



**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.



**Science - Biology**

		<b>KS1</b>	<b>LKS2</b>	<b>UPKS2</b>
<b>Plants</b>	<b>Type</b>	<p>I know what a plant is (A plant is a living organism that usually grows in a permanent site, using water for food).</p> <p>I know how to identify and name some common plants and trees.</p> <p>I know the name of some native plants to the U.K.</p> <p>I know the name of plants and trees found in different habitats (deciduous and evergreen).</p> <p>I know how to 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 know how to identify the features of plants and why these may be appealing to people (easy to grow, insects).</p>		
	<b>Structure</b>	<p>I know the basic structure of a plant (root, stem, leaf, flower/petals).</p>	<p>I know the different parts of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel).</p> <p>I know the function of each part of a flowering plant (sepal, petal, stamen, filament, anther, pistil, stigma, and carpel).</p>	
	<b>Needs</b>	<p>I know how to describe the basic conditions required for plants to survive (food, water, air, warmth and light).</p> <p>I know how to investigate what happens to a plant if they do not have water, light or a suitable temperature.</p>	<p>I know how to investigate what plants require for growth and life (food, water, air, warmth and light) and this varies from plant to plant.</p> <p>I know how the different requirements of plants may vary depending on their environment (cactus requires less water, seaweed has less direct sunlight &amp; lives in salt water, carnivorous plants: Venus flytraps).</p> <p>I know how to investigate how water is transported within a plants circulatory system.</p>	<p>I know how plants have adapted in different ways to suit their environment (for water, food, sunlight, warmth, protection).</p>
	<b>Reproduction</b>	<p>I know how to describe the life cycle of a plant (None flowering plant: seed, germination, sprout, seedling, plant).</p> <p>I know the ways in which plants change over time.</p>	<p>I know how to describe the different stages of the life cycle of a flowering plant.(Recap of Y2)</p> <p>I know what pollination is.</p> <p>I know what seed formation is.</p> <p>I know how seeds are dispersed in a variety of ways.</p>	<p>I know how flowering plants reproduce sexually.</p> <p>I know how none flowering plants reproduce asexually.</p> <p>I know how to point out and describe the similarities between a human and plant cycle.</p> <p>I know how to describe the main processes, which occur at the different stages of the life cycle of a flowering plant.</p>

**Science - Biology**

		KS1	LKS2	KS2
<b>Animals including humans</b>	Type	<p>I know common animals such as: fish, amphibians, reptiles, birds and mammals.</p> <p>I know different animals that are carnivorous, herbivorous or omnivorous.</p>		
	Structure	<p>I know different parts of an animal's body.</p> <p>I know the key features of an animal's body (bird: wings, beak. Fish: fins, gills etc).</p>	<p>I know some animals have skeletons and muscles.</p> <p>I know how skeletons and muscles support, protect and allow the body to move.</p> <p>I know how to name and label main bones based upon their functions (protective: spine, skull, ribs, pelvis. Other for support: femur, tarsals, etc.)</p>	
	Needs	<p>I know the basic needs required for animals to survive (food, water, air).</p> <p>I know what an animal needs to grow and survive.</p>	<p>I know the similarities and differences between the diets of different organisms.</p> <p>I know how diet can affect the health of animals.</p> <p>I know what nutrition is and where it comes from: different types of foods.</p> <p>I know sources of nutrition: carbohydrates, protein, fats, dairy, fruit &amp; veg, oils and spreads, sugar.</p> <p>I know the different ways that animals obtain their food.</p> <p>I know producers, predators, prey, and examples of these.</p> <p>I know how to interpret food chains and gain information.</p> <p>I know how to construct different food chains and label animals with their titles (producer, primary consumer, secondary consumer, tertiary consumer).</p>	
	Reproduction	<p>I know why animals have offspring.</p> <p>I know how to match parent animals to their offspring.</p> <p>I know how to identify animals that give birth to live offspring and those that lay eggs.</p>		<p>I know how to identify and describe a life cycle for a mammal, an amphibian, an insect and a bird.</p> <p>I know how to compare the differences between the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>I know how animals reproduce.</p>
	Humans	<p>I know parts of the body: head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, nose and teeth.</p> <p>I know the five senses: feel, smell, see, taste and hear.</p> <p>I know which part of the body is associated with each sense (feel: every part of the body, NOT hands).</p> <p>I know the importance of exercise for humans.</p> <p>I know how different exercises effect different parts of the body.</p> <p>I know how to group foods into more or less healthy.</p> <p>I know how to group foods into types and quantities to maintain a healthy lifestyle.</p> <p>I know the importance of keeping myself clean.</p>	<p>I know what the digestive system does.</p> <p>I know simple functions of each part of the digestive system: mouth, teeth, tongue, oesophagus, stomach, large and small intestine, anus).</p> <p>I know the different types of teeth in the human body: incisors, canine, pre-molar and molar.</p> <p>I know the functions of different types of teeth.</p>	<p>I know the human life cycle: foetus, baby, infant, toddler, child, teenager, adult, elderly and death.</p> <p>I know ways in which the human body changes as it ages.</p> <p>I know the functions of the heart, lungs and circulatory system.</p> <p>I know the different structures within blood: red blood cells, white blood cells, plasma and platelets.</p> <p>I know the purpose of blood in transporting nutrients within the body.</p> <p>I know the ways in which diet, exercise, drugs and lifestyle can affect how the body functions.</p> <p>I know the impact diet, exercise, drugs and lifestyle has on the human body.</p>

**Science - Biology**

		<b>KS1</b>	<b>Living things and their habitats</b>	<b>LKS2</b>	<b>KS2</b>
<b>Habitats</b>	Identify & compare	<p>I know basic life processes required for plants and animals to be living (MRS NERG – movement, reproduction, sensitivity, nutrition, excretion, respiration, growth).</p> <p>I know how to identify living things by judging against the seven life processes (MRS NERG).</p> <p>I know the differences between living and non-living things.</p> <p>I know the differences between living things, dead things and things that have never been alive.</p>	Identify & compare	<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 know the differences in life cycles between different classification groups.</p>
	Classification	<p>I know how to sort living things into groups and say why I have put them in a group (living, none living (dead), never lived).</p>	Habitats	<p>I know how to suggest ways in which an animal is suited to its environment.</p> <p>I know why different organisms are found in different habitats because of differences in environmental factors.</p> <p>I know how to identify ways in which an environment can change or be altered.</p> <p>I know how to identify why changes to an environment could be dangerous for the living things found there.</p>	<p>I know the importance of the Linnaean system for classifying animals.</p> <p>I know how living things are classified into different groups</p> <p>I know living things are classified into groups according to observable characteristics and how they may be similar or different.</p>
	Habitats	<p>I know the names of 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 know how a habitat is suitable for the animals and plants that live there.</p> <p>I know how to describe how the conditions in a habitat affect the number of living things found there.</p>	Adaptations	<p>I know how animals and plants in two different environments have adapted.</p>	
<b>Living things</b>	Adaptations	<p>I know how living things are suited to their habitat.</p>	Classification	<p>I know how to use a classification key to group living things.</p>	<p>I know how adapting to an environment over a period may lead to evolution.</p>

## Science - Biology

		KS1	LKS2	UPKS2
		Evolution and inheritance	Fossils	
Evolution				I know how adaptations which occurred over time may lead to evolution.
Offspring				I know that living things produce offspring that inherit some traits from their parents.  I know why offspring are not identical to their parents.  I know how to interpret the phrase 'survival of the fittest' in my own words making links to my understanding of evolution.



## Science - Biology

Science Curriculum in EYFS			
<p><b>Understanding the world (educational programme) The natural world :</b> Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children’s personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries, and museums to meeting important members of society such as police officers, nurses, and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes, and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children’s vocabulary will support later reading comprehension.</p>			
Skills and knowledge (Fluid across FS1 FS2)	What does this look like in provision/adult interactions?	Transition into Year 1	Characteristics of effective learning
<ul style="list-style-type: none"> <li>- Explore materials with different properties.</li> <li>- Explore natural materials, indoors and outside (0-3).</li> </ul>	<ul style="list-style-type: none"> <li>- Treasure Baskets for repeated exploration of textures, sounds, smells, and tastes.</li> <li>- Offer lots of different textures for exploration with fingers, feet, and whole body e.g. wet and dry sand, water, paint, and playdough.</li> </ul>	<p><b>Biology</b></p> <ul style="list-style-type: none"> <li>- I can explain what a plant is (A plant is a living organism that usually grows in a permanent site, using water for food).</li> <li>- I can identify and name some common plants and trees.</li> <li>- I can name some native plants to the UK.</li> <li>- I can describe the basic structures of a plant.</li> <li>- I can name some common animals.</li> <li>- I can identify and name different animals that are carnivorous, herbivorous, or omnivorous.</li> <li>- I can name the different parts of an animal’s body.</li> <li>- I can recognise and name parts of the body.</li> <li>- I can name the five senses.</li> <li>- I can say which part of the body is associated with each sense.</li> </ul> <p><b>Chemistry</b></p> <ul style="list-style-type: none"> <li>- I can identify what material an object is made from.</li> <li>- I can identify a range of common materials.</li> <li>- I know the names of different everyday materials.</li> <li>- I can describe materials by saying what they look like and what they feel like.</li> <li>- I can compare materials using the physical properties of them.</li> <li>- I can use my knowledge of the properties of materials to sort them into groups.</li> <li>- I can explain how I have grouped materials based on their physical properties.</li> </ul>	<p>Children in EYFS learn at different rates and abilities through:</p> <ul style="list-style-type: none"> <li>• <b>Playing and exploring</b> – children investigate and experience things, and ‘have a go’.</li> <li>• <b>Active learning</b> – children concentrate and keep on trying if they encounter difficulties and enjoy achievements.</li> <li>• <b>Creating and thinking critically</b> – children have and develop their own ideas, make links between ideas, and develop strategies for doing things.</li> </ul>
<ul style="list-style-type: none"> <li>- Use all their senses in hands on exploration of natural materials.</li> <li>- Explore collections of materials with similar and/or different properties.</li> <li>- Explore how things work (3-4).</li> </ul>	<ul style="list-style-type: none"> <li>- Provide interesting natural environments for children to explore freely outdoors. Make collections of natural materials to investigate and talk about.</li> <li>- Provide equipment to support these investigations: magnifying glasses. Encourage children to talk about what they see. Model observational and investigational skills. Ask out loud: “I wonder if...?” Plan and introduce new vocabulary, encouraging children to use it to discuss their findings and ideas.</li> <li>- Provide mechanical equipment for children to play with and investigate e.g., wind-up toys, pulleys, sets of cogs with pegs and boards.</li> </ul>		
<ul style="list-style-type: none"> <li>- Plant seeds and care for growing plants.</li> <li>- Understand the key features of the life cycle of a plant and an animal.</li> <li>- Begin to understand the need to respect and care for the natural environment and all living things (3-4).</li> </ul>	<ul style="list-style-type: none"> <li>- Show and explain the concepts of growth, change and decay with natural materials: plant seeds and bulbs so children observe growth and decay over time, eggshell experiment on science week (seeing how different liquids effect eggshells).</li> <li>- Life cycle of a chick, have incubators in linked around learning and topic. Plan and introduce new vocabulary related to the exploration. Other options to investigate life cycle e.g. butterfly.</li> </ul>		
<ul style="list-style-type: none"> <li>- Talk about the differences between materials and changes they notice (3-4).</li> <li>- Explore and talk about different forces they can feel (3-4).</li> </ul>	<ul style="list-style-type: none"> <li>- Draw children’s attention to forces e.g., how the water pushes up when they try to push a plastic boat under it, how they can stretch elastic, snap a twig, but cannot bend a metal rod.</li> <li>- Provide children with opportunities to change materials from one state to another e.g. cooking – combining different ingredients, and then cooling or heating (cooking) them melting – leave ice cubes out in the sun, see what happens when you shake salt onto them. Link to science week.</li> </ul>		
<ul style="list-style-type: none"> <li>- Explore the natural world around them.</li> <li>- Describe what they see, hear, and feel whilst outside.</li> <li>- Understand the effect of changing seasons on the natural world around them (4-5).</li> </ul>	<ul style="list-style-type: none"> <li>- Provide children with have frequent opportunities for outdoor play and exploration.</li> <li>- Create opportunities to discuss how we care for the natural world around us.</li> <li>- Offer opportunities to sing songs and join in with rhymes and poems about the natural world. After close observation, draw pictures of the natural world, including animals and plants.</li> <li>- Look for children incorporating their understanding of the seasons and weather in their play.</li> </ul>		
<p><b>Early Learning Goals</b></p> <ul style="list-style-type: none"> <li>• Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>• Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</li> </ul>			