

HEAP BRIDGE VILLAGE PRIMARY SCHOOL



STEM – SCIENCE

Curriculum Implementation Plan

&

Assessment Arrangements



Science – National Curriculum Matrix

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

The national curriculum for science aims to ensure that all pupils:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content.

Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.

Spoken language

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. They must be assisted in making their thinking clear, both to themselves and others, and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

School curriculum

The programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate. All schools are also required to set out their school curriculum for science on a year-by-year basis and make this information available online.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Schools are not required by law to teach the content indicated as being 'non-statutory'.

Key Stage 1

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. 'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Working Scientifically:

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:



- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Notes and guidance (non-statutory)

Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should 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. They should ask people questions and use simple secondary sources to find answers. They should 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. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.


These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of year 2. Pupils are not expected to cover each aspect for every area of study.

Science Curriculum – Overview for Year 1

		Content for Knowledge Organisers		
National Curriculum <i>links/coverage</i>		Scientific vocabulary <i>use simple scientific languageread and spell scientific vocabulary at a level consistent with knowledge at KS1</i>	Developing scientific knowledge <i>enable pupils to experience and observe phenomena, looking more closely at the natural and humanly- constructed world around them.</i>	Applying knowledge, enquiry & key questions <i>observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information</i>
Y1	<p>Plants</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>Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud</p> <p>Names of trees in the local area</p> <p>Names of garden and wild flowering plants in the local area</p>	<p>Growing locally there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts but they vary between the different types of plants. Some trees keep their leaves all year whilst other trees drop their leaves during autumn and grow them again during spring.</p> <p><i>Can name trees and other plants that they see regularly</i></p> <p><i>Can describe some of the key features of these trees and plants e.g. the shape of the leaves, the colour of the flower/blossom</i></p> <p><i>Can point out trees which lost their leaves and those that kept them the whole year</i></p> <p><i>Can point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green</i></p>	<p>Make close observations of leaves, seeds, flowers etc. Compare two leaves, seeds, flowers etc.</p> <p>Classify leaves, seeds, flowers etc. using a range of characteristics. Identify plants by matching them to named images. Make observations of how plants change over a period of time. When further afield, spot plants that are the same as those in the local area studied regularly, describing the key features that helped them.</p> <p><i>Can sort and group parts of plants using similarities and differences</i></p> <p><i>Can use simple charts etc. to identify plants</i></p> <p><i>Can collect information on features that change during the year</i></p> <p><i>Can use photographs to talk about how plants change over time</i></p> <p> Y1_Plants_Shanaea v2.pptx</p>
<p>Non statutory guidance... <i>Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. They should 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). Pupils might 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. Pupils might 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.</i></p>				
Y1	<p>Animals, including humans</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</p>	<p>Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves... Names of animals experienced first-hand from each vertebrate group</p> <p><i>N.B. The children need to be able to name and identify a range of animals in each group e.g.</i></p>	<p>Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.</p> <p>Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals.</p>	<p>Make first hand close observations of animals from each of the groups</p> <p>Compare two animals from the same or different group</p> <p>Classify animals using a range of features</p> <p>Identify animals by matching them to named images</p> <p>Classify animals according to what they eat</p> <p> Y1 Animals_Zeeshan_fin</p>

<p>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><i>name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.</i></p> <p><i>The children also do not need to use the words carnivore, herbivore and omnivore. If they do, ensure that they understand that carnivores eat other animals not just meat.</i></p> <p>Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE association)</p> <p>Senses, touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue</p> <p>NB. Although we often use our fingers and hands to feel objects the children should understand that we can feel with many parts of our body</p>	<p><i>Can name a range of animals which includes animals from each of the vertebrate groups</i></p> <p><i>Can describe the key features of these named animals</i></p> <p><i>Can label key features on a picture/diagram</i></p> <p><i>Can write descriptively about an animal</i></p> <p><i>Can write a What am I? riddle about an animal</i></p> <p><i>Can describe what a range of animals eat</i></p> <p>Humans have keys parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.</p> <p><i>Can play and lead ‘Simon says’.</i></p> <p><i>During PE lessons, can follow instructions involving parts of the body</i></p> <p><i>Can label parts of the body on pictures and diagrams</i></p> <p><i>Can explore objects using different senses</i></p>	<p><i>Can sort and group animals using similarities and differences</i></p> <p><i>Can use simple charts etc. to identify unknown animals</i></p> <p><i>Can create a drawing of an imaginary animal labelling its key features</i></p> <p><i>Can use secondary resources to find out what animals eat, including talking to experts e.g. pet owners, zoo keepers etc.</i></p> <p>Make first hand close observations of parts of the body e.g. hands, eyes. Compare two people. Take measurements of parts of their body. Compare parts of their own body</p> <p>Look for patterns between people e.g. Do people with big hands have big feet? Classify people according to their features. Investigate human senses e.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match?</p> <p><i>Can use first-hand close observations to make detailed drawings</i></p> <p><i>Can name body parts correctly when talking about measurements and comparisons</i></p> <p><i>‘My arm is x straws long.’ ‘My arm is x straws long and my leg is y straws long. My leg is longer than my arm.’ ‘We both have hands, but his are bigger than mine.’ ‘These people have brown eyes and these have blue.’</i></p> <p><i>Can talk about their findings from investigations using appropriate vocabulary ‘My fingers are much better at feeling than my toes’ ‘We found that the crisps all taste the same.’</i></p>
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Non statutory guidance... *Pupils should 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. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should 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. Pupils might work scientifically by: using 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>Y1 Everyday materials</p> <p>distinguish between an object and the material from which it is made</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, compare and group together a variety of everyday materials on the basis of their simple physical properties.</p>	<p>Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through</p>	<p>All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties.</p> <p>Can label a picture or diagram of an object made from different materials</p> <p>Can describe the properties of different materials</p>	<p>Classify objects made of one material in different ways e.g. a group of objects made of metal. Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials. Classify materials based on their properties. Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters</p> <p>Can sort objects and materials using a range of properties</p> <p>Can choose an appropriate method for testing an object for a particular property</p> <p>Can use their test evidence to answer the questions about properties e.g. Which cloth is the most absorbent?</p> <div style="text-align: right;">  <p>Y1 everyday materials_Tahmeed_f</p> </div>
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Non statutory guidance... *Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar 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. Pupils should 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. Pupils might work scientifically by: performing 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>Y1 Seasonal changes</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>Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length</p> <div style="text-align: center;">  <p>y1 Seasonal_Ryan.pptx</p> </div>	<p>In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.</p> <p>The weather also changes with the seasons. In the UK, it is usually colder and rainier in Winter and hotter and dryer in the Summer. The change in weather causes many other changes; some examples are numbers of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people.</p> <p>Can name the four seasons and identify when in the year they occur.</p> <p>Can describe weather in different seasons over a year.</p> <p>Can describe days as being longer (in time) in the summer and shorter in the winter.</p> <p>Can describe other features that change through the year</p>	<p>Collect information about the weather regularly throughout the year</p> <p>Present this information in table and charts to compare the weather across the seasons</p> <p>Collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans</p> <p>Present this information in different ways to compare the seasons</p> <p>Gather data about day length regularly throughout the year and present this to compare the seasons</p> <p>Use their evidence gathered to describe the general types of weather and changes in day length over the seasons.</p> <p>Use their evidence to describe some other features of their surroundings, themselves, animals, plants that change over the seasons</p> <p>Demonstrate their knowledge in different ways e.g. making a weather forecast video, writing seasonal poetry, creating seasonal artwork</p>
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Non statutory guidance... *Pupils should observe and talk about changes in the weather and the seasons. Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils might work scientifically by: 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.*

Science Curriculum – Overview for Year 2

		Content for Knowledge Organisers		
National Curriculum <i>links/coverage</i>		Scientific vocabulary <i>use simple scientific languageread and spell scientific vocabulary at a level consistent with knowledge at KS1</i>	Developing scientific knowledge <i>enable pupils to experience and observe phenomena, looking more closely at the natural and humanly- constructed world around them.</i>	Applying knowledge, enquiry & key questions <i>observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information</i>
Y2	<p>Plants 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>As for year 1: Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud Names of trees, garden and wild flowering plants in the local area</p> <p>plus - light, shade, sun, warm, cool, water, grow, healthy</p>	<p>Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of the year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy.</p> <p><i>Can describe how plants that they have grown from seeds and bulbs have developed over time</i> <i>Can identify plants that grew well in different conditions</i></p>	<p>Make close observations of seeds and bulbs Classify seeds and bulbs Research and plan when and how to plant a range of seeds and bulbs Look after the plants as they grow – weeding, thinning, watering etc. Make close observations and measurements of their plants growing from seeds and bulbs Make comparisons between plants as they grow</p> <p><i>Can spot similarities and difference between bulbs and seeds</i> <i>Can nurture seeds and bulbs into mature plants identifying the different requirements of different plants</i></p> <p> Y2 Plants_Max.pptx</p>
<p>Non statutory guidance... <i>Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants. Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them. Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.</i></p>				
Y2	<p>Animals, including humans 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>Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)</p>	<p>Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles. All animals including humans have basic needs of feeding, drinking and breathing that must be satisfied in order to survive, and to grow into healthy adults they also need the right amounts and types of food and exercise. Good hygiene is also important in preventing infections and illnesses.</p> <p><i>Can describe how animals including humans have offspring which grow into adults, using the appropriate names for the stages</i> <i>Can state the basic needs of animals, including humans, for survival.</i> <i>Can state the importance for humans of exercise, eating the right amounts of different types of food and hygiene.</i> <i>Can name foods in each section of the Eatwell guide</i></p>	<p>Ask people questions and use secondary sources to find out about the life cycles of some animals Observe animals growing over a period of time e.g. chicks, caterpillars, a baby Ask questions of a parent about how they look after their baby Ask pet owners questions about how they look after their pet Explore the effect of exercise on their bodies Classify food in a range of ways, including using the Eatwell guide Investigate washing hands, using glitter gel</p> <p> y2 Animals_Zunairah.ppt</p> <p>Can describe, including using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child Can measure/observe how animals, including humans, grow. Show what they know about looking after a baby/animal by creating a parenting/pet owners' guide Explain how development and health might be affected by differing conditions and needs being met/not met.</p>
<p>Non statutory guidance... <i>Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also 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. 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. Pupils might work scientifically by: observing, 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.</i></p>				
Y2	<p>Everyday materials 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>Names of materials – increased range from year 1 Properties of materials - as for year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching</p>	<p>All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials. Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness.</p> <p>Continued on next page....</p>	<p>Classify materials Make suggestions about alternative materials for a purpose that are both suitable and unsuitable Test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat</p> <p><i>Can sort materials using a range of properties</i> <i>Can explain using the key properties why a material is suitable or not suitable for a purpose</i> <i>Can begin to choose an appropriate method for testing a material for a particular property</i> <i>Can use their test evidence to select appropriate material for a purpose e.g. Which material is the best for a rain hat?</i></p>

			<p>Can name an object, say what material it is made from, identify its properties and make a link between the properties and a particular use</p> <p>Can label a picture or diagram of an object made from different materials</p> <p>For a given object can identify what properties a suitable material needs to have</p> <p>Whilst changing the shape of an object can describe the action used</p> <p>Can use the words flexible and/or stretchy to describe materials that can be changed in shape and stiff and/or rigid for those that cannot</p> <p>Can recognise that a material may come in different forms which have different properties</p>	 <p>Y2 Materials Geanley.pptx</p>
<p>Non statutory guidance... Pupils should 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). They should 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. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam. Pupils might work scientifically by: comparing 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); observing closely, identifying and classifying the uses of different materials, and recording their observations.</p>				
Y2	<p>Living things and their habitats</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>Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc.</p>	<p>All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (this is a simplification but appropriate for year 2 children). An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels). Animals and plants live in a habitat to which they are suited which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect what plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain.</p> <p>Can find a range of items outside that are living, dead and never lived</p> <p>Can name a range of animals and plants that live in a habitat and micro-habitats that they have studied</p> <p>Can talk about how the features of these animals and plants make them suitable to the habitat</p> <p>Can talk about what the animals eat in a habitat and how the plants provide shelter for them</p> <p>Can construct a food chain that starts with a plant and has the arrows pointing in the correct direction</p>	<p>Explore the outside environment regularly to find objects that are living, dead and have never lived</p> <p>Classify objects found in the local environment</p> <p>Observe animals and plants carefully, drawing and labelling diagrams</p> <p>Create simple food chains for a familiar local habitat from first hand observation and research</p> <p>Create simple food chains from information given e.g. in picture books (Gruffalo etc.)</p> <p>Can sort into living, dead and never lived</p> <p>Can give key features that mean the animal or plant is suited to its micro-habitat</p> <p>Using a food chain can explain what animals eat</p> <p>Can explain in simple terms why an animal or plant is suited to a habitat e.g. the caterpillar cannot live under the soil like a worm as it needs fresh leaves to eat; the seaweed we found on the beach cannot live in our pond because it is not salty</p>  <p>y2 living things_Max.ppt</p>
<p>Non statutory guidance... Pupils should 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. Pupils should 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). They should 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. Pupils should 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. Pupils might work scientifically by: sorting and classifying 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. They could construct a simple food chain that includes humans (e.g. grass, cow, human). They could 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>				

Lower key stage 2

The principal focus of science teaching in lower key stage 2 is to enable pupils to **broaden their scientific view of the world around them**. They should do this through **exploring, talking about, testing and developing ideas** about everyday phenomena and the **relationships between living things and familiar environments**, and by beginning to **develop their ideas about functions, relationships and interactions**. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including **observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information**. They should **draw simple conclusions and use some scientific language**, first, to talk about and, later, to write about what they have found out.

Working Scientifically:

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Notes and guidance (non-statutory)

Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should 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.

They should learn how to use new equipment, such as data loggers, appropriately. They should 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. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should 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. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.



These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

Science Curriculum – Overview for Year 3

National Curriculum <i>links/coverage</i>		Content for Knowledge Organisers		Applying knowledge, enquiry & key questions <i>observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information</i>
		Scientific vocabulary <i>use some scientific language, first, to talk about and, later, to write about what they have found out</i>	Developing scientific knowledge <i>enable pupils to broaden their scientific view of the world around them... exploring, talking about, testing and developing ideas... develop their ideas about functions, relationships and interactions</i>	
Y3	Plants: 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.	Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal	Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth <i>Can explain the function of the parts of a flowering plant</i> <i>Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination</i> <i>Can give different methods of pollination and seed dispersal, including examples</i>	Observe what happens to plants over time when the leaves or roots are removed Observe the effect of putting cut white carnations or celery in coloured water Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space. Spot flowers, seeds, berries and fruits outside throughout the year. Observe flowers carefully to identify the pollen. Observe flowers being visited by pollinators e.g. bees and butterflies in the summer. Observe seeds being blown from the trees e.g. sycamore seeds. Research different types of seed dispersal. Classify seeds in a range of ways including by how they are dispersed. Create a new species of flowering plant <i>Can explain observations made during investigations</i> <i>Can look at the features of seeds to decide on their method of dispersal</i> <i>Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal</i>

Non statutory guidance... *Pupils should 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. Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens. Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might 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.*



Y3	Animals, including humans 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.	<i>Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints</i>	Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients that are needed by the body to stay healthy – carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water. A piece of food will often provide a range of nutrients. Humans and some other animals have skeletons and muscles which help them move and provide protection and support <i>Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients Can name some bones that make up their skeleton giving examples that support, help them move or provide protection Can describe how muscles and joints help them to move</i>	Classify food in a range of ways Use food labels to explore the nutritional content of a range of food items Use secondary sources to find out they types of food that contain the different nutrients Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? Plan a daily diet contain a good balance of nutrients Explore the nutrients contained in fast food Use secondary sources to research the parts and functions of the skeleton Investigate pattern seeking questions such as <ul style="list-style-type: none"> • Can people with longer legs run faster? • Can people with bigger hands catch a ball better? Compare, contrast and classify skeletons of different animals <i>Can classify food into those that are high or low in particular nutrients Can answer their questions about nutrients in food based on their gathered evidence Can talk about the nutrient content of their daily plan Use their data to look for patterns (or lack of) when answering their enquiry question Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons</i>
Non statutory guidance... <i>Pupils should 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. Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out.</i>  Y3 animals including humans_Amelie_final.				
Y3	Rocks 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.	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock piece and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. <i>Can name some types of rock and give physical features of each Can explain how a fossil is formed Can explain that soils are made from rocks and also contain living/dead matter</i>	Observe rocks closely. Classify rocks in a range of ways based on their appearance Devise a test to investigate the hardness of a range of rocks. Devise a test to investigate how much water different rocks absorb. Observe how rocks change over time e.g. gravestones or old building. Research using secondary sources how fossils are formed. Observe soils closely. Classify soils in a range of ways based on their appearance. Devise a test to investigate the water retention of soils. Observe how soil can be separated through sedimentation. Research the work of Mary Anning <i>Can classify rocks in a range of different ways using appropriate vocabulary Can devise tests to explore the properties of rocks and use data to rank the rocks Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily? Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc. Can identify plant/animal matter and rocks in samples of soil Can devise a test to explore the water retention of soils</i>
Non statutory guidance... <i>Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment. Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could 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.</i>  Y3_Rocks_JR.pptx				
Y3	Light: 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.	Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the Sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface. <i>Can describe how we see objects in light and can describe dark as the absence of light Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses Can define transparent, translucent and opaque Can describe how shadows are formed by objects blocking light.</i>	Explore how different objects are more or less visible in different levels of lighting Explore how objects with different surfaces e.g. shiny vs matt are more or less visible Explore how shadows vary as the distance between a light source, an object or surface is changed Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground Choose suitable materials to make shadow puppets Create artwork using shadows <i>Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change Can clearly explain, giving examples, that objects are not visible in complete darkness Can describe and demonstrate how shadows are formed by blocking light Can describe, demonstrate and make predictions about patterns in how shadows vary</i>

Non statutory guidance... Pupils should 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. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change. Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.



y3 Light_Johnny.ppt



Y3	<p>Forces and magnets: 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>	<p>Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole</p>	<p>A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. A magnet attracts magnetic material. Iron and nickel and other materials containing these e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles e.g. a north and south, are brought together they will pull together – attract. For some forces to act there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.</p> <p><i>Can give examples of forces in everyday life</i> <i>Can give examples of objects moving differently on different surfaces</i> <i>Can name a range of types of magnets and show how the poles attract and repel</i> <i>Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets</i></p>	<p>Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc. Explore what materials are attracted to a magnet Classify materials according to whether they are magnetic Explore the way that magnets behave in relation to each other Use a marked magnet to find the unmarked poles on other types of magnets Explore how magnets work at a distance e.g. through the table, in water, jumping paper clip up off the table Devise an investigation to test the strength of magnets</p> <p><i>Can use their results to describe how objects move on different surfaces</i> <i>Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface</i> <i>Can use classification evidence to identify that some metals but not all are magnetic</i> <i>Through their exploration they can show how like poles repel and unlike poles attract and name unmarked poles</i> <i>Can use test data to rank magnets</i></p>
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Non statutory guidance... Pupils should 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). Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking 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; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.




y3 Forces and Magnets_Naithan.ppt

Science Curriculum – Overview for Year 4


National Curriculum <i>links/coverage</i>		Content for Knowledge Organisers		Applying knowledge, enquiry & key questions <i>observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information</i>
		Scientific vocabulary <i>use some scientific language, first, to talk about and, later, to write about what they have found out</i>	Developing scientific knowledge <i>enable pupils to broaden their scientific view of the world around them... exploring, talking about, testing and developing ideas... develop their ideas about functions, relationships and interactions</i>	
Y4	<p>Living things and their habitats:</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>Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate</p> <p> Y4 living things and habitats_Chaya_final</p>	<p>Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.</p> <p>Living things live in a habitat which provides an environment to which they are suited (year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way i.e. positive human impact, such as setting up nature reserves or in a bad way i.e. negative human impact, such as littering. These environments also change with the seasons; different living things can be found in a habitat at different times of the year</p> <p><i>Can name living things living in a range of habitats, giving the key features that helped them to identify them</i></p> <p><i>Can give examples of how an environment may change both naturally and due to human impact</i></p>	<p>Observe plants and animals in different habitats throughout the year</p> <p>Compare and contrast the living things observed</p> <p>Use classification keys to name unknown living things</p> <p>Classify living things found in different habitats based on their features</p> <p>Create a simple identification key based on observable features</p> <p>Use fieldwork to explore human impact on the local environment e.g. litter, tree planting</p> <p>Use secondary sources to find out about how environments may naturally change</p> <p>Use secondary sources to find out about human impact, both positive and negative, on environments</p> <p><i>Can keep a careful record of living things found in different habitats throughout the year (diagrams, tally charts etc.)</i></p> <p><i>Can use classification keys to identify unknown plants and animals</i></p> <p><i>Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter</i></p>
<p>Non statutory guidance... <i>Pupils should 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. Pupils should 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. Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses. 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. Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.</i></p>				
Y4	<p>Animals, including humans:</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>Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain</p> <p> Y4 Animals including humans Dougal.ppt</p>	<p>Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p> <p>Humans have four types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing).</p> <p>Living things can be classified as producers, predators and prey according to their place in the food chain.</p> <p><i>Can sequence the main parts of the digestive system</i></p> <p><i>Can draw the main parts of the digestive system onto a human outline</i></p> <p><i>Can describe what happens in each part of the digestive system</i></p> <p><i>Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for</i></p> <p><i>Can name producers, predators and prey within a habitat</i></p> <p><i>Can construct food chains</i></p>	<p>Research the function of the parts of the digestive system</p> <p>Create a model of the digestive system using household objects</p> <p>Explore eating different types of food, to identify which teeth are being used for cutting, tearing and grinding (chewing)</p> <p>Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls</p> <p>Use food chains to identify producers, predators and prey within a habitat</p> <p>Use secondary sources to identify animals in a habitat and find out what they eat</p> <p><i>Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part.</i></p> <p><i>Can record the teeth in their mouth (make a dental record)</i></p> <p><i>Can explain the role of the different types of teeth</i></p> <p><i>Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores.</i></p> <p><i>Can create food chains based on research</i></p>
<p>Non statutory guidance... <i>Pupils should 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. Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.</i></p>				

<p>Y4</p>	<p>States of matter:</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>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>  <p>Y4 States of Matter_Chaya_final.ç</p>	<p>Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle</p>	<p>A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid. Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0oC. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100oC. Evaporation is the same state change as boiling (liquid to gas) but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.</p> <p>Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.</p> <p><i>Can create a concept map, including arrows linking the key vocabulary</i> <i>Can name properties of solids, liquids and gases</i> <i>Can give everyday examples of melting and freezing</i> <i>Can give everyday examples of evaporation and condensation</i> <i>Can describe the water cycle</i></p>	<p>Observe closely and classify a range of solids Observe closely and classify a range of liquids Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind Classify materials according to whether they are solids, liquids and gases Observe a range of materials melting e.g. ice, chocolate, butter Investigate how to melt ice more quickly Observe the changes when making rocky road cakes or ice-cream Investigating melting point of different materials e.g. ice, margarine, butter and chocolate Explore freezing different liquids e.g. tomato ketchup, oil, shampoo Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration) Observe water evaporating and condensing e.g. on cups of icy water and hot water Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers Use secondary sources to find out about the water cycle</p> <p><i>Can give reasons to justify why something is a solid liquid or gas</i> <i>Can give examples of things that melt/freeze and how their melting points vary</i> <i>From their observations, can give the melting points of some materials</i> <i>Using their data, can explain what affects how quickly a solid melts</i> <i>Can measure temperatures using a thermometer</i> <i>Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup</i> <i>From their data, can explain how to speed up or slow down evaporation</i> <i>Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet</i></p>
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Non statutory guidance... Pupils should 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). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning. Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring 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). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might 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>Y4</p>	<p>Sound:</p> <p>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>  <p>y4 Sound_Hamza.pptx</p>	<p>Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud,</p>	<p>A sound source produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.</p> <p>The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively. Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p> <p><i>Can name sound sources and state that sounds are produced by the vibration of the object.</i> <i>Can state that sounds travel through different mediums such as air, water, metal</i> <i>Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it</i> <i>Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder</i> <i>Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases</i></p>	<p>Classify sound sources Explore making sounds with a range of objects such as musical instruments and other household objects Explore how string telephones or ear gongs work Explore using objects that change in feature to change pitch and volume such as length of guitar string, bottles of water or tuning forks Measure sounds over different distances Measure sounds through different insulation materials</p> <p><i>Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear</i> <i>Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects</i> <i>Can use data to identify patterns in pitch and volume</i> <i>Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium</i></p>
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Non statutory guidance... Pupils should 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. Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.

Y4	<p>Electricity: 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>	<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol N.B. Children in year 4 do not need to use standard symbols as this is taught in year 6</p>	<p>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit the component will not work. A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity</p> <p><i>Can name the components in a circuit</i> <i>Can make electric circuits</i> <i>Can control a circuit using a switch</i> <i>Can name some metals that are conductors</i> <i>Can name materials that are insulators</i></p> <div style="text-align: center;">  Y4 Electricity Dougal.pptx </div>	<p>Construct a range of circuits Explore which materials can be used instead of wires to make a circuit Classify the materials that were suitable/not suitable for wires Explore how to connect a range of different switches and investigate how they function in different ways Choose switches to add to circuits to solve particular problems such as a pressure switch for a burglar alarm Apply their knowledge of conductors and insulators to design and make different types of switch Make circuits that can be controlled as part of a D&T project</p> <p>N.B. Children should be given one component at a time to add to circuits.</p> <p><i>Can communicate structures of circuits using drawings which show how the components are connected</i> <i>Use classification evidence to identify that metals are good conductors and non-metals are insulators</i> <i>Can incorporate a switch into a circuit to turn it on and off</i> <i>Can connect a range of different switches identifying the parts that are insulators and conductors</i> <i>Can add a circuit with a switch to a DT project and can demonstrate how it works</i> <i>Can give reasons for choice of materials for making different parts of a switch</i> <i>Can describe how their switch works</i></p>
<p>Non statutory guidance... Pupils should 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. 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. Pupils might work scientifically by: observing 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>				

Upper key stage 2

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. Pupils should read, spell and pronounce scientific vocabulary correctly.

‘Working and thinking scientifically:

- During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:
- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Notes and guidance (non-statutory): Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should 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. They should 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; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should 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. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.


Science Curriculum – Overview for Year 5

		Content for Knowledge Organisers		
National Curriculum links/coverage	Scientific vocabulary read, spell and pronounce scientific vocabulary correctly.	Developing scientific knowledge enable pupils to develop a deeper understanding of a wide range of scientific ideas... exploring, talking about ideas; asking their own questions about scientific phenomena; and analysing functions relationships and interactions more systematically ... recognise that scientific ideas change and develop over time	Applying knowledge, enquiry & key questions select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary source... draw conclusions based on their data and observations... justify ideas... explain findings...	
Y5	<p>Living things and their habitats:</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>Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings</p>	<p>As part of their life cycle plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.</p> <p><i>Can draw the life cycle of a range of animals identifying similarities and differences between the life cycles</i></p> <p><i>Can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways</i></p>	<p>Use secondary sources and, where possible, first hand observations to find out about the life cycle of a range of animals. Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth. Look for patterns between the size of an animal and its expected life span. Grow and observe plants that reproduce asexually e.g. strawberries, spider plant, potatoes. Take cuttings from a range of plants e.g. African violet, mint. Plant bulbs and then harvest to see how they multiply</p> <p>Use secondary sources to find out about pollination</p> <p><i>Can present their understanding of the life cycle of a range of animals in different ways e.g. drama, pictorially, chronological reports, creating a game</i></p> <p><i>Can identify patterns in life cycles</i></p> <p><i>Can compare two or more animal life cycles studied</i></p> <p><i>Can explain how a range of plants reproduce asexually</i></p>

Non statutory guidance... Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils might work scientifically by: observing and comparing 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. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.


Y5	Animals, including humans: describe the changes as humans develop to old age.	Puberty, primary and secondary sexual characteristics	When babies are young they grow rapidly. They are very dependent on their parents. As they develop they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. This needs to be taught alongside PSHE. Useful guidance can be obtained at: http://www.ase.org.uk/news/aseviews/teaching-about-puberty/ http://www.ase.org.uk/documents/2016-joint-statement-on-reproduction/ <i>Can explain the changes that takes place in boys and girls during puberty</i> <i>Can explain how a baby changes physically as it grows and also what it is able to do</i>	This unit is likely to be taught through direct instruction due to its sensitive nature
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Non statutory guidance... Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.


Y5	Properties and changes of materials: 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.	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material  Y5 Materials and their properties Dio	Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. Mixtures can be separated by filtering, sieving and evaporation. Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. <i>Can use understanding of properties to explain everyday uses of materials. For example, how bricks, wood, glass and metals are used in buildings</i> <i>Can explain what dissolving means, giving examples</i> <i>Can name equipment used for filtering and sieving</i> <i>Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving</i> <i>Can describe some simple reversible and non-reversible changes to materials, giving examples</i>	Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate Investigate rates of dissolving by carrying out comparative and fair test Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton) <i>Can create a chart or table grouping/comparing everyday materials by different properties</i> <i>Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose</i> <i>Can group solids based on their observations when mixing them with water</i> <i>Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water</i> <i>Can explain the results from their investigations involving dissolving and non-reversible change</i>
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Non statutory guidance... Pupils should 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. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should 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. Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: carrying 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?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might 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.

Y5	Earth and space: describe the movement of the Earth, and other planets, relative to the Sun in the solar system	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets	The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365½ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night). As the Earth rotates the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are	Use secondary sources to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth. Use secondary sources to help make a model to show why day and night occur Make first-hand observations of how shadows caused by the Sun
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<p>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.</p>	 Y5 Earth and beyond Isabella.ppt	<p>approximately spherical.</p> <p><i>Can create a voice over for a video clip or animation</i> <i>Can show using diagrams the movement of the Earth and Moon</i> <i>Can explain the movement of the Earth and Moon</i> <i>Can show using diagrams the rotation of the Earth and how this causes day and night</i> <i>Can explain what causes day and night</i></p>	<p>change through the day Make a sundial Research time zones Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel</p> <p>Continued on next page: <i>Can use the model to explain how the Earth moves in relation to the Sun and the moon moves in relation to the Earth</i> <i>Can demonstrate and explain verbally how day and night occur</i> <i>Can explain evidence gathered about the position of shadows in term of the movement of the Earth. Can show this using a model</i> <i>Can explain how a sundial works</i> <i>Can explain verbally using a model why we have time zones</i> <i>Can describe the arguments and evidence used by scientists in the past</i></p>
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Non statutory guidance... Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should 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). They should 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). Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils should 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. Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

<p>Y5 Forces: 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>	<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>  Y5 Forces_Jimmy.pptx	<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p> <p><i>Can demonstrate the effect of gravity acting on an unsupported object</i> <i>Can give examples of friction, water resistance and air resistance</i> <i>Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance</i> <i>Can demonstrate how pulleys, levers and gears work</i></p>	<p>Investigate the effect of friction in a range of contexts e.g. trainers, bath mats, mats for a helter-skelter Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats Explore how levers, pulleys and gears work Make a product that involves a lever, pulley or gear Create a timer that uses gravity to move a ball Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation</p> <p><i>Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface, the particles in the water, air or on the surface slow it down</i> <i>Can demonstrate clearly the effects of using levers, pulleys and gears</i></p>
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Non statutory guidance... Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should 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. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.

Science Curriculum – Overview for Year 6

		Content for Knowledge Organisers		
National Curriculum <i>links/coverage</i>		Scientific vocabulary <i>read, spell and pronounce scientific vocabulary correctly.</i>	Developing scientific knowledge <i>enable pupils to develop a deeper understanding of a wide range of scientific ideas... exploring, talking about ideas; asking their own questions about scientific phenomena; and analysing functions relationships and interactions more systematically ... recognise that scientific ideas change and develop over time</i>	Applying knowledge, enquiry & key questions <i>select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary source... draw conclusions based on their data and observations... justify ideas... explain findings...</i>
Y6	<p>Living things and their habitats: 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>Y6 classification_Kirithu</p>	<p>Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering</p>	<p>Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.</p> <p>Animals can be divided into two main groups – those that have backbones (vertebrates) and those that do not (invertebrates). Vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups including insects, spiders, snails and worms.</p> <p>Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.</p> <p><i>Can give examples of animals in the five vertebrate groups and some of the invertebrate groups</i></p> <p><i>Can give the key characteristics of the five vertebrate groups and some invertebrate groups</i></p> <p><i>Can compare the characteristics of animals in different groups</i></p> <p><i>Can give examples of flowering and non-flowering plants</i></p>	<p>Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important</p> <p>Use first hand observation to identify characteristics shared by the animals in a group</p> <p>Use secondary sources to research the characteristics of animals that belong to a group</p> <p>Use information about the characteristics of an unknown animal or plant to assign it to a group</p> <p>Classify plants and animals presenting this in a range of ways – Venn diagrams, Carroll diagrams and keys</p> <p>Create an imaginary animal which has features from one or more groups</p> <p><i>Can use classification materials to identify unknown plants and animals</i></p> <p><i>Can create classification keys for plants and animals</i></p> <p><i>Can give a number of characteristics that explain why an animal belongs to a particular group</i></p>
<p>Non statutory guidance... <i>Pupils should 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.</i></p> <p><i>Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.</i></p> <p><i>Pupils might work scientifically by: using 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.</i></p>				
Y6	<p>Animals including humans:</p> <p>identify and name the main parts of the human circulatory system, and</p> <p>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>Y6 animals including humans N</p>	<p>Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</p>	<p>The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.</p> <p>Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.</p> <p><i>Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do</i></p> <p><i>Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart</i></p>	<p>Create a role play model for the circulatory system</p> <p>Carry out a range of pulse rate investigations</p> <ul style="list-style-type: none"> Fair test – effect of different activities on my pulse rate Pattern seeking – exploring which groups of people may have higher or lower resting pulse rates Observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate) Pattern seeking – exploring recovery rate for different groups of people <p>Learn about the impact of exercise, diet, drugs and lifestyle on the body. This is likely to be taught through direct instruction due to its sensitive nature</p> <p><i>Use the role play model to explain the main parts of the circulatory system and their role</i></p> <p><i>Can use subject knowledge about the heart whilst writing conclusions for investigations</i></p> <p><i>Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body</i></p> <p><i>Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body</i></p>

<p>Non statutory guidance... Pupils should 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. Pupils should 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. Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.</p>				
<p>Y6</p>	<p>Evolution and inheritance: 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>  <p>Y6 evolution Muharem.ppt</p>	<p>Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils</p>	<p>All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time these inherited characteristics become more dominant within the population. Over a very long period of time these characteristics may be so different to how they were originally that a new species is created. This is evolution. Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.</p> <p><i>Can explain the process of evolution</i> <i>Can give examples of how plants and animals are suited to an environment</i> <i>Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth</i> <i>Give examples of living things that lived millions of years ago and the fossil evidence we have to support this</i> <i>Can give examples of fossil evidence that can be used to support the theory of evolution</i></p>	<p>Design a new plant or animal to live in a particular habitat Use models to demonstrate evolution e.g. Darwin’s finches bird beak activity Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution Make observations of fossils to identify living things that lived on Earth millions of years ago Identify features in animals and plants that are passed on to offspring Explore this process by considering the artificial breeding of animals or plants e.g. dogs Compare the ideas of Charles Darwin and Alfred Wallace on evolution Research the work of Mary Anning and how this provided evidence of evolution</p> <p><i>Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat</i> <i>Can link the patterns seen in the model to the real examples</i> <i>Can explain why the dominant colour of the peppered moth changed over a very short period of time</i></p>
<p>Non statutory guidance... Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should 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. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: At this stage, pupils are not expected to understand how genes and chromosomes work. Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing 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>				
<p>Y6</p>	<p>Light: 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>  <p>y6 Light_Muharem s16correction.pptx</p>	<p>Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous</p> <p>plus straight lines, light rays.</p>	<p>Light appears to travel in straight lines and we see objects when light from them goes into our eyes. The light may come directly from light sources but for other objects some light must be reflected from the object into our eyes for the object to be seen.</p> <p>Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</p> <p><i>Can describe with diagrams or models as appropriate how light travels in straight lines either from sources or reflected from other objects into our eyes.</i> <i>Can describe with diagrams or models as appropriate how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape.</i></p>	<p>Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card</p> <p>Explore the uses of the behaviour of light, reflection and shadows such as in periscope design, rear view mirrors and shadow puppets.</p> <p><i>Can explain how evidence from enquiries shows that light travels in straight lines</i> <i>Can predict and explain with diagrams or models as appropriate how the path of light rays can be directed by reflection to be seen, for example reflection in car rear view mirrors or in a periscope.</i> <i>Can predict and explain with diagrams or models as appropriate how the shape of shadows can be varied.</i></p>
<p>Non statutory guidance... Pupils should 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. Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could 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>				
<p>Y6</p>	<p>Electricity: 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</p>	<p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage NB Children do not need to understand what voltage is but will use volts and voltage to describe</p>	<p>Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.</p>	<p>Explain how a circuit operates to achieve particular operations, such as control the light for a torch with different brightnesses or make a motor go faster or slower Make circuits to solve particular problems such as a quiet and a loud burglar alarm Carry out fair tests exploring changes in circuits Make circuits that can be controlled as part of a D&T project</p> <p>Continued on next page:</p>

	<p>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>	<p>different batteries. The words cells and batteries are now used interchangeably</p> <div data-bbox="647 226 706 289" data-label="Image"> </div> <p data-bbox="667 296 685 317">Y6</p> <p data-bbox="587 317 774 338">Electricity_Julie.ppt</p>	<p>You can use recognised circuit symbols to draw simple circuit diagrams.</p> <p><i>Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs can be changed by increasing or decreasing the number of cells or using cells of different voltages</i></p> <p><i>Can draw circuit diagrams of a range of simple series circuits using recognised symbols</i></p>	<p><i>Can incorporate a switch into a circuit to turn it on and off</i></p> <p><i>Can change cells and components in a circuit to achieve a specific effect</i></p> <p><i>Can communicate structures of circuits using circuit diagrams with recognised symbols</i></p> <p><i>Can devise ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test</i></p> <p><i>Can predict results and answer questions by drawing on evidence gathered</i></p>
<p>Non statutory guidance... <i>Building on their work in year 4, pupils should 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. Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity. Pupils might work scientifically by: systematically identifying 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.</i></p>				