



Progression in Science: Overview

Science Progression: Understanding the EYFS to KS1 progression

Organisation of knowledge	Working scientifically	Plants	Animals including humans	Everyday materials	Seasonal Change
Relevant ELG	<p>ELG: Listening, Attention and Understanding</p> <ul style="list-style-type: none"> - Make comments about what they have heard and ask questions to clarify their understanding. <p>ELG: Fine motor skills</p> <ul style="list-style-type: none"> - Use a range of small tools, including scissors, paint brushes and cutlery. <p>ELG: Building Relationships</p> <ul style="list-style-type: none"> - Work and play cooperatively and take turns with others. 	<p>ELG: The Natural World</p> <ul style="list-style-type: none"> - Explore the natural world around them, making observations and drawing pictures of plants and animals. - 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. <p>ELG: Speaking</p> <ul style="list-style-type: none"> - Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary. 		<p>ELG: The Natural World</p> <ul style="list-style-type: none"> - Understand some important processes and changes in the natural world, including the seasons and changing states of matter. <p>ELG: Speaking</p> <ul style="list-style-type: none"> - Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary. 	
KS1 readiness objective	<ul style="list-style-type: none"> - To feel confident to answer simple questions about observable properties of objects and people, animals and plants around them - To compare objects in their environment and talk about similarities and differences - To ask questions about the world around them, and seek to find their own answers 	<ul style="list-style-type: none"> - To know what a plant is - To know what a flower is - To know where you see plants - To describe different plants and flowers 	<ul style="list-style-type: none"> - To know what an animal is - To recognise and name a variety of different animals - To know the names of different body parts of humans and animals they have experience of 	<ul style="list-style-type: none"> - To feel confident to answer simple questions about observable properties of objects and people, animals and plants around them - To compare objects in their environment and talk about similarities and differences - To ask questions about the world around them, and seek to find their own answers 	<ul style="list-style-type: none"> - To know what a plant is - To know what a flower is - To know where you see plants - To describe different plants and flowers

Science Progression: National Curriculum Programme of Study

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.

Aims of the National Curriculum

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.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

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 nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate. All schools are also required to set out their school curriculum for science on a year-by-year basis and make this information available online.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.
Schools are not required by law to teach the content indicated as being 'non-statutory'.

Science Progression: Subject Content in KS1 and KS2

Key Stage 1

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 at key stage 1.

Lower Key Stage 2

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to 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 correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to 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, spell and pronounce scientific vocabulary correctly.

In red are non Statutory objectives

In blue are linked objectives from another topic

Because of the structure of our classes/year groups and mixed age planning, sometimes children will cover a lower year's objectives e.g. a Y2 may cover a Y1 objective and vice versa.

Science Progression: Working Scientifically

<p>Key Stage 1 National Curriculum Statutory Requirements Year 1 and 2</p> <ul style="list-style-type: none"> ask simple questions and recognise that they can be answered in different ways observe closely, using simple equipment perform simple tests identify and classify use their observations and ideas to suggest answers to questions gather and record data to help in answering questions. 	<p>Key Stage 2 National Curriculum Statutory Requirements Year 3 and 4</p> <ul style="list-style-type: none"> ask relevant questions and use different types of scientific enquiries to answer them set up simple practical enquiries, comparative and fair tests make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers gather, record, classify and present data in a variety of ways to help in answering questions record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions identify differences, similarities or changes related to simple scientific ideas and processes use straightforward scientific evidence to answer questions or to support their findings <p>Year 5 and 6</p> <ul style="list-style-type: none"> plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs use test results to make predictions to set up further comparative and fair tests 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
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	EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking questions and recognising that they can be answered in different ways	Question words include who, why, what, when, where and how	Core Knowledge	Question words include what, why, how, when, who and which	Questions can help us find out about the world	Questions can help us find out about the world and can be answered in different ways	Questions can help us find out about the world and can be answered using scientific enquiry	Questions can help us find out about the world and can be answered using a range of scientific enquiries	Questions can help us find out about the world and can be answered using a range of scientific enquiries, including fair tests, research and observation
	Show curiosity and ask questions	Skills	Ask simple questions and recognise that they can be answered in different ways		Ask relevant questions and use different types of scientific enquiries to answer them		Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	
	ask questions, record, sort, group	Vocabulary	ask questions, scientific enquiry, pattern seeking, comparative testing, observing over time, classifying, researching using secondary sources		practical work		variables, independent variable, dependent variable, control variable	

Making observations and taking measurements	Simple equipment can be used to measure distance, height, weight and time	Core Knowledge	Objects, materials and living things can be looked at and compared Simple equipment is used to take measurements and observations e.g. metre sticks, measuring tapes, egg timers and hand lenses	Objects, materials and living things can be looked at, compared and grouped according to their features Simple equipment is used to take measurements and observations e.g. timers, metre sticks, trundle wheels, and hand lenses	An observation involves looking closely at objects, materials and living things, which can be compared and grouped according to their features Equipment is used to take measurements in standard units e.g. data loggers plus sensors, timers (seconds, minutes and hours) thermometers (0°C) and metre sticks (millimetres, centimetres and metres). Taking repeat readings can increase the accuracy of the measurement	An observation involves looking closely at objects, materials and living things. Observations can be made regularly to identify changes over time. Equipment is used to take measurements in standard units e.g. data loggers plus sensors, timers (seconds, minutes and hours) thermometers (0°C) and metre sticks, rulers or trundle wheels (millimetres, centimetres and metres).	An observation involves looking closely at objects, materials and living things. Accurate observations can be made repeatedly or at regular intervals to identify changes over time. Specialised equipment is used to take measurements in standard units e.g. data loggers plus sensors, such as light (lux) sound (dB) and temperature (0°C); timers (seconds, minutes and hours); thermometers (0°C); and measuring tapes (millimetres, centimetres and metres).	An observation involves looking closely at objects, materials and living things. Accurate observations can be made repeatedly or at regular intervals to identify changes over time. Identify processes and make comparisons Specialised equipment is used to take accurate measurements in standard units e.g. data loggers plus sensors, such as light (lux) sound (dB) and temperature (0°C); timers (seconds, minutes and hours); thermometers (0°C); and measuring tapes (millimetres, centimetres and metres).	
	Make observations using their senses and simple equipment Make direct comparisons Use equipment to measure		Skills	Observe closely, using simple equipment		Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers		Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	
	look closely, observe, watch, touch, feel, smell, listen, same, different, compare,		Vocabulary	observe, changes, patterns, grouping, sorting, compare, same, different, identify (name), equipment, resources, magnifying glass, hand lens, ruler, tape measure, metre stick, pipette, syringe, spoon, teaspoon		thermometer, data logger, stopwatch, timer, relationships, accurate, estimate, criteria, properties, characteristics		accuracy, precision, force meter	
Engaging in practical enquiry to answer questions	When we try things out to see if they work, it is called a test	Core Knowledge	Simple tests can be carried out by following a set of instructions	Tests can be carried out by following a set of instructions. A prediction is a guess at what might happen in an investigation	Tests can be set up and carried out by following or planning a set of instructions. A prediction is a best guess for what might happen in an investigation based on some prior knowledge	Scientific enquiries can be set up and carried out by following or planning a method. A prediction is a statement about what might happen in an investigation, based on some prior knowledge or understanding. A fair test is one in which only one variable is changed and all others remain constant.	A method is a set of clear instructions for how to carry out a scientific investigation. A prediction is a statement about what might happen in an investigation based on some prior knowledge or understanding	A method is a set of clear instructions for how to carry out a scientific investigation, including what equipment to use and observations to make. A variable is something that can be changed during a fair test. A prediction is a statement about what might happen in an investigation based on some prior knowledge or understanding	
	Observe how activities are going and adapt their ideas if necessary		Skills	Perform simple tests Identify and classify		Set up simple practical enquiries, comparative and fair tests		Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	
			Vocabulary	test, investigate, explore		Practical work, prediction, fair testing,		variables, independent variable, dependent variable, control variable	

Recording and presenting evidence	Data can be recorded in tables and pictograms	Core Knowledge	Data can be recorded and displayed in different ways, including tables, pictograms and drawings	Data can be recorded and displayed in different ways, including tables, charts, pictograms and drawings	Data can be recorded and displayed in different ways, including tables, charts, graphs and labelled diagrams. Data can be used to provide evidence to answer questions	Data can be recorded and displayed in different ways, including tables, charts, graphs, keys and labelled diagrams.	Data can be recorded and displayed in different ways, including tables, bar and line charts, classification keys and labelled diagrams.	Data can be recorded and displayed in different ways, including tables, bar and line charts, scatter graphs, classification keys and labelled diagrams.
	Record their observations by drawing, taking photographs, using sorting rings or boxes and on simple tick sheets Identify, sort and group	Skills	Gather and record data to help in answering questions		Gather, record, classify and present data in a variety of ways to help in answering questions Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables		Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	
	record, sort, group	Vocabulary	measure, data, record results, drawing, picture, table, tally chart, present, pictogram, block chart, Venn diagram		data, diagram, identification key, chart, bar chart, relationships		scatter graphs, bar graphs, line graphs	
Answering questions and concluding	Talk about what they are doing and have found out	Core Knowledge	The results are information that has been found out from an investigation	The results are information that has been found out from an investigation and can be used to answer a question	Results are information that has been discovered as part of an investigation. A conclusion is the answer to a question that uses the evidence collected	Results are information such as data or observations, that have been found out from an investigation. A conclusion is the answer to a question that uses the evidence collected.	The results are information, such as measurements or observations, that have been collected during an investigation. A conclusion is an explanation of what has been discovered using evidence collected	The results are information, such as measurements or observation, that have been collected during an investigation. A conclusion is an explanation of what has been discovered, using correct, precise terminology and collected evidence.
	Use their observations to help them to answer their questions	Skills	Use their observations and ideas to suggest answers to questions		Use straightforward scientific evidence to answer questions or to support their findings Identify differences, similarities or changes related to simple scientific ideas and processes Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions		Identify scientific evidence that has been used to support or refute ideas or arguments 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 presentation	
		Vocabulary	answer questions, interpret results		Conclusion, explanation, prediction, reason, similarity, difference, information, evidence, findings		Evidence, justify, argument (science), causal relationship	
Evaluating and raising further questions and predictions		Core Knowledge						
		Skills			Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions		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 Use test results to make predictions to set up further comparative and fair tests	

		Vocabulary		Evaluate, improve, prediction, values	causal relationship
Communicating their findings		Core Knowledge			
		Skills		Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	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
		Vocabulary		Conclusion, explanation, reason, information, evidence, findings	Causal relationship

Working scientifically statements that feature in more than one of the broader skills definitions are shown in blue.

The working scientifically vocabulary should be taught through the topics in each year-group during practical work or scientific enquiry

Under each phase the expectation is that the younger year group works with more support and the older group independently.

Science Progression: Plants

Key Stage 1 National Curriculum Statutory Requirements

Year 1

- 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, including trees.

Year 2

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Key Stage 2 National Curriculum Statutory Requirements

Year 3

- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary from plant to plant
- Investigate the way in which water is transported within plants.
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>Plants and trees are living things. They can be identified according to their features, such as leaves, seeds and flowers. Parts of plants and trees include trunk, branch, twig, roots, stem, flowers and leaves. Plants need water, sunlight and air to survive. Develop an understanding of growth Show care and concern for living things and the environment Recognise some environments that are different to the one in which they live. Understand the effect of changing seasons on the natural world around them.</p>	<i>Core Knowledge</i>	<p>Plants are living things. Common plants include the daisy, daffodil and grass. Trees are large woody plants, and are either evergreen or deciduous. Trees that lose their leaves in the Autumn are called deciduous trees. Examples include oak, beech and rowan. Trees that shed old leaves and grow new leaves all year round are called evergreen. Examples include holly and pine. The basic plant parts include root, stem, leaf, flower, petal, fruit, seed and bulb. Trees have a woody stem called a trunk</p>	<p>Plants grow from seeds and bulbs. Seeds and bulbs need water, light and warmth to start growing (germinate) and stay healthy. Without any one of these things, they will die. As the plant grows bigger, it develops leaves and flowers.</p>	<p>The plant's roots anchor the plant in the ground and transport water and minerals from the ground to the plant. The stem (or trunk) support the plant above the ground. The leaves collect energy from the Sun and make food for the plant. Flowers make seeds to produce new plants. Water is transported in [plants from the roots through the stem and to the leaves, through tiny tubes called xylem Plants need air, light, water, minerals from the soil and room to grow in order to survive. Different plants have different needs depending on their habitat. Examples include cacti, which need less water than is typical, and ferns, which can grow in lower light levels. Flowers are important in the life cycle of flowering plants. The processes of a plant's life cycle include germination, pollination, seed formation and seed dispersal. Insects and the wind can transfer pollen from one plant to another (pollination). Animals, wind, water and explosions can disperse seeds away from the parent plant (seed dispersal).</p>	<p><u>Living things and their habitats</u> Living things can be grouped in a variety of ways. Classification keys can be used to help group, identify and name a variety of living things in the local and wider environment. Environments can change and that this can sometimes pose dangers to living things.</p>	<p><u>Living things and their habitats</u> Parts of a flower include the stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal. Pollination is when the male part of a plant (pollen) is carried, by wind, insects or other animals, to the female part of the plant (carpel). The pollen travels to the ovary, where it fertilises the ovules (eggs). Seeds are then produced, which disperse far away from the parent plant and grow new plants. Flowering plants reproduce sexually. The flower is essential for sexual reproduction. Other plants reproduce asexually. Bulbs, corms and rhizomes are some parts used in asexual reproduction in plants.</p>	<p><u>Living things and their habitats</u> Classification keys help us identify living things based on their physical characteristics. Animals and plants can be bred to produce offspring with specific and desired characteristics. This is called selective breeding. Examples include crops that are disease-resistant</p>

	<p>Make observations of plants and explain why some things occur, and talk about changes.</p> <p>Begin to name and group plants and trees according to their observable features</p> <p>Describe some ways plants should be cared for in order for them to survive</p>	Skills	<p>Identify, compare, group and sort a variety of common wild and garden plants, including deciduous and evergreen trees, based on observable features.</p> <p>Label and describe the basic structure of a variety of common plants.</p> <p>Describe how to care for plants</p> <p>Describe, following observation, how plants change over time</p>	<p>Describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>Observe and describe how seeds and bulbs change over time as they grow into mature plants.</p> <p>Living things and their habitats</p> <p>Identify and name a variety of plants in a range of habitats and microhabitats.</p>	<p>Name and describe the functions of the different parts of flowering plants (roots, stem, leaves and flowers).</p> <p>Investigate how water is transported within plants.</p> <p>Describe the requirements of plants for life and growth (air, light, water, nutrients and room to grow) and how they vary from plant to plant.</p> <p>Draw and label the life cycle of a flowering plant.</p>	<p>Living things and their habitats</p> <p>Use and make a simple guide and key to explore and identify local plants</p>	<p>Living things and their habitats</p> <p>Observe and compare the life cycles of plants in their local environment with other plants around the world (in the rainforest, in desert areas and in prehistoric times) Ask pertinent questions and suggest reasons for similarities and differences. Try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.</p>	<p>Living things and their habitats</p> <p>Use and construct classification systems to identify plants from a range of habitats.</p>
	<p>plant, tree, bush, flower, vegetable, herb, weed, names of plants they see</p>		Vocabulary	<p>Leaf, blossom, petal, root, bud, trunk, branch, stem, evergreen, garden plant, deciduous, wild plants, seed, flower, fruit, berry, bark, stalk</p>	<p>light, shade, Sun, warm, cool, water, space, grow, healthy, bulb germinate, shoot, seedling</p>	<p>Air, water, nutrients, soil, minerals absorb transport, seed dispersal (animal dispersal, wind dispersal, water dispersal, insect/wind pollination, male, female, seed formation, photosynthesis, pollen</p>	<p>Living things and their habitats</p> <p>Classification, classification keys</p>	<p>Living things and their habitats</p> <p>Life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, cuttings</p>

Science Progression: Animals, including humans

Key Stage 1 National Curriculum Statutory Requirements

Year 1

- 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.
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Year 2

- Know that animals, including humans, have offspring which grow into adults.
- 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.

Key Stage 2 National Curriculum Statutory Requirements

Year 3

- 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.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement: Know about the skeletal and muscular system of a human.

Year 4

- 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

Year 5

- Describe the changes as humans develop to old age

Year 6

- 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.

	EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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	<p>The basic body parts are the head, arms, legs, nose, eyes, ears, mouth, hands and feet. Different body parts are used for different things, such as the eyes are used to see. Washing and drying hands especially after using the toilet and before eating, helps stop the spread of harmful germs. Animals are living things. There are different types of animal. Parent and baby mammals include cow and calf, sheep and lamb and cat and kitten. Parent and baby birds include duck and duckling, chicken and chick, and goose and gosling. Different animal group have some common body parts, such as birds have wings and fish have fins. Animals eat different kinds of food, including other animals, plants or both animals and plants. Animals are living things. Animals need food, water, air and shelter to survive. Living things change over time. This includes growth and decay.</p>	<p><i>Core Knowledge</i></p>	<p>The basic body parts are the head, arms, legs, nose, eyes, ears, mouth, hands and feet. The five senses are hearing, sight, smell, taste and touch. Ears are used for hearing, eyes are used to see, the nose is used to smell, the tongue is used to taste and skin gives the sense of touch. Handwashing and good hygiene are important parts of a healthy lifestyle and prevent the spread of germs. Animals are living things. Animals can be sorted and grouped into five main groups: fish, amphibians, reptiles, birds and mammals. Different animal groups have some common body parts such as eyes and a mouth, and some different body parts such as fins or wings. Carnivores eat other animals (meat), herbivore eat plants and omnivores eat other animals and plants. Living things need to be cared for in order for them to survive. They need water, food, warmth and shelter.</p>	<p>Human offspring go through different stages as they grow to become adults. These include baby, toddler, child, teenager, adult and elderly. Humans need water, food, air and shelter to survive. A healthy lifestyle includes exercise, good personal hygiene, good quality sleep and a balanced diet. Risks associated with an unhealthy lifestyle include obesity, tooth decay and mental health problems</p>	<p>Humans have to get nutrition from what they eat. It is important to have a balanced diet made up of the main food groups, including proteins, carbohydrates, fruit and vegetables, dairy products and alternatives, and fats and spreads. Carnivores get their nutrition from eating other animals. Herbivores get their nutrition from plants. Omnivores get their nutrition from eating a combination of both plants and other animals. Humans need to stay hydrated by drinking water. Some animals have skeletons for support, movement and protection. Endoskeletons are those found inside some animals such as humans, cats and horses. Exoskeletons are those found on the outside of some animals, such as beetles and flies. Some animals have no skeleton, such as slugs and jellyfish. Humans have a skeleton and muscles for movement, support and protecting organs. Major bones in the human body include the skull, ribs, spine, humerus, ulna, radius, pelvis, femur, tibia and fibula. Major muscle groups in the human body include the biceps, triceps, abdominals, trapezius, gluteals, hamstrings, quadriceps, deltoids, gastrocnemius, latissimus dorsi and pectorals.</p>	<p>The digestive system is responsible for digesting food and absorbing nutrients and water. The main parts of the digestive system are the mouth, oesophagus, stomach, small intestines, large intestines and rectum. The mouth starts digestion by chewing food and mixing it with saliva. The oesophagus transports the chewed food to the stomach, where it mixes with stomach acid and gets broken down into smaller pieces. In the small intestine, nutrients from the food are absorbed by the body. In the large intestine, water is absorbed by the body. The remaining waste is stored in the rectum before excretion through the anus. Regular teeth brushing, limiting sugary foods and visiting the dentist are important for good oral hygiene. There are four different types of teeth: incisors, canines, premolars and molars. Incisors are used for cutting. Canines are used for tearing. Premolars and molars are used for grinding and chewing. Carnivores, herbivores and omnivores have characteristic types of teeth. Herbivores have many large molars for grinding plant material. Carnivores have large canines for killing their prey and tearing meat. Food chains show what animals eat within a habitat and how energy is passed on over time. All food chains start with a producer, which is typically a green plant. The producer is eaten by a primary consumer (prey), which is eaten by a tertiary consumer. All food chains end with a top or apex predator. Changes within a food chain, such as an abundance or lack of one food</p>	<p>Good personal hygiene (washing, wearing clean clothes and brushing teeth) can prevent disease or illness. Puberty is the period during which adolescents reach sexual maturity and become capable of reproduction. It causes physical and emotional changes. Humans go through characteristic stages as they develop towards old age. These stages include baby, infant, toddler, child, adolescent, young adult, adult and senior citizen. Puberty is the transition between childhood and adulthood.</p>	<p>The circulatory system includes the heart, blood vessels and blood. The heart pumps blood through the blood vessels and around the body. There are three types of blood vessel: arteries, veins and capillaries. They each have a different-sized hole (lumen) and walls. The blood carries gases (oxygen and carbon dioxide), water and nutrients to where they are needed. The red blood cells carry oxygen and carbon dioxide around the body. The blood also contains white blood cells, which protect the body from infection. Lifestyle choices can have a positive (exercise and eating healthily) or negative (drugs, smoking and alcohol) impact on the body. The role of the circulatory system is to transport oxygen, water and nutrients around the body. They are transported in blood and delivered to where they are needed. Evolution and Inheritance All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.</p>
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					type, have an impact on the entire food chain.		
<p>Draw pictures of the human body and name some of the different body parts</p> <p>Wash and dry hands regularly and say why this is important.</p> <p>Match animals to their young</p> <p>Identify common features for different groups of animals, including wild and domestic animals</p> <p>Match animals to the foods that they eat.</p> <p>Describe some ways that animals should be cared for in order for them to survive.</p>	Skills	<p>Draw and label the main parts of the human body and say which body part is associated with which sense.</p> <p>Explain why hand washing and cleanliness are important.</p> <p>Identify, compare, group and sort a variety of common animals including fish, amphibians, reptiles, birds and mammals based on observable features.</p> <p>Label and describe the basic structures of a variety of common animals, including fish, amphibians, reptiles, birds and mammals.</p> <p>Group and sort a variety of common animals based on the foods they eat.</p> <p>Describe how to care for animals including pets.</p>	<p>Describe the stages of human development (baby, toddler, child, teenager, adult and elderly).</p> <p>Explain how animals including humans, need water, food, air and shelter to survive.</p> <p>Describe the importance of a health lifestyle including exercise, a balanced diet, good quality sleep and personal hygiene.</p>	<p>Describe how humans need the skeleton and muscles for support, protection and movement.</p> <p>Explain the importance and characteristics of a healthy, balanced diet</p> <p>Identify and group animals that have no skeleton, an internal skeleton (endoskeleton) and an external skeleton (exoskeleton).</p> <p>Compare and contrast the diets of different animals.</p>	<p>Describe the purpose of the digestive system, its main parts and each of their function.</p> <p>Describe what damages teeth and how to look after them</p> <p>Identify the four different types of teeth in humans and other animals and describe their functions.</p> <p>Construct and interpret a variety of food chains and webs to show interdependence and how energy is passed on over time.</p>	<p>Explain why personal hygiene is important during puberty</p> <p>Describe the changes as humans develop to old age.</p>	<p>Name and describe the purpose of the circulatory system and the functions of the heart, blood vessels and blood.</p> <p>Explain the impact of positive and negative lifestyle choices on the body.</p> <p>Explain that the circulatory system in animals transports oxygen, water and nutrients around the body.</p> <p>Evolution and Inheritance</p> <p>Identify that living things produce offspring of the same kind, although the offspring are not identical to either parent.</p>
<p>names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice</p> <p>hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (black, brown, white), big/tall, small/short, bigger/smaller, baby, toddler, child, adult, old person, old, young, brother, sister, mother, father, aunt, uncle, grandmother, grandfather, cousin, friend, family, boy, girl, man, woman</p>	Vocabulary	<p>Names of animals experienced first-hand from each vertebrate group, parts of the human body including those within the school's RSE policy, senses, see, hear, touch, taste, smell, body, head, neck, arm, elbow, knee, face, ears, eyes, hair, mouth, teeth, tongue, shoulder, hand, finger, skin, leg, foot, thumb, nose, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, amphibians, birds, fish, mammals, reptiles, carnivore, herbivore, omnivore</p>	<p>Offspring, reproduction, growth, baby, child, teenager, adult, old person, names of animals and their babies (e.g. chick/chicken, kitten/cat, caterpillar/butterfly), survive, survival, water, food, air, exercise, heartbeat, breathing, hygiene, germs, disease, food types (eg meat, fish, vegetables, bread, rice, pasta, dairy)</p> <p>Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival (Y2 – living things and their habitats)</p>	<p>Nutrients, nutrition, carbohydrates, sugars, protein, fat, vitamins, minerals, water, fibre, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine</p>	<p>herbivore, carnivore, omnivore, consumer, producer, predator, prey, digestive system, tongue, mouth, teeth, saliva, oesophagus, stomach, small intestine, large intestine, rectum, anus, canine, incisor, molar, premolar</p>	<p>Puberty, the vocabulary to describe sexual characteristics in line with the school's RSE policy</p> <p>Life cycle, foetus, embryo, baby, child, adolescent, adult, reproduce, sexual, sperm, fertilises, egg, live young (Y5 – Living things and their habitats)</p>	<p>Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, cycle, circulatory system, diet, drugs, alcohol, tobacco, lifestyle</p> <p>Evolution and Inheritance</p> <p>Offspring, sexual reproduction, vary, characteristics, inherited,</p>
<p>Science Progression: Everyday materials</p>							

<p>Key Stage 1 National Curriculum Statutory Requirements</p> <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 • Describe and compare the simple physical properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of 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 the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching 		<p>Key Stage 2 National Curriculum Statutory Requirements</p> <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 they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. <p>Year 5</p> <ul style="list-style-type: none"> • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • 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 particular uses of everyday materials, including metals, wood 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 that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda 					
	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

	<p>Objects are made from different materials. Everyday materials include plastic, wood, glass, fabric, metal and stone. Materials have different properties. Some materials are magnetic, which means that they are attracted to (pull towards) a magnet. Some metals are magnetic. Other materials are non-magnetic, such as wood, dough and glass. Objects can be compared and grouped according to their shape, colour, material or use.</p>	<p>Core Knowledge</p>	<p>A material is what an object is made from. Everyday materials include wood, plastic, glass, metal, water, rock, brick, paper and fabric. Materials have different properties, such as hard or soft; stretchy or stiff; rough or smooth; see through or not see through; bendy or not bendy; waterproof or not waterproof. Materials can be grouped according to their properties</p>	<p>A material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose such as metal for cutlery and cars. Some objects and materials can be changed by squashing, bending, twisting, stretching, heating, cooling, mixing and being left to decay.</p>	<p><u>Rocks and Soils</u> Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p>	<p>Heating or cooling materials can bring about a change in state. This change of state can be reversible or irreversible. The temperature at which materials change state varies depending on the material. Water changes state from solid (ice) \rightleftharpoons liquid (water) at 0°C and from liquid (water) \rightleftharpoons gas (water vapour) at 100°C. The process of changing from a solid to liquid is called melting. The reverse process of changing a liquid to a solid is called freezing. The process of changing from a liquid to a gas is called evaporation. The reverse process of changing from a gas to a liquid is called condensation. The water cycle has four stages: evaporation, condensation, precipitation and collection. Water in lakes, rivers and streams is warmed by the sun causing the water to evaporate and rise into the air as water vapour. As the water vapour rises, it cools and condenses to form water droplets in clouds. The clouds become full of water until the water falls back to the ground as precipitation (rain, hail, snow and ice). The fallen water collects back in lakes, rivers and streams. Evaporation and condensation are caused by temperature changes. Materials can be grouped according to whether they are solids, liquids or gases. Solids stay in one place and can be held. Some solids can be squashed, bent, twisted and stretched. Examples of solids include wood, metal, plastic and clay. Liquids move around (flow) easily and are difficult to hold. Liquids take the shape of the container in which they are held. Examples of liquids include water, juice and milk. Gases spread out to fill the</p>	<p>Reversible changes include heating, cooling, melting, dissolving and evaporating. Irreversible changes include burning, rusting, decaying and chemical reaction. Materials can be grouped according to their basic physical properties. Properties include hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. Some materials (solutes) will dissolve in liquid (solvents) to form a solution. The solute can be recovered by evaporating off the solvent by heating. Some mixtures can be separated by filtering, sieving and evaporating. Sieving can be used to separate large solids from liquids and some solids from other solids. Filtering can be used to separate small solids from liquids. Evaporating can be used to separate dissolved solids from liquids. A material's properties dictate what it can be used for. For example, cooking pans are made from metal, which is a good thermal conductor, allowing heat to quickly transfer from the hob to the contents of the pan.</p>	
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					available space and cannot be held. Examples of gases include oxygen, helium and carbon dioxide. Air is a mixture of gases.		
Name and sort everyday items into groups of the same material or according to simple given criteria and compare them. Identify that materials have different properties and explore and sort magnetic and non-magnetic materials through play and exploration Observing over time e.g. How does the cake mixture change? How does chocolate change when heated? How does fruit juice change when put in the freezer? How does fruit change when blended?	Skills	Observe materials, sorting and grouping them based on their features. Identify and name what an object is made from including wood, plastic, glass, metal, water and rock Investigate and describe the simple physical properties of some everyday materials such as hard or soft, stretchy or stiff, rough or smooth etc. Compare and group materials in a variety of ways, such as based on their physical properties: being natural or man-made and being recyclable or non-recyclable.	Describe how some objects and materials can be changed and how these changes can be desirable or undesirable. Observe object and materials, sorting and grouping them based on their features and explaining their reasoning. Observe what happens when a range of everyday materials, including foods, are heated and cooled, sorting and grouping them based on their observations. Compare the suitability of a range of everyday materials for particular uses, including wood, metal, plastic, glass, brick, rock, paper and cardboard.	<u>Rocks and Soils</u> Describe simply how fossils are formed, using words, pictures or a model. Investigate soils from the local environments making comparisons and identifying features. Compare and group rocks based on their appearance, properties or uses.	Observe and explain that some materials change state when they are heated or cooled and measure or research the temperature in degrees Celsius (°C) at which materials change state. Describe the water cycle using words or diagrams and explain the part played by evaporation and condensation. Group and sort materials into solids, liquids or gases. Describe materials as electrical conductors or insulators.	Identify, demonstrate and compare reversible and irreversible changes. Compare and group everyday materials by their properties, including hardness, solubility, transparency, conductivity (electrical and thermal) and magnetism. Explain. Following observation that some substances (solutes) will dissolve in liquid (solvents) to form a solution and the solute can be recovered by evaporating off the solvent. Separate mixtures by filtering, sieving and evaporating. Describe, using evidence from comparative or fair tests, why a material has been chosen for a specific use, including metals, wood and glass.	
mix, stir, cook, hot, oven, microwave, change, burn, melt, hard, runny, set, freeze, freezer, cold, blended, hard, soft, bendy, stiff, wobbly, wood, plastic, paper, card, fabric	Vocabulary	hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; floppy breaks/tears waterproof/not waterproof; absorbent/not absorbent; see through/not see through, object, material, wood, plastic, glass, metal, rock, water, brick, paper, fabric, elastic, foil, card, cardboard, rubber, wool, clay.	reflective/non-reflective; rigid/flexible: transparent/opaque/translucent; shape, push/pushing; pull/pulling; twist/twisting; squash/squashing; bend/bending; stretch/stretching	<u>Rocks and Soils</u> Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay)	Solid, liquid, gas, state, melting, melting point, boiling, boiling point, freezing, cooling, heating, change, temperature, condensation, evaporation, water cycle	suspension, chemical, physical, separate, permeable, thermal insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	

Science Progression: Seasonal changes KS1 and Earth and Space KS2

Key Stage 1 National Curriculum

Statutory Requirements

Year 1

- Observe changes across the four seasons
- Observe and describe weather associated with the seasons and how day length varies.

Key Stage 2 National Curriculum

Statutory requirements/Non-Statutory requirements

LKS2

- Observe how the Sun appears to move across the sky from East to West
- Observe how the Sun appears to move and this causes shadows to change
- Describe how we can see the Moon because the Sun's light reflects off it
- Describe how the Earth and Moon go around the Sun in one year
- Recognise that humans have been to the Moon

Year 5

- 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
- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.

EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<p>The weather can change throughout the day, week and month. The weather is different at different times in the year. The number of daylight hours varies throughout the year according to the season. The days are longer in summer and shorter in winter. Ways to describe daily weather include sunny, rainy, windy, cloudy, warm or cold. Weather is warmer in the summer with more sunshine and colder in the winter with more snow, hail and rain.</p>	<p>Core Knowledge</p>	<p>There are four seasons spring, summer, autumn and winter. Certain events and weather patterns happen in different seasons. Day length (the number of daylight hours) is longer in the summer months and shorter in the winter months. Different types of weather include sunshine, rain, hail, wind, snow fog, lightning, storm and cloud. The weather can change daily and some weather types are more common in certain seasons, such as snow in winter.</p>	<p>The Earth is spherical and is covered in water and land. When it is daytime in one location, it is night time on the other side of the world.</p>	<p>Shadows change shape and size when the light source moves. For example, when the Sun is high above the object in the sky, the shadow is short and when the Sun is low down in the sky, the object's shadow is long. During the day, the Sun appears to move across the sky, rising in the east and setting in the west, however, this is due to the Earth rotating and not the Sun moving. The Moon orbits Earth which orbits around the Sun and it takes a year (365.25 days) for Earth to complete a full orbit of the Sun. We can see the Moon because light from the Sun which is shining on the Moon is reflected off the Moon's surface.</p>		<p>The Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). A moon is a celestial body that orbits a planet (Earth has one moon which completes a full orbit every month (27.3 days); Jupiter has four large moons and numerous smaller ones). As Earth orbits the Sun, it also spins on its axis. It takes Earth a day (24 hours) to complete a full spin. Earth rotates to the east or, if viewed from above the North Pole, it rotates anti-clockwise, which means the Sun rises in the east and sets in the west. As Earth rotates, different parts of it face the Sun which brings what we call daytime. The part facing away is in shadow, which is night time. The Sun, Earth, Moon and the planets in our solar system are roughly spherical. All planets are spherical because their mass is so large that they have their own force of gravity. This force of gravity pulls all of a planet's material towards its centre, which compresses it into the most compact shape – a sphere.</p>	

	<p>Notice and begin to describe patterns of weather in summer and winter.</p> <p>Notice and talk about the differences in day length between the seasons.</p> <p>Describe simply how weather changes as the seasons change.</p>	Skills	<p>Observe changes across the four seasons. Observe and describe how day length changes across the year.</p> <p>Observe and describe different types of weather.</p>	<p>Describe typical UK seasonal weather patterns.</p> <p>Describe features of earth using words and pictures.</p>	<p>Find patterns in the way shadows change during the day.</p> <p>Explain why light from the Sun can be dangerous.</p>		<p>Use the idea of Earth's rotation to explain day and night, and the Sun's apparent movement across the sky.</p> <p>Describe or model the movement of the planets in our Solar System including Earth, relative to the Sun.</p> <p>Describe or model the movement of the Moon relative to Earth.</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies and use this knowledge to understand the phases of the moon and eclipses.</p>	
	<p>spring, summer, autumn, winter, seasons, sunny, cloudy, hot, warm, cold, shower, raining, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, windy, rainbow, Sun, Moon, Earth, star, planet, sky, day, night, space, round</p>		Vocabulary	<p>Weather, sunny, rainy, raining, shower, overcast, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, spring, summer, autumn, winter, Sun, sunrise, sunset, day length, temperature</p>	<p>Sphere. (spherical)</p>		<p>Light, light source, Sun, sunlight, dangerous</p> <p>dark, absence of light, surface, shadow, reflect (Light)</p>	

Science Progression: Living things and their habitats

<p>Key Stage 1 National Curriculum Statutory Requirements</p> <p>Year 2</p> <ul style="list-style-type: none"> • Explore and compare the differences 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 different sources of food. 				<p>Key Stage 2 National Curriculum Statutory Requirements</p> <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 dangers to living things. <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 6</p> <ul style="list-style-type: none"> • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and difference, including micro-organisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics. 			
	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

	<p>A habitat is a place where living things live. Local habitats include woodlands, gardens and ponds. Other habitats include hot places, such as deserts and cold places, such as the Arctic. Living things change over time. This includes growth and decay.</p>	<p>Core Knowledge</p>	<p>Living things need to be cared for in order for them to survive. They need water, food, warmth and shelter. The local environment is a habitat for living things and can change during the seasons. All living things (plants and animals) change over time as they grow and mature.</p>	<p>A habitat is a place where a living thing lives. A microhabitat is a very small habitat. Food chains show how living things depend on one another for food. All food chains start with a plant, followed by animals that either eat the plant or other animals. Animals need water, food, air and shelter to survive. Their habitat must provide these things. Local habitats include parks, woodland and gardens. Habitats beyond the locality include beaches, rainforests, deserts, oceans and mountains. All living things live in a habitat to which they are suited and it must provide everything they need to survive. Living things are those that are alive. Dead things are those that were once living but are no longer. Some things have never been alive.</p>	<p>Environments are constantly changing due to natural influences, such as seasons, extreme weather, population changes and availability of food. Living things must adapt to these changes in order to survive.</p>	<p>Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year.</p>	<p>As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.</p>	<p>Living things can be formally grouped according to observable characteristics and based on similarities and differences. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants. Evolution and Inheritance Scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.</p>
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	<p>Observe and describe the living things and their habitats within the local environment. Explore the natural world around them and give simple descriptions, following observation, of changes.</p>	Skills	<p>Describe how to care for plants and animals, including pets. Observe the local environment throughout the year and ask and answer questions about living things and seasonal change. Describe, following observation, how plants and animals change over time.</p>	<p>Identify and name a variety of plants and animals in a range of habitats and microhabitats. Interpret and construct simple food chains to describe how living things depend on each other as a source of food. Explain how animals including humans, need water, food, air and shelter to survive. Describe a range of local habitats and habitats beyond their locality (beaches, rainforests, deserts, oceans and mountains) and what all habitats provide for the things that live there. Compare and group things that are living, dead or have never been alive.</p>	<p>Describe how environments can change due to natural influences and how living things need to be able to adapt to these changes.</p>	<p>Compare, sort and group living things from a range of environments, in a variety of ways, based on observable features and behaviour. Describe how environments can change due to human and natural influences and the impact this can have on living things. Explain how unfamiliar habitats, such as a mountain or ocean, can change over time and what influences these changes.</p>	<p>Describe the life process of reproduction in some plants and animals. Compare the life cycles of animals, including a mammal, an amphibian, an insect and a bird.</p>	<p>Use and construct classification systems to identify animals and plants from a range of habitats. Classify living things including microorganisms, animals and plants, into groups according to common observable characteristics and based on similarities and differences. Research unfamiliar animals and plants from a range of habitats, deciding upon and explaining where they belong in the classification system. Evolution and Inheritance Identify how animals and plants are adapted to suit their environment, such as giraffes having long necks for feeding, and that adaptations may lead to evolution.</p>
	<p>plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment e.g. beach, forest, environment</p>	Vocabulary		<p>Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival, names of local habitats (e.g. pond, woodland, wildlife area), names of micro-habitats (e.g. under logs, in bushes etc), conditions, light, dark, shady, sunny, wet, damp, dry, hot, cold, names of living things in the habitats and micro-habitats studied</p>		<p>classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate</p>	<p>Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, cuttings</p>	<p>vertebrates, fish, amphibians, reptiles, birds, mammals, warm- blooded, cold-blooded, invertebrates, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers Evolution and Inheritance Suited, adapted, environment, evolve, evolution</p>

Science Progression: Rocks

Key Stage 1 National Curriculum
Statutory Requirements

Key Stage 2 National Curriculum
Statutory requirements

Year 3

- Compare and group together different kinds of rocks on the basis of 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.

EYFS

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

	<p><u>Everyday Materials</u> Objects are made from different materials. Everyday materials include plastic, wood, glass, fabric, metal and stone. Materials have different properties. Some materials are magnetic, which means that they are attracted to (pull towards) a magnet. Some metals are magnetic. Other materials are non-magnetic, such as wood, dough and glass. Objects can be compared and grouped according to their shape, colour, material or use.</p>	<p><i>Core Knowledge</i></p>	<p><u>Everyday Materials</u> A material is what an object is made from. Everyday materials include wood, plastic, glass, metal, water, rock, brick, paper and fabric. Materials have different properties, such as hard or soft; stretchy or stiff; rough or smooth; see through or not see through; bendy or not bendy; waterproof or not waterproof. Materials can be grouped according to their properties</p>	<p><u>Everyday Materials</u> A material's physical properties make it suitable for particular purposes, such as glass for windows and brick for building walls. Many materials are used for more than one purpose such as metal for cutlery and cars. Some objects and materials can be changed by squashing, bending, twisting, stretching, heating, cooling, mixing and being left to decay.</p>	<p>Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p>			<p><u>Evolution and Inheritance</u> Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.</p>
	<p>Explore the natural world around them. Describe what they see, hear and feel whilst outside. <u>Everyday materials</u> Name and sort everyday items into groups of the same material or according to simple given criteria and compare them. Identify that materials have different properties and explore and sort magnetic and on-magnetic materials through play and exploration</p>	<p><i>Skills</i></p>	<p><u>Everyday materials</u> Observe materials, sorting and grouping them based on their features. Identify and name what an object is made from including wood, plastic, glass, metal, water and rock Investigate and describe the simple physical properties of some everyday materials such as hard or soft, stretchy or stiff, rough or smooth etc. Compare and group materials in a variety of ways, such as based on their physical properties: being natural or man-made and being recyclable or non-recyclable.</p>	<p><u>Everyday materials</u> Describe how some objects and materials can be changed and how these changes can be desirable or undesirable. Observe object and materials, sorting and grouping them based on their features and explaining their reasoning. Observe what happens when a range of everyday materials, including foods, are heated and cooled, sorting and grouping them based on their observations. Compare the suitability of a range of everyday materials for particular uses, including wood, metal, plastic, glass, brick, rock, paper and cardboard.</p>	<p>Describe simply how fossils are formed, using words, pictures or a model. Investigate soils from the local environments making comparisons and identifying features. Compare and group rocks based on their appearance, properties or uses.</p>			<p><u>Evolution and Inheritance</u> 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>

	<u>Everyday materials</u> ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back	Vocabulary	<u>Everyday materials</u> hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; floppy breaks/tears; waterproof/not waterproof; absorbent/not absorbent; see through/not see through, object, material, wood, plastic, glass, metal, rock, water, brick, paper, fabric, elastic, foil, card, cardboard, rubber, wool, clay.	<u>Everyday materials</u> reflective/non-reflective; rigid/flexible: transparent/opaque/translucent; shape, push/pushing; pull/pulling; twist/twisting; squash/squashing; bend/bending; stretch/stretching	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay)			<u>Evolution and Inheritance</u> Fossils, evolve, evolution
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Science Progression: Light

Key Stage 1 National Curriculum	Key Stage 2 National Curriculum Statutory objectives Year 3 <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. Year 6 <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. 							
	EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

<p>Natural phenomena include shadows and rainbows. A shadow is the same shape as the object that makes it. Shadows change during the day. Some light sources need electricity or batteries to work, such as a torch, and some do not such as candles</p>	<p><i>Core Knowledge</i></p>			<p>We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.</p>			<p>Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</p>
<p>Explore the natural world around them Name and describe natural phenomena, such as the size of shadows and the colours of a rainbow. Explore and describe non-electric light sources Make a shadow bigger or smaller using toys, play equipment and a light source</p>	<p><i>Skills</i></p>			<p>Explain why light from the sun can be dangerous. Find patterns in the way shadows change during the day. Describe the differences between light and dark and how we need light to be able to see. Explain, using words or diagrams, how shadows are formed when a light source is blocked by an opaque object. Group and sort materials as being reflective or non-reflective.</p>			<p>Explain, using words, diagrams or a model, why shadows have the same shape as the objects that cast them and how shadows can be changed. Identify that light travels in straight lines. Explain that, due to how light travels, we can see things because they give out or reflect light into the eye.</p>
<p>sunny, light, shadow, shady, clouds, torch, see-through, non-seethrough, source, light source</p>	<p><i>Vocabulary</i></p>			<p>Light, light source, dark, absence of light, surface, shadow, reflect, mirror, Sun, sunlight, dangerous</p>			<p>Straight lines, light rays</p>

Science Progression: Forces and magnets

<p>Key Stage 1 National Curriculum Statutory Requirements</p>	<p>Key Stage 2 National Curriculum Statutory objectives</p> <p>Year 3</p> <ul style="list-style-type: none"> • Compare how things move on different surfaces • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Observe how magnets attract or repel each other and attract some materials and not others • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • Describe magnets as having two poles • Predict whether two magnets will attract or repel each other, depending on which poles are facing. <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 • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
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	EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	<p>Some objects float and others sink. When an object sinks it falls to the bottom of the vessel. An object that floats stays at the water's surface</p> <p>Some materials are magnetic which means that they are attracted to (pull towards) a magnet. Some metals are magnetic. Other materials are non-magnetic, such as wood, dough and glass</p>	<p>Core Knowledge</p>			<p>A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.</p> <p>A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.</p>		<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p>	

	<p>Explore the natural world around them</p> <p>Describe what they see, feel, hear when outside</p> <p>Describe, predict and sort things that float and sink and talk about the forces that they can feel</p> <p>Identify that materials have different properties and explore and sort magnetic and non-magnetic materials through play and exploration</p>	Skills			<p>Explain that an object will not move unless a push or pull force is applied, describing forces in action and whether the force requires direct contact or whether the force can act at a distance (magnetic force)</p> <p>Investigate and compare a range of magnets (bar, horseshoe and floating) and explain that magnets have two poles (north and south) and that opposite poles attract each other, while like poles repel each other.</p> <p>Compare how objects move over surfaces made from different materials.</p>		<p>Explain that objects fall to earth due to the force of gravity.</p> <p>Describe and demonstrate how simple levers, gears and pulleys assist the movement of objects</p> <p>Compare and describe, using a range of toys, models and natural objects, the effects of water resistance, air resistance and friction</p>	
	<p>float, sink, up, down, top, bottom, surface, move, roll, drop, fly, turn, spin, fall, fast, slow, faster, slower, fastest, slowest, further, furthest, wind, air, water, blow, bounce</p>	Vocabulary			<p>Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole</p>		<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>	

Science Progression: Electricity

Key Stage 1 National Curriculum
Statutory Requirements

Key Stage 2 National Curriculum
Statutory objectives

Year 4

- 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 or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- Recognise some common conductors and insulators, and associate metals with being good conductors.

Year 6

- 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

EYFS

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

	Core Knowledge				<p>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.</p> <p>Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.</p>		<p>Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens.</p> <p>Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.</p> <p>Use recognised circuit symbols to draw simple circuit diagrams.</p>
	Skills				<p>Explain the precautions needed for working safely with electrical circuits</p> <p>Predict and describe whether a circuit will work based on whether or not the circuit is a complete loop and has a battery or cell.</p> <p>Construct operational circuits using a range of components and switches for control</p> <p>Compare common household equipment and appliances that are not powered by electricity</p>		<p>Explain how the brightness of a lamp or volume of a buzzer is affected by the number and voltage of cells used in a circuit</p> <p>Create circuits using a range of components and record diagrammatically using the recognised symbols for electrical components</p> <p>Compare and give reasons for variations in how components in electrical circuits function (brightness of lamps; volume of buzzers and function of on or off switches).</p>
	Vocabulary				<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol</p>		<p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage</p>

What will our pupils go on to learn?

Science Progression: Programme of Study KS3

The principal focus of science teaching in key stage 3 is to develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics. Pupils should begin to see the connections between these subject areas and become aware of some of the big ideas underpinning scientific knowledge and understanding. Examples of these big ideas are the links between structure and function in living organisms, the particulate model as the key to understanding the properties and interactions of matter in all its forms, and the resources and means of transfer of energy as key determinants of all of these interactions. They should be encouraged to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations.

Pupils should understand that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Pupils should decide on the appropriate type of scientific enquiry to undertake to answer their own questions and develop a deeper understanding of factors to be taken into account when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them.

'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Teachers should feel free to choose examples that serve a variety of purposes, from showing how scientific ideas have developed historically to reflecting modern developments in science.

Pupils should develop their use of scientific vocabulary, including the use of scientific nomenclature and units and mathematical representations.

Science Progression: Subject Content KS3

Working scientifically

Through the content across all three disciplines, pupils should be taught to:

Scientific attitudes

- pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility
 - understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review
- evaluate risks

Experimental skills and investigations

- ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
- make predictions using scientific knowledge and understanding
- select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables
- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
- make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
- apply sampling techniques

Analysis and evaluation

- apply mathematical concepts and calculate results
- present observations and data using appropriate methods, including tables and graphs
- interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
- present reasoned explanations, including explaining data in relation to predictions and hypotheses
- evaluate data, showing awareness of potential sources of random and systematic error
- identify further questions arising from their results

Measurement

- understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature
- use and derive simple equations and carry out appropriate calculations
- undertake basic data analysis including simple statistical techniques

Biology

Plants

- Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms

Living things and their habitats/Animals including humans

- Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta
- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- The effects of recreational drugs (including substance misuse) on behaviour, health and life processes
- The structure and functions of the gas exchange system in humans, including adaptations to function
- The mechanism of breathing to move air in and out of the lungs

- The impact of exercise, asthma and smoking on the human gas exchange system

Evolution and Inheritance

- Heredity as the process by which genetic information is transmitted from one generation to the next
- A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
- 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

Chemistry

Materials

- Chemical reactions as the rearrangement of atoms
- Representing chemical reactions using formulae and using equations
- Combustion, thermal decomposition, oxidation and displacement reactions
- Defining acids and alkalis in terms of neutralisation reactions
- The pH scale for measuring acidity/alkalinity; and indicators

Rocks

- The composition of the Earth
- The structure of the Earth
- The rock cycle and the formation of igneous, sedimentary and metamorphic rocks

Physics

Light

- 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
- 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; photo-sensitive 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

Forces

- Magnetic fields by plotting with compass, representation by field lines
- Earth's magnetism, compass and navigation
- Forces as pushes or pulls, arising from the interaction between two objects
- Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces
- Moment as the turning effect of a force
- Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water
- Forces measured in Newtons, measurements of stretch or compression as force is changed

Sound

- Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition
- 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 loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
- Auditory range of humans and animals
- Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound
- Waves transferring information for conversion to electrical signals by microphone

Electricity

- 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).
- Static electricity

Earth and Space

- 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

Seasonal Changes

The seasons and the Earth's tilt, day length at different times of year, in different hemispheres