



HCAT

Science Chemistry Curriculum

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

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.

Subject content

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 – years 3 and 4

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 – years 5 and 6

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.

HCAT Science Coverage Overview	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Biology	Plants	Plants	Plants		Plants	Plants
	Animals including humans	Animals including humans	Animals including humans	Animals including humans	Animals including humans	Animals including humans
		Living things and habitats	Living things and habitats	Living things and habitats		Living things and habitats
			Evolution and inheritance			Evolution and inheritance
Chemistry	Everyday materials	Uses of everyday materials		Materials: States of matter	Materials: Properties and changes.	
			Rocks			
Physics	Seasonal changes					
			Forces and magnets		Forces and magnets	
				Electricity		Electricity
					Earth and space	
				Sound		
			Lights			Light

Science - Chemistry

Year 1 Year 2 Year 3 Year 4 Year 5 Year 6

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials	Type & Uses	<p>I can identify what material an object is made from: wood, plastic, glass, metal and rock.</p> <p>I can identify a range of common materials: wood, plastic, glass, metal, water and rock.</p> <p>I know the names of different everyday materials: brick, paper, fabrics, elastic, foil etc.</p>	<p>I can give reasons why a material may or may not be suitable for a certain purpose: wood, metal, plastic, glass, brick, rock, paper and cardboard.</p> <p>I can identify that a material can be used for more than one purpose. e.g. Metal – coins, cans, cars.</p> <p>I can identify that different materials can be used for the same purpose. E.g. Spoons – metal, plastic, wood.</p>			<p>I can use scientific vocabulary to explain why materials are used for specific purposes.</p> <p>I can discuss the scientific physical properties of these materials to explain why they are suitable or unsuitable for different purposes.</p>	
	Properties	<p>I can describe materials by saying what they look like and what they feel like.</p> <p>I can identify physical properties of different materials: soft/hard, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/not waterproof, absorbent/not absorbent, opaque/transparent.</p>	<p>I can discuss the physical properties of these common materials, using my senses.</p> <p>I can describe how the physical properties of a material would make them suitable or unsuitable for a purpose.</p>		<p>I can understand the properties of different states of matter. (Solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container).</p> <p>I can describe the structure of solids, liquids and gases.</p> <p>I can create a representation of the particles in solids, liquids and gases.</p>	<p>I have developed a wide scientific vocabulary for describing the properties of materials: hardness, solubility, transparency, conductivity (electrical and thermal) and magnetic.</p> <p>I describe the properties of materials using scientific vocabulary.</p> <p>I can understand the main properties of metals: lustrous, malleability, conductivity and high melting point.</p> <p>I use these properties to distinguish between metals and non-metals.</p>	
	Comparison	<p>I can compare materials using the physical properties of them.</p> <p>I can use my knowledge of the properties of materials to sort them into groups.</p> <p>I can explain how I have grouped materials based on their physical properties.</p>	<p>I can use the physical properties of materials to discuss the similarities and differences between them.</p>		<p>I can group materials according to whether they are solids, liquids or gases.</p>	<p>I can describe the difference in properties of a range of materials: hardness, solubility, transparency, conductivity (electrical and thermal) and magnetic.</p> <p>I can compare and group materials based on their properties: hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.</p>	
	Changes		<p>I can experiment with squashing, twisting, bending and stretching materials.</p> <p>I can explain how these processes change materials.</p> <p>I can use the vocabulary I have gathered on physical properties to describe how the materials change.</p> <p>I can sort materials into groups for which will or will not change. (Squashing, twisting, bending and stretching).</p>		<p>I can record changes in state when objects are heated or cooled (water – ice, water, water vapour).</p> <p>Note – avoid using heat where chemical changes occur e.g. baking or burning</p> <p>I can measure the temperature in degrees Celsius when changes in state occur in different materials (water, chocolate, butter, cream)</p> <p>I can research about changes in state with extreme temperatures. (E.g. iron melts/oxygen condenses)</p> <p>I can identify the part played by evaporation and condensation in the water cycle.</p> <p>I can explain how the rate of evaporation changes in water based on the temperature.</p>	<p>I can understand reversible and irreversible changes.</p> <p>I can describe how materials form into a solution.</p> <p>I understand that some materials will dissolve in a liquid and form a solution.</p> <p>I can investigate a range of contexts in which changes take place.</p> <p>I can describe the difference between melting and dissolving. (Melting – only one material, dissolving – two or more materials)</p> <p>Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage.</p>	
	Separation					<p>I understand how a range of mixtures can be separated: evaporating, filtering and sieving.</p> <p>I can explain the processes of filtering, sieving and evaporating.</p> <p>I can describe how to recover a substance from a solution as a process.</p> <p>I can suggest how different mixtures may be separated. (liquids and different sized solids)</p>	

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Rocks	Types			<p>I can identify and name a range of rock types: granite, marble, chalk, limestone, slate, sandstone, pumice, basalt, shale.</p> <p>I can explain the difference between igneous, metamorphic and sedimentary rocks.</p> <p>I can describe the process of how fossils are formed.</p>			
	Properties			<p>I can identify the physical properties of rocks: permeable, durable, density (sinks or floats), hardness.</p> <p>I can identify if a rock has grains or crystals.</p> <p>I can suggest uses for types of rocks based on their physical properties.</p>			
	Compare			<p>I can compare different kinds of rocks based on their appearance and simple physical properties.</p> <p>I can group together different kinds of rocks based on their appearance and simple physical properties.</p> <p>I can investigate what changes occur to rocks: rubbing them together and submerging in water</p>			
	Soil			<p>I can describe the main components of soil: rock, humus (dead plants and animals), microorganisms, air and water.</p> <p>I can understand different types of soils and their properties: sandy soil, clay soil, chalky soil and peat.</p>			