

Science and Understanding the World:

Purpose of Study:

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The EYFS learning goals:

The Natural World

- Explore the natural world around them, making observations and drawing pictures of animals and plants.
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

KS1 Pupils should be taught to:

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information.

They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word-reading and spelling knowledge.

Intent

Across the Dunchurch Federation all pupils will leave with an understanding of the important scientific knowledge and be able to use and apply scientific skills to understand the world that they are part of. The children will have an understanding of natural animal and human world, how we have evolved from the beginning of time, and the application of science in our everyday lives. They will have used a range of engaging resources, actively engaged in scientific discovery and explored key scientists from a range of backgrounds and cultures as well as studying modern world climate and scientific issues. The children will also know about some relevant scientist and the impact they have had on the world.

All children will have had the opportunity to present their own work in a range of ways as well as develop their scientific skills to discuss, analyse, measure, classify and question, before presenting their findings. Working practically, Explore and investigate, children will work collaboratively and systematically to answer a question.

Children will begin by developing an understanding of plants, themselves, the world around them, animals and materials in KS1 and then build on this in KS2 by making links to the wider world and current issues, including the climate, pollution and sources of energy, deepening their understanding and questioning of their previous learning.

Through teaching and learning in science, children will gain an understanding of the world locally and globally and the challenges the modern world is facing. Scientific skills such as questioning, testing, analysing, predicting and concluding will prepare the children for life in an increasingly complex modern world

Implementation

To ensure high standards of teaching and learning in science we implement a curriculum that is progressive throughout the whole school. Science is taught weekly through sequential and coherent patterns which build upon previous learning. Science focuses on the knowledge and skills stated in the National Curriculum. Pupils are encouraged to apply their scientific skills in all areas of the curriculum, questioning their understanding of the world they experience, and developing ways to explore and answer their questions and to provide possible solutions which can be tested. Teachers plan lessons for their class using our progression of knowledge and skills documents. This progression document ensures the curriculum is covered and the skills/knowledge taught are progressive from year group to year group.

Impact

Our Science Curriculum is high quality, well thought out and is planned to demonstrate progression. If children are keeping up with the curriculum, they are deemed to be making good or better progress. At Dunchurch we measure the impact through regular assessment opportunities, discussions with the children and through evidencing the skills and knowledge within the children's written and practical learning. The children will be able to select appropriately from a variety of techniques to investigate and provide answers to questions, making links to the local and wider world.

<u>Areas of Science taught:</u>					
<u>Early Years Foundation Stage:</u>	Plants	Animals including humans	Materials	Seasons	Living things
<u>Year 1:</u>	Plants	Animals including humans	Everyday materials	Seasonal changes	
<u>Year 2:</u>	Plants	Animals including humans	Use of everyday materials		Living things and their habitats

	<u>Skills and Knowledge</u>				
	Rising 3's	Pre-school	Reception	Y1	Y2
Working Scientifically	ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class <u>Answering questions:</u> Explore ways to answer questions posed by themselves and adults through first hand experiences with an adult within continuous provision. <u>Using equipment:</u> Works with an adult to use scientific equipment safely and accurately in small group and individual tasks in continuous provision. <u>Observing closely:</u> Can verbally describe what they can see with some scaffolding from an adult. <u>Identifying and classifying:</u> In a small group scenario, work with an adult to identify simple obvious features e.g. that horse has 4 legs.	ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class <u>Asking questions:</u> Ask questions completing a simple sentence stem with scaffolding by an adult. <u>Answering questions:</u> Explore ways to answer questions posed by themselves and adults through first hand experiences with some adult scaffolding. <u>Using equipment:</u> Follows instructions to use scientific equipment safely and accurately, although may need some support from an adult. <u>Predictions:</u> Say what they think might happen next in discussions with an adult. <u>Observing closely:</u> Can verbally describe what they can see. <u>Identifying and classifying:</u>	ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class <u>Asking questions:</u> Ask relevant questions using a sentence stem as part of class discussions. <u>Answering questions:</u> Explore ways to answer questions posed by themselves and adults through first hand experiences as part of class discussions. <u>Using equipment:</u> Follows instructions to use scientific equipment safely and accurately. <u>Predictions:</u> Make a simple prediction about what might happen e.g. that plant will grow the tallest. <u>Observing closely:</u> Can verbally describe what they can see, including observations over time, and is beginning to represent this in pictorial form. Can make simple comparative observations between two objects e.g. taller / shorter. <u>Identifying and classifying:</u> Identify simple features to sort and classify e.g. sorting animals into those	<u>Asking questions:</u> Independently ask a relevant question using a sentence stem. <u>Answering questions:</u> Suggest a way that a question might be answered. Use first hand and secondary sources of information to find answers to questions posed by themselves and an adult. <u>Using equipment:</u> Knows what scientific equipment tells us e.g. weight and length. Can take measurements using scientific equipment with the support of an adult e.g. ruler, pipette. <u>Predictions:</u> Make a simple prediction about what might happen, giving a reason e.g. that plant will grow the tallest because it has a larger seed. <u>Observing closely:</u> Record what can be seen through lists, words, sentences or pictures, including observations over time. Make descriptive observations using adjectives. Make comparative observations of 3 objects. Make numerical observations with the support of an adult.	<u>Asking questions:</u> Independently ask a relevant question using scientific vocabulary. <u>Answering questions:</u> Suggest several ways that a question might be answered, including planning a series of steps where appropriate. Use first hand and secondary sources of information to find answers to questions posed by themselves and an adult. <u>Using equipment:</u> Can independently take measurements using scientific equipment e.g. ruler, timer. Can select scientific equipment for a purpose e.g. given a choice of 2 or 3 items selects which would be more appropriate. <u>Predictions:</u> Make a simple prediction about what might happen, giving a reason using scientific vocabulary e.g. that plant will grow the quickest because plants need water and we are going to water this one more often than the other plants. <u>Observing closely:</u>

		Identify simple features as a species found in the local environment e.g. birds have wings. <u>Presenting finding and drawings:</u> Can verbally say what has happened, with the support of an adult.	with 4 legs and those that do not have 4 legs. <u>Presenting finding and drawings:</u> Can verbally explain what they have found out to an adult or other children. <u>Sources of information:</u> Looks at pictures or simple diagrams to find out information.	<u>Identifying and classifying:</u> Identify features to sort and classify e.g. mammals, reptiles, and amphibians. Use evidence gathered to fill in a simple recording template e.g. list, grid, pictogram or bar chart (one block per unit of data). <u>Presenting finding and drawings:</u> Record findings in simple sentences, lists or labels. Can answer the question set by using observations or simple data (see maths grid) to present findings. Can use comparative observations to answer questions. <u>Sources of information:</u> Carries out research using a range of simple secondary sources of information – books, photographs, diagrams etc.	Use writing and detailed, accurate drawings to demonstrate what is seen, including over time. Make descriptive observations using increasingly complex scientific vocabulary Make comparative observations of a variety of objects. Make numerical observations. <u>Identifying and classifying:</u> Justify the classifications made using scientific knowledge. Write sentences to demonstrate information gathered, along with filling in prepared tables e.g. tally charts, pictograms, bar charts (one block may signify two, five or ten units of data). <u>Presenting finding and drawings:</u> Recording of findings includes scientific vocabulary. Can answer the question set by using observations or year group appropriate data (see maths grid). Can use comparative observations to answer questions. <u>Sources of information:</u> Carries out research using a range of secondary sources of information – books, photographs, diagrams etc.
	Rising 3's	Pre-school	Reception	Y1	Y2

Plants	Plants to be used: Cress ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Develop a respect for living things by carefully planting, watering and looking after plants they have grown from seeds with the support of an adult. Makes verbal observations about the plants they have grown from seeds, and those in the environment, commenting on what they can see.	Plants to be used: Sunflowers ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Plant and care for bulbs and plants, making simple observations of changes that take place with the support of an adult. Makes verbal observations about the plants they have grown, those provided by adults and those in the environment, commenting on what they can see, including noticing some similarities and differences in discussions with adults.	Plants to be used: Grass (Other seeds will also be looked at. E.g: Opening up a tomato) ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Explore the world around them, making observations (including the use of magnifying glasses), drawing and labelling pictures of the features seen in simple plants, including those found naturally in the environment and those grown. Notice simple similarities and differences in plants e.g. not all plants grow flowers, the leaves on the holly bush are spikier and darker than the leaves on the tree. Discuss how we care for the natural world, including plants e.g. we need to make sure we water them regularly.	Plants to be used: Broad beans Identify and name a variety of common wild and garden plants, including those found in the local environment using first hand experiences. Explore, make careful observations and ask and answer questions about plants growing in the local environment. Understand why a tree is classified as deciduous or evergreen. Identify, name and group/ classify a variety of deciduous and evergreen trees, including first-hand experience in the local environment. Include: Oak, Sycamore, Apple, Willow, Horse Chestnut, Beech, Scots pine, Holly. Observe plants and bulbs (including flowers and vegetables) children have planted as they grow over time, including the use of magnifying glasses, drawings and labels. Identify and name the roots, trunk, branches and leaves of a tree. Compare and contrast familiar plants, including how they have grown over time, noting some similarities and differences. Identify and label the basic structure of a variety of common flowering plants - including leaves, flowers (blossom), petals, fruit, roots, bulb, seed and stem). Find out and describe that seeds and bulbs need water to grow but most do	Plants to be used: Encompass all previous learning. Grass- focus on roots Broad beans/ sunflower seeds- Looking at the differences and similarities between seeds Sunflowers- focus on flowering plants Observe what plants need to survive. I.e. Water, light and a suitable temperature to grow and stay healthy. Observe and describe how seeds and bulbs grow into mature plants over time, including the use of drawings and descriptions. Describe the purpose of the roots, trunk, branches and leaves of a tree. Describe the purpose of the basic structure of a variety of common flowering plants - including leaves, flowers (blossom), petals, fruit, roots, bulb, seed and stem). Compare and contrast plants, including how they have grown over times, including classifying by their similarities and differences.
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				not need light; seeds and bulbs have a store of food inside them. Carry out a comparative test including a prediction, test and conclusion.	
	Rising 3's	Pre-school	Reception	Y1	Y2
Animals including humans	ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Name some animals that they are familiar with e.g. pets. Begin to understand the need to respect and care for all living things e.g. we put spiders outside and don't squash them. Encourage children to talk about what they see, making simple verbal observations describing how animals are different e.g. the chicken has two legs and the cow has four in discussions with an adult. Sing songs and rhymes with an adult, beginning to learn the basic body parts.	ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Name and describe some animals seen in the local environment e.g. horses sheep. Help to care for animals, taking part in first hand explorations of animal life cycles. Begin to notice some similarities and differences in animals in discussions with an adult e.g. the sheep and the cow both have four legs / that horse is brown and that horse is black but they are both horses. Begin to notice differences in humans with the support of an adult e.g. different colours of hair or eyes.	ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Identify and name the basic parts of the human body – head, hair, eyes, nose, ears, mouth, teeth, arms, hands, fingers, tummy, knees, legs, feet and toes. Notice some similarities and differences in humans e.g. height, colour of eyes or length of hair. Begin to understand that exercise and hygiene is important for humans e.g. brushing teeth and washing hands. Start to notice some changes that take place in the body when exercising when they are pointed out by an adult. Begin to identify some foods that are healthy and some that are unhealthy.	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals, including those kept as pets. Sort animals into groups and tables according to their characteristics. Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe the need for the basic parts of the human body. Compare and contrast humans first hand, or by looking at videos and photographs, grouping them into their own categories e.g. according to characteristics of their appearance. Make comparisons between different textures, sounds and smells using the senses. Name the main stages and characteristics of the human life cycle – baby, toddler, child, and teenager, adult. Observe through first-hand experience, photos or videos	Understand how to take care of animals in the local environment, including returning them to their natural habitat after studying them through first-hand experience e.g. in the Junior school haven and at Coombe Abbey (school trip) Know that animals produce offspring that grow into adults, ordering the basic stages of their life cycle. Observe through first-hand experience. Describe why animals need food, shelter from weather and predators, water, and a place to raise young. Compare and contrast humans first hand, or by looking at videos and photographs, grouping them into their own categories e.g. according to characteristics of their appearance. Compare and contrast animals first hand, or by looking at videos and photographs, grouping them into their own categories e.g. Can explain what happens to the body when exercising and has a basic understanding of why. Describe the need to eat the right amounts of different types of food,

				according to characteristics of their appearance.	including sorting foods into different food groups. Suggest ways for a human to stay healthy and hygienic.
	Rising 3's	Pre-school	Reception	Y2	
Living things and their habitats	Lifecycle focus: Ladybird ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Explore and verbally respond to the natural world by looking for minibeasts and other animals in the environment.	Lifecycle focus: Butterfly ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Encourage children to talk about what they see, making simple verbal observations e.g. the ladybird is spotty, the slimy worm lives in the ground.	Lifecycle focus: Plants (Daffodil) ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants Understand that animals live in homes called habitats – a natural home or environment.	Lifecycle focus: Frogs Explore and compare the differences between things that are living, dead, and things that have never been alive. Sort and classify using charts and tables. Know that all living things have certain characteristics that are essential for keeping them alive and healthy, becoming familiar with: movement (all living things move, even plants), respiration (getting energy from food), sensitivity (detecting changes in the surroundings), growth (all living things grow), reproduction (making more living things of the same type), excretion (getting rid of waste) and nutrition (taking in and using food) Identify that most living things live in habitats, or microhabitats (a very small habitat such as woodlice under a log or leaf) to which they are suited and explore habitats using first hand experiences. Identify and name a variety of plants and animals in their habitats, including microhabitats, using first hand experiences. Woodlice, ladybirds, bees, frogs, worms, beetles nettles, foxgloves, brambles Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other e.g. plants serving as a source of food and shelter for animals. Investigate the different animals that are found in different habitats. Compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. Find out and describe how the conditions of a habitat affect the number and type(s) of plants and animals that live there.	

				Describe how animals obtain their food from plants and other animals, identifying and naming different sources of food. Construct a simple food chain. Ask and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals.	
	Rising 3's	Pre-school	Reception	Y1	Y2
Everyday materials	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter Explore materials with different properties e.g. a basket of materials with different textures in the environment by shaking, hitting, looking, feeling, turning and poking. Explore natural and man made materials indoors and outdoors e.g. wet and dry sand, water, paint, shaving foam and playdough by shaking, hitting, looking, feeling, turning and poking. Engage in discussions with adults about natural processes e.g. ice melting in the sun, light travelling through a transparent material, objects casting a shadow, material attracting the magnet or an object floating on water.	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter Investigate and make simple comments about properties of natural materials which have similarities and differences e.g. contrasting pieces of bark, different types of leaves, different types of seeds, different types of rocks and different types of pebbles and shells from the beach. Begin to make verbal observations about natural processes e.g. ice melting in the sun, light travelling through a transparent material, objects casting a shadow, material attracting the magnet or an object floating on water. With the support of an adult, develop verbal observational and investigational skills "I wonder if ..." "What will happen if we ..." Begin to understand that there are changes that take place in the world around them, including states of matter, describing changes involving heating and cooling in simple terms e.g. the ice melted in the sun.	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter Use the senses of touch, smell and hearing in hands on experiences to investigate a range of different materials, making observations verbally. Comments on simple properties of materials through first hand exploration and observation e.g. that blanket feels fluffy, the rock feels smooth, the spoon is hard. Notice simple similarities and differences in materials, reporting these verbally e.g. the rock and the pebble and both hard Make observations about natural processes verbally and in pictures e.g. ice melting in the sun, light travelling through a transparent material, objects casting a shadow, material attracting the magnet or an object floating on water. Notice simple similarities and Make simple predictions and close observations, commenting on what is	Distinguish between and object and the material from which it is made. Identify and name a variety of everyday materials, including wood, metal, plastic, brick, paper, fabric, elastic, foil, glass, water and rock. Describe the simple physical properties of a variety of everyday materials through first hand exploration and observation and make comparisons: stretchy/stiff; opaque/transparent rough/smooth(cycle B); shiny/dull; hard/soft; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent Compare and group together a variety of everyday materials on the basis of their simple properties. Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching through first hand observation. Ask and answer questions about materials and explore these scientifically e.g. which material is the best to use for an umbrella...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?	Identify and discuss the uses of different everyday materials and know that some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). Consider unusual and creative uses for everyday materials, hypothesising about how everyday materials may be used in the future. Describe the properties of materials that make them suitable or unsuitable for particular purposes. Find out about a significant person who has developed new materials. (Macintosh) Ask and answer questions about materials and explore these scientifically e.g. which material is the best to use for an

		Understand that there are changes that take place in the world around them, including states of matter, describing changes involving heating and cooling in simple terms e.g. the ice melted in the sun.	seen both verbally and in pictures. differences when changing state e.g. the smaller ice cube melts quicker than the large ice cube, the butter melts quicker than the chocolate.	Make a class prediction, test and conclusion. Find out about a significant person who has developed new materials. (Ole Kirk Christiansen)	umbrella...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?' Include an independent prediction, test and conclusion. Carry out scientific experiments to explore the effects of squashing, bending, twisting and stretching on different materials, involving predictions, test and conclusion.
	Rising 3's	Pre-school	Reception	Y1	
Seasonal changes	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Explore and respond to the natural world through different seasons e.g. splashing in rain puddles, walking through tall grass, looking at blossom growing on trees and noticing trees and flowers. Encourage children to talk about what they see, making simple verbal observations e.g. it's raining heavily today or the sun is shining brightly.	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Understand that weather changes over time. Begin to notice some similarities and differences in seasonal patterns with support of an adult e.g. it was raining yesterday but its sunny today. Explore and respond to natural materials found in different seasons e.g. conkers, acorns, pine cones, daffodils, sunflowers and holly leaves. Understand that different animals are seen in the environment only at different times of the year and not year round e.g. lambs and robins.	ELG: Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. Note and record weather patterns throughout different seasons through drawings. Make simple observations and comment on what is seen both verbally and in pictures. Notice some similarities and differences in seasonal weather patterns e.g. it rains all year round but not as much in the summer. Explore different seasons outside, observing first-hand how plants and animals behave differently as seasons change e.g. lambs only seen in spring, birds migrating for winter, squirrels hibernating for winter, conkers only found in the autumn.	Know that there are four seasons and name them, demonstrating the order that they occur. Observe and describe changes in weather patterns and temperature across the 4 seasons through first- hand experience. Observe and describe weather associated with the seasons and how day length varies through first-hand experience. Notice how plants have changed over time, for example the leaves falling off trees and buds opening depending on the season. Make tables and charts about the weather, making displays of what is happening around them. These should include day length as the seasons change.	