



**HCAT**

**Science Physics 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.

<b>HCAT Science Coverage Overview</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>
<b>Biology</b>	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
<b>Chemistry</b>	Everyday materials	Uses of everyday materials		Materials: States of matter	Materials: Properties and changes.	
			Rocks			
<b>Physics</b>	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
<b>Forces and Magnets</b>	Type			<p>I can explain what a force is (pushes and pulls in a particular direction).</p> <p>I can identify how forces make objects move (push &amp; pull).</p> <p>I can identify forces that require direct contact between two objects (push &amp; pull).</p> <p>I can identify forces that do not require direct contact between two objects (magnetism).</p>		<p>I can name forces that make things begin to move, get faster or slow down: gravity, air resistance, water resistance &amp; friction.</p> <p>I can identify examples where these forces are acting on an object (gravity, air resistance, water resistance &amp; friction).</p> <p>I can identify examples of balanced and unbalanced forces.</p> <p>I can understand the function of levers, pulleys and gears.</p>	
	Effect			<p>I can compare how different objects move on the same surface.</p> <p>I can compare how the same objects move on different surfaces.</p>		<p>I can explain how balanced and unbalanced forces may affect the movement of an object.</p> <p>I can explore how different forces effect moving objects (gravity, air resistance, water resistance &amp; friction).</p> <p>I can explain the effects of these forces.</p> <p>I can explain how levers, pulleys and gears allow a smaller force to have a greater effect.</p>	
	Magnets			<p>I know that magnets have two poles.</p> <p>I understand through investigation that two magnets can attract or repel each other.</p> <p>I can explore the behaviour of different strengths and types of magnets such as bar, ring, button &amp; horseshoe.</p> <p>I can investigate and find out which materials are magnetic (metallic and none metallic).</p> <p>I can investigate whether all metals are magnetic (different metals, which are/aren't magnetic).</p> <p>I can identify how the properties of magnets make them useful in everyday items (strengths/types of magnets – magnets in a fridge door).</p>			

Science – Physics

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

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light	Function			<p>I can explain that light is need to be able to see.</p> <p>I can explain that darkness is the total absence of light.</p> <p>I can identify different light sources: fire, bulb, sun.</p>			<p>I can explore how different light sources and conditions affect our ability to see (testing quality of light sources, altering darkness and using different materials).</p>
	Seeing			<p>I understand that light from the sun can be dangerous.</p> <p>I can identify ways to protect eyes from the sun.</p> <p>I understand that reflection is a process where light hits a surface and bounces back into our eyes (all objects reflect light In order for us to see them, but reflective objects reflect light well, i.e. a mirror).</p>			<p>I can explain that objects are seen because they give out or reflect light into the eye.</p> <p>I can explain how different colours can be seen.</p>
	Travelling			<p>I understand that light travels in rays.</p> <p>I can investigate how light behaves (using a mirror to show light reflecting).</p> <p>I can recognise that shadows are formed when light is blocked from an opaque object.</p> <p>I can explore patterns in the way that shadows change (i.e. distance of light source, type of material: opaque, translucent, and transparent).</p>			<p>I understand that light travels in straight lines.</p> <p>I can investigate the angles of incidence and reflection.</p> <p>I can investigate how refraction changes the direction in which light travels.</p> <p>I can investigate how a prism changes a ray of light.</p> <p>I can explain why shadows have the same shape as the object that casts them.</p>

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Electricity	Uses				<p>I understand what electricity is (a form of energy resulting from the existence of electrical current).</p> <p>I understand that some items require electricity to work and function.</p> <p>I can group items, which use an alternating current (mains electricity) or direct current (a battery/cell).</p> <p>I can identify common conductors and insulators.</p> <p>I understand the uses of different conductors and insulators.</p>		
	Making circuits				<p>I can identify each component of an electrical circuit (cells, wires, bulbs, buzzers &amp; switches).</p> <p>I can construct a simple series circuit.</p> <p>I can draw a pictorial representation of a circuit (NOT using symbols – these to be taught in Y6).</p> <p>I can explain how a switch works and why they are needed (to open and close a circuit and stop the electrical current).</p>		<p>I can explain what voltage means (voltage is a force that makes electricity move through a wire).</p> <p>I can explain what current means (current is the flow of electric charge, a current flows through a circuit when a voltage is present).</p> <p>I can recognise the symbols that represent the parts of a circuit (bulb, buzzer, motor, cell, wire, lamp, open switch, closed switch).</p> <p>I can use symbols when drawing a diagram of a circuit.</p> <p><b>Note: children are expected to learn only about series circuits, not parallel circuits.</b></p>
	Investigating circuits				<p>I can investigate the way that bulbs work in different circuits (exploring the brightness of bulbs).</p> <p>I can identify whether a bulb will light or not based on the circuit.</p> <p>I can give reasons why a bulb does not light up in an electrical circuit.</p>		<p>I understand that the brightness of a bulb or volume of a buzzer is related to the voltage of cells used in that circuit.</p> <p>I can compare and explain variations in how components function (brightness of bulbs, loudness of buzzer, on/off switches).</p>

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Seasonal changes	Four seasons	I can identify each of the four seasons. I can make observations about each season. I can identify the changes that happen in each of the four seasons. I can identify the differences between the four seasons. I can identify how the length of the day varies during different seasons.					
	Weather	I can identify different types of weather (relating to the UK). I can make observations about the weather in each season. I can describe the weather in each season. I can compare the weather in different seasons.					
Note: Seasonal changes should be taught at intervals throughout the year to enable children to make the relevant observations in environment.							

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Sound</b>	Function				<p>I understand that sounds are made through vibrations.</p> <p>I can identify different sources of sound.</p>		
	Hearing				<p>I can recognise that sounds travel from a source to an ear.</p> <p>I can investigate ways that different mediums absorb sound.</p> <p>I can investigate patterns between the pitch of a sound and features of the object that produced it (different types of instruments, water in bottles, ruler flicked on table).</p> <p>I can investigate patterns between the volume of a sound and the strength of the vibrations that produced it.</p>		
	Travelling				<p>I understand that sound travels in waves.</p> <p>I understand that the amplitude of waves effects the volume (taller the waves, louder the sound).</p> <p>I understand that the speed of vibrations effect the pitch (closer the waves, higher the pitch).</p> <p>I can explain how sound can travel through solids, liquids and gasses but not a vacuum (sound energy travels from particle to particle).</p>		

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Earth and Space</b>	Solar System					<p>I can name the eight planets that make up our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus &amp; Neptune – in 2006, Pluto was reclassified as a Dwarf planet).</p> <p>I can order and name the Sun and planets in our solar system.</p> <p>I can explain some of the key features of planets in our solar system (temperature, size, diameter, orbital period)</p> <p>I can investigate the difference between the geocentric model and the heliocentric model of the solar system.</p>	
	Sun, Earth & Moon					<p>I understand the difference between a star, planet and celestial body.</p> <p>I can explain that the Sun, Earth and Moon are spherical.</p> <p>I can use scientific evidence to support the argument that the Sun, Earth &amp; Moon are all spherical.</p> <p>I can describe the movement of the Moon relative to the earth (investigate the phases of the moon).</p>	
	Day & Night					<p>I can explain how day and night relate to the rotation of the Earth.</p> <p>I can explain how the rotation of the Earth affects the length of a year.</p> <p>I can investigate night and day in different parts of the Earth (investigate longitude and latitude – day and night at different times and durations).</p>	