

Marlborough Primary Academy

Science Progression of Skills & Knowledge



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 foundation 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. Pupils should be made aware of the many occupations and careers that require Science as a foundation and should be encouraged to aspire to work towards these goals.

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.

Knowledge	<ul style="list-style-type: none"> of plants of animals, including humans of everyday materials – their properties and how they change of seasonal changes of living things and their habitats of rocks of light of forces and magnets of states of matter of sound of electricity of Earth and space of evolution and inheritance
Skills	Working scientifically: <ul style="list-style-type: none"> asking questions and problem solving predicting observation and working with others testing and taking measurements through using and applying number identifying and classifying making suggestions gathering, recording and reporting data – communicating all of this scientific understanding
Understanding	Critical thinking, including: <ul style="list-style-type: none"> enquiry analysis evaluation making connections and contrasts

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Science Progression – NC Key Stage 1 & Key Stage 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Living Things and their habitats (Biology)	<p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</p> <p>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> <p>Head, neck, ear, eye, nose, mouth, lips, shoulders, chest, stomach, back, waist, hips, leg, knee, ankle, wrist, foot, toes, fingers & elbow</p>	<p>Explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>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.</p> <p>Use of the school grounds and Forest School area.</p> <p>Identify and name a variety of plants and animals in their habitats, including micro-habitats .</p> <p>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>	<p>Identify that animals including humans, need the right types of nutrition and they cannot make their own food: they get nutrition from what they eat.</p> <p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	<p>Recognise that living things can be grouped in a variety of ways. Include ferns, mosses.</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment .</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things.</p> <p>Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>Describe the life process of reproduction in some plants and animals.</p> <p>Name the parts of the flower in greater depth: Stamen, stigma sepal, anther, etc.</p> <p>Look at sexual and asexual reproduction.</p> <p>seeds, cuttings, tubers, bulbs.</p> <p>They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.</p>	<p>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.</p> <p>Give reasons for classifying plants and animals based on specific characteristics.</p> <p>Look at and grow micro- organisms. i.e mould on bread, fruit</p> <p>Use classification keys to classify plants and see where different plants belong.</p> <p>Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.</p>
Plants (Biology)	<p>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</p> <p>Identify and describe the basic structure of a variety of common flowering plants, including trees .</p> <p>Stem, petals, roots, leaves, trunk, branch</p>	<p>Observe and describe how seeds and bulbs grow into mature plants.</p> <p>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p>	<p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>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.</p>	None	None	None

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			<p>Investigate how light, temperature, water, fertilisers affect plant growth. Investigate the way in which water is transported within plants. Use white carnations and coloured water to show the function of the stem in transporting water. Explore the part that flowers play in the life cycle of flowering plants, including pollination, germination, fertilisation, seed formation and seed dispersal.</p>			
Animals Including Humans (Biology)	<p>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: including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth)</p>	<p>Notice that animals, including humans, have offspring which grow into adults. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult. Find out about and describe the basic needs of animals, including humans, for survival. Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>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. Use correct vocabulary to introduce the different food groups: carbohydrate,, fats, sugars, fibre, dairy produce, vitamins, minerals etc Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Learn basic parts of the skeletal system. spine, ribs, skull, hips, collar bone, elbow (humerus)</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans. mouth, tongue, teeth, oesophagus, stomach and small and large intestine. Identify the different types of teeth in humans and their simple functions . Compare the different types of teeth in different animals and why. Investigate what damages teeth and how to look after the, Eggs in different liquids. Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	<p>Describe the changes as humans develop to old age. Draw time lines of the main stages of development: baby (1-2) toddler (1-3), child (4-12), teenager (13-19), young adult (20-40), middle age (40-60), old age. Research periods of gestation in different animals.</p>	<p>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. Build on the parts of the body learned in years 3 and 4 and learn parts of the skeletal system (spine, ribs, collar bone, skull, hips, patella, tibia etc breast bone.) and internal organs (heart, kidneys, lungs, liver.) Explore how the body can be damaged by substance abuse : drugs, tobacco, alcohol</p>

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States of Matter (Chemistry)	None	None	None	<p>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) Use data loggers as well as thermometers.</p> <p>Look at boiling water, freezing water, melting chocolate, cheese etc. Link to real life.</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	Close links with Materials and their uses.	Close links with Materials and their uses.
Rocks (Chemistry)	None	None	<p>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.</p> <p>Recognise that soils are made from rocks and organic matter</p> <p>Learn about the differences between sedimentary, igneous and metamorphic rocks and how they were formed. Links with volcanoes.</p>	<p>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)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>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.</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the</p>	None

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					<p>particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes .</p> <p>They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.</p> <p>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 rusting and the action of acid on bicarbonate of soda.</p> <p>Find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.</p>	
Light (Physics)			<p>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.</p> <p>Use real life objects to set in contexts. i.e cat's eyes in the road, reflective clothing etc.</p> <p>Use of data loggers to record the amount of light in lux.</p> <p>Recognise that light from the sun can be dangerous and that</p>			<p>Recognise that light appears to travel in straight lines.</p> <p>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.</p> <p>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.</p>

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			<p>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. Shadow puppets. Find patterns in the way that the size of shadows change . Chalk around a child on the playground at different times of the day. Use the arch es with 12 hour divisions, a torch and an object in the classroom to repeat the above. (In the Physics cupboard.) Investigate who invented cat’s eyes, the reflective strip.</p>			<p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them .Ibn al-Haytham (965 in Basra - c. 1040 in Cairo) Muslim scientist that discovered that light travels in straight lines.</p>
<p>Forces & Magnets (Physics)</p>			<p>Compare how things move on different surfaces. Simply introduce friction as a force created when two surfaces rub together to slow the movement of an object down. Use a box full of heavy objects. Tie a rope around it. Pull it across the playground, the grass and the hall. 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</p>		<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Drop objects of different weights from a height. Predict which will hit the ground first. Both will hit the ground at the same point. Gravity acts the same on all objects. Air resistance can create a difference though. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Make parachutes, sycamore seed models. Recognise that some mechanisms, including levers,</p>	

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			<p>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>		<p>pulleys and gears, allow a smaller force to have a greater effect. Liase with DT co-ordinator. effect of pulleys and gears. Look at this in real life contexts. Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p>	
Everyday Materials (Chemistry)	<p>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, elastic, fabrics, foil, brick, paper, polystyrene. Describe the simple physical properties of a variety of everyday materials. hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent Compare and group together a variety of everyday materials on the basis of their simple physical properties. Which material would be the best for an umbrella, a gymnast's leotard, a lining for a dog's basket? Plan and conduct tests. Link to topiv where possible.</p>	<p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. It is important for children to know that metal for example can be used for many things : coins, cans, cars and table legs Wood, metal, platic can be used for spoons but not glass. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. Slime, plasticene, clay, dough, elastic bands, clothes, suitcases. Pupils might find out about people who have developed useful new materials, for example John Dunlop,</p>			<p>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. Conduct fair tests to prove which material would be best for keeping ice cream cold, for black out curtains? 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.</p>	

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		Charles Macintosh or John McAdam.			<p>Link to everyday life: why are wooden spoons better than metal when stirring heated food? etc</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>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> <p>Look at polymers, cornflour and water. Burning wood to make charcoal. Heating sand to make glass.</p>	
Sound (Physics)				<p>Identify how sounds are made, associating some of them with something vibrating</p> <p>Recognise that vibrations from sounds travel through a medium to the ear.</p> <p>Block the sound with different materials.</p> <p>Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>Tuning forks, plastic tubes. Use different materials against other materials and discuss the type of sound.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p>		

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				<p>Recognise that sounds get fainter as the distance from the sound source increases.</p> <p>Use data loggers to record the strength of sound.</p>		
Electricity (Physics)				<p>Identify common appliances that run on electricity.</p> <p>Compare battery operated and mains operated appliances.</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>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.</p> <p>Investigate the brightness of bulbs based on the voltage of batteries or the number of bulbs.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p> <p>Ensure that this is referred to as electrical conduction.</p>		
Earth & Space (Physics)					<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>Drama</p>	

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					Describe the movement of the Moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies. 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.	
Seasonal Changes (Physics)	Observe changes across the four seasons . Take a photo of the same place during each season and compare. Observe and describe weather associated with the seasons and how day length varies.					
Evolution & Inheritance (Biology)						Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.