



PARKLANDS PRIMARY SCHOOL

SCIENCE KNOWLEDGE AND PROGRESSION MAP

EYFS	KS1	LKS2	UKS2
<p><i>The teaching of science in EYFS is in accordance with the EYFS national framework. Children are guided to make sense of their physical world and community through opportunities to explore, observe and find out about people, places, technology and the environment.</i></p> <p><i>In the EYFS, the characteristics of effective learning from the Statutory Framework for the Early Years Foundation Stage are the foundations on which the working scientifically skills build in Key Stage 1.</i></p> <p><i>While children are playing and exploring, teachers should be modelling, encouraging and supporting them to do the following:</i></p> <ul style="list-style-type: none"> - show curiosity and ask questions - make observations using their senses and simple equipment - make direct comparisons - use equipment to measure - record their observations by drawing, taking photographs, using sorting rings or boxes and, in Reception, on simple tick sheets - use their observations to help them to answer their questions - talk about what they are doing and have found out - identify, sort and group. 	<p><i>The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. Children are encouraged to be curious and ask questions about what they notice. Their understanding of scientific ideas is supported through the use of different types of scientific enquiry so that children can answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. Children are supported to begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways, including wider school forums such as science week. Most of the learning about science is done through first-hand practical experiences, and children are also to begin to use appropriate secondary sources, such as books, photographs and videos.</i></p> <p><i>‘Working scientifically’ is described separately in the National Curriculum programme of study, but is always taught through and clearly related to the teaching of substantive science content in the programme of study. The knowledge and skills progression maps outline how the specific skills of each unit progressively build between years and towards the overarching ‘end point statements’. Throughout the notes and guidance, examples show how scientific methods and skills might be linked</i></p>	<p><i>The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. Children are encouraged and supported to ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.</i></p> <p><i>As in KS1, ‘Working scientifically’ is described separately in the National Curriculum programme of study, but is always taught through and clearly related to the teaching of substantive science content in the programme of study. The knowledge and skills progression maps outline how the specific skills of each unit progressively build between years and towards the overarching ‘end point statements’. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.</i></p>	<p><i>The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. At Parklands, children do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. Children are also supported to begin to recognise that scientific ideas change and develop over time. The school curriculum provides opportunities for children to select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Children learn to draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.</i></p> <p><i>‘Working and thinking scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to</i></p>






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	<p>to specific elements of the content. Opportunities are provided for the children to read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.</p>	<p>Opportunities are provided for the children to read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.</p>	<p>specific elements of the content. Opportunities are provided for the children to read, spell and pronounce scientific vocabulary correctly.</p>
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Working Scientifically	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3
	Plan							
<p>Asking questions</p>  <p>Making predictions</p>  <p>Setting up tests</p> 	<p>Choose the resources they need for their chosen activities and say when they do or don't need help</p>	<p>Ask simple questions and recognise that they can be answered in different ways</p>	<p>Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum</p>	<p>Ask relevant questions and use different types of scientific enquiries to answer them</p> <p>Set up simple practical enquiries, comparative and fair tests</p>	<p>Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	<p>Plan different types of scientific enquiries to answer their own or others' 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> <p>Make predictions using scientific knowledge and understanding</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>	



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							Evaluate risks
	Do						
Observing and Measuring 	Know about similarities and differences in relation to places, objects, materials and living things Make observations of animals and plants Explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. Select and use technology for particular purposes	Use simple equipment to observe closely Perform simple tests Identify and classify	Use simple equipment to observe closely, including changes over time Performing simple comparative tests Identify and classify	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate	Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
	Record						
Recording data 	Represent their own ideas, thoughts and feelings through design and technology, art, music, dance,	Gather and record data to help in answering questions	Gather and record data to help in answering questions including from secondary	Gather, record, classify and present data in a variety of ways to help in answering questions Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter	Record data and results of increasing complexity using scientific diagrams and labels, classification	Make and record observations and measurements using a range of methods for different investigations; and evaluate the



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	role play and stories		sources of information		graphs, bar and line graphs	keys, tables, scatter graphs, bar and line graphs	reliability of methods and suggest possible improvements Apply sampling techniques Apply mathematical concepts and calculate results
Review							
<p>Interpreting and communicating results</p>  <p>Evaluating</p> 	<p>Talk about the features of their own immediate environment and how environments might vary from one another</p> <p>Explain why some things occur and talk about changes</p>	Use observations and ideas to suggest answers to questions	Use their observations and ideas to suggest answers to questions, noticing similarities, differences and patterns	<p>Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>Identify differences, similarities or changes related to simple scientific ideas and processes</p> <p>Use straightforward scientific evidence to answer questions or to support his/her findings</p>	<p>Use test results to make predictions to set up further comparative and fair tests</p> <p>Report and present findings from enquiries, including conclusions, causal relationships, in oral and written forms such as displays and other presentations</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments</p>	<p>Use test results to make predictions to set up further comparative and fair tests</p> <p>Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</p> <p>Identify scientific evidence that has been used to support or refute</p>	<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>Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility</p>



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						<p>ideas or arguments Describe and evaluate their own and other people's scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources</p> <p>Group and classify things and recognise patterns</p> <p>Find things out using a wide range of secondary sources of information</p> <p>Use appropriate scientific language and ideas from the national curriculum to explain, evaluate and communicate</p>	
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											his/her methods and findings	
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Programme of study	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	KS3	
Biology	Plants								<u>Structure and function of living organisms</u> Cells and organisation ♣ cells as the fundamental unit of living organisms,
	Nursery Grow plants	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	Observe and describe how seeds and bulbs grow into mature plants	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk,					



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		Identify and describe the basic structure of a variety of common flowering plants, including trees	Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	leaves and flowers Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal				including how to observe, interpret and record cell structure using a light microscope ♣ the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts ♣ the similarities and differences between plant and animal cells ♣ the role of diffusion in the movement of materials in and between cells ♣ the structural adaptations of some unicellular organisms ♣ the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
Animals including Humans								
	Nursery Excluding humans Learn about the life cycles of animals Compare adult animals to their babies	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals Identify and name a variety of	Notice that animals, including humans, have offspring which grow into adults Find out about and describe the basic needs of	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	Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions construct and interpret a variety of	Describe the changes as humans develop to old age.	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Recognise the impact of diet, exercise, drugs and lifestyle on the	The skeletal and muscular systems ♣ the structure and functions of the human skeleton, to include support, protection, movement and making blood cells ♣ biomechanics – the interaction between skeleton and muscles, including the



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	<p>Observe how baby animals change over time</p> <p>Humans Learn about the life cycles of humans Learn about how to take care of themselves</p> <p>Learn about their senses</p>	<p>common animals that are carnivores, herbivores and omnivores</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</p>	<p>animals, including humans, for survival (water, food and air)</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p>	<p>identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p>food chains, identifying producers, predators and prey</p>		<p>way their bodies function</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans</p>	<p>measurement of force exerted by different muscles</p> <ul style="list-style-type: none"> ♣ the function of muscles and examples of antagonistic muscles. <p>Nutrition and digestion</p> <ul style="list-style-type: none"> ♣ content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed ♣ calculations of energy requirements in a healthy daily diet ♣ the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases ♣ the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as
	<p>Reception Excluding humans</p> <p>Name and describe animals that live in different habitats</p> <p>Describe different habitats</p> <p>Humans Describe people who are familiar to them</p> <p>Learn about how to take care of themselves</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>	Living Things and their Habitats					



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	<p>Nursery Explore the surrounding natural environment</p> <p>Explore natural objects from the surrounding environment</p>		<p>Explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>Identify and name a variety of plants and animals in their habitats, including micro-habitats</p> <p>Describe how animals obtain their food from plants and other animals, using the idea of a simple food</p>		<p>Recognise that living things can be grouped in a variety of ways</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things</p>	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>Describe the life process of reproduction in some plants and animals</p>	<p>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</p> <p>Give reasons for classifying plants and animals based on specific characteristics</p>	<p>biological catalysts)</p> <ul style="list-style-type: none"> ♣ the importance of bacteria in the human digestive system ♣ plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots. <p>Gas exchange systems</p> <ul style="list-style-type: none"> ♣ the structure and functions of the gas exchange system in humans, including adaptations to function ♣ the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume ♣ the impact of exercise, asthma and smoking on the human gas exchange system ♣ the role of leaf stomata in gas exchange in plants. <p>Reproduction</p> <ul style="list-style-type: none"> ♣ reproduction in humans (as an
	<p>Reception Explore the plants in the surrounding natural environment</p> <p>Explore the animals in the surrounding natural environment</p> <p>Explore plants and animals in a contrasting natural environment</p>							



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			chain, and identify and name different sources of food					<p>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</p> <p>♣ reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</p> <p>Health</p> <p>♣ the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</p> <p><u>Material cycles and energy</u></p> <p>Photosynthesis</p> <p>♣ the reactants in, and products of,</p>
Evolution and Inheritance								
							<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>Identify how animals and plants</p>	



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								<p>are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>	<p>photosynthesis, and a word summary for photosynthesis</p> <ul style="list-style-type: none">♣ the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere♣ the adaptations of leaves for photosynthesis. <p>Cellular respiration</p> <ul style="list-style-type: none">♣ aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life♣ a word summary for aerobic respiration♣ the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration
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								<ul style="list-style-type: none">♣ the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism. <p><u>Interactions and interdependencies</u></p> <p>Cellular respiration</p> <ul style="list-style-type: none">♣ aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life♣ a word summary for aerobic respiration♣ the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration♣ the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.
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								<p><u>Genetics and Evolution</u></p> <p>Inheritance, chromosomes, DNA and genes</p> <ul style="list-style-type: none">♣ heredity as the process by which genetic information is transmitted from one generation to the next♣ 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♣ differences between species♣ the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation♣ the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection♣ changes in the environment may
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								leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction ♣ the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.
Physics	Seasonal Changes							Energy
		Observe changes across the four seasons						Calculation of fuel uses and costs in the domestic context ♣ comparing energy values of different foods (from labels) (kJ) ♣ comparing power ratings of appliances in watts (W, kW) ♣ comparing amounts of energy transferred (J, kJ, kW hour) ♣ domestic fuel bills, fuel use and costs ♣ fuels and energy resources.
	Reception Play and explore outside in all seasons and in different weather Observe living things throughout the year	Observe and describe weather associated with the seasons and how day length varies						
	Forces							
				Compare how things move on different surfaces Notice that some forces need contact between two objects, but		Explain that unsupported objects fall towards the Earth because of the force of gravity acting between		Energy changes and transfers ♣ simple machines give bigger force but at the expense of smaller movement (and vice versa):



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				<p>magnetic forces can act at a distance</p> <p>Observe how magnets attract or repel each other and attract some materials and not others</p> <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</p> <p>Describe magnets as having two poles</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>		<p>the Earth and the falling object</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p>		<p>product of force and displacement unchanged</p> <p>♣ heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators</p> <p>♣ other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.</p> <p>Changes in systems</p> <p>♣ energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</p>
Light								



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	<p>Nursery Explore light sources</p> <p>Shine light on or through different materials</p>			<p>Recognise that they need light in order to see things and that dark is the absence of light</p> <p>Notice that light is reflected from surfaces</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p>			<p>Recognise that light appears to travel in straight lines</p> <p>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</p> <p>Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>	<p>♣ comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions</p> <p>♣ using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.</p> <p><u>Motion and forces</u></p> <p>Describing motion</p> <p>♣ speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)</p> <p>♣ the representation of a journey on a</p>
	<p>Reception Explore shadows</p> <p>Explore rainbows</p>			<p>Recognise that shadows are formed when the light from a light source is blocked by an opaque object</p> <p>Find patterns in the way that the size of shadows change</p>			<p style="text-align: center;">Sound</p>	



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	<p>Nursery Listen to sounds</p> <p>Make sounds</p>				<p>Identify how sounds are made, associating some of them with something vibrating</p> <p>Recognise that vibrations from sounds travel through a medium to the ear</p> <p>Find patterns between the pitch of a sound and features of the object that produced it</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>Recognise that sounds get fainter as the distance from the sound source increases</p>			<p>distance-time graph</p> <p>♣ relative motion: trains and cars passing one another.</p> <p>Forces</p> <p>♣ forces as pushes or pulls, arising from the interaction between two objects</p> <p>♣ using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces</p> <p>♣ moment as the turning effect of a force</p> <p>♣ 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</p> <p>♣ forces measured in newtons, measurements of</p>	
	<p>Reception Listen to sounds outside and identify the source</p> <p>Make sounds</p>								
	Earth and Space								



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						<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p>	<p>stretch or compression as force is changed</p> <ul style="list-style-type: none"> ♣ force-extension linear relation; Hooke's Law as a special case ♣ work done and energy changes on deformation ♣ non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. <p>Pressure in fluids</p> <ul style="list-style-type: none"> ♣ atmospheric pressure, decreases with increase of height as weight of air above decreases with height ♣ pressure in liquids, increasing with depth; upthrust effects,
	<p>Reception Learn about the Solar System and stars</p> <p>Learn about space travel</p>						
Electricity							



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	<p>Nursery Identify electrical devices</p> <p>Use battery-powered devices</p>				<p>Identify common appliances that run on electricity</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors</p>		<p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> <p>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</p> <p>Use recognised symbols when representing a simple circuit in a diagram</p>	<p>floating and sinking</p> <ul style="list-style-type: none"> ♣ pressure measured by ratio of force over area – acting normal to any surface. <p>Balanced forces</p> <ul style="list-style-type: none"> ♣ opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. <p>Forces and motion</p> <ul style="list-style-type: none"> ♣ forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) ♣ change depending on direction of force and its size. <p><u>Waves</u></p> <p>Observed waves</p> <ul style="list-style-type: none"> ♣ waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. <p>Sound waves</p> <ul style="list-style-type: none"> ♣ frequencies of sound waves, measured in hertz (Hz); echoes,
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									<p>reflection and absorption of sound</p> <ul style="list-style-type: none">♣ sound needs a medium to travel, the speed of sound in air, in water, in solids♣ sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal♣ auditory range of humans and animals. <p>Energy and waves</p> <ul style="list-style-type: none">♣ pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone. <p>Light waves</p> <ul style="list-style-type: none">♣ the similarities and differences between light waves and waves in matter♣ light waves travelling through a vacuum; speed of light♣ the transmission of light through materials: absorption, diffuse
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								<p>scattering and specular reflection at a surface</p> <ul style="list-style-type: none">♣ 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♣ light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras♣ colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. <p><u>Electricity and electromagnetism</u></p> <p>Current electricity</p> <ul style="list-style-type: none">♣ electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge♣ potential
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								<p>difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <ul style="list-style-type: none">♣ differences in resistance between conducting and insulating components (quantitative). <p>Static electricity</p> <ul style="list-style-type: none">♣ separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects♣ the idea of electric field, forces acting across the space between objects not in contact. <p>Magnetism</p> <ul style="list-style-type: none">♣ magnetic poles, attraction and repulsion♣ magnetic fields by plotting with compass, representation by field lines♣ Earth's magnetism, compass and navigation♣ the magnetic effect of a current, electromagnets,
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								<p>D.C. motors (principles only).</p> <p>Matter</p> <p>Physical changes</p> <ul style="list-style-type: none">♣ conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving♣ similarities and differences, including density differences, between solids, liquids and gases♣ Brownian motion in gases♣ diffusion in liquids and gases driven by differences in concentration♣ the difference between chemical and physical changes. <p>Particle model</p> <ul style="list-style-type: none">♣ the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition♣ atoms and molecules as particles. <p>Energy in matter</p> <ul style="list-style-type: none">♣ changes with
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<p>Chemistry</p>	<p>Nursery Explore a range of materials</p> <p>Shape and join materials</p> <p>Combine and mix ingredients</p> <p>Change materials by heating and cooling, including cooking</p>	<p>Distinguish between an object and the material from which it is made</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>Describe the simple physical properties of a variety of everyday materials</p> <p>Compare and group together a variety of everyday materials on the</p>	<p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</p> <p>Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>			<p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide</p>		<p>The particulate nature of matter</p> <ul style="list-style-type: none"> ♣ the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure ♣ changes of state in terms of the particle model. <p>Atoms, elements and compounds</p> <ul style="list-style-type: none"> ♣ a simple (Dalton) atomic model ♣ differences between atoms, elements and compounds ♣ chemical symbols and formulae for elements and compounds ♣ conservation of mass changes of state and chemical reactions. <p>Pure and impure substances</p>
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SCIENCE KNOWLEDGE AND PROGRESSION MAP

	<p>Reception Explore a range of materials, including natural materials</p> <p>Make objects from different materials, including natural materials</p> <p>Observe, measure and record how materials change when heated and cooled</p> <p>Compare how materials change over time and in different conditions</p>	basis of their simple physical properties				<p>how mixtures might be separated, including through filtering, sieving and evaporating Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p>	<ul style="list-style-type: none"> ♣ the concept of a pure substance ♣ mixtures, including dissolving ♣ diffusion in terms of the particle model ♣ simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography ♣ the identification of pure substances. <p>Chemical reactions</p> <ul style="list-style-type: none"> ♣ chemical reactions as the rearrangement of atoms ♣ representing chemical reactions using formulae and using equations ♣ combustion, thermal decomposition, oxidation and displacement reactions ♣ defining acids and alkalis in terms of neutralisation reactions ♣ the pH scale for measuring acidity/alkalinity; and indicators ♣ reactions of acids with metals
States of Matter							
					Compare and group materials together,		



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SCIENCE KNOWLEDGE AND PROGRESSION MAP

					<p>according to whether they are solids, liquids or gases</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>			<p>to produce a salt plus hydrogen</p> <ul style="list-style-type: none"> ♣ reactions of acids with alkalis to produce a salt plus water ♣ what catalysts do. <p>Energetics</p> <ul style="list-style-type: none"> ♣ energy changes on changes of state (qualitative) ♣ exothermic and endothermic chemical reactions (qualitative). <p>The Periodic Table</p> <ul style="list-style-type: none"> ♣ the varying physical and chemical properties of different elements ♣ the principles underpinning the Mendelev Periodic Table ♣ the Periodic Table: periods and groups; metals and non-metals ♣ how patterns in reactions can be predicted with reference to the Periodic Table ♣ the properties of metals and non-metals ♣ the chemical properties of metal and non-metal oxides with respect to acidity. <p>Materials</p> <ul style="list-style-type: none"> ♣ the order of metals and carbon
Rocks								
				<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p>				



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				<p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>Recognise that soils are made from rocks and organic matter</p>				<p>in the reactivity series</p> <ul style="list-style-type: none">♣ the use of carbon in obtaining metals from metal oxides♣ properties of ceramics, polymers and composites (qualitative). <p>Earth and atmosphere</p> <ul style="list-style-type: none">♣ the composition of the Earth♣ the structure of the Earth♣ the rock cycle and the formation of igneous, sedimentary and metamorphic rocks♣ Earth as a source of limited resources and the efficacy of recycling♣ the carbon cycle♣ the composition of the atmosphere♣ the production of carbon dioxide by human activity and the impact on climate.
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