

## Science Sequencing at Osbaldwick Primary Academy

Science sequence of Knowledge:		
Nursery		
Working Scientifically, Disciplinary Knowledge		
Pupils should be taught to: Begin to ask 'why' questions about their experiences		
Sequence of Substantive Knowledge		
Physical Development	Communication and Language	Understanding the World
Make healthy choices about food, drink, activity and teeth brushing at home and at snack time.	Know how to respond to 'why questions' such as Why do caterpillars get so fat?	<ul style="list-style-type: none"> <li>• Know that wood and leaves are natural materials</li> <li>• Know that materials have different properties such as different textures.</li> <li>• Knows how to use a wide range of vocabulary that relates to exploration and things that they see.</li> <li>• Knows how to plant seeds and care for growing plants with support.</li> <li>• Knows the key features of the life cycle of a plant and animal (butterfly or frog).</li> <li>• Begin to understand the need to respect and care for the natural environment and all living things Know different forces they can feel such as magnetic forces.</li> </ul>

Science sequence of Knowledge:		
Reception		
Working Scientifically, Disciplinary Knowledge		
Pupils should be taught to: Answer how and why questions about their experiences Find ways to solve problems and test their ideas Use senses to explore the world around them		

## Sequence of Substantive Knowledge

Physical Development	Communication and Language	Understanding the World
<ul style="list-style-type: none"> <li>• Know and talk about the different factors that support their overall health and wellbeing.</li> <li>• Make healthy choices more independently and know that some foods are bad if too much is eaten.</li> <li>• Understand why looking after our oral health is important and know some things to help us do this.</li> <li>• Know how exercise makes us hot and hearts beat fast.</li> </ul>	<ul style="list-style-type: none"> <li>• Learn new vocabulary.</li> <li>• Ask questions to find out more and to check what has been said to them. Articulate their ideas and thoughts in well-formed sentences.</li> <li>• Describe events in some detail.</li> <li>• Use talk to work out problems and organise thinking and activities.</li> <li>• Explain how things work and why they might happen.</li> <li>• Use new vocabulary in different contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• Explore the natural world around them. Knows how to describe what they see, hear and feel whilst outside.</li> <li>• Can recognise some environments that are different to the one in which they live.</li> <li>• Knows and understands the effect of changing seasons on the natural world around them.</li> <li>• Knows a bit about how they can look after our world such as recycling and turning lights off.</li> <li>• Knows how their immediate environment differs from that of others that we have learnt about.</li> <li>• Revisits lifecycles and extends their knowledge built in Nursery to learn another lifecycle.</li> <li>• Knows how to plant seeds and care for plants with increasing independence</li> </ul>

SCIENCE PROGRESSION- Conceptual Knowledge and Understanding					
Animals including Humans					
KS1		LKS2		UKS2	
Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
<ul style="list-style-type: none"> <li>Label the human body using the correct science words.</li> <li>Identify simple similarities and differences between some common fish, amphibians, reptiles, birds, mammals.</li> <li>Identify the names of different animals' young and talk about how animals change as they grow.</li> <li>Talk about what kinds of animals are kept as pets.</li> <li>Name some common carnivores, herbivores and omnivores and suggest things they might like to eat.</li> <li>Explain what animals and humans need to survive.</li> </ul>	<ul style="list-style-type: none"> <li>Label the human body using the correct science words.</li> <li>Explain why exercise is important.</li> <li>Explain why a healthy diet is important.</li> <li>Talk about why it is important to have good hygiene (hand washing, etc)</li> </ul>	<ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amount of nutrition to stay healthy and that they cannot make their own food.</li> <li>Explain the different parts of the human digestive system.</li> <li>Describe the different types and functions of my teeth.</li> <li>Draw and explain a food chain in terms of the transfer of energy, identifying producers, predators and prey.</li> </ul>	<ul style="list-style-type: none"> <li>Identify that humans and other vertebrate animals have a skeleton and muscles for support, protection and movement.</li> <li>Sort and classify living things in different ways (including using and constructing simple classification keys)</li> <li>Recognise the characteristics of the different animal classification groups (bird, fish, reptile, amphibian, insect, mammal) and understand that humans are animals.</li> <li>Describe how environmental changes can affect living things (e.g. Pesticides destroying bee populations) - from plants unit.</li> </ul>		<ul style="list-style-type: none"> <li>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</li> <li>Describe the ways in which nutrients and water are transported within animals, including humans</li> <li>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</li> <li>Describe the changes as humans develop to old age (puberty).</li> </ul>
arm, leg, hand, foot, eyes, ears, mouth, nose see,hear,taste,smell, touch fish, amphibian, reptile, bird, mammal	arm, leg, hand, foot, eyes, ears, mouth, nose see,hear,taste,smell, touch germs, hygiene, healthy	carbohydrates, protein, fats, sugar, dairy, balanced diet, molars, canines, incisors, oesophagus, saliva, stomach, intestines, anus,	skeleton, vertebrates/ invertebrates, muscles, bones, classification key, environment, deforestation, pollution, extinction, endangered		heart, blood, lungs, oxygenated, deoxygenated, plasma, platelets, red and white blood cells, blood vessels, veins, arteries, pulse,

herbivore, carnivore, omnivore, adult, baby, parents		digestion, nutrients, food chain, energy, producer, predator, prey			puberty
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## Living things and their Habitats

KS1		LKS2		UKS2	
Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
<ul style="list-style-type: none"> <li>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</li> </ul>	<ul style="list-style-type: none"> <li>Explore and compare the differences between things that are living, dead, and things that have never been alive.</li> <li>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.</li> <li>Identify and name a variety of plants and animals in their habitats, including microhabitats.</li> <li>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</li> </ul>	See above.	See above.	<ul style="list-style-type: none"> <li>Describe how living things are classified into broad groups according to common observable characteristics, including microorganisms, plants and animals.</li> <li>Sort and classify plants and animals into groups according to their characteristics.</li> <li>Construct my own classification keys.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the differences between the life cycles of a mammal, bird, amphibian and insect.</li> <li>Describe the reproductive cycle of a plant using the vocabulary related to pollination, asexual reproduction and seed dispersal.</li> <li>Describe the reproductive cycle of some animals.</li> </ul>
herbivore, carnivore, omnivore food chain, predator, prey habitat, microhabitat	habitat, microhabitat food chain, predator, prey dead, alive, never alive			microorganism, germ, microbe, characteristic, Linnaean system	life cycle, asexual and sexual reproduction, pollination, fertilisation, seed dispersal, fruit, stigma, anther, ovary, ovule, pollen

Plants					
KS1		LKS2		UKS2	
Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
<ul style="list-style-type: none"> <li>Describe the basic structure of flowering plants and trees</li> <li>Explain that plants need the right amounts of water, light and warmth to grow and stay healthy.</li> <li>Explain how seeds and bulbs grow into plants.</li> </ul>	<ul style="list-style-type: none"> <li>Name a variety of common plants (including wild, garden, evergreen and deciduous trees)</li> </ul>	<ul style="list-style-type: none"> <li>Explain the functions of the main parts of a plant: roots, leaves, stem, flower.</li> <li>Talk about why different plants need different amounts of water, light, space and heat to grow and stay healthy.</li> <li>Talk about how and why water is transported inside plants.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how bees are important in the life cycle of the flowering plant (pollination)</li> <li>Describe how environmental changes can affect living things (e.g. Pesticides destroying bee populations) - revisit in with animals unit as well</li> </ul>	See <b>Evolution and inheritance</b> - plant adapting to environment	See <b><i>Living things and their habitats</i></b> - <i>Plant reproduction, seed dispersal, life cycles)</i>
tree, leaf, stem, flower, petals, roots seed, bulb, germination, root, shoot	deciduous, evergreen, plant, tree, flower	nutrients, photosynthesis, energy, function, stem, roots, leaves, petal, flower, seedling, germination.	pollination, stigma, anther, ovary, ovule, pollen, nectar environment, deforestation, pollution, extinction, endangered.		

Evolution and Inheritance				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
See <b>Animals including humans</b> - work on offspring and parents.			<ul style="list-style-type: none"> <li>• Tell you about how fossils provide information about living things that lived on Earth millions of years ago.</li> <li>• Recognise and explain why the offspring of living things share some characteristics but are not identical to their parents.</li> <li>• Explain how animals and plants adapt to suit their environment.</li> <li>• Explain how evolution is caused by the ability to adapt to environment (natural selection)</li> </ul>	
			offspring, characteristics, adaptation, natural selection, variation, genes, Charles Darwin, evolution, inheritance, inherited and environmental traits, extinction, fossil	

Seasonal changes					
KS1		LKS2		UKS2	
Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
	<ul style="list-style-type: none"> <li>Explain the differences between each season.</li> <li>Talk about the kind of weather we get in each season.</li> <li>Talk about how the length of the day changes from summer to winter.</li> </ul>			<i>Link to water cycle - different types of precipitation</i>	<i>Link to Space unit - Why do we have different Seasons?</i>
	autumn, winter, spring, summer, rain, snow, frost, wind, sun, fog, mist, clouds, temperature (warm/cold/freezing) day, night,			precipitation	



## Materials and States of Matter

KS1		LKS2		UKS2	
Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
<ul style="list-style-type: none"> <li>Tell you the difference between an object and the material it is made from.</li> <li>Talk about simple physical properties of some everyday materials (e.g. hard, soft, stretchy, rough, see through) including wood, plastic, glass, metal, rock and water.</li> <li>Talk about how I can change the shape of solid objects (bend, squash, stretch).</li> <li>Sort and group together materials by their simple physical properties.</li> <li>Explain what different materials are used for and why some objects can't be made from certain materials</li> </ul>		See Rocks, Light, Magnets.	<ul style="list-style-type: none"> <li>Sort and classify materials in terms of solid, liquid, or gas and know the simple properties of each (not at molecular level).</li> <li>Describe what happens to water as it is heated and cooled (evaporation, condensation)</li> <li>Explain the water cycle.</li> <li>Observe what happens to different materials when they are heated or cooled, and measure temperature accurately in degrees Celsius.</li> </ul>	<ul style="list-style-type: none"> <li>Sort, classify and rank different materials by:                             <ul style="list-style-type: none"> <li>Transparency</li> <li>Hardness.</li> <li>Solubility.</li> <li>Electrical conductivity.</li> <li>Thermal conductivity.</li> <li>Response to magnets.</li> </ul> </li> <li>Explain why certain materials are most suitable for a particular purpose and prove using enquiry.</li> </ul>	<ul style="list-style-type: none"> <li>Describe how some materials dissolve to form a solution.</li> <li>Explain how to separate materials in a solution.</li> <li>Decide how best to separate mixtures.</li> <li>Explain why some changes are reversible and some are irreversible, including state changes, changes related to burning and acid on bicarbonate of soda.</li> </ul>

<p>object, material, wood, plastic, metal, water, rock, fabric</p> <p>property- everyday language <i>e.g</i> <i>hard/soft, stretchy, rough, bendy, see-through, strong etc</i></p> <p>sort, waterproof</p> <p>squash, bend, twist, stretch</p>			<p>solid, liquid, gas, state, melt, freeze, evaporate, condense, thermometer, degrees celsius, the water cycle, precipitation</p>	<p>thermal, electrical, conductor, insulator, rigid, transparent, opaque, translucent</p>	<p>dissolve, soluble, insoluble, solution, filter, sieving, evaporation, reversible and irreversible change</p>
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Electricity				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
<p><i>Know that electricity is needed to make some things work.</i></p> <p><i>Know that some appliances need batteries and some use mains electricity to work.</i></p>	<ul style="list-style-type: none"> <li>Identify some appliances that run on electricity.</li> <li>Build a series electrical circuit and identify basic elements (cells, wires, bubbles, switches, buzzers).</li> <li>Recognise, by looking at a circuit, whether the bulb will light and explain reasons why/why not.</li> <li>Show how switches work in a circuit.</li> <li>Sort and classify materials into electrical conductors and insulators.</li> </ul>			<ul style="list-style-type: none"> <li>Explain how the brightness of a lamp, or volume of a buzzer, is associated with the number and voltage of cells used in a circuit.</li> <li>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>Use recognised symbols to represent a simple circuit in a diagram.</li> </ul>
	<b>electricity, mains electricity, battery, wire, bulb, buzzer, motor, switch, circuit, electrical conductor, electrical insulators</b>			<b>cell, voltage, component, circuit diagram, symbols, buzzer, bulb, switch, motor, electrical conductor</b>

Earth and Space				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
			<ul style="list-style-type: none"><li>Describe how the planets in our solar system move in relation to the Sun.</li><li>Describe/show how the Moon moves relative to the Earth, and why it appears to change shape in the sky.</li><li>Explain how day turns into night.</li></ul>	
day, night, sun, moon			solar system, orbit, Earth's axis, planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune), star	

Forces and Magnets				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
<p><i>Explore floating and sinking, pushes and pulls.</i></p> <p><i>Explore cars moving quicker on different surfaces.</i></p>		<ul style="list-style-type: none"> <li>Describe how things move on different surfaces due to the force of friction.</li> <li>Describe magnetic force.</li> <li>Describe how magnets attract and repel each other, as well as how they interact with some materials.</li> <li>Sort and classify materials as magnetic and non-magnetic.</li> <li>Discuss the poles of a magnet and predict whether two magnets will attract or repel each other just by looking at which way the poles are facing.</li> </ul>	<ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</li> </ul>	
float, sink, push, pull		magnet, magnetic, poles, north pole, south pole, magnetic force, attract, repel, friction, force meter, Newtons	gravity, air resistance, water resistance, mechanism, lever, pulley, gears	

Light				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
<ul style="list-style-type: none"> <li>Know that we use our eyes to see</li> </ul>	<ul style="list-style-type: none"> <li>Explain why we need light to see things.</li> <li>Explain that dark is the absence of light.</li> <li>Talk about why the sun is dangerous to the eyes.</li> <li>Talk about how shadows are formed.</li> <li>Understanding how some light is reflected.</li> <li>Describe why shadows are sometimes long and sometimes short.</li> </ul>		<i>(Link and revisit- Year 5 work on Space, Day and Night, Shadows on the Moon)</i>	<ul style="list-style-type: none"> <li>Describe how light appears to travel.</li> <li>Describe how objects need to reflect or emit light to be visible.</li> <li>Explain how we are able to see things because of the way light travels.</li> <li>Explain why shadows are the same shape as the objects that cast them.</li> </ul>
eyes sight light sun	light source, reflect, mirror, translucent, transparent, opaque, shadow			periscope, ray, reflect, shadow, retina

Sound				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
<p><i>Exploring how to change the volume of a sound during music lessons.</i></p> <ul style="list-style-type: none"> <li>Know we use our ears to hear</li> </ul>	<p><i>Exploring how to change the volume and pitch of a sound during music lessons.</i></p>	<ul style="list-style-type: none"> <li>Know that sound is made by vibrations.</li> <li>Describe how sound travels to your ears.</li> <li>Explain how to change the pitch or volume of a sound.</li> <li>Describe what happens to a sound when you get further away from it.</li> </ul>	<ul style="list-style-type: none"> <li>Identify how sounds are made, associating some of them with something vibrating</li> <li>Recognise that vibrations from sounds travel through a medium to the ear</li> <li>Find patterns between the pitch of a sound and features of the object that produced it</li> <li>Find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>Recognise that sounds get fainter as the distance from the sound source increases.</li> </ul>	<p><i>Links with Music</i></p>
ear sound hearing		vibration, volume, pitch, waves, muffle, amplify, sound source	vibration, volume, pitch, eardrum, waves, properties	

Rocks				
KS1	LKS2		UKS2	
	Cycle A	Cycle B	Cycle A	Cycle B
	<ul style="list-style-type: none"> <li>Compare and sort rocks based on their appearance and physical properties.</li> <li>Describe how fossils are formed.</li> <li>Explain what soil is made from and compare different soil.</li> </ul>			<ul style="list-style-type: none"> <li>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> </ul>
	<b>fossil, rock, sedimentary, igneous, metamorphic, soil, crystals</b> <b>molten rock, lava</b>			<b>[see unit on evolution]</b>



Working Scientifically		
KS1	LKS2	UKS2
<ul style="list-style-type: none"> <li>• Ask questions (Why? How? What if?) and understand that they can be answered in different ways (testing, researching)</li> <li>• Observe things closely using a magnifying glass.</li> <li>• Record observations in simple drawings</li> <li>• Make simple measurements (non-standard) Measure accurately using a ruler/simple measuring cylinder/simple thermometer (standard measures)</li> <li>• Communicate simple similarities and differences</li> <li>• Sort and group things together by their features in different ways using their features, noticing similarities and differences.</li> <li>• Find the answer to questions by using my senses and observing closely.</li> <li>• Communicate my findings in pictures and words (or orally)</li> <li>• Collect and record simple data (pictorial, tally chart or bar chart). Record results in a simple, prepared table and talk about what they show.</li> </ul>	<ul style="list-style-type: none"> <li>• Raise questions and consider the type of enquiry required (fair test, research, observation over time)</li> <li>• Recognise and set up a fair test enquiry (explain what has changed and what has stayed the same)</li> <li>• Take accurate measurements using standard measures: thermometer, ruler, data logger</li> <li>• Use appropriate scientific enquiry when recording.</li> <li>• Communicate my results and conclusions in a range of ways (pictures, reports, Seesaw video, tables, diagrams, etc)</li> <li>• Sort and classify objects in a variety of ways.</li> <li>• Use the results I have found to begin to draw conclusions, make predictions, suggest improvements and raise further questions.</li> <li>• Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> </ul>	<ul style="list-style-type: none"> <li>• Plan the appropriate scientific enquiry to answer my own questions (fair test, pattern seeking, research, observation over time).</li> <li>• Make careful, detailed, relevant observations.</li> <li>• Decide and explain how I will control the variables in a comparative or fair test enquiry</li> <li>• Take accurate measurements using different scientific equipment, taking repeat measurements when necessary.</li> <li>• Explain why it's important to take repeated measurements.</li> <li>• Record and present my data in different ways: <ul style="list-style-type: none"> <li>◦ Labelled scientific diagrams.</li> <li>◦ Classification keys.</li> <li>◦ Draw tables.</li> <li>◦ Construct bar charts, line and scatter graphs.</li> </ul> </li> <li>• Make predictions about how other tests will work based on my results.</li> <li>• Communicate my findings in different ways (oral or written).</li> <li>• Draw conclusions and evaluate my working methods.</li> <li>• Talk about other experiments that have been done to support or disprove ideas.</li> </ul>
<b>questions, answer, classify, sort, observe, equipment, identify, group, record, diagram, chart, map, data, compare, contrast, describe, biology, chemistry, physics.</b>	<b>research, relevant questions, scientific enquiry, comparative and fair test, systematic, observation, accurate measurements, conclusion, prediction, differences, similarities, evidence, improvements, guides, keys, construct, interpret, [any equipment specific vocab]</b>	<b>plan, variables, pattern seeking, accuracy, precision, classification key, tables, scatter graph, line graph, bar graph, scientific diagrams, evidence, support, refute, comparative and fair test, causal relationship, correlation, degree of certainty, conclusion, prediction, evaluation.</b>