

# Halesowen C of E Primary School



We care, we trust, we believe.

We share, we enjoy, we achieve.

**Science Curriculum**



## Halesowen C of E Curriculum Science Curriculum

### School Vision

Halesowen Church of England Primary School was a school built for the local community. Right from the beginning it was an inclusive school built on strong Christian beliefs. It is our duty to ensure that this deeply Christian core runs through everything we do at Halesowen C of E in the modern day.

We believe children can flourish if they are loved and valued. We have high expectations of everyone because we know they can achieve if someone believes in them. We trust each other and are proud that we are one big family. We care about each and every one of our families. We enjoy the job we do and make school a fun place to be. We share this place Halesowen C of E; a place special to all of us, a place where we can feel safe, a place where we can learn and thrive together.

### Our Halesowen Curriculum Vision

At Halesowen C of E we want all children to have access to a meaningful, fun and exciting, curriculum which is rich with first hand experiences and language. We will ensure pupils are given the opportunities to achieve. We believe that:

“A child is like a butterfly in the wind. Some can fly higher than others, but each one flies the best it can. Each one is different, each one is special, each one is beautiful.”

We value all of our children irrespective of background, culture or academic ability and want them all to experience the breadth of curriculum subjects we offer allowing them to develop their own preferences and interests which they can foster and develop as they learn grow and move on to their next phase of education.



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Curriculum Intent

<p><b>STATUTORY REQUIREMENTS AND NON- STATUTORY GUIDANCE</b></p>	<ul style="list-style-type: none"> <li>• EYFS:- Statutory EYFS framework and Early learning goals. Use of Development Matters 2021- taken predominantly from the Understanding the World Section.</li> <li>• Key stage 1 and 2:- National Curriculum. (School have reordered objectives as they see fit to match our curriculum)</li> <li>• Use of the document “Teaching a Broad and Balanced Curriculum for Education Recovery”</li> <li>• Use of additional resources such as (but not limited to) Twinkl, Manic Street teachers, Association for Science Education, The Primary Science Teaching Trust, Explorify, stem.org.uk</li> </ul>
<p><b>PROVISION</b></p>	<ul style="list-style-type: none"> <li>• Science stands alone in some ways but in others runs through many different subjects with obvious links to things like Geography, DT, Maths but further links in other areas too. Stem is an important aspect of this.</li> <li>• Mathematics knowledge will be applied to help understanding of science and how to collect, present and analyse data.</li> <li>• In EYFS there will be opportunities to learn Science through discussion, play and exploration within half termly topics.</li> <li>• Each term (in key stage 1 and 2) at least one Science aspect will be taught as part of a wider immersive thematic approach. (planned across one bubble/ 2 year groups) Sometimes Science will be the main driver for the topic. Incidental Science opportunities will also be exploited when they arise.</li> <li>• Working scientifically is an integral aspect to covering the specific knowledge in biology, chemistry and physics. It is not a separate strand but it is instead embedded in the skills we teach.</li> </ul>
<p><b>KNOWLEDGE</b></p>	<ul style="list-style-type: none"> <li>• Children need to know about the disciplines of biology, chemistry and physics.</li> <li>• Each aspect should be explored in depth. The aspects of knowledge are covered in the national curriculum can be explained to primary age children under the categories of Life Processes and living things (Biology), Materials and their properties (Chemistry) and Physical processes (Physics). It is important not to just scratch the surface and to be very clear what knowledge is required.</li> <li>• The knowledge in each aspect is intended to be progressive and is designed to build on prior learning but to ensure acquisition deliberately overlaps and is repetitive.</li> <li>• Aspects are revisited in different year groups and through different themes and topics.</li> <li>• There is a focus on retention of knowledge and this is addressed in a number of ways such as quizzes.</li> </ul>
<p><b>SKILLS</b></p>	<ul style="list-style-type: none"> <li>• There is a planned skills progression through the aspect of “Working Scientifically”</li> <li>• These skills are categorised in the following key areas: Planning and Communication; Enquiry and investigation; Using and Interpreting Sources; Observing, recording and presenting; considering evidence and drawing conclusions.</li> <li>• Transfer of skills is encouraged across different subjects for example using presentation skills such as writing (English) graphs (maths)</li> </ul>



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<b>MEANINGFUL START POINTS</b>	<ul style="list-style-type: none"> <li>• Children need to know where subjects exist in real life. “We are Scientists”. They need to know how science is used for today and for the future. They need to know how Science has changed our lives and is vital to the world’s development.</li> <li>• They need to understand what Science is and when we are learning a Science aspect within our topic.</li> <li>• Children should be taught the knowledge required to understand Science in our world</li> <li>• Stem links should always be looked for- try to link Science to “real life”</li> <li>• Initial learning should link to the child and their part in the subject in real life. In Science each theme or topic should always start – How does the scientific aspect relate to me and my life?</li> </ul>
<b>VOCABULARY AND LANGUAGE</b>	<ul style="list-style-type: none"> <li>• Children should build a bank of subject and topic specific vocabulary – understanding meanings and define words then use in the correct context.</li> <li>• Pupils need to be familiar with and use technical terminology accurately and precisely.</li> <li>• They should use language to question, enquire, compare, contrast, explain, justify and debate in a scientific context.</li> </ul>
<b>ENRICHMENT OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>• Children should be encouraged to be curious and ask questions about the world around them.</li> <li>• To bring alive the knowledge of all aspects of Science children should experience things first hand through trips and visitors.</li> <li>• Further aspects of Science can be developed through the use of technology. (STEM)</li> <li>• Relevant and meaningful opportunities should be provided linked to their local area, individual interests, current affairs or events, culture, community and other aspects of the curriculum e.g. what is the best material to make a Viking Longboat? Which animals is best suited to the North Pole? How can I make a healthy lunch?</li> <li>• Making the most of resources available- for example seeing the churchyard as an asset- looking at trees in there, the stone the gravestones are made from.</li> <li>• Using all of our senses to be fully immersed in learning- what can they hear, see, smell – this helps with investigation.</li> </ul>
<b>INDIVIDUAL DEVELOPMENT</b>	<ul style="list-style-type: none"> <li>• Ensure equality so all children can access learning (SEND). Consider ways children who struggle with English skills can access and present learning</li> <li>• Allow opportunities for curiosity and fascination in all subjects and topics- create awe and wonder about the world they live in.</li> <li>• Make time for children to be inquisitive and develop learning in their own way- let them own their learning journey for example- link to places they have visited.</li> <li>• Nurture ambitions and aspirations- talk about careers where geography learning can be useful.</li> <li>• Develop a love for Science and understanding how and why things happen/ work. Know how science can make things better e.g. technology, new medicines etc. Know that everyone can access this learning and take an interest in science.</li> </ul>



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Knowledge Progression map

Aspect	EYFS	Key stage 1	Lower key stage 2	Upper key stage 2
<p><b>Life processes and living things (Biology)</b></p>	<p><b>Explore the natural world around them</b></p> <ul style="list-style-type: none"> <li>Outdoor play and exploration</li> <li>Give children freedom to touch, smell and hear the natural world.</li> <li>Discuss how we care for the natural world around us</li> <li>After close observation draw pictures of animals and plants</li> </ul> <p><b>Describe what they see, hear and feel whilst outside</b></p> <ul style="list-style-type: none"> <li>Encourage focused observation of the natural world.</li> <li>Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.</li> <li>Name and describe some plants and animals they see.</li> </ul> <p><b>Plants</b></p> <ul style="list-style-type: none"> <li>Plant seeds and care for growing plants.</li> </ul>	<p><b>Plants</b></p> <ul style="list-style-type: none"> <li>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>identify and describe the basic structure of a variety of common flowering plants, including trees</li> <li>observe and describe how seeds and bulbs grow into mature plants</li> <li>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</li> <li>identify and name a variety of plants in their habitats</li> </ul> <p><b>Animals (humans)</b></p> <ul style="list-style-type: none"> <li>identify and name a variety of common mammals including humans</li> <li>identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>identify, name, draw and label the basic parts of the</li> </ul>	<p><b>Plants</b></p> <ul style="list-style-type: none"> <li>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>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</li> <li>investigate the way in which water is transported within plants</li> <li>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> <li>Explore and use classification keys to help group, identify and name a variety of plants in their local and wider environment.</li> <li>Recognise that living things can be grouped in a variety of ways</li> </ul>	<p><b>Plants</b></p> <ul style="list-style-type: none"> <li>describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including plants.</li> <li>give reasons for classifying plants based on specific characteristics</li> <li>describe the life process of reproduction in some plants</li> </ul> <p><b>Animals (humans)</b></p> <ul style="list-style-type: none"> <li>describe the changes as humans develop to old age</li> <li>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> <li>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>describe the ways in which nutrients and water are</li> </ul>



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	<ul style="list-style-type: none"> <li>• Understand the key features of the life cycle of a plant</li> <li>• Begin to understand the need to respect and care for the natural environment.</li> </ul> <p><b>Animals</b></p> <ul style="list-style-type: none"> <li>• Understand the key features of the life cycle of different animals.</li> <li>• Begin to understand the need to respect and care for animals.</li> </ul>	<p>human body and say which part of the body is associated with each sense</p> <ul style="list-style-type: none"> <li>• find out about and describe the basic needs of humans, for survival (water, food, air)</li> <li>• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> </ul> <p><b>Animals</b></p> <ul style="list-style-type: none"> <li>• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>• identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>• describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</li> <li>• find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> </ul>	<p><b>Animals (humans)</b></p> <ul style="list-style-type: none"> <li>• identify that humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</li> <li>• identify that humans have skeletons and muscles for support, protection and movement</li> <li>• describe the simple functions of the basic parts of the digestive system in humans</li> <li>• identify the different types of teeth in humans and their simple functions</li> </ul> <p><b>Animals</b></p> <ul style="list-style-type: none"> <li>• Confidently identify different animals including fish, amphibians, reptiles, birds and mammals and be able to describe a group them according to what they eat (herbivore, carnivore, omnivore), how they move, what they look like (e.g. Feathers, scales)</li> <li>• identify that animals, need the right types and amount</li> </ul>	<p>transported within animals, including humans</p> <p><b>Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>• Describe the life process of reproduction in some plants and animals</li> <li>• 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</li> <li>• give reasons for classifying plants and animals based on specific characteristics</li> </ul> <p><b>Evolution and inheritance</b></p> <ul style="list-style-type: none"> <li>• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> </ul>
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		<p><b>Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>• explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>• 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</li> <li>• identify and name a variety of plants and animals in their habitats, including microhabitats</li> <li>• 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</li> </ul> <p><b>Evolution and inheritance</b></p> <ul style="list-style-type: none"> <li>• Notice that animals, including humans, have offspring which grow into adults</li> <li>• Begin to discuss how animals and plants are adapted to</li> </ul>	<p>of nutrition, and that they cannot make their own food; they get nutrition from what they eat</p> <ul style="list-style-type: none"> <li>• identify that some animals have skeletons and muscles for support, protection and movement</li> <li>• construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul> <p><b>Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways</li> <li>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things</li> </ul> <p><b>Evolution and inheritance</b></p> <ul style="list-style-type: none"> <li>• recognise that living things produce offspring of the</li> </ul>	<ul style="list-style-type: none"> <li>• recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>• identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul>
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		<p>suit their environment in different ways</p>	<p>same kind, but normally offspring vary and are not identical to their parents</p> <ul style="list-style-type: none"> <li>identify how animals and plants are adapted to suit their environment in different ways</li> </ul>	
<p><b>Materials and their properties ( Chemistry)</b></p>	<p><b>Explore the natural world around them</b></p> <ul style="list-style-type: none"> <li>Observe and interact with natural processes such as changing states of matter (e.g. ice melting), a boat floating on water,</li> <li>Explore and talk about different forces they can feel e.g. friction, upthrust (in water)</li> </ul> <p><b>Everyday materials</b></p> <ul style="list-style-type: none"> <li>Talk about the differences between materials</li> <li>Talk about changes they notice can be made to materials e.g. melted, burnt, torn.</li> </ul>	<p><b>Everyday materials</b></p> <ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of everyday materials on the basis of their simple physical properties</li> </ul> <p><b>Uses of everyday materials</b></p> <ul style="list-style-type: none"> <li>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass,</li> </ul>	<p><b>States of matter</b></p> <ul style="list-style-type: none"> <li>compare and group materials together according to whether they are solids, liquids or gases.</li> <li>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.</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul> <p><b>Rocks</b></p> <ul style="list-style-type: none"> <li>compare and group together different kinds of rocks on the basis of their appearance</li> </ul>	<p><b>Properties and changes of materials</b></p> <ul style="list-style-type: none"> <li>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</li> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>give reasons, based on evidence from comparative</li> </ul>





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		<p>brick, rock, paper and cardboard for particular uses</p> <ul style="list-style-type: none"> <li>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<p>and simple physical properties.</p> <ul style="list-style-type: none"> <li>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>Recognise that soils are made from rocks and organic matter.</li> </ul>	<p>and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <ul style="list-style-type: none"> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>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</li> </ul>
<p><b>Physical processes ( Physics)</b></p>	<p><b>Explore the natural world around them</b></p> <ul style="list-style-type: none"> <li>Observe and interact with natural processes such as a sound causing vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object.</li> </ul> <p><b>Understand the effect of changing seasons on the natural world around them.</b></p>	<p><b>Forces</b> (not formal unit)</p> <ul style="list-style-type: none"> <li>Begin to compare how things move on different surfaces</li> </ul> <p><b>Magnets</b> (not formal unit)</p> <p>Begin to investigate magnets in investigation</p> <p><b>Light</b> (not formal unit)</p> <ul style="list-style-type: none"> <li>Begin to investigate light and dark through investigations</li> </ul> <p><b>Electricity</b> (not formal unit)</p>	<p><b>Forces and magnets</b></p> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between 2 objects, but magnetic forces can act at a distance</li> <li>observe how magnets attract or repel each other and attract some materials and not others</li> <li>compare and group together a variety of everyday materials on the basis of whether they are attracted to</li> </ul>	<p><b>Forces</b></p> <ul style="list-style-type: none"> <li>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</li> </ul>



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	<ul style="list-style-type: none"> <li>• Draw children’s attention to the weather and seasonal features.</li> <li>• Provide opportunities to note and record the weather.</li> <li>• Throughout the year observe how seasons change and the affect this has on the natural world including animals.</li> </ul>	<ul style="list-style-type: none"> <li>• Begin to investigate electricity in cross curricular investigation and through stories ( e.g. through the use of technology as a told to aid learning)</li> </ul> <p><b>Sound</b> (not formal unit)</p> <ul style="list-style-type: none"> <li>• Begin to investigate sound through play and investigation.</li> </ul> <p><b>Earth and space</b> (not formal unit)</p> <ul style="list-style-type: none"> <li>• Begin to investigate Earth and Space in cross curricular investigation and through stories</li> </ul> <p><b>Seasonal changes</b></p> <ul style="list-style-type: none"> <li>• Observe changes across the 4 seasons</li> <li>• Observe and describe weather associated with the 4 seasons and how day length varies.</li> </ul>	<p>a magnet, and identify some magnetic materials</p> <ul style="list-style-type: none"> <li>• describe magnets as having 2 poles</li> <li>• predict whether 2 magnets will attract or repel each other, depending on which poles are facing</li> </ul> <p><b>Light</b></p> <ul style="list-style-type: none"> <li>• recognise that they need light in order to see things and that dark is the absence of light</li> <li>• notice that light is reflected from surfaces</li> <li>• recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>• recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> <li>• find patterns in the way that the size of shadows changes</li> </ul> <p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>• identify common appliances that run on electricity</li> </ul>	<p><b>Light</b></p> <ul style="list-style-type: none"> <li>• recognise that light appears to travel in straight lines</li> <li>• 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</li> <li>• 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</li> <li>• use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul> <p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>• compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</li> </ul>
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			<ul style="list-style-type: none"><li>• construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li><li>• 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</li><li>• recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li><li>• recognise some common conductors and insulators, and associate metals with being good conductors</li></ul> <p><b>Sound</b></p> <ul style="list-style-type: none"><li>• identify how sounds are made, associating some of them with something vibrating</li><li>• recognise that vibrations from sounds travel through a medium to the ear</li><li>• find patterns between the pitch of a sound and features of the object that produced it</li></ul>	<ul style="list-style-type: none"><li>• use recognised symbols when representing a simple circuit in a diagram</li></ul> <p><b>Earth and space</b></p> <ul style="list-style-type: none"><li>• describe the movement of the Earth and other planets relative to the sun in the solar system</li><li>• describe the movement of the moon relative to the Earth</li><li>• describe the sun, Earth and moon as approximately spherical bodies</li><li>• use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</li></ul>
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			<ul style="list-style-type: none"><li>• find patterns between the volume of a sound and the strength of the vibrations that produced it</li><li>• recognise that sounds get fainter as the distance from the sound source increases</li></ul>	
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Skills Progression map

Aspect	EYFS	Key stage 1	Lower key stage 2	Upper key stage 2
<b>Using and interpreting sources</b>	<ul style="list-style-type: none"> <li>Share sources as a class that support ideas being taught or questions being asked.</li> </ul>	<ul style="list-style-type: none"> <li>Use sources to find answers to simple questions</li> <li>Use a range of simple texts to find out information</li> </ul>	<p>Use sources to find out information to support an investigation including non-fiction texts.</p>	<ul style="list-style-type: none"> <li>Use scientific evidence and sources that has been used to support or refute ideas or arguments such as non-fiction books and online sources.</li> </ul>
<b>Planning and Communication</b>	<ul style="list-style-type: none"> <li>Ask questions to find things out – using why?</li> <li>Talk about what they want to know and how we could find out- guided by the adult.</li> <li>Draw simple pictures of how we will find out.</li> <li>Predict what might happen using sentence starters from the adult. Look at equipment they might use and talk about how to use it.</li> </ul>	<ul style="list-style-type: none"> <li>Ask questions to find out about a concept.</li> <li>Suggest how they might find things out</li> <li>With support- plan (as a class) simple tests discussing how we can ensure they are fair</li> <li>Draw simple pictures to plan</li> <li>Make simple predictions</li> <li>Discuss how to use equipment given</li> </ul>	<ul style="list-style-type: none"> <li>Begin to plan their own investigations or aspects of an investigation to answer questions.</li> <li>Put forward their own ideas of how to find the answers to questions</li> <li>Plan a fair test with support</li> <li>Recognise and explain why it is a fair test.</li> <li>Make predictions</li> <li>Select and choose suitable equipment</li> </ul>	<ul style="list-style-type: none"> <li>Plan different types of scientific enquires to answer questions including recognising and controlling variables where necessary ensuring the carry out a fair test.</li> <li>Make predictions based on previous scientific knowledge and understanding</li> <li>Plan making their own decisions what observations to make, what measurements to use and how long to make them for and also choose the most appropriate equipment to use.</li> </ul>



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<p><b>Enquiry and investigation</b></p>	<ul style="list-style-type: none"> <li>• Ask questions to find things out – using why</li> <li>• In child-initiated time explore and investigate using resources available to them.</li> <li>• Guided by an adult complete a full investigation e.g. growing bean.</li> <li>• Talk about how we can make a test fair.</li> <li>• Observe the teacher using simple measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Explore the world around them by asking questions</li> <li>• Ask and answer questions that can be answered in different ways</li> <li>• Take part in practical activities to investigate questions to test ideas suggested to them.</li> <li>• Perform simple tests- ensuring they are fair tests and recognise when a test is unfair.</li> <li>• Use simple measurements and equipment e.g. magnifying glasses, egg timers to gather data.</li> <li>• Make comparisons</li> </ul>	<ul style="list-style-type: none"> <li>• Further develop their understanding of the world around them by asking questions.</li> <li>• Carry out their own investigations or aspects of an investigation to answer questions.</li> <li>• Set up simple practical investigations</li> <li>• Carry out simple comparative and fair tests</li> <li>• Be able to say which factor will vary whilst the others stay the same. (with support)</li> <li>• Use equipment accurately such as thermometers, measuring equipment and data loggers to take measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Drawing on their previous scientific understanding ask questions of the world around them to aid investigation.</li> <li>• Carry out their own investigations to answer questions.</li> <li>• Recognise the key factors to be considered when carrying out a fair test.</li> <li>• Be able to say which factor will vary whilst the others stay the same.</li> <li>• Take measurements, using a range of scientific equipment with increasing accuracy and precisions- taking repeat readings when appropriate</li> </ul>
<p><b>Observing, recording and presenting</b></p>	<ul style="list-style-type: none"> <li>• Use their senses where appropriate.</li> <li>• Make observations using pictures/ photos to record.</li> <li>• Present findings as a class/ group e.g. on the working wall.</li> <li>• Begin to be introduced to some simple scientific language.</li> </ul>	<ul style="list-style-type: none"> <li>• Observe closely using their senses</li> <li>• Observe using simple equipment in single sessions or over time</li> <li>• Use simple equipment to carry out the investigation.</li> <li>• Identify and classify into simple groups/ categories</li> <li>• Gather and record simple data</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and careful observations</li> <li>• Gather, record, classify and present data in a variety of ways to answer questions</li> <li>• Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and accurate observations</li> <li>• Record observations systematically (often a series of observations)</li> <li>• Gather, record, classify and present data in a variety of ways to answer questions</li> <li>• Record data and results of increasing complexity using scientific diagrams and</li> </ul>



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		<ul style="list-style-type: none"> <li>• Present findings using simple scientific language, drawings and diagrams</li> </ul>	<ul style="list-style-type: none"> <li>• Measure using given equipment accurately</li> <li>• Present findings using scientific language, drawings, labelled diagrams, keys, bar charts and tables.</li> </ul>	<p>labels, classification keys, tables, bar, scatter and line graphs</p> <ul style="list-style-type: none"> <li>• Use and develop keys and other information to record, identify, classify and describe living things and materials and begin to identify patterns</li> <li>• Measure using equipment accurately using scales. Present findings using appropriate scientific vocabulary, scientific diagrams and labels, classification keys, tables, bar, scatter and line graphs</li> </ul>
<p><b>Considering evidence and drawing conclusions.</b></p>	<ul style="list-style-type: none"> <li>• Say what has happened.</li> <li>• Refer back to predictions</li> <li>• Refer back to our original why questions and be able to answer.</li> </ul>	<ul style="list-style-type: none"> <li>• Say what has happened.</li> <li>• Say whether what has happened is what they expected (predicted)</li> <li>• Use their observations to suggest simple answers to questions</li> <li>• Begin to draw conclusions and explain what they did.</li> <li>• Make simple comparisons and sort and group things</li> <li>• Begin to notice patterns</li> <li>• Suggest ways to improve their investigation</li> </ul>	<ul style="list-style-type: none"> <li>• Draw simple conclusions using scientific language</li> <li>• Report on findings, using oral and written explanations, displays or presentations of conclusions</li> <li>• Use results to draw simple conclusions and relate back to predictions made.</li> <li>• Make further predictions and suggest ways to improve further investigations</li> </ul>	<ul style="list-style-type: none"> <li>• Draw conclusions using scientific language</li> <li>• Use test results to make further predictions to set up further comparative and fair tests</li> <li>• Report and present findings from enquiries, and use these to draw conclusions that are consistent with evidence presented.</li> <li>• Use relevant scientific language to draw conclusions and justify their scientific ideas by</li> </ul>



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			<ul style="list-style-type: none"><li>• Look for patterns and relationships in findings when drawing conclusions.</li><li>• Identify differences, similarities or changes related to scientific ideas</li><li>• Use straightforward scientific evidence to answer questions or support findings. Suggest ways to improve their investigation, giving reasons.</li></ul>	<p>identifying patterns and relationships where appropriate</p> <ul style="list-style-type: none"><li>• Offer simple explanations for any differences in their results</li><li>• Make practical suggestions about how their working methods could be improved.</li></ul>
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Science whole school thematic overview

	Autumn		Spring	Summer
<b>Year 1</b>	<p><b><u>Plants and Seasonal changes</u></b></p> <p><i>These science topics will run throughout the year and can be revisited at least once every term. This is so that children can use evidence in our local environment of changes in weather and plants throughout the seasons.</i></p> <ul style="list-style-type: none"> <li>Identify and name a variety of common and wild garden plants, including deciduous and evergreen trees.</li> <li>Identify and describe the basic structure of a variety of common flowering plants including trees.</li> </ul> <p>Examples: explore plants growing in the school habitat and those in the wider area (graveyard,</p>	<p><b>Home and Away</b></p> <p><b><u>Animals including humans</u></b></p> <ul style="list-style-type: none"> <li>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</li> </ul> <p>Examples: chn to learn a range of body parts including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth and teeth. Chn to use games, actions songs and rhymes to help remember vocabulary. Use their senses to compare different textures, sounds and smells. Chn to work scientifically to</p>	<p><b>The Big Smoke</b></p> <p><b><u>Animals including humans</u></b></p> <ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, and mammals including pets)</li> </ul> <p>Examples: chn to use the local environment throughout the year to explore and answer questions about animals in their habitat. Chn to understand how to look after different pets, and animals in their local environment (e.g. minibeasts how do we handle them in containers and release them safely). Chn to identify common names of animals, and know which can be kept as pets. Chn to identify different diets of animals. Chn to work scientifically using their observations to compare and contrast animals through first hand experiences with animals, photographs and videos. Chn to group animals in different ways based on similarities and differences.</p>	<p><b>Poles Apart</b></p> <p><b><u>Everyday materials</u></b></p> <ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> <li>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>Describe the simple physical properties of a variety of everyday materials</li> <li>Compare and group together a variety of everyday materials on the basis of their simple properties.</li> </ul> <p>Examples: 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. Explore and experiment with a wide variety of materials (not just those in the statutory guidance) e.g. brick, paper, fabrics, elastics, foil. Chn to work scientifically by performing simple tests about the properties of materials, for example: “what is the best material for an umbrella? For warm mittens? for an explorers sledge” (could link to topic where relevant)</p>



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	<p>around Halesowen, allotments). Discuss the different between wild flowers/ plants and those that have been planted by people. Chn to plant their own vegetables or flowers and observe how they change over time. Chn to label different parts of a plant e.g. roots, bulb, stem, trunk, branches. Work scientifically using magnifying glasses to explore plants up close, thinking about visual, textural, aromatic differences. Keep a record of changes over time in different ways e.g. photographs, sketches, diary, collecting samples of leaves/ seeds.</p> <ul style="list-style-type: none"><li>• Observe the changes across the 4 seasons</li><li>• Observe and describe weather associated with the seasons and</li></ul>	<p>investigate the different senses e.g. taste trying sweet, bitter, salty foods. Chn to consider what life might be like without one of our senses e.g. what if we were blind or deaf.</p>		
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	<p>how the day length varies. Examples: observe the weather at different points of the year. Ensure children know about the dangers of looking directly at the sun. Record their findings in different ways e.g. photographs, tables and charts, using weather forecasts. Chn to notice the impact of seasons on plants and people (clothing). Measure how long the day is and how this changes- chn to make predictions throughout the year.</p>			
<p><b>Year 2</b></p>	<p><b>Bostin' Black Country</b></p> <p><u>Living Things and Their Habitats</u></p> <ul style="list-style-type: none"> <li>• Explore and compare the differences between things that are living, dead and things that have never been alive.</li> <li>• 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.</li> </ul>	<p><b>Iceberg Ahead!</b></p> <p><u>Animals including humans</u></p> <ul style="list-style-type: none"> <li>• Find out about and describe the basic needs of animals, including humans, for survival (water, food, air)</li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> </ul> <p>Examples: chn to know what animals and humans need for survival, as well as the importance of exercise and nutrition for humans. Discussion points</p>	<p><b>African Adventure</b></p> <p><u>Plants</u></p> <ul style="list-style-type: none"> <li>• Observe and describe how seeds and bulbs grow into mature plants.</li> <li>• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</li> </ul> <p>Examples: chn to use the local environment throughout the year to observe how different plants grow (this could be done as a lesson once each term/half term to observe plants in the environment- create a calendar or diary growth). Chn to know the</p>	



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- Identify and name a variety of plants and animals in their habitats, including microhabitats.
- Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Examples: chn to understand that all living things have certain characteristics that are essential for keeping them alive and healthy. Chn to raise and answer questions to help them become familiar with life processes. Chn should identify differences in habitats and microhabitats. Chn should use prior knowledge to identify plants and animals in their local environments- expand this by explaining why these are suited to their environment. Chn to observe how living things depend on each other e.g. plants are a source of food and shelter for animals. Chn to compare animals found in familiar habitats to those found in less familiar habitats e.g. seashore. Chn to work scientifically by sorting and classifying and record their ideas using charts and diagrams. Chn to use their scientific vocabulary to explain their sorting choices. Chn to construct simple food chains. Chn to investigate why different microhabitats attract higher numbers of wildlife e.g. woodlice investigation- which microhabitat do they go to? (logs, leaves, soil, stones)

of what would happen if we were missing some things we need for survival. Chn to work scientifically by recording diary of diet to monitor healthy diets. Chn to record impact of exercise on the body e.g. how fast your heart beats after exercise. Investigate the importance of hygiene e.g. hand washing experiment (germs growing on bread)

### Uses of 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.
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Examples: discuss the uses of different everyday materials so they become familiar with how some materials can be used for more than one purpose (e.g. metal can be used for coins, cans, cars); or different materials can be used for the same thing (e.g. spoons can be made from metal, plastic, wood). Chn to think about properties that make them suitable and unsuitable for particular purposes. Chn could also find out about people who developed useful new materials e.g. John Dunlop (rubber for tyres), Charles Macintosh (raincoats) and John McAdam (tarmac/road surfaces). Chn to work scientifically by comparing uses of everyday materials found in a variety of places (home, journey

requirements of plants for germination, growth and survival. Chn to observe the process of growth in plants. Chn to work scientifically by observing and recording the growth of a variety of plants as they change over time from a seed or bulb e.g. use of photographs to show progress over time, plant quick growing plants such as beans or sunflowers to measure periodically. Chn to observe similar plants at different stages of growth. Chn to set up a comparative test to show that plants need light and water to stay healthy.

### Animals including humans

- Notice that animals, including humans, have offspring which grow into adults.

Examples: chn should be introduced to the process of reproduction e.g. birds and reptiles lay eggs, mammals carry their young. (they should not be expected to understand how reproduction occurs.) Chn to explain how animals grow, using vocabulary such as egg, chick, chicken; egg, caterpillar, pupa, butterfly. Growing into adults can be linked to PSHE unit of Changing Me. Chn to work scientifically by observing through video or first-hand observation e.g. chn to hatch butterflies from caterpillars.



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		to school, in songs and rhymes). Chn to record their observations of materials, using photos and labels.	
<p><b>Year 3</b></p>	<p><b>The Chocolate Factory</b></p> <p><u>States of Matter</u></p> <ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>• 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)</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul> <p>Examples: chn to explore a variety of everyday materials and develop simple descriptions of the states of matter e.g. solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container. Chn should observe water in all states (solid, liquid and gas) and should note how these changes occur when it is heated or cooled. At this stage avoid where heating is associated with chemical change for example through baking. Chn to work scientifically by grouping and classifying different materials. Chn to explore the effect of temperature on substances such as chocolate, butter and ice-cream. Chn to research the melting/ evaporation points of different materials. Chn to observe and record evaporation over time e.g. the size of a puddle on the playground, or the time taken</p>	<p><b>Why Rome wasn't built in a day</b></p> <p><u>Rocks</u></p> <ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> </ul> <p>Examples: link to geography work, chn to explore different rocks and soils, including those found in the local environment. Chn to work scientifically by observing rocks, considering their different uses and purposes e.g. for building, for gravestones. Chn to explore how rocks have changed over time e.g. effect of weathering or human factors. Chn to use magnifiers and microscopes to help to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Chn to research and discuss the different kinds of living things whose fossils can be found in sedimentary rock, and understand how fossils are formed. Chn to explore different soils and identify similarities and differences between them. Raise and answer questions about the ways soils are formed.</p> <p><u>Animals including humans</u></p> <ul style="list-style-type: none"> <li>• Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their</li> </ul>	<p><b>Under the Canopy</b></p> <p><u>Plants</u></p> <ul style="list-style-type: none"> <li>• Identify and describe the functions of different parts of flowering plants: roots, stem/ trunk, leaves and flowers.</li> <li>• 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</li> <li>• Investigate the way in which water is transported within plants.</li> <li>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation, and seed dispersal.</li> </ul> <p>Examples: chn to be introduced to the relationship between structure and function, the idea that every part of the plant has a job to do. They should explore questions which focus on the role of the roots and stem in nutrition and support, the leaves for nutrition and the flower for reproduction. Chn should know that plants can make their own food (but they do not need to understand how this process happens). Chn to work scientifically by comparing the effect of different factors on plant growth e.g. amount of light, type of light, type of soil/ fertiliser, type of liquid plants are fed. Chn to discover hoe seeds are formed by observing the different stages of plant life cycles over a period of</p>



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	<p>for washing to dry. Chn to set up an investigation to see how different factors can alter the rate of melting e.g. by adding things to ice can they accelerate or decelerate the rate of melting ice.</p>	<p>own food; they get nutrition from what they eat</p> <ul style="list-style-type: none"><li>• Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</li></ul> <p>Examples: chn to continue to learn about the importance of nutrition, and should be introduced to the main body parts associated with the skeleton and muscles, finding how different parts of the body have special functions. Chn to work scientifically by identifying and grouping animals with and without skeletons, observing and comparing their movements, chn to explore the idea of what humans would be like with no skeleton. Chn to compare and contrast the diets of different animals, and decide ways of grouping them based on diets. Chn to research different food groups and how they keep us healthy.</p>	<p>time (using videos and setting up their own plants and observing). Chn to look for patterns in the structure of fruits that relate to how seeds are dispersed- chn to make observations of plants in the local environment and ways in which they disperse seeds. Chn to observe how water is transported in plants e.g. celery or carnations in coloured water.</p> <p><b><u>Living Things and their Habitats</u></b></p> <ul style="list-style-type: none"><li>• Recognise that living things can be grouped in a variety of ways.</li><li>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li><li>• Recognise that environments can change and that this can sometimes pose dangers to living things.</li></ul> <p>Examples: chn to use the local environment throughout the year to raise and answer questions that help to identify and study plants and animals in their habitats e.g. why do lots of squirrels live in the grave yard? Are there more deciduous or evergreen trees in the church yard? Chn should identify how the habitat has changed over the year (take photos periodically to look back on). Chn to explore possible ways of groups a wide selection of living things that include animals and flowering /non-flowering plants. Chn to begin to put vertebrate animals into groups such as fish, amphibians, reptiles, birds and mammals; and invertebrates into snails, slugs, worms, spiders and insects. Chn should explore examples of both positive and negative human impact on environments e.g. positive effects of nature reserves and garden ponds, and the negative</p>
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			effects of population, litter and deforestation. Chn to work scientifically by using and making simple guides or keys to explore and identify local plants and animals, make a guide to local living things, raising the answering questions based on their observation of animals.
<b>Year 4</b>	<p><b>Best of British</b></p> <p><b><u>Forces and Magnets</u></b></p> <ul style="list-style-type: none"> <li>• Compare how things move on different surfaces</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others</li> <li>• 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</li> <li>• Describe magnets as having two poles</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul> <p>Examples: chn to observe that magnetic forces can act without direct contact, unlike most forces. Chn to explore the behaviour and everyday uses for different magnets e.g. bar, ring, button, horseshoe. Chn to work scientifically by comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things</p>	<p><b>Raid, Invade and Stayed!</b></p> <p><b><u>Animals including humans</u></b></p> <ul style="list-style-type: none"> <li>• Describe the simple functions of the basic parts of the digestive system in humans</li> <li>• Identify the different types of teeth in humans and their simple functions</li> <li>• Construct and interpret a variety of food chains, identifying producers, predators and prey.</li> </ul> <p>Examples: chn to be introduced to main body parts associated with the digestive system e.g. mouth, tongue, teeth, oesophagus, stomach, small/ large intestine, and explore questions that help them to understand their special functions. Chn to work scientifically comparing the teeth of carnivores and herbivores, suggesting reasons for differences. Chn to investigate what damages teeth e.g. egg shell in different liquids; and ways we can look after our teeth.</p>	<p><b>Mexico and the Mayans</b></p> <p><b><u>Light</u></b></p> <ul style="list-style-type: none"> <li>• recognise that they need light in order to see things and that dark is the absence of light</li> <li>• notice that light is reflected from surfaces</li> <li>• recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>• recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> <li>• find patterns in the way that the size of shadows change.</li> </ul> <p>Examples: chn 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: chn should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Chn might work scientifically by: looking for patterns in what happens to shadows when the</p>



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move on different surfaces and gathering and recording data to find answers their questions. Chn to explore the strengths of different magnets and find a fair way to compare them e.g. how many paper clips will they hold up? Chn to sort materials into those that are magnetic and those that are not, looking for patterns and identifying how these properties make materials useful for everyday items. Chn to make predictions about the relationships of magnets and how they will attract or repel each other.

### **Sound**

- 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

Examples: chn should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world, find out how the pitch and volume of sounds can be changed in a variety of ways. Chn to work scientifically by finding patterns in the sounds that are made by different objects e.g. different size or thickness of elastic bands. Chn to investigate which materials insulate sound best. Chn could make and

light source moves or the distance between the light source and the object changes e.g. measuring how shadows change as the light source moves, measuring shadows throughout the day (sunlight). Chn to investigate best material to use for a sunshade, using knowledge of opacity (measure temperature underneath different material shades).

### **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.

Examples: chn 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. Chn should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Chn should be taught about precautions for working safely with





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	<p>play their own instruments using what they have found out about pitch and volume.</p>		<p>electricity. Chn 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>
<p><b>Year 5</b></p>	<p style="text-align: center;"><b>Rock and Roll</b></p> <p><b><u>Living Things and their Habitats</u></b></p> <ul style="list-style-type: none"> <li>describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</li> <li>give reasons for classifying plants and animals based on specific characteristics.</li> </ul> <p>Examples: chn should build on their learning about grouping living things in LKS2 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. Chn to find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. Chn to 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</p>	<p style="text-align: center;"><b>Water of life</b></p> <p><b><u>Properties and changes of Materials</u></b></p> <ul style="list-style-type: none"> <li>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</li> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>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</li> </ul>	<p style="text-align: center;"><b>Battles, Blackout and Blitz</b></p> <p><b><u>Living Things and their Habitats</u></b></p> <ul style="list-style-type: none"> <li>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>describe the life process of reproduction in some plants and animals</li> </ul> <p>Examples: chn 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. Chn should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Chn to 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</p>



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from a broad range of other habitats and decide where they belong in the classification system.

### **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

Examples: Building on what they learned about fossils in the topic on rocks in LKS2, chn 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. Chn 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. Chn to work scientifically by: observing and raising questions about local animals and how

Examples: Chn 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 and about electricity in LKS2. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Chn 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. Safety guidelines should be followed when burning materials. Chn to 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.

### **Forces**

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

might observe changes in an animal over a period of time (e.g. frogspawn to frogs) comparing how different animals reproduce and grow.

### **Animals including humans**

- describe the changes as humans develop to old age.

Examples: chn should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. This should be linked to their PSHE unit Changing Me. Chn to 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.



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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.

- 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.

Examples: Chn 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. Chn 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. Chn should explore the effects of levers, pulleys and simple machines on movement. Chn might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Chn to 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.



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Year 6	Groovy Greeks	Peaks and Falls	Protect our planet
	<p><b><u>Light</u></b></p> <ul style="list-style-type: none"><li>• recognise that light appears to travel in straight lines</li><li>• 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</li><li>• 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</li><li>• use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li></ul> <p>Examples: Chn should build on the work on light in LKS2, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions. Chn to 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><b><u>Animals including humans</u></b></p> <ul style="list-style-type: none"><li>• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li><li>• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li><li>• describe the ways in which nutrients and water are transported within animals, including humans.</li></ul> <p>Examples: Chn should build on their learning from LKS2 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. Chn 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 (links can be made to PSHE unit Healthy Me). Chn to work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.</p>	<p><b><u>Electricity</u></b></p> <ul style="list-style-type: none"><li>• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li><li>• compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</li><li>• use recognised symbols when representing a simple circuit in a diagram.</li></ul> <p>Examples: Building on their work in LKS2, chn 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: chn are expected to learn only about series circuits, not parallel circuits. Chn should be taught to take the necessary precautions for working safely with electricity. Chn to 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.</p>



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### **Earth and Space**

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Examples: chn should be introduced to a model of the Sun and Earth that enables them to explain day and night. Chn 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. Chn 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. Chn to 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;



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	<p>finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p>		
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Vocabulary Overview

*This vocabulary is a starting point for staff to use with their knowledge organisers. Additional vocabulary should be introduced to the children.*

	Autumn		Spring	Summer
<b>Year 1</b>	<p><b><u>Plants and Seasonal changes</u></b></p> <p><i>These science topics will run throughout the year and can be revisited at least once every term. This is so that children can use evidence in our local environment of changes in weather and plants throughout the seasons.</i></p> <p><b>Who:</b>  <b>What doing:</b> planting, investigating, predicting, growing,  <b>When:</b>  <b>Where:</b> local area-churchyard, school grounds, Halesowen, in sunlight,  <b>What:</b> trees (oak, beech, horse chestnut, sycamore etc) flowers (daisy, dandelion, poppy, rose, lily etc), plants, roots, stem, leaves,</p>	<p><b>Home and Away</b></p> <p><b><u>Animals including humans</u></b></p> <p><b>Who:</b> humans  <b>What doing:</b> eating, looking, hearing, seeing, smelling, tasting,  <b>When:</b>  <b>Where:</b>  <b>What:</b> mammals, body parts, head, neck, arms, elbows, knees, legs, face, ears, eyes, mouth, nose, teeth, hands, feet  <b>Description:</b> rough/ smooth, bumpy, sweet, sour, salty, bitter, loud, quiet, strong/ weak, aromatic/ pungent  <b>Other:</b> senses, blind, deaf, impairment</p>	<p><b>The Big Smoke</b></p> <p><b><u>Animals including humans</u></b></p> <p><b>Who:</b>  <b>What doing:</b> classifying, sorting, grouping, eating  <b>When:</b>  <b>Where:</b> habitat, microhabitat, zoo  <b>What:</b> animals, mammal, bird, fish, reptile, amphibian, meat, vegetables, leaves, eggs, babies  <b>Description:</b> herbivore, omnivore, carnivore, scaly, feathery, hairy, furry, warm blooded, cold blooded,  <b>Other:</b> diet</p>	<p><b>Poles Apart</b></p> <p><b><u>Everyday materials</u></b></p> <p><b>Who:</b>  <b>What doing:</b> testing, comparing, grouping,  <b>When:</b>  <b>Where:</b>  <b>What:</b> material, wood, plastic, glass, metal, water, rock, paper, cardboard, brick, fabric, elastic/ rubber, magnets,  <b>Description:</b> shiny/dull, rough/smooth, bendy/ not bendy, waterproof/ absorbent, hard/soft, stretchy/stiff,  <b>Other:</b> properties, uses,</p>



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	<p>flower, seed, bulb, light, sun, nutrients, water, temperature, Description: deciduous, evergreen, wild plants, garden plants, hot, cold, mild, Other: climate, environment</p> <p>Who:</p> <p>What doing: raining, snowing, hailing, sleeting, forecasting, predicting, recording, observing</p> <p>When: summer, spring, autumn, winter</p> <p>Where: local, UK</p> <p>What: seasons, weather</p> <p>Description: sunny, cloudy, stormy, dry, wet, hot, cold, mild, longest/ shortest (day)</p> <p>Other: forecast,</p>			
<p><b>Year 2</b></p>	<p><b>Bostin' Black Country</b></p> <p><u>Living Things and Their Habitats</u></p> <p>Who:</p>	<p><b>Iceberg Ahead!</b></p> <p><u>Animals including humans</u></p> <p>Who: humans, animals</p>	<p><b>African Adventure</b></p> <p><u>Plants</u></p> <p>Who:</p>	





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	<p>What doing: providing, consuming, eating, surviving, living, building  <b>When:</b>  <b>Where:</b> habitats, microhabitats, woodland, sea shore, rainforest, farm, fields, ocean,  <b>What:</b> plants, animals, living things, food chain, sun, food sources,  <b>Description:</b> living, dead, never alive, hot/ warm/ cold, dry/damp/wet, bright/shady/ dark, sheltered,  <b>Other:</b> variety, conditions, food chain, survival</p>	<p>What doing: eating, consuming, washing, cleaning, exercising  <b>When:</b>  <b>Where:</b>  <b>What:</b> water, air, food, nutrients, warmth, shelter, germs  <b>Description:</b> carnivores, herbivores, omnivores, healthy/ unhealthy, balanced/ unbalanced, clean/dirty, hygienic/ unhygienic  <b>Other:</b> diet, survival, exercise, hygiene</p> <p><b><u>Uses of Everyday Materials</u></b>  <b>Who:</b> John Dunlop, Charles Macintosh, John McAdam  <b>What doing:</b> pushing, pulling, sliding, predicting, investigating, squashing, squeezing, stretching, twisting, manipulating  <b>When:</b>  <b>Where:</b>  <b>What:</b> materials- paper, fabric, card, metal, plastic, glass, wood, objects,  <b>Description:</b> smooth, rough, bumpy, hard, soft, strong, flexible, metallic, waterproof, absorbent, malleable, same, different  <b>Other:</b> prediction, fair test, investigation, purpose, properties, suitability</p>	<p>What doing: planting, investigating, predicting, growing,  <b>When:</b>  <b>Where:</b> local area- churchyard, school grounds, Halesowen, in sunlight,  <b>What:</b> trees (oak, beech, horse chestnut, sycamore etc) flowers (daisy, dandelion, poppy, rose, lily etc), plants, roots, stem, leaves, flower, seed, bulb, light, sun, nutrients, water, temperature, seedling, mature plant  <b>Description:</b> deciduous, evergreen, wild plants, garden plants, hot, cold, mild, suitable  <b>Other:</b> climate, fair testing, prediction, investigation,</p> <p><b><u>Animals including humans</u></b>  <b>Who:</b>  <b>What doing:</b> growing, maturing, reproducing, aging, hatching,  <b>When:</b>  <b>Where:</b>  <b>What:</b> offspring, adults, egg, chick, chicken, pupa, larva, butterfly, frog spawn, tadpole, froglet, frog, baby, toddler, child, teenager, adult.  <b>Description:</b> young, old,  <b>Other:</b></p>
<p><b>Year 3</b></p>	<p><b>The Chocolate Factory</b>  <b><u>States of Matter</u></b></p>	<p><b>Why Rome wasn't built in a day</b>  <b><u>Rocks</u></b></p>	<p><b>Under the Canopy</b>  <b><u>Plants</u></b></p>



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	<p><b>Who:</b>  <b>What doing:</b> melting, freezing, boiling, solidifying, evaporating, condensing, heating, cooling, changing,  <b>When:</b>  <b>Where:</b>  <b>What:</b> materials, solids, liquids, gases, thermometer, water, river, clouds, rain,  <b>Description:</b> reversible, irreversible, warm, hot, cold,  <b>Other:</b> temperature, degrees Celsius, changes of state, water cycle</p>	<p><b>Who:</b> Mary Anning  <b>What doing:</b> covering, squashing, dissolving, forming,  <b>When:</b> millions of years  <b>Where:</b> underground, earth surface, (within) layers  <b>What:</b> rock, soil, grains, boulders, stones, crystals, sand, gravel, clay, chalk, flint, granite, sandstone, slate, marble, fossil, organic matter, minerals, air, water,  <b>Description:</b> sedimentary, metamorphic, igneous, volcanic, permeable, impermeable,  <b>Other:</b></p> <p><b><u>Animals including humans</u></b>  <b>Who:</b>  <b>What doing:</b> classifying, sorting, grouping, identifying, moving, supporting, protecting, pulling, contracting, relaxing,  <b>When:</b>  <b>Where:</b>  <b>What:</b> animals (mammals, birds, fish, amphibians, reptiles), diet, nutrition, food chains, skeletons, muscles, joints,  <b>Description:</b> carnivores, herbivores, omnivores, predators, prey, consumers, producers, vertebrates/ invertebrates  <b>Other:</b> appearance, characteristics,</p>	<p><b>Who:</b> biologists  <b>What doing:</b> dissecting, labelling,  <b>When:</b>  <b>Where:</b> local environment,  <b>What:</b> plants (ferns, mosses, flowers, conifers), trees, flowers, flower parts (petals, stigma, style, ovary, stamen, anther, filament, sepal), nutrients, water, light, cells, stem,  <b>Description:</b>  <b>Other:</b> classification key, function, purpose, transportation, prediction, investigation, fair test, variables, method, equipment, life cycle, germination, pollination, seed dispersal (wind, exploding, water, eaten by animals, carried by animals)</p> <p><b><u>Living Things and their Habitats</u></b>  <b>Who:</b>  <b>What doing:</b> grouping, classifying, endangering, changing, adapting, impacting, protecting, littering,  <b>When:</b>  <b>Where:</b> environment, nature reserves, oceans, rivers rainforests, deserts, polar regions, jungle,  <b>What:</b> animals, plants, pollution, litter,  <b>Description:</b> dangerous, hazardous, suited,  <b>Other:</b> dichotomous key, venn diagram, deforestation, ecology, adaptation, survival,</p>
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<p><b>Year 4</b></p>	<p style="text-align: center;"><b>Best of British</b></p> <p><b><u>Forces and Magnets</u></b>            Who:             What doing: pushing, pulling, attracting, repelling,            When:             Where: North, South,            What: magnet, magnetic poles, nickel, cobalt, steel, aluminium, iron, horse shoe magnet, bar magnet,            Description: magnetic, non- contact (force),            Other: force, push, pull, direction,</p> <p><b><u>Sound</u></b>            Who:             What doing: vibrate, hear, listen, echo, amplify, travel,            When:             Where:             What: air, medium, ear, sound wave, Hertz, decibel, instruments,            Description: loud, quiet, low, high, fainter,            Other: vibration, sound, volume, pitch, frequency,</p>	<p style="text-align: center;"><b>Raid, Invade and Stayed!</b></p> <p><b><u>Animals including humans</u></b>            Who: dentist            What doing: transporting, cutting, slicing, ripping, tearing, chewing, grinding, absorbing, compacting, brushing, flossing, moving, supporting,            When:             Where:             What: mouth, tongue, teeth, stomach, oesophagus, incisors, canines, molars, saliva, acids, enzymes, small intestine, large intestine, skeletons, vitamins, minerals, fats, proteins, carbohydrates, fibre, water            Description: healthy, unhealthy, decaying,            Other: digestive system, nutrition,</p>	<p style="text-align: center;"><b>Mexico and the Mayans</b></p> <p><b><u>Light</u></b>            Who:             What doing: reflecting, travelling, absorbing, blocking,            When:             Where:             What: light source, shadow, spectrum, colours, surface, sunlight, reflection,            Description: straight (lines), light, dark, natural (source), artificial (source), dangerous            Other:</p> <p><b><u>Electricity</u></b>            Who:             What doing: flowing, conducting, insulating,            When:             Where:             What: appliances, battery, mains electricity, circuits, simple circuits, light bulb, bulb holder, wires, crocodile clips, cells, batteries, cell/battery holder, motor, buzzer, switch, diagrams, components,            Description: dangerous,            Other: safety, hazards, insulators, conductors,</p>
<p><b>Year 5</b></p>	<p style="text-align: center;"><b>Rock and Roll</b></p> <p><b><u>Living Things and their Habitats</u></b>            Who: biologists, zoologists, Carl Linnaeus            What doing: categorising, sorting, classifying,</p>	<p style="text-align: center;"><b>Water of life</b></p> <p><b><u>Properties and changes of Materials</u></b>            Who:</p>	<p style="text-align: center;"><b>Battles, Blackout and Blitz</b></p> <p><b><u>Living Things and their Habitats</u></b>            Who: David Attenborough, Jane Goodall</p>



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	<p><b>When:</b> <b>Where:</b> What: animals, diet, groups, categories, fish, birds, mammals, reptiles, amphibians, food chains, food webs (consumer, producer), predator, prey, micro-organisms Description: herbivore, omnivore, carnivore, Other: classification keys, dichotomous key, venn diagram,</p> <p><b><u>Evolution and Inheritance</u></b> Who: Charles Darwin, Mary Anning, Alfred Wallace What doing: changing, adapting, evolving, inheriting When: Where: environment, habitat What: fossils, offspring, parent, adults, Description: identical/ non-identical, suited/ unsuited, Other: variation, characteristics, evolution, adaptation, conditions, inheritance,</p>	<p>What doing: melting, freezing, evaporating, condensing, heating, cooling, changing state, solidifying, dissolving, filtering, sieving, separating, When: Where: mountains, lakes, underground, clouds, oceans, seas, rivers, What: solid, liquid, gas, heat, thermometer, water vapour, water, condensation, temperature, solution, mixture, run-off, collection, rain, snow, sun, Description: hot, cool, cold, frozen, reversible, irreversible, permanent, soluble, insoluble, hardness, solubility, transparency, conductivity, Other: degrees Celsius, water cycle, evaporation, condensation, properties, precipitation, transpiration,</p> <p><b><u>Forces</u></b> Who: Galileo Galilei, Isaac Newton What doing: pushing, pulling, moving, falling, When: Where: What: gravity, mechanisms, levers, pulleys, gears, Description: stream lined, Other: friction, variables (independent, dependent), resistance, water resistance, investigation, prediction, methodology, air resistance, gravity,</p>	<p>What doing: classifying, reproducing, growing, respiring, moving, sensing, excreting, When: Where: habitats, What: invertebrates, exoskeleton, vertebrates, mammal, amphibian, bird, reptile, fish, plants, animals, micro-organisms Description: sexual/ asexual Other: life cycles, classification, life processes, movement, reproduction, sensitivity, growth, respiration, excretion, nutrition (MRS GREN/ MRS NERG)</p> <p><b><u>Animals including humans</u></b></p>
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Year 6	Groovy Greeks	Peaks and Falls	Protect our planet
	<p><b><u>Light</u></b>            Who:            What doing: reflecting, travelling, absorbing, blocking,            When:            Where:            What: light source, shadow, spectrum, colours, surface, sunlight, reflection, prisms, eye, cornea, retina, lens, iris, pupil, sclera, optic nerve, periscope, mirrors            Description: straight (lines), light, dark, natural (source), artificial (source), dangerous, opaque, translucent, transparent, reflective,            Other:</p> <p><b><u>Earth and Space</u></b>            Who: Ptolemy, Alhazen and Copernicus.            What doing: Orbiting, Rotating, Tilting, Reflecting            When: Seasons– winter, spring, summer, autumn, Day, Night, Year, Month            Where: Space, Solar system, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune            What: Sun, Star, Planet, Moon, Axis, Light, Shadow            Description: Elliptical, Anti-clockwise, Light, celestial, Dark, heliocentric            Other:</p>	<p><b><u>Animals including humans</u></b>            Who:            What doing: Pumping, Circulating, Oxygenating, Aging, Exercising            When:            Where: Towards (heart), Away from (heart)            What: Circulatory system, Heart, Ventricle, Atrium, Artery, Vein, Capillary, Blood, Red blood cells, White blood cells, Plasma, Platelets, Heart rate, Drugs, Alcohol            Description: Red, white, Oxygenated, Deoxygenated            Other:</p>	<p><b><u>Electricity</u></b>            Who:            What doing:            When:            Where:            What: appliances, circuits, cell, wire, bulb, buzzer, switch, motor, circuit diagram, simple circuit, series circuit, parallel circuit, component            Description: dangerous, hazardous, insulators, conductors, bright, dim, complete, broken/incomplete, open/closed,            Other: safety, voltage,</p>