

**PROGRESSION IN SCIENCE - Expected Outcomes**

Date		Review Date		Subject Leader				
March 2020		August 2021		Richard Mendum				
<p align="center">This document aims to give guidance on the progression of Science knowledge and skills across the year groups.                      It can also be used to differentiate work, and expectations, appropriately for pupils working above and below age-related expectations (particularly SEND pupils and GD pupils).                      Through practical learning opportunities, children will be able to make connections and reflect on prior knowledge enabling them to become Inquiry-based learners.</p> <p align="center">In Science, like all other subjects, we recognise the importance of the methods and practice of teaching (the pedagogy) we choose to use in enabling pupils to know more, understand more and remember more. In Science, the following approaches will be used, and be evident in pupil discussion, observations and work in books, in order to ensure that the Science learning opportunities are as effective as possible and that pupils progress throughout the year and across year groups during their experience of Science school:</p>								
Teaching Sequence in Science – lesson expectation detail within the Science Intent Statement	Big Picture: Start with what the children know, understand, are able to do and able to say. Daily Review: Revisit previous learning.		Possible pedagogical approaches used in Science	Behaviourism	Direct teacher instruction; modelling of skills and techniques; demonstration			
	Provide information and scientific concepts.			Constructivism	Enquiry led learning			
	Specify key vocabulary to be used and its meaning.			Social Constructivism	Teacher modelling; questioning; mix of individual, paired and group instruction			
	Provide opportunities for the children to investigate in a variety of contexts.			Liberationism	Pupil-led learning; opportunities			
	Obtain and present evidence through observations, comparisons and collected data.			Learning, working and talking about Science with confidence.				
	Consider and evaluate evidence making connections with scientific knowledge and understanding.			Being introduced to the key vocabulary relating to Science so that all children can express their understanding, findings, and conclusions.				
The Hive		Class 1		Class 2		Class 3		
		Purple 2019/20 21/22		Brown 2020/21 22/23				
FS1 and FS2		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Animals including Humans	<p><b>Understanding the world: 30-50</b>                      Can talk about some of the things they have observed such as plants, animals, natural and found objects</p> <p>Developing an understanding of growth, decay and changes over time. Shows care and concern for living things and the environment.</p> <p><b>Understanding the world: 40-60</b></p> <p><b>Early Learning Goal:</b>                      They make observations of animals and plants and explain why some things occur, and talk about changes.</p>	<p>What are the five senses and how do we use these to find out about the world                      Explain their ideas as responses to an issue.</p> <p>Identify, name common and compare animals. (fish, amphibians, reptiles, birds and mammals)</p>	<p>How do humans keep healthy?                      (exercise, food, hygiene)</p> <p>What are the basic needs for survival?                      (water, food, air)</p>	<p>Animals including humans need the right amount of nutrition</p> <p>Animals including humans get their nutrition from what they eat.</p> <p>Why do we have a skeleton and what does it protect?</p>	<p>What are the simple functions of the basic parts of the digestive system in humans?</p> <p>What are the different types of teeth in a human and what are their simple functions.</p> <p>Construct and interpret a variety of food chains.</p>	<p><i>What are the changes as humans develop to old age?</i></p>	<p><i>What are the main parts of the human circulatory system?</i></p> <p><i>What are the functions of the heart, blood vessels and blood.</i></p> <p><i>What is the impact of diet, exercise, drugs and lifestyle on the way the body functions?</i>  <b>Class 3 T3 2020</b>  <b>Lini to Trojans</b></p>	
		Identify and name common animals (carnivores,		How do animals move their muscles?	Identify producers, predators and prey.		What ways are nutrients and water transported within animals, including humans?	

		herbivores and omnivores)		How do muscles work?			
<b>Vocabulary</b>	Plant, Animal	Senses Fish, Reptiles, Mammals, Birds, Amphibians Herbivore, Omnivore, Carnivore, Wings, Beak	Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene	Nutrition Movement, Muscles, Bones, Skull, Nutrition, Skeleton,	Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar,	Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty	Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration

<p><b>Plants</b></p>	<p><b>Understanding the world: 30-50</b> Can talk about some of the things they have observed such as plants, animals, natural and found objects</p> <p><b>Understanding the world: Early Learning Goal:</b> They make observations of animals and plants and explain why some things occur, and talk about changes.</p>	<p>Can you name the parts of a flowering plant and trees?</p> <p>What do plants need to grow well?</p> <p>What plants can you find by our school?</p> <p>Can you identify and name common wild and garden plants (deciduous and evergreen trees)</p>	<p>How do seeds and bulbs grow into mature plants?</p> <p>Find out and describe how plants need water, light and suitable temperature to grow and stay healthy.</p>	<p>Explore the part the flower plays in the life cycle of flowering plants including pollination, seed formation and seed dispersal.</p> <p>How is water transported through the plant?</p> <p>What are the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow)</p> <p>How can this vary from plant to plant?</p> <p>What is the job of roots, leaves and stems/trunk and flowers</p>			
<p><b>Vocabulary</b></p>	<p>Plant, Flower, Grass, Tree</p>	<p>Deciduous, Evergreen trees, Leaves, Flowers, Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem</p>	<p>Seeds, Bulbs, Water, Light, Temperature, Growth</p>	<p>Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower</p>			
<p><b>Living things and their habitats</b></p>	<p><b>Understanding the world: Early Learning Goal:</b> They make observations of animals and plants and explain why some things occur, and talk about changes.</p>		<p>Identify/name plants and animals including microhabitats.</p> <p>How can we sort living, dead and never been alive things?</p> <p>Describe how animals get food – food chain.</p>		<p>Recognise that living things can be grouped in a variety of ways.</p> <p>How do I use a key to identify local plants and animals?</p> <p>That environments can change and that this can</p>	<p><i>What is the difference between the life cycles of a mammal, an amphibian, and insect and a bird?</i></p> <p>Describe the life process of reproduction is some plants and animals .</p>	<p><i>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including micro-organisms, plants and animals. Class 3 T1 2020</i></p>

			What are the similarities and differences between local habitats and how does it affect the animals and plants that live there?		sometimes pose dangers to living things.  What ways can we protect living things and the environment?		What are the reasons for classifying plants and animals (specific characteristics)
<b>Vocabulary</b>	Plant, Animal, Home		Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert		Vertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats	Mammal, Reproduction, Insect, Amphibian, Bird, Offspring	Classification, Vertebrates, Invertebrates, Micro- organisms, Amphibians, Reptiles, Mammals, Insects
<b>Seasonal Change</b>	<b>Understanding the world ELG:</b> They make observations of plants and explain why some things occur, and talk about changes	Observe changes across the four seasons.  Observe and describe weather associated with the seasons  Observe and describe how the day length varies based on the season					
<b>Vocabulary</b>	Weather rain sunshine snow cloud	Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark					
<b>Evolution and Inheritance</b>							How do living things change over time?  What information does a fossil provide? (information about living things that inhabited the Earth millions of years ago)  Living things produce offspring of the same kind, but normally

							offspring vary and are not identical to their parents.
							How do animals and plants adapt to suit their environment?  How does adaptation lead to evolution?
<b>Vocabulary</b>							<b>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics</b>
<b>Materials</b>	<p><b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things.</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>To describe the simple physical properties of a variety of everyday materials</p> <p>Compare and group together a variety of everyday materials based on their simple properties.</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>Find out 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 the properties including hardness, solubility, transparency, conductivity (electricity and thermal) and response to magnets.</p> <p>Some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>Separate solids, liquids and gases through filtering, sieving and evaporating</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular use of everyday materials including wood, plastic and metals.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes.</p>

						Some changes result in the formation of new materials.	
						Changes associated with burning and the action of acid on bicarbonate of soda are irreversible	
						<b>T6 Class 3 2020/21</b>	
<b>Vocabulary</b>	Sand, Playdough, Paint, Mix, Soft, Hard	Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth	Stretchy, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil			Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing	
<b>States of Matter</b>	<b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.				Compare and group materials together according to whether they are solids, liquids or gases  How do some materials change state when they are heated or cooled?  I can measure or research the temperature at which this change happens in degree Celsius  Identify the part played by evaporation and condensation in the water cycle  Associate the rate of evaporation with temperature.		
<b>Vocabulary</b>	Hard, Soft, Water, Hot, Cold					Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating	

<p><b>Forces</b></p>	<p><b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to objects and materials.</p>	<p>How do objects move?</p> <p>How do you stop or slow down an object?</p>	<p>What are pushes and pulls?</p> <p>How can we control speed, direction of an object?</p> <p>How do they effect an object – can pushes and pulls change the shape of objects?</p>	<p>Compare how things move on different surfaces</p> <p>Magnets can attract, repel each other and have two poles.</p> <p>That magnets can attract some materials and not others</p> <p>Predict whether two magnets will attract or repel each other based on which poles are facing</p> <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet. Identify some magnetic materials</p>		<p>Why do unsupported objects fall towards the Earth (forces of gravity)</p> <p>What are the effects of air resistance, water resistance and friction on moving surfaces?</p> <p>That some mechanicalness, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p> <p><i>This is a catch up unit from 2019-20</i></p>	
<p><b>Vocabulary</b></p>	<p>Stop, Start</p>	<p>Stop, start, roll, Move Slow fast</p>	<p>Push, pull, speed, direction Force</p>	<p>Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull</p>		<p>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys</p>	
<p><b>Rocks</b></p>	<p><b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.</p>		<p>Compare and group together different kinds of rocks based on appearance and simple physical properties.</p> <p>Describe in simple terms how fossils are formed when things have lived and then are trapped within rock.</p>				

			Recognise that soils are made from rocks and organic matter.				
<b>Vocabulary</b>	Hard, Smooth, Rough		Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent				
<b>Electricity</b>	<b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.				<p>What common appliances run on electricity?</p> <p>Construct a simple series circuit</p> <p>Identify the different parts to a circuit including cell, wires, bulbs, switches and buzzers</p> <p>Identify whether 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>How does a switch work and will this light the lamp in the simple series circuit?</p> <p>What are the common conductors and isolators?</p> <p>Are metals good conductors?</p>	<p>How does the number and voltage of cells effect the brightness of a lamp or the volume of a buzzer?</p> <p>Compare and give reasons for variations in how components function including brightness of bulb, loudness of buzzer, on/off position of switches.</p> <p>Recognise symbols when representing a simple circuit in a diagram.</p>	
<b>Vocabulary</b>	Bright, Dark				Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators	Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell	
<b>Earth and Space</b>	<b>Understanding the world ELG:</b> The world Children know about similarities and					Describe the movement of the earth and other planets, relative to the Sun in the solar system	



	differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.					Describe the movement of the Moon relative to the Earth  Describe the Sun, Earth and Moon as approximately spherical bodies Why does the sun seem to move across the sky, rising in the East and setting in the West  Why do we have day time and night time?	
<b>Vocabulary</b>	The world, Sky, Space, Stars, Planets					Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, Solar System	
<b>Sound</b>	<b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.				How are sounds made? (vibration)  Vibrations travel through a medium to the ear  Find patterns between the volume of a sound and the strength of the vibration  What happens to sound as the distance from the sound source increases?		
<b>Vocabulary</b>	Quiet, Loud				Volume, Vibration, Wave, Pitch, Tone,		
<b>Light</b>	<b>Understanding the world ELG:</b> The world Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate			Recognise the need for light to see things and that dark is the absence of light?  Light is reflected from surfaces			What direction does light travel?  Objects are seen because they give out or reflect light into the eye.  How do we see things? (light travels from light

	environment and how environments might vary from one another.			Light from the sun can be dangerous and that there are ways to protect your eyes.  Shadows are formed when the light from light sources is blocked by a solid object.			sources to our eyes or from light sources to objects then to our eyes)  Understand that light travels in straight lines which explain why shadows have the same shape as the object that cast them.
<b>Vocabulary</b>	Bright, Dark			Light, Shadows, Mirror, Reflective, Dark, Reflection			Refraction, Reflection, Light, Spectrum, Rainbow, Colour,

**Working Scientifically (skills coverage from ASE and Planning for assessment)**

ASE login [head@kempsford.gloucs.sch.uk](mailto:head@kempsford.gloucs.sch.uk)

	UFS	Year 1/Year 2	Year 3/Year 4	Year 5/Year 6
Asking simple questions and recognising that they can be answered in different ways		<p>While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.</p> <p>The children answer questions developed with the teacher often through a scenario.</p> <p>The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.</p>	<p><b>Asking relevant questions and using different types of scientific enquiries to answer them</b></p> <p>The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.</p> <p>The children answer questions posed by the teacher.</p> <p>Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.</p>	

<p><b>Observing closely, using simple equipment</b></p>		<p>Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.</p> <p>They begin to take measurements, initially by comparisons, then using non-standard units.</p>	<p><b>Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</b></p>	<p>The children make systematic and careful observations.</p> <p>They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.</p>	<p><b>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</b></p>	<p>The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.</p> <p>During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).</p>
<p><b>Performing simple tests</b></p>		<p>The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.</p>	<p><b>Setting up simple practical enquiries, comparative and fair tests</b></p>	<p>The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.</p> <p>They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. <a href="#">See Appendix A</a></p>	<p><b>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</b></p>	<p>Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.</p> <p>Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.</p> <p>The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.</p>
<p><b>Identifying and Classifying</b></p>		<p>Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.</p> <p>They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.</p>	<p><b>Identifying differences, similarities or changes related to simple scientific ideas and processes</b></p>	<p>Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.</p>		

<p><b>Gathering and recording data to help in answering questions</b></p>		<p>The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.</p> <p>They record their measurements e.g. using prepared tables, pictograms, tally charts and bar charts.</p> <p>They classify using simple prepared tables and sorting rings.</p>	<p><b>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</b></p> <p><b>Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</b></p>	<p>The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.</p> <p>Children are supported to present the same data in different ways in order to help with answering the question</p>	<p><b>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</b></p>	<p>The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. (Term 2 2020)</p> <p>Children present the same data in different ways in order to help with answering the question.</p>
<p><b>Using their observations and ideas to suggest answers to questions</b></p>		<p>Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.</p> <p>The children recognise 'biggest and smallest', 'best and worst' etc. from their data.</p>	<p><b>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</b></p>	<p>They draw conclusions based on their evidence and current subject knowledge.</p> <p>They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.</p> <p>Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.</p> <p>Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.</p>	<p><b>Using test results to make predictions to set up further comparative and fair tests</b></p>	<p>Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.</p>
			<p><b>Using straightforward scientific evidence to answer questions or to support their findings</b></p>	<p>Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.</p>	<p><b>Identifying scientific evidence that has been used to support or refute ideas or arguments</b></p>	<p>Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.</p>

					<p>They talk about how their scientific ideas change due to new evidence that they have gathered.</p> <p>They talk about how new discoveries change scientific understanding.</p>
			<p><b>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</b></p>	<p>They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.</p>	<p><b>Reporting and presenting 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</b></p> <ul style="list-style-type: none"> <li>• In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.</li> <li>• They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.</li> <li>• They identify any limitations that reduce the trust they have in their data.</li> <li>• They communicate their findings to an audience using relevant scientific language and illustrations.</li> </ul>
	<p><b>Appendix A Explanatory note</b>  A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome.</p>				
	<p>A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.</p>				

