



Subject: SCIENCE

RATIONALE FOR OUR SCIENCE CURRICULLUM AT WHITE MEADOWS:

At White Meadows we believe that our Science curriculum should inspire our children, so that they view themselves as scientists. All children should be able to access the curriculum and take part in the activities provided. Our lessons will build on the experiences of discovery in Early Years and will ensure that through creative teaching and classroom management SEND children are central to our vision; these children may excel in science. Working science will be embedded into our lessons and the vocabulary used, will be explicitly taught, as it is a fundamental part of the science curriculum across all year groups. Knowledge based vocabulary will be highlighted in year group planning, building the children's technical vocabulary over time.

We will engender a love of science through concrete, hands on experiences and by making science relevant to the world around them. Our Enchanted Meadow, provides in-school opportunities to experience nature and the seasons close up and first-hand. Children will develop their investigational skills over the key stages, building independence so that by upper key stage 2, they will be able to plan and carry out investigations, collect and present evidence as appropriate. Additionally, we will ensure that our children have a good understanding of how to keep safe through our teaching of SRE and how to be healthy.

Science Week is key to raising the profile of science within our school, offering further opportunities to tap into children's natural curiosity and provide extended periods of the school day to enable cross curricular links to be made. We aim for our children to aspire to pursue science as part of their future education and careers, thus, where possible, this should include involving the wider community and provide role models, who work within a variety of diverse science fields.

<u>Year Group</u>	<u>NC Knowledge/Skills</u> *See non-negotiable 'sticky skills/knowledge' focus in green	<u>'Sticky' Knowledge/Skills</u> *See non-negotiable 'sticky skills/knowledge' focus in green	<u>Possible Key Questions</u>	<u>Vocabulary</u>	<u>Club/ Visit/Expert</u> See link to separate form.
EYFS 3-4 (Nursery)	<p>Science covered in Communication and Language (CLL) - Language and understanding and speaking, and Understanding the world - The Natural world. (UW)</p> <p>Use all their senses in hands on exploration of natural materials. Explore collections of materials with similar and/or different properties Talk about what they see, using a wide range of vocabulary. Explore how things work. Plant seeds and care for growing plants. Understand the key features of the life cycle of a plant and an animal. Begin to understand the need to respect and care for the natural environment and all living things.</p>	<p>Talk about what you can see - what has changed? Discuss what is the same and what is different. Plants grow from seeds. Plants need light and water to grow. Animals Change as they grow - explore life cycles. Talk about where you live Handle animals gently and with care and look after things in our environment.</p>	<ul style="list-style-type: none"> • What can you see? • How are they different? • How are they the same? • What does the plant need to grow? • How do we look after animals? • How do we look after our environment? • What can you feel? • What is a life cycle? 	<p>Change, Hot , Cold, Hard,, Soft, rough, smooth, Plant, Seed, Water, Sun, Soil, Egg, Hatch, Crack, Duckling, Baby, tiny, caterpillar, butterfly, grow, big, small, different, world,</p>	<p>Science Enrichment Opportunities</p>

	<p>Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice. Know that there are different countries in the world and talk about the differences they have experienced or seen in photos.</p>				
<p>Reception</p> <p>ELG</p>	<p>Know that there are different countries in the world and talk about the differences they have experienced or seen in photos. Explore the natural world around them. Describe what they see, hear and feel whilst outside. Recognise some environments that are different to the one in which they live. Understand the effect of changing seasons on the natural world around them</p> <p>Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.</p> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<p>Talk about what you can see - what has changed? Discuss what is the same and what is different. Plants grow from seeds. Plants need light and water to grow. Animals Change as they grow - explore life cycles. Talk about where you live Handle animals gently and with care and look after things in our environment. We have four seasons - Be able to talk about Spring/Summer/Autumn/winter and the changes to the environment.</p>	<ul style="list-style-type: none"> • What can you see? • How are they different? • How are they the same? • What does the plant need to grow? • How do we look after animals? • How do we look after our environment? • What can you feel? • What is a life cycle? • Where do you live? • What is different? • What is the weather like in summer? • What is weather like In Spring? • What is the weather like in Autumn • What is the weather like in Winter? <p>How is the weather different.</p> <ul style="list-style-type: none"> • What is a season? 	<p>Change, Hot , Cold, Hard,, Soft, rough, smooth, Plant, Seed, Water, Sun, Soil, Egg, Hatch, Crack, Duckling, Baby, tiny, caterpillar, butterfly, grow, big, small, different, world, season, weather, trees, leaves</p>	
<p>Year 1</p> <p>Animals including Humans</p> <p>Autumn 1</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>There are many different animals with different characteristics. Animals have senses to help individuals survive. When animals sense things they are able to respond. Animals need food to survive. Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.</p>	<ul style="list-style-type: none"> • What do animals eat? • Do all animals eat the same food? • Which of our senses is the most accurate at identifying food? • Do all animals hunt? <ul style="list-style-type: none"> • Why are animals different colours and patterns? 	<p>Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow</p>	
<p>Year 1 - Energy - Seasons and how they change</p> <p>Autumn 2</p>	<p>Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.</p>	<p>Weather can change There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc Days are longer and hotter in the summer Days are shorter and colder in the winter There are four seasons: Spring, Summer, Autumn, Winter</p>	<ul style="list-style-type: none"> • Why do more frequent days of rain saturate the ground? • How long does it take for the ground to dry after it has been raining? • Does more rain take longer to dry? • Do countries with higher temperatures have less rain? • How does rainfall and temperature change over time in our school grounds? 	<p>Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature</p>	

			<ul style="list-style-type: none"> • Which leaf is the strongest/best shade cover/best at directing water? • What do you notice about different leaves? • What purpose to leaves serve for a tree? • Why do you think leaves turn brown in Winter? • What colours can we find outside? Does this change across the seasons? • What effect does rain have on the environment? • What would happen if there was too much rain? • What would happen if there wasn't enough rain? • 		
<p>Year 1 - Materials Spring Term</p>	<p>Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock, Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials based on their simple properties</p>	<p>There are many different materials that have different describable and measurable properties. Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass). The properties of a material determine whether they are suitable for a purpose.</p>	<p>It is recommended that materials be taught three times through KS1. Give a theme for each topic e.g. buildings, exploration, toys, the seaside. Plan to investigate a couple of classes of materials and properties in each topic so children get a depth of experience each topic and cover all the classes of materials over the key stage</p> <p><u>Buildings</u></p> <ul style="list-style-type: none"> • Which rocks are the least crumbly? • Which materials absorb the most water? • Which type of brick would be the easiest to drag to make a pyramid? • Which material would be the strongest to use as a floor tile? <p><u>Toys & Nice things</u></p> <ul style="list-style-type: none"> • Which fabric would make the softest blanket? • The baby has spilt her drink, which material would absorb the drink the best? • We want to make a really slippery slide; which liquid would be best to use? • Which chocolate will melt the fastest on a warm plate (a model of a warm hand) • Which wrapping papers are strong enough to wrap and send a present? <p><u>Clothing & Materials</u></p> <ul style="list-style-type: none"> • Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime? • Which plastic would be flexible enough to make a belt? 	<p>Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque,</p>	

			<ul style="list-style-type: none"> Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker? What could I wrap a chicken egg in to keep it warm when it is waiting to hatch? What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush? 		
Year 1 Plants Summer Term	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Identify and describe the basic structure of a variety of common flowering plants. Identify and name the roots, trunk, branches and leaves of trees.	Plants grow from seeds/bulbs Plants need light and water to grow and survive Plants are important We can eat lots of plants	<ul style="list-style-type: none"> How do Plants grow? What do Plants need to grow? Do all plants need water? Are all plants green? Why do seeds look different? Can plants grow as big in the shade? What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen	
Year 2 - Materials Autumn term	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Materials can be changed by physical force (twisting, bending, squashing and stretching)	It is recommended that materials be taught three times through KS1. Give a theme for each topic e.g. buildings, exploration, toys, the seaside. Plan to investigate a couple of classes of materials and properties in each topic so children get a depth of experience each topic and cover all the classes of materials over the key stage <u>Buildings</u> <ul style="list-style-type: none"> Which rocks are the least crumbly? Which materials absorb the most water? Which type of brick would be the easiest to drag to make a pyramid? Which material would be the strongest to use as a floor tile? <u>Toys & Nice things</u> <ul style="list-style-type: none"> Which fabric would make the softest blanket? The baby has spilt her drink, which material would absorb the drink the best? We want to make a really slippery slide; which liquid would be best to use? Which chocolate will melt the fastest on a warm plate (a model of a warm hand) Which wrapping papers are strong enough to wrap and send a present? <u>Clothing & Materials</u>	Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons,	

			<ul style="list-style-type: none"> Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime? Which plastic would be flexible enough to make a belt? Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker? What could I wrap a chicken egg in to keep it warm when it is waiting to hatch? What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush? 		
Year 2 Animals including Humans Autumn term	<p>Know that animals, including humans, have offspring which grow into adults □</p> <p>Know the basic stages in a life cycle for animals, including humans. □</p> <p>Find out and describe the basic needs of animals, including humans, for survival (water, food and air).</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Animals move in order to survive.</p> <p>Different animals move in different ways to help them survive.</p> <p>Exercise keeps animal's bodies in good condition and increases survival chances.</p> <p>All animals eventually die.</p> <p>Animals reproduce new animals when they reach maturity.</p> <p>Animals grow until maturity and then do not grow any larger.</p>	<ul style="list-style-type: none"> How long do should my pets live for? Do all animals grow and live the same way? Do bigger animals live longer? Why are we all different heights? How and why do we grow and change? 	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,</p>	
Year 2 Plants Spring term	<p>Observe and describe how seeds and bulbs grow into mature plants.</p> <p>Find out and describe how plants need water, light and warmth to grow and stay healthy.</p>	<p>Plants grow from seeds/bulbs</p> <p>Plants need light, water and warmth to grow and survive</p> <p>Flowers make seeds to make more plants (reproduce)</p> <p>Plants are important</p> <p>We need plants to survive (to clean air, to eat)</p> <p>We can eat different parts of the plants (leaves, stems, roots, seeds, fruit)</p>	<ul style="list-style-type: none"> Do cress produce seeds, how could we find out? Do all plants produce flowers and seeds? What is different between freshly cut and planted flowers? Do plants flower all year round? What are flowers for? <p>What happens to a plant after it has produced seeds?</p>	<p>Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight.</p>	
Year 2 - Living Things and their Habitats Spring term	<p>Explore and compare the difference 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</p>	<p>Some things are living, some were once living but now dead and some things never lived.</p> <p>There is variation between living things.</p> <p>Different animals and plants live in different places.</p> <p>Living things are adapted to survive in different habitats.</p> <p>Environmental change can affect plants and animals that live there.</p>	<ul style="list-style-type: none"> How to animals eat? Do all animals eat the same thing? Which animals hunt, and which animals are hunted? Why? What animals live in our school environment? How are animals and plants 'adapted' to live in their habitats Why do animals and plants like to live in different places? How do seasons affect our animals and plants? 	<p>Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,</p>	

	idea of a simple food chain, and identify and name the different sources of food.		<ul style="list-style-type: none"> • Which animals hibernate and why? • Why do snails hibernate, but slugs do not? • How do habitats change over our school year? 		
Year 2 - Forces Summer term	There are no specified National Curriculum Objectives for forces at KS1	<p>Pushing and pulling can make things move faster or slower.</p> <p>Pushing and pulling can make things move or stop.</p> <p>Things can move in different ways.</p> <p>Larger masses take bigger pushes and pulls to move or stop them.</p> <p>Pushing and pulling can change the shape of things.</p> <p>Bigger pushes and pulls have bigger effects</p>	<ul style="list-style-type: none"> • How can we move objects? • How can we change the way an object moves? • How does a material affect how fast a ball rolls down a slope? • How does the length/steepness of a slope affect how far a ball/car/tin will roll off the end? • What is a push or a pull that makes it go further? • How does how hard/long I press a pop-up toy for affect how high it jumps? • On what surface do objects roll the best on? Is it the same for sliding? • Which material would be best for a teddy bungee cord? • How does length of an elastic band affect how elastic it is? • Which sock is the most elastic? • Which tights are the most elastic (denier)? • Which recipe play dough needs the greatest push to squash it? • How does the height an egg is dropped from affect how big the splat pattern is? (you could use wet tissue paper balls) 	Force, push, pull, surface, attract, repel, compass	
Year 3 - Energy - Light and Sight Autumn 2	<p>Recognise that they need light in order to see things and that dark is the absence of light.</p> <p>Notice that light is reflected from surfaces.</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</p> <p>Recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>Find patterns in the way that the sizes of shadows change.</p>	<p>There must be light for us to see. Without light it is dark.</p> <p>We need light to see things even shiny things.</p> <p>Transparent materials let light travel through them, and opaque materials don't let light through.</p> <p>Beams of light bounce off some materials (reflection).</p> <p>Shiny materials reflect light beams better than non-shiny materials.</p> <p>Light comes from a source</p>	<ul style="list-style-type: none"> • A coin is lost, what would be the best way to find it? (Turn the lights out and see it shine? Use a torch to see it reflect?) • How does distance from a light source affect how bright it looks? • How does being in darkness affect your sense of hearing? • What colour would be the best to make a safety jacket from? • How does the colour of a material affect how reflective it is? • What would be the best material to make a blind for a baby's room? • How does thickness of a material affect how much light can pass through it? 	Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.	

			<ul style="list-style-type: none"> • How many pieces of tracing paper are as translucent as a single piece of white paper? • How does the shape of a mirror affect how the light reflects? • How can we change the darkness, size and shape of a shadow? • 		
<p>Year 3 – Animals including Humans</p> <p>Spring 1</p>	<p>Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat. □</p> <p>Know how nutrients, water and oxygen are transported within animals and humans. Know about the importance of a nutritious, balanced diet. □</p> <p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement:</p>	<p>Different animals are adapted to eat different foods. Many animals have skeletons to support their bodies and protect vital organs. Muscles are connected to bones and move them when they contract. Movable joints connect bones.</p>	<ul style="list-style-type: none"> • Why do we need a skeleton? • What types of skeleton are there? • Are all skeletons the same? • Can something survive without a skeleton? • What happens if we break a bone? • How do we move? • Are bones that are bigger, stronger? • Why do we need joints? • Why do muscles get tired? • Can we 'break' muscles? 	<p>Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax,</p>	
<p>Year 3 – Materials</p> <p>Spring 2</p>	<p>Compare and group together different kinds of rocks based on their appearance and simple physical properties</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>Recognise that soils are made from rocks and organic matter</p>	<p>There are different types of rock. There are different types of soil. Soils change over time. Different plants grow in different soils. Fossils tell us what has happened before. Fossils provide evidence. Palaeontologists use Fossils to find out about the past. Fossils provide evidence that living things have changed over time.</p>	<ul style="list-style-type: none"> • How are the soils different? • Which do you think has best drainage? • Which is more likely to lead to flooding? • How many soil types have we found? • Where might you find more? • How might the soil be different in different countries? • What rock is best for a kitchen chopping board? What might be the issues with various materials and what they must withstand? • What types of rocks are there? • How do rocks change? • What would grow best in your soil? • Why do you think worms are important to the creation of soil? • How can we use composting to make our own soil? • Does it currently look like real soil? • How long do you think this process will take and why? • How are fossils created? • Why do fossils help us find out about historical events? • If you could fossilise an object what would it be? 	<p>Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, topsoil, sub soil, base rock.</p>	
<p>Year 3 – Forces</p>	<p>Compare how things move on different surfaces.</p> <p>Know how a simple pulley works and use making</p>	<p>Magnets exert attractive and repulsive forces on each other.</p>	<ul style="list-style-type: none"> • What are magnetic materials? How can we find out? • Can I make a magnetic material non-magnetic? 	<p>Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole,</p>	

<p>Summer 1</p>	<p>lifting an object simpler Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract and repel each other and attract some materials and not others. Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>Magnets exert non-contact forces, which work through some materials. Magnets exert attractive forces on some materials. Magnet forces are affected by magnet strength, object mass, distance from object and object material.</p>	<ul style="list-style-type: none"> • How far away does a magnet have to be before it attracts a magnetic material? • How far away can the magnetic attraction between two magnets be experienced? • Is the repulsive force the same size? • How is the magnetic attraction of repulsion force affected by putting materials between the magnets? • Are bigger magnets stronger? • How could you use magnets to measure the number of pages in a book? 	<p>north, south, attract, repel, compass</p>	
<p>Year 3 Plants Summer 2</p>	<p>Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers Explore the part flowers play in a flowering plants life cycle, including pollination, seed formation and seed dispersal Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants Know the way in which water is transported between plants</p>	<p>Plants are producers, they make their own food. Their leaves absorb sunlight and carbon dioxide Plants have roots, which provide support and draw water from the soil Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production Seed dispersal improves a plants chances of successful reproduction Seeds/bulbs require the right conditions to germinate and grow. Seeds contain enough food for the plant's initial growth</p>	<ul style="list-style-type: none"> • How do plants reproduce? • Do all flowers look the same? • How do insects know which flowers to pollinate? • Why do flowers smell? • What do seeds do? • Can a plant live without its leaves? • Do grass/trees make flowers? • What conditions are perfect for a seed to grow? • Where do weeds come from? • How does the space between seeds affect how well they grow? • Does seed size match plant size? • Do plants take in water through their roots? • How does water move through the plant? • How do plants make their food? • How does light affect plant growth? • How does a plant get carbon dioxide? 	<p>Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll</p>	
<p>Year 4 - Living Things and their Habitat Autumn Term 1</p>	<p>Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose danger to living things.</p>	<p>Living things can be divided into groups based upon their characteristics Environmental change affects different habitats differently Different organisms are affected differently by environmental change Different food chains occur in different habitats Human activity significantly affects the environment</p>	<ul style="list-style-type: none"> • What food chains and webs are there in our local habitat? • How does energy move through the food chain? • How does removal of one species from an environment, affect others? (keystone species) • How does environmental change affect different organisms? • What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers) 	<p>Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.</p>	

			<ul style="list-style-type: none"> How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?) 		
Year 4 - Materials, Liquids and Gases Autumn Term 2	<p>Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>Solids, liquids and gases are described by observable properties.</p> <p>Materials can be divided into solids, liquids and gases.</p> <p>Heating causes solids to melt into liquids and liquids evaporate into gases. d) Cooling causes gases to condense into liquids and liquids to freeze into solids.</p> <p>The temperature at which given substances change state are always the same.</p>	<ul style="list-style-type: none"> How does the amount of water added to flour affect its state? How does the amount of detergent added to water affect how slippery it is? How does the temperature affect how viscous a liquid is (use cooking oil)? Place a peach in a glass of lemonade and watch it spin. Why does it behave that way, and can you prove it? How does the material sprinkled on ice and snow affect how quickly it melts? What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature? What is the melting temperature of ice and how does it compare with the freezing temperature of water? Is the melting temperature of wax the same as its freezing temperature? 	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,	
Year 4 - Electricity Spring Term 1	<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 a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.</p> <p>Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.</p> <p>Know the difference between a conductor and an insulator, giving examples of each.</p> <p>Safety when using electricity.</p>	<p>A source of electricity (mains of battery) is needed for electrical devices to work.</p> <p>Electricity sources push electricity round a circuit.</p> <p>More batteries will push the electricity round the circuit faster.</p> <p>Devices work harder when more electricity goes through them.</p> <p>A complete circuit is needed for electricity to flow and devices to work.</p> <p>Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators.</p>	<ul style="list-style-type: none"> What would life be like without electricity? What sorts of things use/need electricity? What electricity do I use? In which ways can we 'get' electricity? (mains/plugs/batteries/wireless) How do we make electricity? How do batteries work? How quickly can batteries run out? Does this make a difference depending on number of components? How does the number of batteries added to the circuit affect a device? What materials can carry electricity? (conductors/insulators) 	Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component.	
Year 4 - Energy - Sound Spring Term 2	<p>Know how sound is made associating some of them with vibrating.</p> <p>Know what happens to a sound as it travels from its source to our ears.</p> <p>Know the correlation between the volume of a sound and the strength of the vibrations that produced it.</p>	<p>Sound travels from its source in all directions and we hear it when it travels to our ears.</p> <p>Sound travel can be blocked.</p> <p>Sound spreads out as it travels.</p> <p>Changing the shape, size and material of an object will change the sound it produces.</p> <p>Sound is produced when an object vibrates.</p> <p>Sound moves through all materials by making them vibrate.</p>	<ul style="list-style-type: none"> How can you change the volume of a sound? How does the size of an ear trumpet affect the volume of sound detected? How does the type of material affect how well it blocks a sound? How does thickness of material affect how well it blocks a sound? 	Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.	

	<p>Know how sound travels from a source to our ears. Know the correlation between pitch and the object producing a sound.</p>	<p>Changing the way an object vibrates changes its sound. Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. Faster vibrations (higher frequencies) produce higher pitched sounds</p>	<ul style="list-style-type: none"> Which materials vibrate better and produce louder sounds? Can we identify any patterns? Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test) How does length of the tube (when making a straw oboe) affect the pitch and volume? 		
<p>Year 4 – Animals including Humans Summer Term 1</p>	<p>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 food chains, identifying producers, predators and prey</p> <p>Puberty will be taught in Year 4 to the girls (see PSCH/SRE)</p>	<p>Animals have teeth to help them eat. Different types of teeth do different jobs. Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body. Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.</p> <p>Puberty will be taught to the girls in year 4 .See PSCH/SRE</p>	<ul style="list-style-type: none"> What different types of food are there? Why do we need a variety of different foods? Do all organisms eat the same things? Why do some people need different diets? (weightlifter vs marathon runner) Why are teeth important? What happens to our food? What is our digestive system? How does our food turn into poo and wee? 	<p>Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer.</p>	
<p>Year 5 – Earth and Space Autumn 1</p>	<p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the movement of the Moon relative to the Earth Describe the Sun, Earth and Moon as approximately spherical bodies Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance. Objects with larger masses exert bigger gravitational forces. Objects like planets, moons and stars spin. Smaller mass objects like planets orbit large mass objects like stars. Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.</p>	<p>How does temperature/size/day length/year length change as you get closer/further to the sun? How does distance from a light source affect how much light hits an object? Does having more moons result in more light hitting a planet? How could you test this? How does speed/size of a meteorite affect the size of the moon crater formed? If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth? If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon? Why do we have day/night/months/years/seasons? Why does day length change? Why does shadow size change over the course of a day? Tim Peake (local astronaut) Katherine Johnson, Dorothy Vaughan, and Mary Jackson</p>	<p>Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.</p>	
<p>Year 5 – Forces Autumn 2</p>	<p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.</p>	<p>Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. Friction is a force against motion caused by two surfaces rubbing against each other.</p>	<ul style="list-style-type: none"> What is a force? How can a force act on an object? How can we see forces? How can we measure forces? 	<p>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing,</p>	

	<p>Identify the effects of air resistance, water resistance and friction, which 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>Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move</p>	<ul style="list-style-type: none"> • How does the saltiness (salinity) of water affect the water resistance? • How does the length of a piece of a paper helicopter's wings affect the time it takes to fall? • How does the changing the shape of a piece of plasticine affect water resistance? • How does adding holes to a parachute affect the time it takes to fall? • How does the amount/depth of tread affect the friction between a shoe and a surface? • How can we use levers to lift heavy objects? • What is the most effective way to move an object? • How do see-saws work? • Can you create a pulley system to lift a given load? • 	<p>streamline, brake, mechanism, lever, cog, machine, pulley.</p>											
<p>Year 5 – Materials – Mixtures and Separations Spring 1</p>	<p>Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p>	<p>When two or more substances are mixed and remain present the mixture can be separated. Some changes can be reversed, and some cannot. Materials change state by heating and cooling.</p> <table border="1" data-bbox="887 1068 1475 1247"> <thead> <tr> <th>Separating technique</th> <th>Difference in property required</th> </tr> </thead> <tbody> <tr> <td>Filtration and sieving</td> <td>A solid that does not dissolve in a liquid. Different sized solid bits</td> </tr> <tr> <td>Magnets</td> <td>Some materials magnetic others not</td> </tr> <tr> <td>Evaporation</td> <td>A solid dissolved in water and the solid has a high boiling temperature</td> </tr> <tr> <td>Floating</td> <td>Some materials float and other sink</td> </tr> </tbody> </table>	Separating technique	Difference in property required	Filtration and sieving	A solid that does not dissolve in a liquid. Different sized solid bits	Magnets	Some materials magnetic others not	Evaporation	A solid dissolved in water and the solid has a high boiling temperature	Floating	Some materials float and other sink	<ul style="list-style-type: none"> • What are mixtures? • What does dissolve mean? • Which of the following dissolve in water: sugar, flour, coffee, dark vinegar, sand? • How does the amount of water used affect how much sugar will dissolve in it? • How can we separate mixtures? 		
Separating technique	Difference in property required														
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<p>Year 5 – Materials – Changes Spring 1</p>	<p>Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p>	<p>Sometimes mixed substances react to make a new substance. These changes are usually irreversible. Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature) If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)</p>	<ul style="list-style-type: none"> • The key question we want children to interrogate is "have we made a new substance?" • Add sugar to fizzy water; it fizzes up. Has a new substance been made? (No, the gas was dissolved in the water and adding sugar made it become undissolved) • Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes, the gas was not in the vinegar as it was not fizzy, so it must have been made) • When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently? • 	<p>Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.</p>											

<p>Year 5 - Animals including Humans</p> <p>Summer 1</p>	<p>Describe the changes as humans develop to old age.</p>	<p>Different animals mature at different rates and live to different ages. Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction Hormones control these changes, which can be physical and/or emotional.</p>	<ul style="list-style-type: none"> • What do humans look like? • Do all animal embryos look the same? • How do humans change? • Why do humans change? • What causes puberty? • What changes do we go through during puberty? • Are there any patterns between vertebrate animals and their gestation periods? 	<p>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional,</p>	
<p>Year 5 - Living Things and their Habitats</p> <p>Summer 1</p>	<p>Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. Know the process of reproduction in plants. Know the process of reproduction in animals.</p>	<p>Different animals mature at different rates and live to different ages. Some organisms reproduce sexually where offspring inherit information from both parents. Some organisms reproduce asexually by making a copy of a single parent. Environmental change can affect how well an organism is suited to its environment. Different types of organisms have different lifecycles.</p>	<ul style="list-style-type: none"> • What is a life cycle? What types of life cycles are there? • Are life cycles the same? • Do plants reproduce in the same ways as us? • How do plants spread their seeds? • 	<p>Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant</p>	
<p>Year 6 - Living things and their Habitats</p> <p>Autumn 1</p>	<p>Classify living things into broad groups according to observable characteristics and based on similarities and differences. Give reasons for classifying plants and animals based on specific characteristics.</p>	<p>Variation exists within a population (and between offspring of some plants) - NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Organisms reproduce and offspring have similar characteristic patterns. Competition exists for resources and mates.</p>	<ul style="list-style-type: none"> • Why do we need to classify living things? • How do we classify? • What are the difficulties with classification? (penguins, whales, platypus) • How do animals change over time? • Why does variation exist? • What happens if animals of different species breed? (hybrids) • What happens to house plants outside? • What are microorganisms? • How can we prevent the spread of disease? • Why do animals and plants compete - and what for? 	<p>Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.</p>	
<p>Year 6 - Evolution and Inheritance</p> <p>Autumn 2</p>	<p>Know about evolution and can explain what it is. Know how fossils can be used to find out about the past. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may</p>	<p>Life cycles have evolved to help organisms survive to adulthood. Over time the characteristics that are most suited to the environment become increasingly common. NB: The following could be duplicated in Year 6 Living things and their habitats. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so.</p>	<ul style="list-style-type: none"> • Why are we all different? • What is variation, and why is it important? • How did life begin on Earth? • How do we change? • What is evolution? • What evidence is there for evolution? • How does evolution happen? • What reasons do animals become extinct? 	<p>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,</p>	

	<p>lead to evolution- 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>Organisms reproduce and offspring have similar characteristic patterns. Variation exists within a population (and between offspring of some plants) Competition exists for resources and mates</p>	<ul style="list-style-type: none"> • Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely? • How did Darwin come up with the theory? • Why was his theory not initially accepted? 		
<p>Year 6 - Electricity Spring 1</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. 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. Use recognised symbols when representing a simple circuit in a diagram.</p>	<p>Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.' The greater the current flowing through a device the harder it works. Current is how much electricity is flowing round a circuit. When current flows through wires heat is released. The greater the current, the more heat is released.</p>	<ul style="list-style-type: none"> • Do all batteries push as hard as each other? • What is electricity? • How does the voltage of a battery affect how much current is pushed? • How does the length of time I leave the current flowing for affect the brightness of the bulb? • How does number of bulbs affect the brightness of a bulb? • Are all types of wires as good as conducting electricity? • Why are wires insulated in plastic? Does type of material make a difference? • Does length of wire make a difference? • Does the type of circuit affect how the components work/long the battery lasts? • What renewable ways can we generate electricity? • How does current affect heat? • What are the dangers of a short circuit? 	<p>Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.</p>	
<p>Year 6 - Energy - Light and Sound Spring 2</p>	<p>Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.</p>	<p>Animals see light sources when light travels from the source into their eyes. Animals see objects when light is reflected off that object and enters their eyes. Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light, so we do not see the beam. Light travels in straight lines.</p>	<ul style="list-style-type: none"> • How does the size of an object affect the size of a shadow? • How does the distance between the light and the object change the size of a shadow? • How does the distance between the object and the size of the screen affect the size of a shadow? • How would a solar eclipse be different if: - The moon was a different size? <ul style="list-style-type: none"> ◦ The earth spin faster or slower? ◦ The sun was larger or smaller? ◦ If the earth and moon were the same size but further away in the solar system? • How does the amount of aluminium foil crumpled affect how much light is scattered? • How does the amount of polishing affect how well a piece of metal scatters light? 	<p>Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction</p>	

			<ul style="list-style-type: none"> • How perfect are our mirrors? Do some scatter light more than others? • What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water? • How does a periscope/microscope/telescope work? • 		
<p>Year 6 – Animals including Humans</p> <p>Summer 2</p>	<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans.</p>	<p>The heart pumps blood around the body.</p> <p>Oxygen is breathed into the lungs where it is absorbed by the blood.</p> <p>Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)</p>	<ul style="list-style-type: none"> • Why do we need oxygen? • How do we breathe? • Do fish and plants breathe? • Do all living things need oxygen? • How does the size of a person's lungs affect their lung capacity? • Are there ways to increase/decrease our lung capacity? Is lung capacity fixed? • Why do we have blood? • How does our heart work? • How does size of muscle affect our pulse rate? • How does exercise effect our pulse rate? • How might the circulatory system of an elephant, a hummingbird, or a polar bear differ? • Is the air you breathe out, the same as that you breathe in? • 	<p>Oxygenated, Deoxygenated, Valve, Exercise, Respiration</p> <p>Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.</p>	
<p>KS3</p>	<p>Working Scientifically</p> <p>Through the content across all three disciplines, pupils should be taught to:</p> <p>Scientific attitudes</p> <ul style="list-style-type: none"> • pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • 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 • evaluate risks <p>Experimental skills and investigations</p> <ul style="list-style-type: none"> • ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience • make predictions using scientific knowledge and understanding • select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables • use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety • make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements • apply sampling techniques <p>Analysis and evaluation</p>				

- apply mathematical concepts and calculate results
- present observations and data using appropriate methods, including tables and graphs
- interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
- present reasoned explanations, including explaining data in relation to predictions and hypotheses
- evaluate data, showing awareness of potential sources of random and systematic error
- identify further questions arising from their results

Measurement

- understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature
- use and derive simple equations and carry out appropriate calculations
- undertake basic data analysis including simple statistical techniques

<https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study#key-stage-3>