



Science

“Science is magic that works.” Kurt Vonnegut

At Caton Primary School, our children are **SCIENTISTS!** It is our mission to give every child a broad and balanced Science curriculum which enables them to confidently explore and discover what is around them, so that they have a deeper understanding of the world we live in. We want our children to love science. We want them to have no limits to what their ambitions are and grow up wanting to be astronauts, forensic scientists, botanists or microbiologists. At Caton, we believe firmly in giving children problems to solve rather than giving them the answers and in fostering curiosity in all our pupils. It is through investigating their burning questions that they understand the world around them.

Purpose and aims of science (NC programmes 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.

The national curriculum for physical education 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

INTENT (knowledge and skills to be taught)

	EYFS		
	KNOWLEDGE		
	Understanding the World	Communication and Language	Personal, Social and Emotional development
Early Learning Goals	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● Make comments about what they have heard and ask questions to clarify their understanding 	<ul style="list-style-type: none"> ● Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.
How they apply in science	<ul style="list-style-type: none"> ● Explore the natural world around them. ● Describe what they see, hear and feel while they are outside. ● Recognise some environments that are different to the one in which they live. ● Understand the effect of changing seasons on the natural world around them. 	<ul style="list-style-type: none"> ● Learn new vocabulary. ● Ask questions to find out more and to check what has been said to them. ● Articulate their ideas and thoughts in well-formed sentences. ● Describe events in some detail. ● Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen. ● Use new vocabulary in different contexts. 	<ul style="list-style-type: none"> • Know and talk about the different factors that support their overall health and wellbeing, including: <ul style="list-style-type: none"> - regular physical activity - healthy eating - toothbrushing - sensible amounts of 'screen time' - having a good sleep routine - being a safe pedestrian

Reception / KS1

KNOWLEDGE (Year 1 and Year 2)

	Autumn	Spring	Summer
Cycle A	<p>Animals (including humans) Children will:</p> <ul style="list-style-type: none"> 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. identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. <p>Seasonal Changes</p> <ul style="list-style-type: none"> observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies. 	<p>Plants</p> <ul style="list-style-type: none"> identify and name a variety of wild and garden plants, including deciduous and evergreen trees. identify and describe the basic structure of a variety of common flowering plants, including trees. <p>Seasonal Changes</p> <ul style="list-style-type: none"> observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies. 	<p>Materials</p> <ul style="list-style-type: none"> 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. identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. <p>Seasonal Changes</p> <ul style="list-style-type: none"> observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies.
Cycle B	<p>Animals (including humans)</p>	<p>Plants</p> <ul style="list-style-type: none"> observe and describe how seeds 	<p>Living things and their habitats</p> <ul style="list-style-type: none"> explore and compare the

	<ul style="list-style-type: none"> • 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) <p>Seasonal Changes</p> <ul style="list-style-type: none"> • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies. 	<p>and bulbs grow into mature plants</p> <ul style="list-style-type: none"> • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <p>Seasonal Changes</p> <ul style="list-style-type: none"> • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies. 	<p>differences between things that are living, dead, and things that have never been alive</p> <ul style="list-style-type: none"> • 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. <p>Seasonal Changes</p> <ul style="list-style-type: none"> • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies
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Year 1

Observing closely	Performing Tests	Identifying and Classifying	Recording findings
<p>Can they talk about what they see, touch, smell, hear or taste?</p> <p>Can they use simple equipment to help them make observations?</p>	<p>Can they perform a simple test?</p> <p>Can they tell other people about what they have done?</p>	<p>Can they identify and classify things they observe?</p> <p>Can they think of some questions to ask?</p> <p>Can they answer some scientific questions?</p>	<p>Can they show their work using pictures, labels and captions?</p> <p>Can they record their finding using standard units?</p> <p>Can they put some information in a chart or table</p>

		Can they give a simple reason for their answers? Can they explain what they have found out?	
Year 1 - Challenging			
Can they find out by watching, listening, tasting, smelling and touching?	Can they give a simple reason for their answers?	Can they talk about similarities and differences? Can they explain what they have found out using scientific vocabulary?	Can they use ICT to show their working? Can they make accurate measurements?

Year 2			
Observing closely	Performing Tests	Identifying and Classifying	Recording findings
Can they use <see, touch, smell, hear or taste> to help them answer questions? Can they use some science words to describe what they have seen and measured? Can they compare several things?	Can they carry out a simple fair test? Can they explain why it might not be fair to compare two things? Can they say whether things happened as they expected? Can they suggest how to find things out? Can they use prompts to find things out?	Can they organise things into groups? Can they find simple patterns (or associations)? Can they identify animals and plants by a specific criteria, eg, lay eggs or not; have feathers or not?	Can they use (text, diagrams, pictures, charts, tables)to record their observations? Can they measure using <simple equipment>?
Year 2 (Challenging)			
Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?	Can they say whether things happened as they expected and if not why not?	Can they suggest more than one way of groupings animals and plants and explain their reasons?	Can they use information from books and online information to find things out?

LKS2 (Year 3 and Year 4)

KNOWLEDGE

	Autumn	Spring	Summer
Cycle A	<p>Rocks</p> <ul style="list-style-type: none"> 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. <p>Forces and magnets</p> <ul style="list-style-type: none"> compare how things move on different surfaces notice that some forces need contact between two objects, but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others 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 two poles predict whether two magnets will attract or repel each other, depending on which poles are facing. 	<p>Animals including humans</p> <ul style="list-style-type: none"> 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 construct and interpret a variety of food chains, identifying producers, predators and prey. 	<p>Electricity</p> <ul style="list-style-type: none"> 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 lights in a simple series circuit recognise some common conductors and insulators, and associate metals with being good conductors.

<p>Cycle B</p>	<p>Animals including humans</p> <ul style="list-style-type: none"> ● 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 ● identify that humans and some other animals have skeletons and muscles for support, protection and movement. <p>Light</p> <ul style="list-style-type: none"> ● 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. 	<p>Sound</p> <ul style="list-style-type: none"> ● 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. <p>Living things and their habitats</p> <ul style="list-style-type: none"> ● 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 ● recognise that environments can change and that this can sometimes pose dangers to living things. 	<p>Plants</p> <ul style="list-style-type: none"> ● identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers ● explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant ● investigate the way in which water is transported within plants ● explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <p>States of matter; the water cycle</p> <ul style="list-style-type: none"> ● compare and group materials together, according to whether they are solids, liquids or gasses ● 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) ● identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
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SKILLS			
	<p>Planning</p>	<p>Obtaining and presenting evidence</p>	<p>Considering evidence and evaluating</p>

Year 3	<p>Can they use different ideas and suggest how to find something out?</p> <p>Can they make and record a prediction before testing?</p> <p>Can they plan a fair test and explain why it was fair?</p> <p>Can they set up a simple fair test to make comparisons?</p> <p>Can they explain why they need to collect information to answer a question?</p>	<p>Can they measure using different equipment and units of measure?</p> <p>Can they record their observations in different ways? (labelled diagrams, charts etc)</p> <p>Can they describe what they have found using scientific language?</p> <p>Can they make accurate measurements using standard units?</p>	<p>Can they explain what they have found out and use their measurements to say whether it helps to answer their question?</p> <p>Can they use a range of equipment (including a data-logger) in a simple test?</p>
Year 4	<p>Can they set up a simple fair test to make comparisons?</p> <p>Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated?</p> <p>Can they suggest improvements and predictions?</p> <p>Can they decide which information needs to be collected and decide which is the best way for collecting it?</p> <p>Can they use their findings to draw a simple conclusion?</p>	<p>Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?</p> <p>Can they make accurate measurements using standard units?</p> <p>Can they explain their findings in different ways (display, presentation, writing)?</p>	<p>Can they find any patterns in their evidence or measurements?</p> <p>Can they make a prediction based on something they have found out?</p> <p>Can they evaluate what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?</p> <p>Can they use straightforward scientific evidence to answer questions or to support their findings?</p> <p>Can they identify differences, similarities or changes related to simple scientific ideas or processes?</p>
Year 4 Challenging	<p>Can they plan and carry out an investigation by controlling variables fairly and accurately?</p> <p>Can they use test results to make further predictions and set up further comparative tests?</p>	<p>Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?</p>	<p>Can they report findings from investigations through written explanations and conclusions?</p> <p>Can they use a graph or diagram to answer scientific questions?</p>

UKS2 (Year 5 and Year 6)

KNOWLEDGE

	Autumn	Spring	Summer
Cycle A	<p>Properties and changes of materials</p> <ul style="list-style-type: none"> 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 know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution use knowledge of solids, liquids and gasses to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes 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 	<p>Evolution and Inheritance</p> <ul style="list-style-type: none"> recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. 	<p>Living things and their habitats</p> <ul style="list-style-type: none"> 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. <p>Earth and Space</p> <ul style="list-style-type: none"> 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. Include the work of NASA linked to USA topic
Cycle B	<p>Electricity</p> <ul style="list-style-type: none"> associate the brightness of a lamp or 	<p>Animals including humans</p> <ul style="list-style-type: none"> describe the changes as humans 	<p>Living things and their habitats</p> <ul style="list-style-type: none"> describe how living things are

	<p>the volume of a buzzer with the number and voltage of cells used in the circuit</p> <ul style="list-style-type: none"> 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. <p>Light</p> <ul style="list-style-type: none"> 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. 	<p>develop to old age.</p> <p>Forces</p> <ul style="list-style-type: none"> 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; recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. 	<p>classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</p> <ul style="list-style-type: none"> give reasons for classifying plants and animals based on specific characteristics.
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Year 5		
Planning	Obtaining and presenting evidence	Considering evidence and evaluating
<p>Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary?</p> <p>Can they make a prediction with reasons?</p> <p>Can they use test results to make predictions to set up comparative and fair tests?</p>	<p>Can they take measurements using a range of scientific equipment with increasing accuracy and precision?</p> <p>Can they take repeat readings when appropriate?</p> <p>Can they record more complex data and results using scientific diagrams, labels,</p>	<p>Can they report and present findings from enquiries through written explanations and conclusions?</p> <p>Can they use a graph to answer scientific questions?</p>

Can they present a report of their findings through writing, display and presentation?	classification keys, tables, scatter graphs, bar and line graphs?	
Year 5 (Challenging)		
Can they explore different ways to test an idea, choose the best way and give reasons? Can they vary one factor whilst keeping the others the same in an experiment? Can they use information to help make a prediction? Can they explain, in simple terms, a scientific idea and what evidence supports it?	Can they decide which units of measurement they need to use? Can they explain why a measurement needs to be repeated?	Can they find a pattern from their data and explain what it shows? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this?

Year 6		
Planning	Obtaining and presenting evidence	Considering evidence and evaluating
Can they explore different ways to test an idea, choose the best way, and give reasons? Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? Can they plan and carry out an investigation by controlling variables fairly and accurately? Can they make a prediction with reasons? Can they use information to help make a prediction? Can they use test results to make further predictions and set up further comparative tests? Can they explain, in simple terms, a scientific idea and what evidence supports it? Can they present a report of their findings through writing, display and presentation?	Can they explain why they have chosen specific equipment? (incl ICT based equipment) Can they decide which units of measurement they need to use? Can they explain why a measurement needs to be repeated? Can they record their measurements in different ways? (incl bar charts, tables and line graphs) Can they take measurements using a range of scientific equipment with increasing accuracy and precision?	Can they find a pattern from their data and explain what it shows? Can they use a graph to answer scientific questions? Can they link what they have found out to other science? Can they suggest how to improve their work and say why they think this? Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models? Can they report findings from investigations through written explanations and conclusions? Can they identify scientific evidence that has been used to support to refute ideas or arguments? Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and

		written forms such as displays and other presentations?
Year 6 (Challenging)		
<p>Can they choose the best way to answer a question?</p> <p>Can they use information from different sources to answer a question and plan an investigation?</p> <p>Can they make a prediction which links with other scientific knowledge?</p> <p>Can they identify the key factors when planning a fair test?</p> <p>Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?</p>	<p>Can they plan in advance which equipment they will need and use it well?</p> <p>Can they make precise measurements?</p> <p>Can they collect information in different ways?</p> <p>Can they record their measurements and observations systematically?</p> <p>Can they explain qualitative and quantitative data?</p>	<p>Can they draw conclusions from their work?</p> <p>Can they link their conclusions to other scientific knowledge?</p> <p>Can they explain how they could improve their way of working?</p>