



Science Curriculum Overview

Rationale

At Birch Copse, we believe that Science provides children with the opportunity to understand the world around them and provides an exciting context to apply many of the other skills and disciplines they learn at school. The science National Curriculum identifies three key areas in which the children should be taught: knowledge and understanding; working scientifically and the application of Science. We have developed a carefully sequenced Science curriculum that ensures children cover these three aims in an accessible, creative and engaging way throughout their time at Birch Copse. We believe that children learn science best by doing and seeing; by providing the children with a range of opportunities to actively carry out different types of scientific enquiries, we ensure that working scientifically and application of knowledge is embedded into the heart of our Science curriculum.

Structure

Each year, the children learn about four science topics in the infants and five in the juniors – each of which is either ten or twenty sessions long. This equates to children being taught science for two hours over thirty weeks of the year – sixty hours of science in total.

Throughout Key Stage 1, children learn to identify, name, describe and compare different animals and plants as well as learning about the different habitats of living things. They also learn about everyday materials and their uses as well as observing and describing the four seasons. In Key Stage 2, the children's learning around plants and animals is broadened and deepened to include details about basic functions and systems. Children's learning around habitats is extended to classification, life cycles and the environment and learning about materials focuses on their properties and how they can change. In addition, they are taught units on rocks and soils, electricity, light, sound, forces and the Earth in space as well as the evolution and inheritance of plants and animals over time.

For each unit of work, the knowledge we teach the children has been carefully mapped to provide a clear and progressive sequence of learning. Details of this knowledge can be seen on the Knowledge Organisers we have created for each unit of work. Alongside the topic-specific knowledge, we have a clear idea of how we want children to know and learn about working scientifically at each stage of their schooling at Birch Copse. We have mapped out our expectations against seven aspects around working scientifically:

- Asking questions and recognising that they can be answered in different ways
- Making observations and taking measurements
- Engaging in practical enquiry to answer questions
- Recording and presenting evidence
- Answering questions and concluding
- Evaluating and raising further questions and predictions
- Communicating their findings

We have created a progression framework for both the subject and topic specific knowledge we want the children to as well as the skills required to be able to work scientifically under the seven heading above. This can be seen in the Science Progression Framework document.

SCIENCE CURRICULUM MAP

This table shows the topics covered every term in each year group and demonstrates the range of Science the children at Birch Copse will learn during their time at the school.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 1	Seasonal Changes	Animals, Including Humans	Animals, Including Humans	Everyday Materials	Plants	Plants
Year 2	Plants	Animals, Including Humans	Living Things and Their Habitats	Living Things and Their Habitats	Everyday Materials	Everyday Materials
Year 3	Animals, Including Humans	Rocks and Fossils	Plants	Plants	Light	Forces and magnets
Year 4	Animals, Including Humans	Living Things and Their Habitats	Electricity	Sound	States of Matter	States of Matter
Year 5	Properties and Changes of Materials	Properties and Changes of Materials	Forces	Earth and Space	Living Things and Their Habitats	Animals, Including Humans
Year 6	Evolution and Inheritance	Electricity	Living Things and Their Habitats	Animals, Including Humans		Light

SCIENCE CURRICULUM OVERVIEW

The following grids give a more detailed overview of the content in each of the Science units of work.

YEAR 1			
Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Seasonal Changes	<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. 	Dr Steve Lyons (Extreme Weather) Holly Green (Meteorologist)
Autumn 2	Animals, Including Humans	<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). identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. 	Chris Packham (Animal Conservationist)
Spring 1			
Spring 2	Everyday Materials	<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. 	William Addis (Toothbrush Inventor) Charles Mackintosh (Waterproof coat) John McAdam (Roads) <i>All these also in Year 2</i>
Summer 1	Plants	<ul style="list-style-type: none"> identify and name a variety of common wild and garden plants, including deciduous and evergreen trees identify and describe the basic structure of a variety of common flowering plants, including trees. 	Beatrix Potter (Author & Botanist) Jeanne Baret (Botanist)
Summer 2			

YEAR 2

Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Plants	<ul style="list-style-type: none"> observe and describe how seeds and bulbs grow into mature plants find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. 	Agnes Arber (Botanist) Alan Titchmarsh (Botanist & Gardener)
Autumn 2	Animals, Including Humans	<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. 	Steve Irwin (Crocodile Hunter) Robert Winston (Human Scientist) <i>Also in Year 5</i> Joe Wicks (Personal Trainer) Florence Nightingale (Nurse introduced hygiene improvements)
Spring 1	Living Things and Their Habitats	<ul style="list-style-type: none"> explore and compare the differences between things that are living, dead, and things that have never been alive 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 micro-habitats 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. 	Terry Nutkins (TV Presenter) Liz Bonnin (Conservationist)
Spring 2			
Summer 1	Everyday Materials	<ul style="list-style-type: none"> 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. 	William Addis (Toothbrush Inventor) Charles Mackintosh (Waterproof coat) John McAdam (Roads) <i>All these also in Year 2</i>
Summer 2			

YEAR 3

Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Animals, Including Humans	<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. 	Adelle Davis (20th Century Nutritionist) Marie Curie (Radiation / X-Rays)
Autumn 2	Rocks and Fossils	<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. 	Mary Anning (Discovery of Fossils) Inge Lehmann (Earth's Mantle)
Spring 1	Plants	<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. 	Jan Ingenhousz (Photosynthesis) Joseph Banks (Botanist)
Spring 2			
Summer 1	Light	<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 a solid object • find patterns in the way that the size of shadows change. 	James Clerk Maxwell (Visible and Invisible Waves of Light)
Summer 2	Forces and magnets	<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. 	William Gilbert (Theories on Magnetism) Andre Marie Ampere (Founder of Electro-Magnetism)

YEAR 4

Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Animals, Including Humans	<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. 	Ivan Pavlov (Digestive System Mechanisms) Joseph Lister (Antiseptics) Joy Adamson (Born Free Foundation)
Autumn 2	Living Things and Their Habitats	<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. 	Cindy Looy (Environmental Change and Extinction) Jaques Cousteau (Marine Biologist)
Spring 1	Electricity	<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. 	Thomas Edison (First Working Lightbulb) Joseph Swan (Incandescent Light Bulb)
Spring 2	Sound	<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. 	Aristotle (Sound Waves) Gailileo Galilei (Frequency and Pitch of Sound Waves) <i>Also in Year 5 – Forces</i> Alexander Graham Bell (Invented the Telephone)
Summer 1	States of Matter	<ul style="list-style-type: none"> compare and group materials together, according to whether they are solids, liquids or gases 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. 	Anders Celsius (Celsius Temperature Scale) Daniel Fahrenheit (Fahrenheit Temperature Scale / Invention of the Thermometer)
Summer 2			

YEAR 5

Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Properties and Changes of Materials	<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 gases 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. 	Spencer Silver , Arthur Fry and Alan Amron (Post-It Notes) Ruth Benerito (Wrinkle-Free Cotton)
Autumn 2			
Spring 1	Forces	<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. 	Galileo Galilei (Gravity and Acceleration) <i>Also in Year 4 – Sound</i> Isaac Newton (Gravitation) Archimedes of Syracuse (Levers) John Walker (The Match)
Spring 2	Earth and Space	<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. 	Nicolaus Copernicus (Heliocentric vs Geocentric Universe) Neil Armstrong (First man on the Moon) Helen Sharman (First British astronaut) Tim Peake (First British ESA astronaut)
Summer 1	Living Things and Their Habitats	<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 	Jane Goodall (Naturalist) James Brodie of Brodie (Reproduction of Plants by Spores) David Attenborough (Naturalist and Nature Documentary Broadcaster)
Summer 2	Animals, Including Humans	<ul style="list-style-type: none"> describe the changes as humans develop to old age. 	Dr Steve Jones (Geneticist) Robert Winston (Human Scientist) <i>Also in Year 2</i> Kayla Lacovino (Study of volcanoes)

YEAR 6

Term	Topic	By the end of the unit, children will learn to:	Linked scientists
Autumn 1	Evolution and Inheritance	<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 	Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection) Jane Goodall (Chimpanzees) <i>Also in Year 5 – Living Things</i>
Autumn 2	Electricity	<ul style="list-style-type: none"> associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit 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. 	Alessandro Volta (Electrical Battery) Nicola Tesla (Alternating Currents)
Spring 1	Living Things and Their Habitats	<ul style="list-style-type: none"> describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals give reasons for classifying plants and animals based on specific characteristics. 	Carl Linnaeus (Identifying, Naming and Classifying Organisms)
Spring 2	Animals, Including Humans	<ul style="list-style-type: none"> identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans. 	Justus von Liebig (Theories of Nutrition and Metabolism) Sir Richard Doll (Linking Smoking and Health Problems) Leonardo Da Vinci (Anatomy)
Summer 1			
Summer 2	Light	<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. 	Thomas Young (Wave Theory of Light) Ibn al-Haytham (Alhazen) (Light and our Eyes) Percy Shaw (The Cats Eye)