6 – Energy (Light and Sound)

National Curriculum Objectives	Prior Learning	Future Learning
<ul style="list-style-type: none"> • Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. • Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. • Changing the way an object vibrates changes its sound. • Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. Faster vibrations (higher frequencies) produce higher pitched sounds 	<p>Year 3/4:</p> <ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change. • Know how sound is made associating some of them with vibrating. • Know what happens to a sound as it travels from its source to our ears. 	<p>In Key Stage 3, children will learn about:</p> <ul style="list-style-type: none"> • the similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light • the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science • use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the human eye • light transferring energy from source to absorber leading to chemical and electrical effects; photosensitive material in the retina and in cameras • colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. • frequencies of sound waves measured in hertz (Hz), echoes, reflection and absorption of sound • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals.
Sticky Knowledge	Vocabulary	Key Questions

<ul style="list-style-type: none"> Light travels in straight lines Describe how shadows are made and describe how the size of a shadow can be changed. Describe how sounds are made and how they can be changed. 	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect</p> <p>Absorb Emitted Scattered Refraction</p> <p>Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.</p>	<ul style="list-style-type: none"> 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? 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? How does the amount of aluminium foil scrunched affect how much light is scatters? How does the amount of polishing affect how well a piece of metal scatters light? How can you change the volume of a sound? How does the size of an ear trumpet affect the volume of sound detected? How does the type of material affect how well it blocks a sound? How does thickness of material affect how well it blocks a sound? How does length of the tube (when making a straw oboe) affect the pitch and volume? Can you predict the relative pitch of tuning forks from the patterns of ripples they make in the water?
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Teaching Ideas and Methods of Approach					
<p>Comparative test</p> <p>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?</p> <p>Are two ears better than one?</p>	<p>Identify and Classify</p> <p>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? Which material is best to use for muffling sound in ear defenders?</p>	<p>Observation over time</p> <p>Does the temperature of a light bulb go up the longer it is on? How does my shadow change over the day?</p>	<p>Pattern Seeking</p> <p>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?</p>	<p>Research</p> <p>Why do some people need to wear glasses to see clearly? How do our eyes adapt to different conditions?</p> <p>Do all animals have the same hearing range?</p>	<p>Big Question Assessment Opportunity</p> <p>Why does my shadow change length over the course of a day?</p> <p>How can we make different sounds?</p>

Wrens - Materials		
National Curriculum Objectives in Wrens	Prior Learning	Future Learning in Robins
<p>EYFS:</p> <ul style="list-style-type: none"> • Be able to ask questions about the place they live. • Talk about why things happen and how things work. • Discuss the things they have observed such as natural and found objects. • Manipulates materials to achieve a planned effect <p>Year 1</p> <ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock. 		<p>Year 1:</p> <ul style="list-style-type: none"> • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials based on their simple properties <p>Year 2:</p> <ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> • There are many different materials that have different describable and measurable properties. • Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass). 	<p>Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy,</p>	<ul style="list-style-type: none"> • Which wrapping papers are strong enough to wrap and send a present? • Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime? • Which plastic would be flexible enough to make a belt?

Teaching Ideas and Methods of Approach					
Comparative test	Identify and Classify	Observation over time	Pattern Seeking	Research	Big Question Assessment Opportunity
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?

Robins - Materials		
National Curriculum Objectives in Robins	Prior Learning in Wrens	Future Learning in Woodpeckers
<p>Year 1:</p> <ul style="list-style-type: none"> Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials based on their simple properties <p>Year 2</p> <ul style="list-style-type: none"> Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>EYFS:</p> <ul style="list-style-type: none"> Be able to ask questions about the place they live. Talk about why things happen and how things work. Discuss the things they have observed such as natural and found objects. Manipulates materials to achieve a planned effect <p>Year 1</p> <ul style="list-style-type: none"> Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock. 	<p>Year 3:</p> <ul style="list-style-type: none"> Compare and group together different kinds of rocks based on their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are trapped within rock Recognise that soils are made from rocks and organic matter
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass). The properties of a material determine whether they are suitable for a purpose. 	<p>Fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons, waterproof/not waterproof, absorbent, opaque,</p>	<ul style="list-style-type: none"> Which rocks are the least crumbly? Which materials absorb the most water? Which type of brick would be the easiest to drag to make a pyramid? Which material would be the strongest to use as a floor tile? Which fabric would make the softest blanket? The baby has spilt her drink, which material would absorb the drink the best? We want to make a really slippery slide; which liquid would be best to use? Which chocolate will melt the fastest on a warm plate (a model of a warm hand)?

		<ul style="list-style-type: none"> • Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker? • What could I wrap a chicken egg in to keep it warm when it is waiting to hatch? • What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush?
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Teaching Ideas and Methods of Approach					
<p>Comparative test</p> <p>Which shapes make the strongest paper bridge? Which material would be best for the roof of the little pig's house</p>	<p>Identify and Classify</p> <p>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?</p>	<p>Observation over time</p> <p>How long do bubble bath bubbles last for? What will happen to our snowman?</p>	<p>Pattern Seeking</p> <p>How do materials change with heat? leave outside in sunshine/windowsill/radiator How does amount of water affect the strength of a kitchen towel?</p>	<p>Research</p> <p>How have the materials we use changed over time? How are plastics made?</p>	<p>Big Question Assessment Opportunity</p> <p>Can we change materials? How do we choose the best material?</p>

Woodpeckers – Materials – Rocks/Fossils

National Curriculum Objectives in Woodpeckers	Prior Learning in Robins	Future Learning in Owls and Peregrines
<ul style="list-style-type: none"> • Compare and group together different kinds of rocks based on their appearance and simple physical properties • Describe in simple terms how fossils are formed when things that have lived are trapped within rock • Recognise that soils are made from rocks and organic matter 	<p>Year 1:</p> <ul style="list-style-type: none"> • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials based on their simple properties <p>Year 2</p> <ul style="list-style-type: none"> • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. <p><i>Children may:</i></p> <ul style="list-style-type: none"> • have some understanding of a variety of different rocks in the natural world. • have some understanding of what soil is. (how to identify soil etc) • have some knowledge of what a fossil is. 	<p>Year 4:</p> <ul style="list-style-type: none"> • Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. In Year 6 children will: • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. <p>Year 6</p> <ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
Sticky Knowledge	Vocabulary	Key Questions

<ul style="list-style-type: none"> Recognise that there are different types of rocks and they have different properties and be able to give an example. 	<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"> How are the soils different? Which do you think has best drainage? How might the soil be different the further down we dig? What rock is best for a kitchen chopping board? What might be the issues with various materials and what they must withstand? What types of rocks are there? How do rocks change? Why do you think worms are important to the creation of soil? How can we use composting to make our own soil? Does it currently look like real soil? How long do you think this process will take and why? How are fossils created? Why do fossils help us find out about historical events?
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Teaching Ideas and Methods of Approach					
<p>Comparative test</p> <p>How does adding different amounts of sand to soil affect how quickly water drains through it? Which soil absorbs the most water</p>	<p>Identify and Classify</p> <p>Can you use the identification key to find out the name of each of the rocks in your collection?</p>	<p>Observation over time</p> <p>How does tumbling change a rock over time? What happens when water keeps dripping on a sandcastle?</p>	<p>Pattern Seeking</p> <p>Is there a pattern in where we find volcanos on planet Earth?</p>	<p>Research</p> <p>Who was Mary Anning and what did she discover?</p>	<p>Big Question Assessment Opportunity</p> <p>What are rocks and soils like?</p>

Owls – Materials

National Curriculum Objectives in Owls	Prior Learning in KS1	Future Learning in Peregrines
<ul style="list-style-type: none"> • Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. In Year 6 children will: • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. 	<p>KS1:</p> <ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials based on their simple physical properties. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching 	<p>Year 5:</p> <ul style="list-style-type: none"> • Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. • Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
<p>Sticky Knowledge</p>	<p>Vocabulary</p>	<p>Key Questions</p>
<ul style="list-style-type: none"> • Materials can be divided into solids, liquids and gases. Give an example of each and describe the difference between them. 	<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"> • How does the amount of water added to flour affect its state? • How does the amount of detergent added to water affect how slippery it is? • How does the temperature affect how viscous a liquid is (use cooking oil)? • Place a peach in a glass of lemonade and watch it spin. Why does it behave that way, and can you prove it? • How does the material sprinkled on ice and snow affect how quickly it melts? • What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature?

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

Peregrines – Materials (Mixtures and Separation)

National Curriculum Objectives in Peregrines	Prior Learning in Owls	Future Learning in Peregrines
<ul style="list-style-type: none"> Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda. 	<p>Year 4:</p> <ul style="list-style-type: none"> Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. In Year 6 children will: Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. 	<p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> the concept of a pure substance mixtures, including dissolving diffusion in terms of the particle model simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> When two or more substances are mixed and remain present the mixture can be separated. Some changes can be reversed, and some cannot. Materials change state by heating and cooling. 	<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"> What are mixtures? What does dissolve mean? Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax? How does the amount of water used affect how much sugar will dissolve in it? Which sweets dissolve in water? How can we separate mixtures? How can we clean our dirty water?

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

Peregrines – Materials (Changes)		
National Curriculum Objectives in Peregrines	Prior Learning in Owls	Future Learning
<ul style="list-style-type: none"> Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda 	<p>Year 4:</p> <ul style="list-style-type: none"> Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. In Year 6 children will: Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. 	<p>In KS3 children will learn about:</p> <ul style="list-style-type: none"> the concept of a pure substance mixtures, including dissolving diffusion in terms of the particle model simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances
Sticky Knowledge	Vocabulary	Key Questions
<ul style="list-style-type: none"> Know that there can be reversible and irreversible changes made to substances and give examples of each. Sometimes mixed substances react to make a new substance. These changes are usually irreversible. 	<p>Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversable, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.</p>	<ul style="list-style-type: none"> The key question we want children to interrogate is “have we made a new substance?” 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) 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) Add water to instant snow. Use lemon juice as an invisible ink, heating gently makes the ink visible. Is this a new substance? When water is added to jelly and it is set, is it a new substance?

Teaching Ideas and Methods of Approach









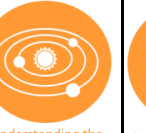


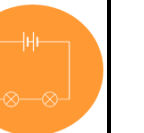
<p>Comparative test</p> <p>Which material rusts fastest/slowest? How can we change the 'jellyness' of jelly?</p>	<p>Identify and Classify</p> <p>Can you identify and classify these reactions and changes into reversible, and irreversible? Can you describe their groups similarities and differences?</p>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




Pupils should have the opportunity to carry out practical investigations in science that help them to develop their scientific skills. While working scientifically, the children should be developing the following skills:

- asking questions
- making predictions
- setting up tests
- observing and measuring
- recording data
- interpreting and communicating results
- evaluating

Progression of these skills are set out in the table below:

SCIENCE												
BIG IDEAS	Working Scientifically		Biology				Chemistry			Physics		
Building Blocks	Methodologies of Science	Communicate Scientifically/ Vocabulary	Understand Plants	Understand Animals & Humans	Investigate Living Things	Understand Evolution & Inheritance	Investigate Materials	Understand Movement, Forces & Magnets	Understand the Earth's Movement in Space	Investigate Light & Seeing	Investigate Sound & Hearing	Understand Electrical Circuits
	 Methodologies of Science	 Vocabulary	 Understand plants	 Understand animals and humans	 Investigate living things	 Understand evolution and inheritance	 Investigate materials	 Understand movement forces and magnets	 Understanding the Earth's movement in space	 Investigate light and seeing	 Investigate sound and hearing	 Understand electrical circuits

BIG IDEAS	BUILDING BLOCKS	EYFS	MILESTONE 1	MILESTONE 2	MILESTONE 2
Working Scientifically	 Methodologies of Science  Vocabulary	Questions Answers Equipment Gather Measure Record Results Sort Group Test Explore Observe Compare Describe Similar/similarities Different/differences Egg timers Ruler Tape measure Metre stick Beaker Pipette Syringe	Pictogram Tally chart Block diagram Venn diagram Table Chart Order Observe changes over time Notice patterns Link Secondary sources Hand lenses Stop watch	Variables Control variable Types of scientific enquiry Identify Classify Order/rank Comparative tests Fair tests Careful/systematic Accurate Observations Evidence Present Data/evidence/results Keys Bar charts Conclusions Prediction Support/not support/refute Thermometers Data loggers Magnifying glass Microscope Increase Decrease Appearance	Independent variable Dependent variable Accuracy Precision Degree of trust Classification keys Scatter graphs Line graphs Causal relationship Opinion/fact
	 Methodologies of Science Planning	Class discussion led by teacher Starter question led What are we keeping the same? What are we changing?	Ask simple questions and recognise that they can be answered in different ways Choose the resources from a narrow selection What makes a fair test? What are we keeping the same? What are we changing?	Planning a scientific enquiry with support Choose the resources from a broader selection Fair test. Identify independent, controlled and depend variables with support	Planning a scientific enquiry Select equipment and materials needed Fair test. Identify independent, controlled and depend variables independently

 <p>Methodologies of Science</p> <p>Practical work</p>	<p>What do you think will happen?</p> <p>Whole class explorations and opportunities to explore and try out ideas in independent play</p> <p>Non-standard units of measure</p> <p>Taking a risk by engaging in new experience and learning by trial and error.</p>	<p>Predict results individually/group</p> <p>Group/individual investigation. Making simple observations and testing out their ideas.</p> <p>Non-standard and standard units of measure (whole numbers, half, quarter)</p> <p>Taking a risk by engaging in new experience and learning by trial and improvement</p>	<p>Predict with reasoning</p> <p>Independent and group investigations. Systematic observations. Make measurements using standard units of measure (begin to use decimals, rounding to one decimal place, round to a whole number)</p> <p>Use a range of equipment.</p>	<p>Hypothesis with reasoning</p> <p>Independent and paired work. Take measurements using scientific equipment with increased accuracy, precision, taking repeat readings when appropriate (decimals to 3d.p., fractions, ratio and proportion, formulas, percentages, rounding to a given degree of accuracy)</p>
 <p>Methodologies of Science</p> <p>Recording</p>	<p>Drawings, photographs, making collections of objects, modelled data collection (pictogram, table, tally)</p>	<p>Filling in simple tables, tally chart, bar graph.</p> <p>Gather data to help answer questions. (videos, voice recordings, TA writing up children's ideas)</p>	<p>Gather, record, classify data in a variety of ways to help answer questions</p> <p>Record findings using simple scientific vocabulary, diagrams, labelling diagram, keys. Bar graphs and tables.</p> <p>Looking for relationships/patterns</p>	<p>Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p>
 <p>Methodologies of Science</p> <p>Reviewing</p>	<p>Talking about things that they have noticed (same/different)</p> <p>Review how well their approach worked</p> <p>Noticing patterns and making links between their experience</p>	<p>Observing similarities and differences, noticing patterns and making links.</p> <p>Using gathered data to answer questions.</p> <p>Use knowledge to pose future questions.</p> <p>Report on findings in a range of formats (oral, written, pictorial, video, digitally)</p> <p>Reflect on their prediction.</p>	<p>Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>Identify differences, similarities or changes related to simple scientific ideas and processes</p>	<p>Use test results to predictions to set up further comparative and fair test.</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations Identify scientific evidence that has been used to support or refute ideas or arguments</p>

				Use straightforward scientific evidence to answer questions or to support their findings	
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