



### KMA PROGRESSION IN SCIENCE

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This document aims to give guidance on the progression of Science knowledge and skills across the year groups. It can also be used to differentiate work, and expectations, appropriately for pupils working above and below age-related expectations (particularly SEND pupils and GD pupils). Through practical learning opportunities, children will be able to make connections and reflect on prior knowledge enabling them to become Inquiry-based learners.

In Science, like all other subjects, we recognise the importance of the methods and practice of teaching (the pedagogy) we choose to use in enabling pupils to know more, understand more and remember more. In Science, the following approaches will be used, and be evident in pupil discussion, observations and work in books, in order to ensure that the Science learning opportunities are as effective as possible and that pupils progress throughout the year and across year groups during their experience of Science school.

#### TEACHING SEQUENCE IN SCIENCE

**Begin with a 'Big Picture' start with what the children already know, understand, can do and able to say**

**Daily review: Revisit prior learning**

**Provide information and scientific concepts**

**Provide specific key vocabulary to be used and its meaning (knowledge organiser)**

**Obtain and present evidence through observations, comparisons and collected data**

**Consider and evaluate evidence, making connections with scientific knowledge and understanding**

#### Meta-cognition in Science

<b>Activating prior knowledge</b>	The teacher discusses with children the learnt strategies and content in previous reading lessons
<b>Explicit strategy instruction</b>	The teacher explicitly explains how to organise their ideas, with the emphasis on the cognitive strategy 'cause and effect' model' to help them organise and plan
<b>Modelling of learned strategy</b>	Use initial notes to model one part of the strategy
<b>Memorisation of strategy</b>	The teacher tests if pupils have memorised the key aspects of the strategy through questions and discussions
<b>Guided practice</b>	The teacher models one further example with the whole group, with pupils verbally contributing ideas
<b>Independence practice</b>	Pupils complete their own task
<b>Structured reflection</b>	The teacher encourages pupils to reflect on how appropriate the model was, how successfully they applied it, and how they might use it in the future.

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**Animals including humans Coverage**

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Animals (including humans)</b>	<p>Identify and name categories of animals:</p> <p>Pets Farm Sea Jungle Desert Wild Arctic</p>	<p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</p>	<p>Notice that animals, including humans, have offspring which grow into adults.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).</p>	<p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.</p>	<p>Construct and interpret a variety of food chains, identifying producers, predators and prey</p>		<p>Describe the ways in which nutrients and water are transported within animals, including humans.</p>	<ul style="list-style-type: none"> <li>•Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</li> <li>• The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.</li> <li>• The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</li> </ul>
<b>Humans</b>	<p>Identify, name, draw and label the basic parts of the human body</p> <p>Know and name the senses:</p> <p>Taste Smell Touch Hearing Sight</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>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</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>Describe the changes as humans develop to old age.</p>	<p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p>	<ul style="list-style-type: none"> <li>• The structure and functions of the gas exchange system in humans, including adaptations to function.</li> <li>• The mechanism of breathing to move air in and out of the lungs.</li> <li>• The impact of exercise, asthma and smoking on the human gas exchange system.</li> </ul>

**Working scientifically ideas**

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Observing over time</b>	How does my height change over the year?	How does my height change over the year?	How much food and drink do I have over a week? How does a tadpole change over time?	How does our skeleton change over time? (from birth to death)	How does an eggshell change when it is left in cola?	How do different animal embryos change?	How does my heart rate change over the day? How much exercise do I do in a week? How do different animal embryos change? How much exercise do I do in a week?
<b>Comparative tests</b>		Is our sense of smell better when we can't see?	Do bananas make us run faster? Do amphibians have more in common with reptiles or fish?	How does the skull circumference of a girl compare with that of a boy?		Who grows the fastest, girls or boys?	Which type of exercise has the greatest effect on our heart rate?
<b>Fair tests</b>				How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh?		How does age affect a human's reaction time?	How does the length of time we exercise for affect our heart rate? Can exercising regularly affect your lung capacity?
<b>Vocabulary</b>	Plant, Animal, pet, wild, farm,	<i>Senses Fish, Reptiles, Mammals, Birds, Amphibians Herbivore, Omnivore, Carnivore, Wings, Beak</i>	<i>Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene</i>	<i>Nutrition Movement, Muscles, Bones, Skull, Nutrition, Skeleton</i>	<i>Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar</i>	<i>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty</i>	<i>Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration</i>
<b>Scientists</b>		<b>Chris Packham</b>	<b>Steve Irwin Robert Winston Joe Wickes</b>	<b>Adelle Davis Marie Curie</b>	<b>Ivan Pavlov Joseph Lister</b>	<b>Justus von Liebig Sir Richard Doll Leonardo Da Vinci David Attenborough</b>	<b>Justus von Liebig Sir Richard Doll Leonardo Da Vinci</b>

<b>Books</b>	<p><b>RSPB: My First Book of Garden Birds</b> (Mike Unwin and Sarah Whittley)</p> <p><b>Snail Trail</b> (Ruth Brown)</p> <p><b>Superworm</b> (Julia Donaldson &amp; Axel Scheffler)</p> <p><b>One Year with Kipper</b> (Mick Inkpen)</p>	<p><b>Handa's Surprise</b> (Eileen Brown)</p> <p><b>Once There Were Giants</b> (Martin Waddell and Penny Dale)</p> <p><b>Tadpole's Promise</b> (Jeanne Willis and Tony Ross)</p> <p><b>The Gruffalo</b> (Julia Donaldson)</p> <p><b>Meerkat Mail</b> (Emily Gavett)</p>	<p><b>Funnybones</b> (Janet and Allan Ahlberg)</p> <p><b>I Will Never Not Ever Eat a Tomato</b> (Lauren Child)</p> <p><b>Goldilocks and the Three Bears</b> (Samantha Berger)</p> <p><b>The Story of Frog Belly Rat Bone</b> (Timothy Basil Erina)</p>	<p><b>Human Body Odyssey</b> (Werner Holzwarth)</p> <p><b>Crocodiles Don't Brush Their Teeth</b> (Colin Fancy)</p> <p><b>Wolves</b> (Emily Gravett)</p>	<p><b>Hair in Funny Places</b> (Babette Cole)</p> <p><b>Giant</b> (Kate Scott)</p> <p><b>You're Only Old Once!</b> (Dr. Seuss)</p> <p><b>Mummy Laid an Egg</b> (Babette Cole)</p> <p><i>The Land of Neverbelieve</i> (Norman Messanger)</p>	<p><b>Pig-Heart Boy</b> (Malorie Blackman)</p> <p><b>Skellig</b> (David Almond)</p> <p><b>A Heart Pumping Adventure</b> (Heather Manley)</p>
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	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Plants</b>		<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> </ul>	<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>	<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>				Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>  <b>Identifying and classifying</b>  <b>Pattern seeking</b>		<p>What are the most common British plants and where can we find them?</p> <p>How did Beatrix Potter help our understanding of mushrooms and toadstools?</p> <p>In the 1500s, tobacco plants were</p>	<p>How does a cactus survive in a desert with no water? (Link to Habitats also)</p> <p>How did George Washington Carver use science to improve farming in America?</p> <p>What ideas did botanist Arthur</p>	<p>What are all the different ways that seeds disperse?</p> <p>How many ways can you group our seed collection?</p> <p>What colour flowers do pollinating insects prefer?</p>				

<p><b>Observing over time</b></p> <p><b>Comparative tests</b></p> <p><b>Fair tests</b></p>		<p>grown in Britain for medicine. How have our ideas about these plants changed?</p> <p>How can we sort the leaves that we collected on our walk?</p> <p>How can we organise all the zoo animals?</p> <p>Do trees with bigger leaves lose their leaves first in autumn?</p> <p>Is there a pattern in where we find moss growing in the school grounds?</p> <p>How does a daffodil bulb change over the year?</p> <p>How does my sunflower change each week?</p> <p>How does the oak tree change over the year?</p> <p>Which type of compost grows the tallest sunflower?</p> <p>Which tree has the biggest leaves?</p>	<p>Tansley have about habitats in 1935?</p> <p>How can we identify the trees that we observed on our tree hunt?</p> <p>Do bigger seeds grow into bigger plants?</p> <p>What happens to my bean after I have planted it?</p> <p>Do cress seeds grow quicker inside or outside?</p>	<p>What happens to celery when it is left in a glass of coloured water?</p> <p>How do flowers in a vase change over time?</p> <p>Which conditions help seeds germinate faster?</p> <p>Which soil absorbs the most water?</p> <p>How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?</p>				
<p><b>Vocabulary</b></p>	<p>Plant, Flower, Grass, Tree</p>	<p>Deciduous, Evergreen trees, Leaves, Flowers, Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem</p>	<p>Seeds, Bulbs, Water, Light, Temperature, Growth</p>	<p>Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower</p>				

<b>Scientists</b>		Beatrix Potter	Agnes Arber Alan Titchmarsh	Jan Ingenhousz Joseph Banks				
<b>Books</b>		<p><b><i>A Little Guide to Wild Flowers</i></b> (Charlotte Voake)</p> <p><b><i>The Things That I LOVE about TREES</i></b> (Chris Butterworth)</p> <p><b><i>Harry's Hazelnut</i></b> (Ruth Parsons)</p> <p><b><i>Tree: Seasons Come, Seasons Go</i></b> (Patricia Hegarty and Britta Teckentrup)</p>	<p><b><i>Jack and the Beanstalk</i></b> (Richard Walker)</p> <p><b><i>Ten Seeds</i></b> (Ruth Brown)</p> <p><b><i>A Seed Is Sleepy</i></b> (Dianna Aston)</p> <p><b><i>The Tin Forest</i></b> (Helen Ward)</p>	<p><b><i>The Story of Frog Belly Rat Bone</i></b> (Timothy Basil Ering)</p> <p><b><i>The Hidden Forest</i></b> (Jeannie Baker)</p> <p><b><i>George and Flora's Secret Garden</i></b> (Jo Elworthy)</p>				

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
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<p><b>Living things and their habitats</b></p>	<p>Understanding the world: Early Learning Goal: They make observations of animals and plants and explain why some things occur and talk about changes.</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>		<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>	<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>	<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>	<ul style="list-style-type: none"> <li>• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</li> <li>• Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</li> <li>• Differences between species.</li> </ul>
<p><b>Working scientifically ideas</b></p> <p><b>Research</b></p> <p><b>Changes over time</b></p>			<p>How does the habitat of the Arctic compare with the habitat of the rainforest? How are the animals in Australia different</p>		<p>Why are people cutting down the rainforests and what effect does that have?</p> <p>How did Jane Goodall learn about</p>	<p>What are the differences between the life cycle of an insect and a mammal?</p> <p>How did the experiments and</p>	<p>What do different types of microorganisms do? Are they always harmful?</p>	

<p>Identifying and classifying</p> <p>Pattern seeking</p> <p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>			<p>to the ones that we find in Britain?</p> <p>What ideas did botanist Arthur Tansley have about habitats in 1935?</p> <p>How would you group these plants and animals based on what habitat you would find them in? How would you group things to show which are living, dead, or have never been alive?</p> <p>What conditions do woodlice prefer to live in? Which habitat do worms prefer – where can we find the most worms?</p> <p>How does a tadpole change over time? How does the school pond change over the year?</p> <p>Do amphibians have more in common with reptiles or fish? Which pets are the easiest to look after? Is there the same level of light in the evergreen wood compared with the deciduous wood?</p>		<p>the habits and behaviours of chimpanzees and why does she still need to work to protect their habitat?</p> <p>Can we use the classification keys to identify all the animals that we caught pond dipping?</p> <p>How has the use of insecticides affected bee population?</p> <p>How does the variety of invertebrates on the school field change over the year?</p> <p>In our class, are omnivores taller than vegetarians? How does the average temperature of the pond water change in each season?</p> <p>Does the amount of light affect how many woodlice move around?</p>	<p>ideas of Jan Ingenhousz help improve our understanding of plants?</p> <p>Can you identify all the stages in the human life cycle? Compare this collection of animals based on similarities and differences in their lifecycle.</p> <p>Is there a relationship between a mammal's size and its gestation period?</p> <p>How do brine shrimp change over their lifetime? How does a bean change as it germinates? How does our compost heap change over time?</p> <p>Which seed shape takes the longest time to fall?</p> <p>How does the level of salt affect how quickly brine shrimp hatch?</p>	<p>How did Carl Linnaeus' ideas help us to group plants?</p> <p>How would you make a classification key for vertebrates/invertebrates or microorganisms?</p> <p>Is there a pattern between the size and shape of a bird's beak and the food it will eat? Do all flowers have the same number of petals?</p> <p>What happens to a piece of bread if you leave it on the windowsill for two weeks?</p> <p>Which is the most common invertebrate on our school playing field?</p> <p>How does the temperature affect how much gas is produced by yeast?</p>	
<p>Vocabulary</p>	<p>Plant, Animal, Home</p>		<p>Living, Dead, Habitat, Energy,</p>		<p>Vertebrates, Fish, Amphibians,</p>	<p>Mammal, Reproduction,</p>	<p>Classification, Vertebrates,</p>	

			Food chain, Predator, Prey, Woodland, Pond, Desert		Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats	Insect, Amphibian, Bird, Offspring	Invertebrates, Microorganisms, Amphibians, Reptiles, Mammals, Insects	
<b>Scientists</b>			Terry Nutkins Liz Bonnin		Cindy Looy Jaques Cousteau	David Attenborough Jane Goodall James Brodie of Brodie	Carl Linnaeus	
<b>Books</b>			<b><i>The Gruffalo</i></b> (Julia Donaldson)  <b><i>Meerkat Mail</i></b> (Emily Gravett)  <b><i>No Place Like Home</i></b> (Jonathon Emmett)		<b><i>The Vanishing Rainforest</i></b> (Richard Platt)  <b><i>The Morning I Met a Whale</i></b> (Michael Morpurgo)  <b><i>Journey to the River Sea</i></b> (Eva Ibbotson)	<b><i>Charlotte's Web</i></b> (E.B. White)  <b><i>The Land of Neverbelieve</i></b> (Norman Messenger)  <b><i>Mummy Laid an Egg</i></b> (Babette Cole)	<b><i>Beetle Boy</i></b> (M G Leonard)  <b><i>Insect Soup</i></b> (Barry Louis Polisar)  <b><i>Fur and Feathers</i></b> (Janet Halfmann)	

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Seasonal Change</b>	Understanding the world ELG: They make observations of plants and explain why some things occur, and talk about changes	<ul style="list-style-type: none"> <li>• Observe changes across the four seasons.</li> <li>• Observe and describe weather associated with the seasons and how day length varies.</li> </ul>						<ul style="list-style-type: none"> <li>• The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.</li> </ul>
<b>Working scientifically ideas</b> <b>Research</b> <b>Changes over time</b> <b>Identifying and classifying</b> <b>Pattern seeking</b> <b>Observing over time</b> <b>Comparative tests</b> <b>Fair tests</b>		<p>Are there plants that are in flower in every season? What are they?</p> <p>How would you group these things based on which season you are most likely to see them in?</p> <p>Does the wind always blow the same way?</p> <p>How does the colour of a UV bead change over the day?</p> <p>In which season does it rain the most?</p>						
<b>Vocabulary</b>	Weather rain sunshine snow cloud	Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark						
<b>Scientists</b>		Dr Steve Lyons Holly Geen						
<b>Books</b>		<i>Tree: Seasons Come, Seasons Go</i> (Patricia Hegarty and Britta Teckentrup)						

		<i><b>One Year with Kipper</b></i> <i>(Mick Inkpen)</i>							
		<i><b>After the Storm</b></i> <i>(Nick Butterworth)</i>							

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Evolution and inheritance</b>							<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> <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>	<ul style="list-style-type: none"> <li>• Heredity as the process by which genetic information is transmitted from one generation to the next.</li> <li>• A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model.</li> <li>• The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection.</li> <li>• Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction.</li> </ul>
<b>Working scientifically ideas</b>							What happened when Charles	

<p><b>Research</b></p> <p>Changes over time</p> <p>Identifying and classifying</p> <p>Pattern seeking</p> <p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>							<p>Darwin visited the Galapagos islands?</p> <p>What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?</p> <p>Can you classify these observations into evidence for the idea of evolution, and evidence against? Compare the skeletons of apes, humans and Neanderthals – how are they similar, and how are they different?</p> <p>Is there a pattern between the size and shape of a bird's beak and the food it will eat?</p> <p>How has the skeleton of the horse changed over time?</p> <p>What is the most common eye colour in our class?</p>	
<p><b>Vocabulary</b></p>							<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics</p>	

Scientists							Mary Anning Charles Darwin Jane Goodall Alfred Wallace	
Books							<b><i>One Smart Fish</i></b> <i>(Christopher Wormell)</i>  <b><i>The Molliebird</i></b> <i>(Jules Pottle)</i>  <b><i>Our Family Tree</i></b> <i>(Lisa Westberg Peters)</i>	

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Materials / States of Matter</b>	<p>Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. about changes.</p> <p>Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.</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>	<ul style="list-style-type: none"> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>		<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>	<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</li> </ul>		<ul style="list-style-type: none"> <li>• Chemical reactions as the rearrangement of atoms.</li> <li>• Representing chemical reactions using formulae and using equations.</li> <li>• Combustion, thermal decomposition, oxidation and displacement reactions.</li> <li>• Defining acids and alkalis in terms of neutralisation reactions.</li> <li>• The pH scale for measuring acidity/alkalinity; and indicators.</li> </ul>

						<p>state are reversible changes.</p> <ul style="list-style-type: none"> <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>Working scientifically ideas</b></p> <p><b>Research</b></p> <p><b>Changes over time</b></p> <p><b>Identifying and classifying</b></p> <p><b>Pattern seeking</b></p> <p><b>Observing over time</b></p> <p><b>Comparative tests</b></p> <p><b>Fair tests</b></p>		<p>How are bricks made? Which materials can be recycled?</p> <p>How are building materials different now to when Queen Elizabeth I was on the throne?</p> <p>We need to choose a material to make an umbrella. Which materials are waterproof? Which materials will float, and which will sink?</p> <p>Is there a pattern in the types of materials that are used to make objects in a school?</p> <p>What happens to materials over time</p>	<p>How are plastics made? How have the materials we used changed over time?</p> <p>How have the materials that humans use for tools changed since the Stone Age? How has glass making changed since it was first made in ancient Egypt?</p> <p>Which materials are shiny, and which are dull? Which materials will let electricity go through them, and which will not?</p> <p>Do magnetic materials always conduct electricity?</p>		<p>How does the mass of a block of ice affect how long it takes to melt? How does the surface area of a container of water affect how long it takes to evaporate?</p> <p>How have scientific tests for predicting the weather changed over time?</p> <p>Can you group these materials and objects into solids, liquids, and gases? How would you sort these objects/materials based on their temperature?</p> <p>Is there a pattern in how long it takes</p>	<p>What are microplastics and why are they harming the planet? What are smart materials and how can they help us?</p> <p>What did Stephanie Kwolek discover (Kevlar) and why was it important?</p> <p>Can you group these materials based on whether they are transparent or not? Can you identify and classify these reactions and changes into reversible, and irreversible? Can you describe their groups similarities and differences?</p>		

		<p>if we bury them in the ground? What happens to shaving foam over time?</p> <p>Which materials are the most flexible? Which materials are the most absorbent?</p>	<p>How do materials change with heat? Leave outside in the sunshine/windowsill/ Radiator How does the amount of water affect the strength of a kitchen towel?</p> <p>How long do bubble bath bubbles last for? What would happen to our snowman? Would a paper boat float forever?</p> <p>Which material would be best for the little pigs roof or the little pigs house? Which shapes make the strongest paper bridge?</p>		<p>different sized ice lollies to melt? How does the evaporation rate change as you add more salt to your water?</p> <p>Which material is best for keeping our hot chocolate warm? How does the level of water in a glass change when left on the windowsill? How does the mass of an ice cube change over time?</p> <p>Does seawater evaporate quicker than fresh water?</p> <p>How does the mass of a block of ice affect how long it takes to melt? How does the surface area of a container of water affect how long it takes to evaporate?</p>	<p>Do all stretchy materials stretch in the same way? Do all objects fall through water in the same way? What patterns can you notice in different reactions? How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction?</p> <p>How does a container of saltwater change over time? How does a sugar cube change as it is put in a glass of water? How does a nail in saltwater change over time? How does nail in saltwater change over time?</p> <p>Which type of sugar dissolves the fastest? Which materials rusts the fastest/slowest?</p> <p>How does the temperature of tea affect how long it takes for a sugar cube to dissolve?</p>	
<b>Vocabulary</b>	Sand, Playdough, Paint, Mix, Soft,	Wood, Plastic, Glass, Paper, Water,	Stretchy, Shiny, Dull, Rough,		Solid, Liquid, Gas, Evaporation,	Hardness, Solubility, Transparency,	

	Hard, Water, Hot, Cold	Metal, Rock, Hard, Soft, Bendy, Rough, Smooth	Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil		Condensation, Particles, Temperature, Freezing, Heating	Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing		
<b>Scientists</b>		William Addis Charles Mackintosh John McAdam	John Dunlop Charles Macintosh John McAdam		Anders Celcius Daniel Fahrenheit	Spencer Silver Ruth Benerito		
<b>Books</b>		<b><i>The Great Paper Caper</i></b> (Oliver Jeffers)  <b><i>Who Sank the Boat</i></b> (Pamela Allen)  <b><i>The Story of Cinderella</i></b> (Walt Disney)	<b><i>The Tin Forest</i></b> (Helen Ward)  <b><i>Traction Man</i></b> (Mini Grey)  <b><i>Three Little Pigs</i></b> (Lesley Sims)		<b><i>Charlie and the Chocolate Factory</i></b> (Roald Dahl)  <b><i>Once Upon a Raindrop: The Story of Water</i></b> (James Carter)  <b><i>Sticks</i></b> (Diane Alber)	<b><i>Itch</i></b> (Simon Mayo)  <b><i>Kensuke's Kingdom</i></b> (Michael Morpurgo)  <b><i>The BFG</i></b> (Roald Dahl)		

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Forces</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to objects and materials.			<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>		<ul style="list-style-type: none"> <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>• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</li> <li>• Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>		<ul style="list-style-type: none"> <li>• Magnetic fields by plotting with compass, representation by field lines.</li> <li>• Earth's magnetism, compass and navigation.</li> <li>• Forces as pushes or pulls, arising from the interaction between two objects.</li> <li>• Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.</li> <li>• Moment as the turning effect of a force.</li> <li>• Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water.</li> <li>• Forces measured in Newtons, measurements of</li> </ul>
<b>Working scientifically ideas</b> <b>Research</b> <b>Changes over time</b>				<p>How does a compass work?</p> <p>How have our ideas about forces changed over time?</p>		<p>How do submarines sink if they are full of air?</p>		

<p>Identifying and classifying</p> <p>Pattern seeking</p> <p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>				<p>How have our ideas about magnets changed over time?</p> <p>Which materials are magnetic?</p> <p>Does the size and shape of a magnet affect how strong it is?</p> <p>Do magnetic materials always conduct electricity?</p> <p>If we magnetise a pin, how long does it stay magnetised for?</p> <p>Which surface is best to stop you slipping? Which magnet is the strongest?</p> <p>How does the mass of an object affect how much force is needed to make it move?</p>		<p>How have our ideas about gravity changed over time?</p> <p>Can you label and name all the forces acting on the objects in each of these situations?</p> <p>Do all objects fall through water in the same way? How does the surface area of a parachute affect the time it takes to fall?</p> <p>How long does a pendulum swing for before it stops?</p> <p>Which shoe is the most slippery? Which shape parachute takes the longest to fall?</p> <p>How does the angle of launch affect how far a paper rocket will go?</p> <p>How does the surface area of a container affect the time it takes to sink? How does the surface area of a parachute affect the time it takes to fall to the ground?</p>		<p>stretch or compression as force is changed.</p>
<p><b>Vocabulary</b></p>	<p>Stop, Start</p>			<p>Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull</p>		<p>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys</p>		

<b>Scientists</b>				William Gilbert Andre Marie Ampere		Galileo Galilei Isaac Newton Archimedes of Syracuse John Walker		
<b>Books</b>				<i><b>The Iron Man</b></i> <i>(Ted Hughes)</i>  <i><b>Mrs Armitage: Queen of the Road</b></i> <i>(Quentin Blake)</i>  <i><b>Mr Archimedes' Bath</b></i> <i>(Pamela Allen)</i>		<i><b>The Enormous Turnip</b></i> <i>(Katie Daynes)</i>  <i><b>Leonardo's Dream</b></i> <i>(Hans de Beer)</i>  <i><b>The Aerodynamics of Biscuits</b></i> <i>(Clare Helen Welsh)</i>		

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Rocks</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.			<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> <li>• Recognise that soils are made from rocks and organic matter.</li> </ul>				<ul style="list-style-type: none"> <li>• The composition of the Earth.</li> <li>• The structure of the Earth.</li> <li>• The rock cycle and the formation of igneous, sedimentary and metamorphic rocks.</li> </ul>
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>  <b>Identifying and classifying</b>  <b>Pattern seeking</b>  <b>Observing over time</b>  <b>Comparative tests</b>  <b>Fair tests</b>				<p>Who was Mary Anning and what did she discover?</p> <p>What were James Hutton's ideas about how rocks were made and what was his evidence? How did Mary Anning's work help us to understand prehistoric life?</p> <p>Can you use the identification key to find out the name of each of the rocks in your collection?</p> <p>Is there a pattern in where we find volcanos on planet Earth?</p>				

				<p>How does tumbling change a rock over time?</p> <p>What happens when water keeps dripping on a sandcastle?</p> <p>How does adding different amounts of sand to soil affect how quickly water drains through it?</p> <p>Which soil absorbs the most water?</p>				
<b>Vocabulary</b>	Hard, Smooth, Rough			Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent				
<b>Scientists</b>				Mary Anning Inge Lehmann				
<b>Books</b>				<p><b><i>The Pebble in My Pocket</i></b> (Meredith Hooper)</p> <p><b><i>Stone Girl, Bone Girl</i></b> (Laurence Anholt)</p> <p><b><i>The Street Beneath My Feet</i></b> (Charlotte Guillain &amp; Yuval Zommer)</p>				

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Electricity</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.				<ul style="list-style-type: none"> <li>Identify common appliances that run on electricity.</li> <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>		<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>	<ul style="list-style-type: none"> <li>Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.</li> <li>Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.</li> <li>Differences in resistance between conducting and insulating components (quantitative).</li> <li>Static electricity.</li> </ul>
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>					<p>How does the thickness of a conducting material affect how bright the lamp is?</p> <p>How has electricity changed the way we live?</p>		<p>How has our understanding of electricity changed over time?</p> <p>How has our understanding of</p>	

<p>Identifying and classifying</p> <p>Pattern seeking</p> <p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>					<p>How does a light bulb work?</p> <p>Who actually invented the light bulb, Thomas Edison or Joseph Swan?</p> <p>How would you group these electrical devices based on where the electricity comes from?</p> <p>Which room has the most electrical sockets in a house?</p> <p>How long does a battery light a torch for?</p> <p>Which metal is the best conductor of electricity?</p> <p>How does the thickness of a conducting material affect how bright the lamp is?</p>		<p>electricity changed over time?</p> <p>How have batteries changed over time?</p> <p>How would you group electrical components and appliances based on what electricity makes them do?</p> <p>Does the temperature of a light bulb go up the longer it is on?</p> <p>How does the brightness of the bulb change as the battery runs out? How can we measure how quickly a battery is used up?</p> <p>Which make of battery lasts the longest? Which type of fruit makes the best fruity battery?</p> <p>How does the voltage of the batteries in a circuit affect the brightness of the lamp?</p> <p>How does the voltage of the batteries in a circuit affect the volume of the buzzer?</p>	
<p><b>Vocabulary</b></p>	<p>Bright, Dark</p>				<p>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit,</p>		<p>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit,</p>	

					Series, Conductors, Insulators		Series, Conductors, Insulators, Amps, Volts, Cell	
<b>Scientists</b>					Thomas Eddison Joseph Swan		Alessandro Volta Nicola Tesla	
<b>Books</b>					<i><b>Until I Met Dudley</b></i> <i>(Roger McGough)</i>		<i><b>Goodnight Mister Tom</b></i> <i>(Michelle Magorian)</i>	
					<i><b>Oscar and the Bird: A Book about Electricity</b></i> <i>(Geoff Waring)</i>		<i><b>Blackout</b></i> <i>(John Rocco)</i>	
					<i><b>Electrical Wizard: How Nikola Tesla Lit Up the World</b></i> <i>(Elizabeth Rusch)</i>		<i><b>Hitler's Canary</b></i> <i>(Sandi Toksvig)</i>	

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Earth and Space</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.					<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>		<ul style="list-style-type: none"> <li>Gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only).</li> <li>Our Sun as a star, other stars in our galaxy, other galaxies.</li> <li>The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.</li> </ul>
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>  <b>Identifying and classifying</b>  <b>Pattern seeking</b>  <b>Observing over time</b>  <b>Comparative tests</b>  <b>Fair tests</b>						<p>What unusual objects did Jocelyn Bell Burnell discover (linked to radio pulsars and 'rapidly spinning neutron stars)?</p> <p>How do astronomers know what stars are made of?</p> <p>How have our ideas about the solar system changed over time?</p> <p>How is astronomer and planetary scientist Sara Seager changing</p>		<ul style="list-style-type: none"> <li>The light year as a unit of astronomical distance.</li> </ul>

						<p>our ideas about the universe?</p> <p>How could you organise all the objects in the solar system into groups? Can you observe and identify all the phases in the cycle of the Moon?</p> <p>Is there a pattern between the size of a planet and the time it takes to travel around the Sun?</p> <p>Can you observe and identify all the phases in the cycle of the Moon?</p> <p>How does the length of daylight hours change in each season?</p>		
<b>Vocabulary</b>						Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, Solar System		
<b>Scientists</b>						Ptolemy Alhazen Copernicus Neil Armstrong Helen Sharman Tim Peake Jocelyn Bell Burnell		
<b>Books</b>						<i>The Skies Above My Eyes</i>		

						<i>(Charlotte Guillain &amp; Yuval Zommer)</i>  <b><i>George's Secret Key to the Universe</i></b> <i>(Lucy and Stephen Hawking with Christophe Galfard)</i>  <b><i>The Way Back Home</i></b> <i>(Oliver Jeffers)</i>		
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	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Sound</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.				<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> <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>			<ul style="list-style-type: none"> <li>• Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.</li> <li>• Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound.</li> <li>• Sound needs a medium to travel, the speed of sound in air, in water, in solids.</li> <li>• Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal.</li> </ul>
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>  <b>Identifying and classifying</b>					<p>How does the volume of a drum change as you move further away from it?</p> <p>How does the length of a guitar string/tuning fork</p>			<ul style="list-style-type: none"> <li>• Auditory range of humans and animals.</li> <li>• Pressure waves transferring energy; use for cleaning and</li> </ul>

<p>Pattern seeking</p> <p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>					<p>affect the pitch of the sound? Do all animals have the same hearing range?</p> <p>How has our understanding and use of ultrasound changed over time? Since the 1800s, how has science helped people who are deaf?</p> <p>Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?</p> <p>When is our classroom the quietest?</p> <p>Which material is best to use for muffling sound in ear defenders? Are two ears better than one?</p> <p>How does the volume of a drum change as you move further away from it? How does the length of a guitar string/tuning fork affect the pitch of the sound?</p>			<p>physiotherapy by ultra-sound.</p> <ul style="list-style-type: none"> <li>• Waves transferring information for conversion to electrical signals by microphone.</li> </ul>
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<b>Vocabulary</b>	Quiet, Loud				Volume, Vibration, Wave, Pitch, Tone,			
<b>Scientists</b>					Aristotle Galileo Galilei Alexander Graham Bell			
<b>Books</b>					<i><b>Horrid Henry Rocks</b></i> (Francesca Simon)  <i><b>Moonbird</b></i> (Joyce Dunbar)  <i><b>The Pied Piper of Hamelin</b></i> (Natalia Vasquez)			

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
<b>Light</b>	Understanding the world ELG: The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.			<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>			<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>	<ul style="list-style-type: none"> <li>• The similarities and differences between light waves and waves in matter.</li> <li>• Light waves travelling through a vacuum; speed of light.</li> <li>• The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface.</li> <li>• Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye.</li> <li>• Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras.</li> <li>• Colours and the different frequencies of light, white light and</li> </ul>
<b>Working scientifically ideas</b>  <b>Research</b>  <b>Changes over time</b>  <b>Identifying and classifying</b>  <b>Pattern seeking</b>				<p>How does the sun make light?</p> <p>How have our ideas about eclipses changed over time?</p> <p>How would you organise these light sources into</p>			<p>Why do some people need to wear glasses to see clearly?</p> <p>How do our eyes adapt to different conditions?</p> <p>Cameras detect light – how has our understanding of</p>	

<p>Observing over time</p> <p>Comparative tests</p> <p>Fair tests</p>				<p>natural and artificial sources?</p> <p>Are you more likely to have bad eyesight and to wear glasses if you are older?</p> <p>When is our classroom darkest? Is the Sun the same brightness all day?</p> <p>Which pair of sunglasses will be best at protecting our eyes?</p> <p>How does the number of layers of transparent plastic affect how much light can pass through? How does the distance between the shadow puppet and the screen affect the size of the shadow?</p>			<p>light and its effects changed camera design throughout history?</p> <p>Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?</p> <p>Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom?</p> <p>How does my shadow change over the day? Does the temperature of a light bulb go up the longer it is on?</p> <p>Which material is most reflective?</p> <p>How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?</p>	<p>prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</p>
<p><b>Vocabulary</b></p>	<p>Bright, Dark</p>			<p>Light, Shadows, Mirror, Reflective, Dark, Reflection</p>			<p>Refraction, Reflection, Light, Spectrum, Rainbow, Colour,</p>	

Scientists				James Clerk Maxwell			Thomas Young Ibn al-Haytham (Alhazen) Percy Shaw	
Books				<p><i>The Owl Who Was Afraid of the Dark</i> (Jill Tomlinson)</p> <p><i>The Dark</i> (Lemony Snicket)</p> <p><i>The Firework-Maker's Daughter</i> (Philip Pullman)</p>			<p><i>Letters from the Lighthouse</i> (Emma Carroll)</p> <p><i>The Gruffalo's Child</i> (Julia Donaldson)</p> <p><i>The King Who Banned the Dark</i> (Emily Haworth-Booth)</p>	

Working Scientifically

	EYFS	Year 1/2	Year 3/4	Year 5/6	KS3
Questions	<p>Questions why things happen <i>Speaking: 30-50 months</i></p> <p>Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world <i>The World: 30-50 months</i></p>	<p>Ask simple questions and recognise that they can be answered in different ways.</p>	<p>Ask relevant questions and use different types of scientific enquiries to answer them</p> <p>Use straightforward scientific evidence to answer questions or to support their findings.</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p>	<p>Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience</p>
Observing	<p>Show curiosity about objects, events and people <i>Playing &amp; Exploring</i></p> <p>Make links and notice patterns in their experience <i>Creating &amp; Thinking Critically</i></p> <p>Develop their own narratives and explanations by connecting ideas or events <i>ELG: Speaking</i></p> <p>Builds up vocabulary that reflects the breadth of their experience <i>Understanding: 30-50 months</i></p> <p>Closely observes what animals, people and vehicles do <i>The World 8-20 months</i></p> <p>Use senses to explore the world around them <i>Playing &amp; Exploring</i></p>	<p>Observe closely, using simple equipment.</p>	<p>Make systematic and careful observations and, where appropriate, take accurate measurements using standard units.</p> <p>Use a range of equipment, including thermometers and data loggers</p>	<p>Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p>	<p>Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</p> <p>Evaluate the reliability of methods and suggest possible improvements</p> <p>Evaluate risks</p> <p>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility.</p> <p>Make and record observations and measurements using a range of methods for different investigations</p>
Experimenting	<p>Engage in open-ended activity <i>Playing &amp; Exploring</i></p> <p>Take a risk, engage in new experiences and learn by trial and error <i>Playing &amp; Exploring</i></p>	<p>Perform simple tests.</p>	<p>Set up simple practical enquiries, comparative and fair tests.</p>	<p>Use test results to make predictions to set up further comparative and fair tests.</p>	<p>Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</p>

	<p>Find ways to solve problems / find new ways to do things / test their ideas <i>Creating &amp; Thinking Critically</i></p> <p>Choose the resources they need for their chosen activities <i>ELG: Self Confidence &amp; Self Awareness</i></p> <p>Handle equipment and tools effectively <i>ELG: Moving &amp; Handling</i></p>				<p>Make predictions using scientific knowledge and understanding</p> <p>Identify further questions arising from their results</p>
Classifying	<p>Know about similarities and differences in relation to places, objects, materials and living things <i>ELG: The World</i></p>	Identify and classify.	Gather, record, classify and present data in a variety of ways to help in answering questions.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	<p>Apply sampling techniques</p> <p>Apply mathematical concepts and calculate results</p> <p>Use and derive simple equations and carry out appropriate calculations</p> <p>Undertake basic data analysis including simple statistical techniques</p>
Applying	<p>Answer how and why questions about their experiences <i>ELG: Understanding</i></p> <p>Make observations of animals and plants and explain why some things occur, and talk about changes <i>ELG: The World</i></p>	Use their observations and ideas to suggest answers to questions.	<p>Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</p> <p>Identify differences, similarities or changes related to simple scientific ideas and processes</p>	Identify scientific evidence that has been used to support or refute ideas or arguments.	<p>Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review</p> <p>Present reasoned explanations, including explaining data in relation to predictions and hypotheses</p>
Recording	Create simple representations of events, people and objects <i>Being Imaginative: 40-60+ months</i>	Gather and record data to help in answering questions	Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such	Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature

	<p>Develop ideas of grouping, sequences, cause and effect <i>Creating &amp; Thinking Critically</i></p>		<p>Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</p>	<p>as displays and other presentations.</p>	<p>Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</p> <p>Evaluate data, showing awareness of potential sources of random and systematic error</p> <p>Present observations and data using appropriate methods, including tables and graphs</p>
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