

POLICY FOR THE TEACHING OF SCIENCE

Introduction

- This document is a statement of the rationale, aims and strategies for the use of Science at The Pochin School.
- It was revised in the Spring Term 2014 through a process of consultation with teaching staff and approved by the Governing Body on 16 September 2014.
- Every child in the school has an entitlement and equal right of access to Science regardless of ability, gender or race.
- It is the responsibility of all members of the teaching staff to implement this policy.

What is Science?

Science is a body of knowledge, which is built up through experimental testing of ideas, and which is organised in a way that makes it easy to use. Science is also a methodology, a practical way of finding reliable answers to questions we may ask about the world around us.

Rationale

Science is important because:

- it is essential to our understanding of the world around us.
- it has built up a method of thinking, which today forms the basis of scientific enquiry.
- the skills and knowledge of Science are used and relevant to everyday life.
- Science is a core subject in the National Curriculum.

Aims

Our aims in teaching Science are that all children will, to the best of their ability:

- develop their natural sense of curiosity about the world around them.
- develop a set of attitudes, which will promote scientific ways of thinking, and working individually and in groups.
- come to understand the nature of "scientific method" involving observation, the design of fair tests, the predicting of results and the evaluation of the evidence.
- discuss and record scientific ideas, facts and data in a variety of ways.
- begin to build scientific knowledge and understanding which will serve as a foundation for future enquiry.

Statutory Requirements

The National Curriculum requires that by the end of KS2, pupils should have developed their scientific capability through four main areas;

- Working Scientifically
- Life Processes and Living Things
- Materials and their Properties
- Physical Properties

Strategies for the teaching of Science

- The program for teaching and learning is based on a Scheme of Work (see Appendix A).
- Pupils with learning difficulties will receive support from the class teacher to undertake work geared to their level of ability. Children with a flair for Science will be expected to achieve a higher standard of work.

Strategies for Ensuring Continuity and Progress

- The Scheme of Work (see Appendix A) gives continuity and progression across the key stages and addresses NC requirements, long, medium and short term planning and an overview of both key stages.
- Class teachers give copies of medium term planning to the science co-ordinator on a termly basis.

- The science co-ordinator visits each class teacher on a regular basis to monitor and evaluate lessons.

Role of the Science Co-ordinator:

- support and encourage colleagues to implement the policy and scheme of work.
- monitor and evaluate progress in Science and report back to colleagues.
- take responsibility for the purchase and organisation of central resources for Science.
- keep up-to-date with developments in science education and disseminate information to colleagues as appropriate.

Strategies for Assessment, Recording and Reporting

- Assessment should be built into the planning process identifying each child's progress in each aspect of this subject. Formative assessment is mainly carried out by teachers in the course of teaching.
- Formal summative assessment is carried out at the end of each National Curriculum Key Stage; in Year 6 through the use of SATs and teacher assessment and in Year 2 through teacher assessment alone.
- Recording should be in reference to the school's overall recording policy.
- Reporting: In the Autumn and Spring terms through parent interviews and by written report at the end of each academic year.

Strategies for the use of resources

- A wide range of resources and equipment is available in classrooms.
- More specialized items are available in the Costume Cupboard.
- The School Garden and local environment is an invaluable tool in the learning process and as such is used on a regular basis.
- Use of the Internet and other ICT programmes.

Health and Safety

- Use of equipment and materials in accordance with a Health and Safety policy.
- Appropriate storage of equipment and materials.
- Pupils are taught to recognize potential hazards, and how to minimize the risk to themselves and others.

The use of ICT

The use of ICT should be seen as an invaluable tool in science, for measuring, finding and recording information.

Scheme of Work for Science

Working Scientifically

Although shown as a separate aspect of science, ‘Working Scientifically’ will always be taught within the context of each topic in the scheme of work.

Key Stage 1

Knowledge and Skills	Non-statutory
<p>Pupils should be taught to:</p> <p>ask simple questions and recognise that they can be answered in different ways</p> <p>observe closely, using simple equipment</p> <p>perform simple tests</p> <p>identify and classify</p> <p>use their observations and ideas to suggest answers to questions</p> <p>gather and record data to help in answering questions</p>	<p>Where possible, pupils should:</p> <p>explore the world around them and raise their own questions.</p> <p>experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions.</p> <p>use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships.</p> <p>ask people questions and use simple secondary sources to find answers.</p> <p>use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out.</p> <p>With help, record and communicate their findings in a range of ways and begin to use simple scientific language</p>

Lower Key Stage 2

Knowledge and Skills	Non-statutory
<p>Pupils should be taught to:</p> <p>ask relevant questions and use different types of scientific enquiries to answer them</p> <p>set up simple practical enquiries, comparative and fair tests</p> <p>make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <p>gather, record, classify and present data in a variety of ways to help in answering questions</p> <p>record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>identify differences, similarities or changes related to simple scientific ideas and processes</p>	<p>Where possible, pupils should:</p> <p>be given a range of scientific experiences to enable them to raise their own questions about the world around them</p> <p>start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions</p> <p>recognise when a simple fair test is necessary and help to decide how to set it up</p> <p>talk about criteria for grouping, sorting and classifying; and use simple keys</p> <p>begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them</p> <p>help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.</p> <p>learn how to use new equipment, such as data loggers, appropriately</p> <p>collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data.</p>

<p>use straightforward scientific evidence to answer questions or to support their findings</p>	<p>With help, look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.</p> <p>With support, identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done</p> <p>recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations</p> <p>use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences</p>
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Upper Key Stage 2

Knowledge and Skills	Non-statutory
<p>Pupils should be taught to:</p> <p>plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</p> <p>record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p>use test results to make predictions to set up further comparative and fair tests</p> <p>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</p> <p>identify scientific evidence that has been used to support or refute ideas or arguments</p>	<p>Where possible, pupils should:</p> <p>explore ideas and raise different kinds of questions</p> <p>select and plan the most appropriate type of scientific enquiry to use to answer scientific questions</p> <p>recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</p> <p>use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment</p> <p>make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them;</p> <p>choose the most appropriate equipment to make measurements and explain how to use it accurately.</p> <p>decide how to record data from a choice of familiar approaches</p> <p>look for different causal relationships in their data and identify evidence that refutes or supports their ideas</p> <p>use their results to identify when further tests and observations might be needed</p> <p>recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.</p> <p>use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.</p>

Year 1

Topic	Knowledge and Skills	Non-statutory
Plants	<p>Pupils should be taught to:</p> <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>Where possible pupils should:</p> <p>use the local environment throughout the year to explore and answer questions about plants growing in their habitat.</p> <p>become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem)</p> <p>work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees.</p> <p>keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.</p>
Animals including humans	<p>Pupils should be taught to:</p> <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>Where possible, pupils should:</p> <p>use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study</p> <p>become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets</p> <p>have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes</p> <p>use their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells</p>
Everyday Materials	<p>Pupils should be taught to:</p> <p>distinguish between an object and the material from which it is made</p>	<p>Where possible, pupils should:</p> <p>explore, name, discuss and raise and answer questions about everyday materials so that they become familiar</p>

	<p>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>describe the simple physical properties of a variety of everyday materials</p> <p>compare and group together a variety of everyday materials on the basis of their simple physical properties</p>	<p>with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent.</p> <p>explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil</p> <p>perform simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'</p>
<p>Seasonal Changes</p>	<p>Pupils should be taught to:</p> <p>observe changes across the four seasons</p> <p>observe and describe weather associated with the seasons and how day length varies</p>	<p>Where possible, pupils should:</p> <p>observe and talk about changes in the weather and the seasons</p> <p>making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change</p> <p>NOTE: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</p>

Year 2

Topic	Knowledge & Skills	Non-statutory
Plants	<p>Pupils should be taught to:</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>Where possible, pupils should:</p> <p>use the local environment throughout the year to observe how different plants grow</p> <p>be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants</p> <p>observe and record, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observe similar plants at different stages of growth; set up a comparative test to show that plants need light and water to stay healthy</p>
Animals including Humans	<p>Pupils should be taught to:</p> <p>notice that animals, including humans, have offspring which grow into adults</p> <p>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p>	<p>Where possible, pupils should:</p> <p>be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans.</p> <p>be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs</p> <p>observe, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions</p>
Uses of Everyday Materials	<p>Pupils should be taught to:</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</p> <p>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>	<p>Where possible, pupils should:</p> <p>identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass).</p> <p>think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials.</p> <p>compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observe closely, identifying and classifying the uses of different materials, and record their observations</p>

Seasonal Changes and Weather	<p>Pupils should be taught to:</p> <p>observe changes across the four seasons</p> <p>observe and describe weather associated with the seasons and how day length varies</p>	<p>Where possible, pupils should:</p> <p>observe and talk about changes in the weather and the seasons</p> <p>making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change</p> <p>NOTE: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.</p>
Living Things and their Habitats	<p>Pupils should be taught to:</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>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>Where possible, pupils should:</p> <p>be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things</p> <p>be introduced to the terms ‘habitat’ (a natural environment or home of a variety of plants and animals) and ‘micro-habitat’ (a very small habitat, for example for woodlice under stones, logs or leaf litter)</p> <p>raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals</p> <p>compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest</p> <p>sort and classify things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: ‘Is a flame alive? Is a deciduous tree dead in winter?’ and talk about ways of answering their questions</p> <p>construct a simple food chain that includes humans (e.g. grass, cow, human)</p> <p>describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there</p>

Year 3

Topic	Knowledge & Skills	Non-Statutory
Forces and Magnets	<p>Pupils should be taught to:</p> <p>compare how things move on different surfaces</p> <p>notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>observe how magnets attract or repel each other and attract some materials and not others</p> <p>compare and group together a variety of everyday materials on the basis of</p>	<p>Where possible, pupils should:</p> <p>observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe)</p> <p>compare how different things move and group them; raise questions and carrying out tests to find out how far things move on different surfaces and gather and record data to find answers their questions</p> <p>sort materials into those that are magnetic and those that are not</p>

	<p>whether they are attracted to a magnet, and identify some magnetic materials</p> <p>describe magnets as having two poles</p> <p>predict whether two magnets will attract or repel each other, depending on which poles are facing</p>	<p>look for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identify how these properties make magnets useful in everyday items and suggest creative uses for different magnets</p>
Light	<p>Pupils should be taught to:</p> <p>recognise that they need light in order to see things and that dark is the absence of light</p> <p>notice that light is reflected from surfaces</p> <p>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>recognise that shadows are formed when the light from a light source is blocked by a solid object</p> <p>find patterns in the way that the size of shadows change</p>	<p>Where possible, pupils should:</p> <p>explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves.</p> <p>think about why it is important to protect their eyes from bright lights look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change</p> <p>look for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes</p>
Plants	<p>Pupils should be taught to:</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> <p>investigate the way in which water is transported within plants</p> <p>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</p>	<p>Where possible, pupils should:</p> <p>be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction</p> <p>compare the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discover how seeds are formed by observing the different stages of plant life cycles over a period of time; look for patterns in the structure of fruits that relate to how the seeds are dispersed</p> <p>observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers</p>
Animals including Humans	<p>Pupils should be taught to:</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</p> <p>identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p>Where possible, pupils should:</p> <p>continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions</p> <p>identify and group animals with and without skeletons and observe and compare their movement; explore ideas about what would happen if humans did not have skeletons.</p> <p>compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat.</p> <p>They might research different food groups and how they keep us healthy and design meals based on what they find out</p>
Rocks	<p>Pupils should be taught to:</p> <p>compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p>	<p>Where possible, pupils should:</p> <p>explore different kinds of rocks and soils, including those in the local environment</p> <p>observe rocks, including those used in buildings and gravestones, and explore how and why they might have changed over time; use a hand lens or</p>

	<p>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>microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them</p> <p>research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed</p> <p>explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed</p>
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Year 4

Topic	Knowledge & Skills	Non-Statutory
Living Things and their Habitats	<p>Pupils should be taught to:</p> <p>recognise that living things can be grouped in a variety of ways</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>Where possible, pupils should:</p> <p>use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year.</p> <p>explore possible ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.</p> <p>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>use and make simple guides or keys to explore and identify local plants and animals; make a guide to local living things; raise and answer questions based on their observations of animals and what they have found out about other animals that they have researched</p>
Animals including Humans	<p>Pupils should be taught to:</p> <p>describe the simple functions of the basic parts of the digestive system in humans</p> <p>identify the different types of teeth in humans and their simple functions</p> <p>construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p>Where possible, pupils should:</p> <p>be introduced to the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine and explore questions that help them to understand their special functions.</p> <p>compare the teeth of carnivores and herbivores, and suggesting reasons for differences; find out what damages teeth and how to look after them.</p> <p>draw and discuss their ideas about the digestive system and compare them with models or images</p>
States of Matter	<p>Pupils should be taught to:</p> <p>compare and group materials together, according to whether they are solids, liquids or gases</p> <p>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>Where possible, pupils should:</p> <p>explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container).</p> <p>observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.</p> <p>Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.</p> <p>group and classify a variety of different materials;</p>

	<p>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p>explore the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).</p> <p>research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.</p> <p>observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting</p>
Sound	<p>Pupils should be taught to:</p> <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>find patterns between the pitch of a sound and features of the object that produced it</p> <p>find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>recognise that sounds get fainter as the distance from the sound source increases</p>	<p>Where possible, pupils should:</p> <p>explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.</p> <p>find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.</p> <p>make earmuffs from a variety of different materials to investigate which provides the best insulation against sound.</p> <p>make and play their own instruments by using what they have found out about pitch and volume</p>
Electricity	<p>Pupils should be taught to:</p> <p>identify common appliances that run on electricity</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>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>Where possible, pupils should:</p> <p>construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6.</p> <p>Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.</p> <p>observe patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit</p>

Year 5

Topic	Knowledge & Skills	Non-Statutory
Living Things and their Habitats	<p>Pupils should be taught to:</p> <p>describe the differences in the life cycles of a mammal, an amphibian, an</p>	<p>Where possible, pupils should:</p> <p>study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living</p>

	<p>insect and a bird</p> <p>describe the life process of reproduction in some plants and animals</p>	<p>things, for example, plants in the vegetable garden or flower border, and animals in the local environment.</p> <p>find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.</p> <p>find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.</p> <p>observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences.</p> <p>try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.</p> <p>observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow</p>
Animals including humans	<p>Pupils should be taught to:</p> <p>describe the changes as humans develop to old age</p>	<p>Where possible, pupils should:</p> <p>draw a timeline to indicate stages in the growth and development of humans.</p> <p>learn about the changes experienced in puberty.</p> <p>research the gestation periods of other animals and comparing them with humans</p> <p>find out and recording the length and mass of a baby as it grows</p>
Properties and Changes of Materials	<p>Pupils should be taught to:</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 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>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>Where possible, pupils should:</p> <p>build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4.</p> <p>explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes</p> <p>explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with 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> <p>carry out tests to answer questions, for example, ‘Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’</p> <p>compare materials in order to make a switch in a circuit.</p> <p>observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes.</p> <p>research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials</p>

<p>Earth and Space</p>	<p>Pupils should be taught to:</p> <p>describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>describe the movement of the Moon relative to the Earth</p> <p>describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>Where possible, pupils should:</p> <p>be introduced to a model of the Sun and Earth that enables them to explain day and night.</p> <p>learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).</p> <p>understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p>find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.</p> <p>Compare the time of day at different places on the Earth through internet links and direct communication</p> <p>create simple models of the solar system</p> <p>construct simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day</p> <p>find out why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p>
<p>Forces</p>	<p>Pupils should be taught to:</p> <p>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p>	<p>Where possible, pupils should:</p> <p>explore falling objects and raise questions about the effects of air resistance</p> <p>explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall</p> <p>experience forces that make things begin to move, get faster or slow down</p> <p>explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel</p> <p>explore the effects of levers, pulleys and simple machines on movement</p> <p>find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p> <p>explore falling paper cones or cup-cake cases, and design and make a variety of parachutes and carrying out fair tests to determine which designs are the most effective.</p> <p>explore resistance in water by making and testing boats of different shapes.</p> <p>design and make products that use levers, pulleys, gears and/or springs and explore their effects</p>

Year 6

Topic	Knowledge & Skills	Non-statutory
Animals including Humans	<p>Pupils should be taught to:</p> <p>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>Where possible, pupils should:</p> <p>build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function</p> <p>learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body</p> <p>explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health</p>
Living Things and their Habitats	<p>Pupils should be taught to:</p> <p>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</p> <p>give reasons for classifying plants and animals based on specific characteristics</p>	<p>Where possible, pupils should:</p> <p>build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another.</p> <p>find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification</p> <p>use classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system</p>
Evolution and Inheritance	<p>Pupils should be taught to:</p> <p>recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p> <p>recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	<p>Where possible, pupils should:</p> <p>find out more about how living things on earth have changed over time</p> <p>be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox.</p> <p>find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.</p> <p>Note: At this stage, pupils are not expected to understand how genes and chromosomes work.</p> <p>observe and raise questions about local animals and how they are adapted to their environment; compare how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.</p>

Light	<p>Pupils should be taught to:</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> <p>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>	<p>Where possible, pupils should:</p> <p>build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.</p> <p>decide where to place rear-view mirrors on cars; design and making a periscope and using the idea that light appears to travel in straight lines to explain how it works</p> <p>investigate the relationship between light sources, objects and shadows by using shadow puppets</p> <p>extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).</p>
Electricity	<p>Pupils should be taught to:</p> <p>associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> <p>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</p> <p>use recognised symbols when representing a simple circuit in a diagram.</p>	<p>Where possible, pupils should:</p> <p>construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols</p> <p>systematically identify the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit</p>

KEY STAGE ONE

CLASSES 1 & 2 – ONE YEAR PROGRAMME

Class 1		Class 2 Year Ones	Class 2 Year Twos
Plants (Y1)		Plants (Y1)	Plants (Y2)
Animals inc humans (Y1)		Animals inc humans (Y1)	Animals inc humans (Y2)
Everyday Materials (Y1)		Everyday Materials (Y1)	Uses of Everyday Materials (Y2)
Seasonal Changes (Y1)		Seasonal Changes (Y1)	Seasonal Changes and Weather (Y1)
		Living Things and their Habitats (Y2)	Living Things and their Habitats (Y2)

KEY STAGE TWO

CLASSES 3 & 4 – TWO YEAR ROLLING PROGRAMME

Class 3 Year A	Class 3 Year B	Class 4 Year A	Class 4 Year B
Electricity (Y4)	Animals inc humans (Y3)	As Class 3 plus:	
Forces & Magnets (Y3)	Animals inc humans (Y4)	Forces 1 (Y5)	Forces 2 (Y5)
Sound (Y4)	Earth & Space (Y5)		
Light (Y3)	Rocks (Y3)		
Plants (Y3)	States of Matter (Y4)		
Living Things and Habitats (Y4/5)			

CLASS 5 – ONE YEAR PROGRAMME

Class 5
Forces 3 (Y5)
Animals inc humans (Y6)
Living Things & Habitats (Y6)
Properties & Changes of Materials (Y5)
Evolution & Inheritance (Y6)
Light (Y6)
Electricity (Y6)