



HCAT

Science Biology 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
			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

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants	Type	<p>I can explain what a plant is (A plant is a living organism that usually grows in a permanent site, using water for food).</p> <p>I can identify and name some common plants and trees.</p> <p>I can name some native plants to the U.K.</p>	<p>I can identify and name plants and trees found in different habitats (deciduous and evergreen).</p> <p>I can sort plants and trees into groups based upon the habitat in which they are found (deciduous and evergreen).</p> <p>I know that plants can grow in different places. (e.g. water, woods, etc).</p> <p>I can identify the features of plants and why these may be appealing to people (easy to grow, insects).</p>				
	Structure	<p>I can describe the basic structure of a plant (root, stem, leaf, flower/petals).</p>		<p>I can identify the different parts of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel).</p> <p>I can identify the function of each part of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel).</p>			
	Needs		<p>I can describe the basic conditions required for plants to survive (food, water, air, warmth and light).</p> <p>I can identify what a plant needs to grow and survive.</p> <p>I can investigate what happens to a plant if they do not have water, light or a suitable temperature.</p>	<p>I can investigate what plants require for growth and life (food, water, air, warmth and light).</p> <p>I can explain how water and light affect a plants growth.</p> <p>I can identify how different plants requirements may vary depending on their environment (cactus requires less water, seaweed has less direct sunlight & lives in salt water, carnivorous plants: Venus flytraps).</p> <p>I can investigate how water is transported within a plants circulatory system.</p>		<p>I can identify how plants have adapted in different ways to suit their environment (for water, food, sunlight, warmth, protection).</p>	
	Reproduction		<p>I can identify ways in which plants change over time.</p> <p>I can describe the life cycle of a plant (None flowering plant: seed, germination, sprout, seedling, plant).</p>	<p>I can identify the life cycle of a flowering plant (Seed, germination, sprout, seedling, plant, flowers, fruit)</p> <p>I can describe the different stages of the life cycle of a flowering plant.</p> <p>I can explain what pollination is.</p> <p>I can explain what seed formation is.</p> <p>I can explain how seeds are dispersed in a variety of ways.</p>		<p>I can describe how flowering plants reproduce sexually.</p> <p>I can describe how none flowering plants reproduce asexually.</p> <p>I can point out and describe the similarities between a human and plant cycle.</p>	<p>I can describe the main processes, which occur at the different stages of the life cycle of a flowering plant.</p>

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Animals including humans	Type	I can name common animals such as: fish, amphibians, reptiles, birds and mammals. I can identify and name different animals that are carnivorous, herbivorous or omnivorous.					
	Structure	I can name the different parts of an animal's body. I can label the key features of an animal's body (bird: wings, beak. Fish: fins, gills etc).		I can identify that some animals have skeletons and muscles. I can explain how skeletons and muscles support, protect and allow the body to move. I can name and label main bones based upon their functions (protective: spine, skull, ribs, pelvis. Other for support: femur, tarsals, etc.)			
	Needs		I can describe the basic needs required for animals to survive (food, water, air). I can identify what an animal needs to grow and survive.	I can identify the similarities and differences between the diets of different organisms. I can explain how diet can affect the health of animals. I can explain what nutrition is and where it comes from: different types of foods. I can name sources of nutrition: carbohydrates, protein, fats, dairy, fruit & veg, oils and spreads, sugar. I can describe the different ways that animals obtain their food.	I can identify producers, predators, prey, and examples of these. I can interpret food chains and gain information. I can construct different food chains and label animals with their titles (producer, primary consumer, secondary consumer, tertiary consumer).		
	Reproduction		I can consider why animals have offspring. I can match parent animals to their offspring. I can identify animals that give birth to live offspring and those that lay eggs.			I can identify and describe a life cycle for a mammal, an amphibian, an insect and a bird. I can compare the differences between the life cycles of a mammal, an amphibian, an insect and a bird. I can describe how animals reproduce.	
	Humans	I can recognise and name parts of the body: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, nose and teeth. I can name the five senses: feel, smell, see, taste and hear. I can say which part of the body is associated with each sense (feel: every part of the body, NOT hands).	To explore the importance of exercise for humans. I can explain how different exercises effect different parts of the body. I can group foods into more or less healthy. I can group foods into types and quantities to maintain a healthy lifestyle. I can explain the importance of keeping myself clean.		I understand what the digestive system does. I can describe simple functions of each part of the digestive system: mouth, teeth, tongue, oesophagus, stomach, large and small intestine, anus). I can identify the different types of teeth in the human body: incisors, canine, pre-molar and molar. I can explain the functions of different types of teeth.	I can describe the human life cycle: foetus, baby, infant, toddler, child, teenager, adult, elderly and death. I can identify ways in which the human body changes as it ages.	I can explain the functions of the heart, lungs and circulatory system. I can identify the different structures within blood: red blood cells, white blood cells, plasma and platelets. I can explain the purpose of blood in transporting nutrients within the body. I can identify ways in which diet, exercise, drugs and lifestyle can affect how the body functions. I can recognise what impact diet, exercise, drugs and lifestyle has on the human body.

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Living things and their habitats	Identify & compare		<p>I can describe the basic life processes required for plants and animals to be living (MRS NERG – movement, reproduction, sensitivity, nutrition, excretion, respiration, growth).</p> <p>I can identify living things by judging against the seven life processes (MRS NERG).</p> <p>I can describe differences between living and non-living things.</p> <p>I can identify differences between living things, dead things and things that have never been alive.</p>		<p>I use my knowledge of basic life processes (MRS NERG) to describe the differences between plants and animals (for example: animals clearly move/excrete – plants are less obvious).</p>	<p>I can identify the differences in life cycles between different classification groups.</p>	
	Habitats		<p>I can identify and name plants and animals found in different habitats (different climates and geographical locations: seashore, woodland, in the ocean, in the rainforest).</p> <p>I know what a microhabitat is (under stones, logs, leaves, a bush).</p> <p>I can identify the habitat where an animal lives.</p> <p>I can explain how a habitat is suitable for the animals and plants that live there.</p> <p>I can describe how the conditions in a habitat affect the number of living things found there.</p>		<p>I can suggest ways in which an animal is suited to its environment.</p> <p>I explain why different organisms are found in different habitats because of differences in environmental factors.</p> <p>I can identify ways in which an environment can change or be altered.</p> <p>I can identify why changes to an environment could be dangerous for the living things found there.</p>		
	Adaptations		<p>I can explain how living things are suited to their habitat.</p>		<p>I can describe how animals and plants in two different environments have adapted.</p>		<p>I can explain how adapting to an environment over a period may lead to evolution.</p>
	Classification		<p>I can sort living things into groups and say why I have put them in a group (living, none living (dead), never lived).</p>		<p>I can use a classification key to group living things.</p>		<p>I understand the importance of the Linnaean system for classifying animals.</p> <p>I can describe how living things are classified into different groups: kingdom, phylum, class, order, family, genus and species.</p> <p>I can explain why living things are classified into groups according to observable characteristics and how they may be similar or different.</p>

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Evolution and inheritance	Fossils			I understand that a fossil was once a living thing.			<p>I can recognise that fossils are formed from living things that have died.</p> <p>I can explain how fossils can provide information (type of animal, body structure) about living things from the past.</p> <p>I understand that the depth at which fossil was discovered determines the age of it.</p>
	Evolution						I can explain how adaptations which occurred over time may lead to evolution.
	Offspring						<p>I can recognise that living things produce offspring that inherit some traits from their parents.</p> <p>I can explain why offspring are not identical to their parents.</p> <p>I can explain why offspring will be of the same kind but normally vary.</p> <p>I can interpret the phrase 'survival of the fittest' in my own words making links to my understanding of evolution.</p>