



Our Science Curriculum

Key Concepts in Science

These key concepts are the skills and knowledge essential to pupils achieving and exceeding expected standards in Science. Key concepts are subject specific and build progressively as pupils move through the school. When pupils encounter a key concept, they will revisit other topics where they learn about the same concept to enable them to make connections between different learning and build the schema they need.

Science								
Working scientifically	Animals including humans	Plants	Living things and their habitats	Materials	States of matter	Forces	Energy	Earth Science
Biology				Chemistry		Physics		

Second Order Concepts

Significance	Similarity & Difference	Cause and consequence	Continuity and Change	Responsibility	Communication (Oracy & written)	Enquiry
Significant scientists, discoveries, laws, models and theories	Making comparisons, finding patterns, noting differences, drawing conclusions	Models and laws, reactions between materials, observing processes	Observing what changes and what stays the same	Working safely, climate change and sustainability, how science solves problems	Using scientific terms, evaluating, drawing conclusions, explaining patterns and processes, presenting and interpreting data	Working scientifically, observing, classifying, patterns, fair testing, using evidence

Progression of Knowledge and skills in Science

EYFS- ELG	<u>Understanding the World- The Natural World</u> Explore the natural world around them, making observations and drawing pictures of animals and plants; Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.
Biology Living things and their environments Animals including humans Plants	To understand the difference between plants and animals through observation (similarity and difference) To understand the need to respect and care for the natural environment and all living things (responsibility) To talk about lifecycles (continuity and change) To use my senses in hands on explanations (similarity and difference) To name my 5 senses (similarity and difference) To explain what my 5 senses are (similarity and difference) To plant seeds and care for growing plant with support (responsibility) To say what a plant needs to survive (cause and consequence) To talk about lifecycles (continuity and change)
Chemistry Materials	To explore collections of materials and talk about similarities and differences To talk about the differences between materials and talk about the changes I see (cause and consequence)
Physics Forces Earth Science	To explore how things work e.g. toys To explore pushes and pulls To talk about forces and concepts such as floating and sinking, magnetism and light. To name and identify some different types of weather

Area of Study	EYFS	KS1	LKS2	UKS2
Animals Including humans (Incl. Y6 Evolution and Inheritance) Biology	<u>Nursery:</u> Observe animals closely through a variety of means e.g. magnifiers & photographs Understand the key features of the life cycle of an animal <u>Reception:</u> Describe what they see, hear, smell & feel (senses) Name and describe some animals Identify familiar animals Observational drawings of animals Be able to show care and concern for living things Talk about things they have seen outside including animals Encourage children to observe how animals behave differently as the seasons change	<u>Y1:</u> 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 <i>(Y2 – Living things and their habitats:</i> <i>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and</i>	<u>Y3:</u> Identify that humans and some other animals have skeletons and muscles for support, protection and movement Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat <u>(Y3 Rocks):</u> <i>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</i>	<u>Y5:</u> Describe the changes as humans develop to old age <i>Y5 (Living things and their habitats):</i> <i>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</i> <u>Y6:</u> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Describe the ways in which nutrients and water are transported within animals, including humans <u>Y6: (Evolution and inheritance)</u> Recognise that living things produce offspring of the same kind, but normally offspring vary
			<u>Y4:</u>	

		<i>name different sources of food)</i> <u>Y2:</u> Notice that animals, including humans, have offspring which grow into adults Find out about 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	Construct and interpret a variety of food chains, identifying producers, predators and prey 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	and are not identical to their parents
				<u>Y6:</u> 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)
				<u>Y6 (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 Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

	(weather and seasonal features)			
Living things and their habitats Biology	<u>Nursery:</u> Begin to understand the need to respect & care for the natural environment & all living things. Talk about what they see, using a wide vocabulary Explore collections of materials with similar and/ or different properties Understand the key features of the life cycle of a butterfly <u>Reception:</u> Describe what they see, hear, smell & feel whilst outside – focused observation of the natural world Discuss how we care for the natural world around us. After close observation, draw pictures of the natural world, including animals and plants	<u>Y2:</u> 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 microhabitats 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 <i>(Y2 – Animals including Humans: notice that animals, including humans, have offspring which grow into adults)</i> <u>Y2:</u> Explore and compare the differences between things that are living, dead, and things that have never been alive.	<u>Y4:</u> Recognise that environments can change and that this can sometimes pose dangers to living things <u>(Y4: Animals including humans):</u> <i>construct and interpret a variety of food chains, identifying producers, predators and prey</i> 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	<u>Y5:</u> 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 <u>Y6:</u> Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics.

<u>Materials:</u> Chemistry Everyday materials (Y1) Uses of everyday materials (Y2) Rocks (Y3) States of matter (Y4) Properties & changes of materials (Y5)	<u>Nursery:</u> Use all their senses in hands-on exploration of natural materials Explore collections of materials with similar and/or different properties Talk about what they see, using a wide vocabulary Explore how things work e.g. pulleys, cogs, pegs & boards Explore & talk about different forces they can feel e.g. stretch, snap, rigid, magnetic repulsion, water pushing up when pushing a boat under it Talk about the differences between materials and changes they notice e.g. cooking, melting, shadows, floating & sinking Characteristics of liquids & solids e.g. cooking eggs, melting chocolate, putting salt onto ice cubes <u>Reception:</u> Observe & interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a	<u>Y1 (Everyday materials):</u> Distinguish between an object and the material from which it is made Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock describe the simple physical properties of a variety of everyday materials Compare and group together a variety of everyday materials on the basis of their simple physical properties <u>Y2 Uses of everyday materials:</u> Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.	<u>Y3 Rocks</u> 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. <u>Y4 States of matter:</u> Compare and group materials together, according to whether they are solids, liquids or gases Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature 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)	<u>Y5 Properties and changes of materials:</u> Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. 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. 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 demonstrate that dissolving, mixing and changes of state are reversible changes. Know that some materials will dissolve in liquid to form

	magnet attracting an object & a boat floating on water Model the vocabulary needed to name specific features of the natural world, both natural & man-made			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 <i>(Y6 Evolution and inheritance):</i> <i>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</i>
Forces and magnets (Y3) Forces (Y5) Physics			<u>Y3 (Forces and magnets):</u> Compare how things move on different surfaces notice that some forces need contact between 2 objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others	<u>Y5 (Forces)</u> 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.

			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 2 poles Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.	Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect
Electricity (Y4 and Y6) Physics			<u>Y4:</u> 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	<u>Y6:</u> 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

			lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors	
Light (Y3 and Y6) Physics			<u>Y3 (Light):</u> 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 an opaque object Find patterns in the way that the size of shadows change	<u>Y6 (Light):</u> 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
Sound(Y4) Physics			<u>Y4 (Sound):</u> Identify how sounds are made, associating some of them with something vibrating.	

			Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases	
Seasonal changes (Y1) Physics	Reception: Talk about the features of their own immediate environment and how environments might vary from one another Talk about changes in the seasons.	Y1: Observe changes across the 4 seasons Observe and describe weather associated with the seasons and how day length varies		
Earth and space (Y5) Physics				Y5: 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.
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Working Scientifically Skills Progression

Enquiry Types

To ensure complete coverage of the working scientifically skills and that children gain experience in all five types of scientific enquiry, there are a variety of big questions suggested for each topic. These can be adapted to suit, as long as the same enquiry coverage is achieved. In addition, there is a problem solving task linked to a famous scientist for each year group. Links to scientists are identified in yellow. Further information can be found in the **Scientists across the curriculum** document.

Comparative/Fair Testing 	Research using secondary sources 	Observation over time 	Pattern Seeking 	Identifying, grouping & classifying 	Problem solving 
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Enquiry Skills

There are 7 enquiry skills. Each of the 7 enquiry skills must be covered as part of the science content coverage. Use of the suggested big questions, should ensure full coverage of these skills. It is not expected that every skill will be covered in every enquiry. Instead, teachers should identify skill/s they wish to assess within that enquiry. These should be identified in the planning.

Asking Questions 	Making Predictions 	Setting up Tests 	Observing and Measuring 	Recording data 	Interpreting and communicating results 	Evaluating (KS2 only) 
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The progression of these skills for each key stage is outlined in the **Working Scientifically Skills Progression document**. The progression of knowledge for each content area is broken down in the **Progression of knowledge and skills document**. The progression of vocabulary for each area is broken down in the **Scientific Vocabulary Progression** document which teachers use in their planning and are detailed on the Knowledge and Skills Grid for each content area.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plan	Choose the resources they need for their chosen activities and say when they do or don't need help	Ask simple questions when prompted Suggest ways of answering a question	Ask simple questions Recognise that questions can be answered in different ways	Ask relevant questions when prompted Use different types of scientific enquiry to answer them. Set up simple and practical enquiries, comparative and fair tests with some support.	Ask relevant questions. Use different types of scientific enquiries to answer their questions Set up simple and practical enquiries, comparative and fair tests	Plan different types of scientific enquiries to answer questions. With prompting, recognise and control variables where necessary	Plan different types of scientific enquiries to answer questions Recognise and control variables where necessary
Do	Know about similarities and differences in relation to places, objects, materials and living things. Make observations of animals and plants Explore a variety of materials,	Make relevant observations using simple equipment Conduct simple tests, with support Identify and classify with guidance	Observe closely, using simple equipment Perform simple tests Identify and classify	Make systematic and careful observations, using simple equipment. Use standard units when taking measurements.	Make systematic and careful observations using a range of equipment, including thermometers and dataloggers. Take accurate measurements using standard units, where appropriate	Select, with prompting, and use appropriate equipment to take readings. Take precise measurement using standard units. Begin to understand the need for repeat	Use a range of scientific equipment to take measurements Take measurements with increasing accuracy and precision. Take repeat readings when

	tools and techniques, experimenting with colour, design, texture, form and function. Select and use technology for particular purposes.					readings.	appropriate
Record	Represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories.	Gather and record data	Record and communicate their findings in a range of ways and begin to use simple scientific language. Gather and record data to help answer questions	With modelling and guidance, gather, record, classify and present data in a variety of ways to help to answer questions. With prompting, use various ways of recording, grouping and displaying evidence and suggest how findings may be tabulated	Gather, record, classify and present data in a variety of ways to help to answer questions. Record findings using simple scientific language, drawings and labelled diagrams. Record findings using keys, bar charts, and tables.	Take and process repeat readings. Record data and results. Record data using labelled diagrams, keys, tables and charts. Use line graphs to record data.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar charts and line graphs.
Review	Talk about the features of their own immediate	Recognise findings. Use their observations	Use their observations and ideas to suggest	With prompting, suggest conclusions	Report on findings from enquiries, including oral	Report and present findings from enquiries,	Report and present findings from enquiries, including

	environment and how environments might vary from one another. Explain why some things occur and talk about changes.	and ideas to suggest answers to simple questions.	answers to simple questions.	from enquiries Suggest how findings could be reported. Suggest possible improvements or further questions to investigate.	and written explanations, of results and conclusions Report on findings from enquiries using displays or presentations. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings. Use results to draw simple conclusions, make predictions for new values, suggest.	including conclusions and, with prompting, suggest causal relationships. With support, present findings from enquiries orally and in writing. Suggest further comparative or fair tests	conclusions and causal relationships. Report and presents findings from enquiries in oral and written forms such as displays and other presentation. Report and present findings from enquiries, including explanations of, and degree of, trust in results. Identify scientific evidence that has been used to support or refute ideas or arguments. Use test results to make predictions to set up.
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Progression in the enquiry types

Knowledge and skills sequencing							
	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Comparative/Fair testing 			I can carry out simple comparative tests	I can ask relevant questions and use different types of scientific enquiry to answer them, including comparative and fair tests I can record findings and present data using simple scientific language, explanations, diagrams, pictures, keys, bar charts and tables		I can plan and carry out scientific enquiry using a range of scientific equipment and variables in order to answer questions I can use test results to make predictions to set up further comparative and fair tests	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary and carrying out comparative and fair tests I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways

Research using secondary sources 			I can find things out using secondary sources of information	I can identify scientific evidence that has been used to support or refute ideas or arguments	I describe and evaluate my own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including finding things out using a wide range of secondary sources	
Observation over time 	I can make observations and explain what I can see	I can use observations and ideas to suggest answers to questions	I can observe changes over time I can ask questions about what I notice	I make careful and systematic observations and take accurate measurements using standard units I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions I can record findings using bar charts keys, tables and labelled diagrams	I can take measurements, using a wider range of scientific equipment, with increasing accuracy and precision and taking repeat reading when appropriate I can report and present findings from enquiries including conclusions, explanations, data and diagrams including scatter graphs and line graphs.	I use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including observing changes over

						different periods of time I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways I am evaluate the degree of trust in results
Pattern seeking 		I can perform simple tests, involving observations and the gathering and recording of data	I can use different types of Scientific enquiry to gather and record data, using simple equipment I notice patterns in my observations or data	I can identify differences, similarities or changes related to simple scientific ideas and processes	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and noticing patterns	
Identifying, Grouping and Classifying 	I can sort objects into groups	I can identify and classify according to simple criteria	I can group and classify things	I can gather, record, classify and present information in a variety of different ways to help me answer questions	I can classify materials and identify why they are / are not fit for purpose	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions,

						recognising and controlling variables and grouping and classifying things
Problem-solving 				Understand how models can explain progresses that can't be fully observed eg: how light/sound travel, magnetism, the water cycle Understand how models explain how molecules behave when substances change shape.	Understand how models about space and the solar system explain processes that can't be observed.	

