



# Science

## Vision

At South Farnborough Junior School, our motto is: Embracing our values today... to be a successful part of the world tomorrow!

In science, we aim for our children to think like scientists and understand the world through the threads of the specific science disciplines: biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

## Implementation

The use of Hampshire Learning Journeys and other planning tools have been implemented to support our teachers in ensuring the balance and interplay between both substantive and disciplinary knowledge, identifying purpose for all practical activities and ideas for retrieval for all sessions within a learning journey. By breaking down the knowledge and introducing it sequentially, we ensure that our children's abilities to make links and draw upon pre-existing knowledge is supported and developed, therefore making it more likely that what they are learning, moves into their long-term memory. Viewing our children's books will show that substantive knowledge is complemented with diagrams, tables and graphs relevant to their year group. This leads to a deeper understanding of the concepts taught. The Science Learning Journey units have been carefully ordered to ensure maximum opportunities for progression both within years and across years.

In addition to our quality first classroom practice, including differentiation, use of resources, assessment and so on, our MTP and STP covers important details, which are unique to us and we feel have an impact on the way we successfully implement our curriculum:

Big Picture- <i>What is our end goal?</i>	Prior Knowledge- <i>Links to threads and previous learning to make links.</i>	Misconceptions- <i>How can we pre-empt where children may struggle to make the most of learning time?</i>	Values/SMSC- <i>Embedding personal development learning within our curriculum to achieve our school vision.</i>	Cultural Capital- <i>Visitors, themed days, workshops, school trips.</i>	Explain, Change, Create- <i>We challenge our children through a mastery approach.</i>
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Unit Overview			
Year 3	Year 4	Year 5	Year 6
<p><b>Magnets</b></p> <p>Are bigger magnets stronger? Can identify that connecting similar magnets together will make a stronger magnet (due to accumulation of the magnetic forces). Can identify variables they need to keep the same, change and measure. Can draw labelled diagrams to help them conclude their findings.</p> <p><b>Longitudinal Study</b></p> <p>Children will name and monitor populations of organisms on the school grounds over a year period. Begin to make simple food chains.</p> <p><b>States of Matter</b></p> <p>Know the difference, similarities and properties of a solid, liquid and gas. Understanding that everything has a boiling and melting point and these temperatures can be different for different substances.</p> <p><b>Skeletons</b></p> <p>How does the diameter of a bone affect its bending strength and compressional strength?</p> <p><b>Light</b></p>	<p><b>Digestion</b></p> <p>Give information about the poor diet of someone who is trying to be super skinny, predict the effects on the person's health and body.</p> <p><b>Longitudinal Study</b></p> <p>How does the weather affect the populations of invertebrates in our school ground? Children should measure the temperature, wind speed and rainfall whilst also counting the populations of invertebrates in a given area.</p> <p><b>Classification in own Environment</b></p> <p>Creating food chains and webs using the school grounds.</p> <p><b>Plants</b></p> <p>Teach children how pollination and fertilisation occur, let them dissect a flower (lilies and daffodils are good) and identify the parts of the flower. Use a microscope to observe the pollen. Children then chose a flower from the school and try and identify the reproductive organs.</p> <p><b>Mixtures</b></p>	<p><b>Space</b></p> <p>Using knowledge of the solar system and the importance of water and light for life, predict the temperature and light levels on different planets and suggest which planets might be possible to support life in the future. They then look at real temperature and light data and reflect upon what they suggested.</p> <p><b>Longitudinal Study</b></p> <p>Do shadows stay the same length all year round? Using knowledge of Space and Light topics covered, children will investigate how shadows change across the year.</p> <p><b>Materials</b></p> <p>This topic is about making new substances by changing the material's property. Is it possible to return the material to its original state/property?</p> <p><b>Sound</b></p> <p>Children can say how sounds are made. They can show in models how sounds travel. They can use scientific language to describe how characteristics of sound change (pitch, volume, amplitude)</p>	<p><b>Longitudinal Study</b></p> <p>Can the children suggest and carry out a test to investigate whether we all grow at the same rate proportional to our size. Can children suggest potential pitfalls of their investigation and how they will overcome them? How often will they record measurements? What body parts will they measure?</p> <p><b>Circulation</b></p> <p>Children can identify parts of the circulatory system and explain their job within the system. Can describe the vital role oxygen has in circulatory systems using investigations to demonstrate it. Can research and find similarities and differences between different animal hearts/circulatory systems. Can conduct investigations to test their predictions.</p> <p><b>Light</b></p> <p>Children can draw labelled diagrams to show how light behaves/travels. Children can successfully use scientific vocabulary in their writing.</p>



<p>The shiny coin problem. A coin is lost what would be the best way to find it, turn out the lights and see it shine or use a torch to see it reflect? How many pieces of tracing paper are as translucent as a single piece of white paper?</p> <p style="text-align: center;"><b>Plants</b></p> <p>Children will become aware of the role parts of a plant. How will the plant survive if different parts are removed? Children will know the essential things a plant needs to grow.</p> <p style="text-align: center;"><b>Rocks and Soils</b></p> <p>Children will learn about the types of rocks and their properties. Children will also look at different types of soils (linked with their plants topic). Children will evaluate which rock is the best for making a shelter out of by testing its properties.</p>	<p>Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?</p> <p style="text-align: center;"><b>Electricity</b></p> <p>Children can create a simple circuit with several components. Children know the function of each component of a circuit.</p>	<p style="text-align: center;"><b>Forces</b></p> <p>Can identify variables they need to keep the same, change and measure. Can draw labelled diagrams to help them conclude their findings. Children can name non-contact and contact forces such as gravity, magnetism, friction, air and water resistance. Children can name some ways to overcome these forces and test them.</p> <p style="text-align: center;"><b>Life Cycles</b></p> <p>Construct life cycles for different organisms and consider why there are such variations in the relative times for each of these stages.</p>	<p>Children can design experiments to test and answers questions in the topic. Use prediction, deduction and research to investigation nocturnal animals.</p> <p style="text-align: center;"><b>Electricity</b></p> <p>Children can construct series and parallel circuits. They understand how resistance affects the flow of electricity in a circuit. They recognise that heat is produced from current flowing. Circuits are used to explain the terms resistance, conductor and voltage.</p> <p style="text-align: center;"><b>Evolution</b></p> <p>Children know who Charles Darwin was and understand his theories on evolution and survival of the fittest in simple terms. They compare his ideas to those of Jean-Baptiste Lamarck. Children can use his theories to test questions that arise in this topic. They understand the role fossils have in identifying possible evolutionary advances. Fossils are part of Evolution (previously part of Rocks and Soils).</p>
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Year	Unit 1	
Year 3	<b>Magnets</b>	
	What is a magnet?	
	<b>Why this?</b> Children will first experience 'Forces' in Year 3. Magnetism is a non-contact force.	
	<b>Why now?</b> Some children may have had experience with magnets at home or KS1, but other children magnets will appear to be 'magical'. This topic will set children up for when other forces are introduced in Year 5.	
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
	1.Magnets exert attractive forces on some metals 2.Magnets can exert force through other materials. Magnetism is a non-contact force. 3.The end of magnets are called poles. There is a positive and a negative pole. 4.Opposite poles attract (+ & -) 5.Like poles repel (- & - or + & +). 6.The strength of magnetic forces is affected by the strength of the magnet, the distance between the object and the magnet and the material the object is made of.	-Ask some relevant questions and use different types of scientific enquiries to answer them. -Set up some simple, practical enquiries, comparative and fair tests. -Begin to recognise when a fair test is necessary and help decide how to set it up. -Make predictions with reasons. -Gather, record and begin to classify data in a variety of ways. -Begin to make systematic and careful observations and where appropriate, take accurate measurements using standard units using a range of equipment- e.g. thermometers, data loggers.
	<b>Learning Journey Question for Assessment</b>	What is a magnet?
<b>Longitudinal Study</b>		
Can you name living organisms?		



	<p><b>Why this?</b> Each year group should experience collecting their own data using the school grounds as their base. This allows the children to conduct field work and apply their 'Working Scientifically' skills in a meaningful way.</p> <p><b>Why now?</b> Year 3's study is about identifying plants and organisms in the school grounds. As this is linked to the seasons, it would be most beneficial to start in the autumn to see patterns and links that emerge throughout the year.</p>	
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
	<p>1. Identify plants and organisms in the school grounds using classification keys.</p> <p>2. Creating food chains and webs with organisms found to see the connections made.</p> <p>3. Producers, consumers, predators (primary, secondary and tertiary).</p> <p>4. Deciduous plants/trees will lose their leaves when autumn arrives/ temperature drops.</p> <p>5. Evergreen plants/trees will keep their leaves through the year.</p>	<p>-Ask some relevant questions and use different types of scientific enquiries to answer them.</p> <p>-Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources)</p> <p>-Begin to decide when and how to use secondary sources and carry out own research.</p> <p>-Begin to identify differences, similarities, or changes related to simple scientific ideas or processes.</p> <p>-Begin to talk about criteria for grouping, sorting and classifying.</p> <p>-Make predictions with reasons.</p> <p>-Gather, record and begin to classify data in a variety of ways.</p> <p>-Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</p> <p>-Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Begin to talk about criteria for grouping, sorting and classifying.</p> <p>-Begin to compare and group according to behaviour or properties.</p>
<b>Learning Journey Question for Assessment</b>	Can you name living organisms?	



Unit 3					
<b>Year 3</b>	<p><b>States of Matter</b></p> <p>How can I identify materials based on their properties?</p>				
	<p><b>Why this?</b> Children need to know that objects, materials and substances can be classified as a solid, liquid and a gas. This is a fundamental aspect that will underpin future learning in physics.</p> <p><b>Why now?</b> This topic is a starting point for many chemistry and physics topics. Once the children understand properties of matter then understanding mixtures (year 4) and properties of materials (Year 5) can be accessed with more clarity.</p>				
	<table border="1" style="width: 100%;"> <thead> <tr> <th style="background-color: #FFD700;">Substantive Knowledge</th> <th style="background-color: #FFD700;">Scientific Skills</th> </tr> </thead> <tbody> <tr> <td> <p>1)Materials can be divided into solids, liquids and gases.</p> <p>a)Solids hold their shape unless forced to change.</p> <p>b)Liquids flow easily but stay in their container because of gravity. The more viscous a liquid the less runny it is.</p> <p>c)Gases move everywhere and are not held in containers by gravity.</p> <p>2)Heating causes solids to melt into liquids and liquids to evaporate to gases.</p> <p>3)Cooling causes gases to condense to liquids and liquids to freeze to solids.</p> <p>4)Different substances change state at different temperatures but the temperatures at which given substances change state are always the same.</p> <p>5)The temperature at which a substance melts from a solid to a liquid is the same at which it freezes from a liquid to a solid.</p> <p>6)The temperature at which a substance boils from a liquid to a gas is the same at which it condenses from a gas to a liquid.</p> <p>7)Liquids evaporate slowly, even below their boiling temperatures.</p> </td> <td> <p>-Ask some relevant questions and use different types of scientific enquiries to answer them.</p> <p>-Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources)</p> <p>-Set up some simple, practical enquiries, comparative and fair tests.</p> <p>-Begin to recognise when a fair test is necessary and help decide how to set it up.</p> <p>-Make predictions with reasons.</p> <p>-Gather, record and begin to classify data in a variety of ways.</p> <p>-Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</p> <p>-Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Begin to suggest how I could improve an investigation</p> <p>-Begin to make systematic and careful observations.</p> <p>-Begin to identify differences, similarities, or changes related to simple scientific ideas or processes.</p> <p>-Begin to talk about criteria for grouping, sorting and classifying.</p> <p>-Begin to compare and group according to behaviour or properties.</p> </td> </tr> </tbody> </table>	Substantive Knowledge	Scientific Skills	<p>1)Materials can be divided into solids, liquids and gases.</p> <p>a)Solids hold their shape unless forced to change.</p> <p>b)Liquids flow easily but stay in their container because of gravity. The more viscous a liquid the less runny it is.</p> <p>c)Gases move everywhere and are not held in containers by gravity.</p> <p>2)Heating causes solids to melt into liquids and liquids to evaporate to gases.</p> <p>3)Cooling causes gases to condense to liquids and liquids to freeze to solids.</p> <p>4)Different substances change state at different temperatures but the temperatures at which given substances change state are always the same.</p> <p>5)The temperature at which a substance melts from a solid to a liquid is the same at which it freezes from a liquid to a solid.</p> <p>6)The temperature at which a substance boils from a liquid to a gas is the same at which it condenses from a gas to a liquid.</p> <p>7)Liquids evaporate slowly, even below their boiling temperatures.</p>	<p>-Ask some relevant questions and use different types of scientific enquiries to answer them.</p> <p>-Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources)</p> <p>-Set up some simple, practical enquiries, comparative and fair tests.</p> <p>-Begin to recognise when a fair test is necessary and help decide how to set it up.</p> <p>-Make predictions with reasons.</p> <p>-Gather, record and begin to classify data in a variety of ways.</p> <p>-Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</p> <p>-Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Begin to suggest how I could improve an investigation</p> <p>-Begin to make systematic and careful observations.</p> <p>-Begin to identify differences, similarities, or changes related to simple scientific ideas or processes.</p> <p>-Begin to talk about criteria for grouping, sorting and classifying.</p> <p>-Begin to compare and group according to behaviour or properties.</p>
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<b>Unit 4</b>					



<b><u>Skeleton</u></b>	
How does the diameter of a bone affect its bending strength and compressional strength? You could use paper tubes or real chicken wing and leg bones)	
<p><b>Why this?</b> Children will have a basic understanding that they have a skeleton but not necessarily understanding why they have one. Also they will learn about the role muscles play in movement of the skeleton.</p> <p><b>Why now?</b> In KS1, children have learnt to name parts of the body with simple scientific language. In Year 3, moving into LKS2, children need to use challenging language to describe and explain the parts and functions of the musculoskeletal system.</p>	
<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
<p>1)All vertebrates have internal skeletons that protect vital organs. 2)Invertebrates have exoskeletons that protect vital organs 3)Skeletons support the weight of land animals. Stronger bones can support more weight 4)Bones are connected (but can move relative to each other) at joints. Muscles connect to bones and move them when they contract. Stronger bones can anchor stronger muscles</p>	<p>-Ask some relevant questions and use different types of scientific enquiries to answer them. -Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources) -Set up some simple, practical enquiries, comparative and fair tests. -Begin to recognise when a fair test is necessary and help decide how to set it up. -Make predictions with reasons. -Gather, record and begin to classify data in a variety of ways. -Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. -Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions. -Begin to suggest how I could improve an investigation -Begin to make systematic and careful observations. -Begin to identify differences, similarities, or changes related to simple scientific ideas or processes. -Begin to talk about criteria for grouping, sorting and classifying. -Begin to compare and group according to behaviour or properties.</p>
<b>Learning Journey Question for Assessment</b>	How does the diameter of a bone affect its bending strength and compressional strength?



Unit 5	
<p><b>Light</b></p> <p>The shiny coin problem. A coin is lost what would be the best way to find it, turn out the lights and see it shine or use a torch to see it reflect?</p> <p>How many pieces of tracing paper are as translucent as a single piece of white paper?</p>	
<p><b>Why this?</b> Children will have first-hand experience of what light does in their homes. What happens when light hits different objects? Where does light come from?</p>	
<p><b>Why now?</b> Children will need a basic understanding of how light affects different materials in order for them to understand Year 5 Space (how the sun gives us day and night) and Year 6 Light (how light travels) topics.</p>	
Substantive Knowledge	Scientific Skills
<p>1. We can only see things when there is light and the light had to come from somewhere. All light originally comes from a light source.</p> <p>2. When light hits an object it can do a number of things:</p> <p>i) If the object is transparent it will go through it and we will be able to see through it.</p> <p>ii) If the object is opaque it will block the light and no light will get through.</p> <p>iii) If the object is perfectly reflective light will bounce back off it and we will see reflections of objects.</p> <p>iv) If the material is translucent it will allow light through but we won't be able to see through it.</p> <p>PSHE Link: About safe and unsafe exposure to the sun, and how to reduce the risk of sun damage, including skin cancer.</p>	<ul style="list-style-type: none"> <li>-Ask some relevant questions and use different types of scientific enquiries to answer them.</li> <li>-Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources)</li> <li>-Set up some simple, practical enquiries, comparative and fair tests.</li> <li>-Begin to recognise when a fair test is necessary and help decide how to set it up.</li> <li>-Make predictions with reasons.</li> <li>-Gather, record and begin to classify data in a variety of ways.</li> <li>-Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</li> <li>-Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</li> <li>-Begin to suggest how I could improve an investigation</li> <li>-Begin to make systematic and careful observations.</li> <li>-Begin to identify differences, similarities, or changes related to simple scientific ideas or processes.</li> <li>-Begin to talk about criteria for grouping, sorting and classifying.</li> <li>-Begin to compare and group according to behaviour or properties.</li> </ul>



<p><b>Learning Journey Question for Assessment</b></p>	<p>The shiny coin problem. A coin is lost what would be the best way to find it, turn out the lights and see it shine or use a torch to see it reflect?</p> <p>How many pieces of tracing paper are as translucent as a single piece of white paper?</p>	
<p><b>Unit 6</b></p>		
<p><b>Plants</b></p> <p><i>What are the roles of different parts of a plant?</i></p>		
<p><b>Why this?</b> To link in and consolidate the year 3 longitudinal study.</p> <p><b>Why now?</b> Children will build on their previous knowledge of what a plant needs to grow. They will look at how a plant responds to different levels of light, water and heat. In KS2, children are introduced to the relationship between structure and function – every part has a job to do.</p>		
<p><b>Substantive Knowledge</b></p>	<p><b>Scientific Skills</b></p>	
<ul style="list-style-type: none"> <li>• Plants do not eat food so have to make their own.</li> <li>• This food provides them with energy, and materials to grow</li> <li>• To make the food (sugar) plants need water from the ground, <b>carbon dioxide</b> from the air and light from the sun.</li> <li>• The water is taken up through the <b>roots</b> from the <b>soil</b>.</li> <li>• The carbon dioxide is taken in through the <b>leaves</b>.</li> <li>• As well as food, plants also make <b>oxygen</b> which is given out back into the air through the leaves.</li> </ul>	<ul style="list-style-type: none"> <li>-Ask some relevant questions and use different types of scientific enquiries to answer them.</li> <li>-Begin to make decisions about which types of enquiry will be the best way of answering questions (observing over time, noticing patterns, grouping and classifying, fair tests, secondary sources)</li> <li>-Begin to decide when and how to use secondary sources and carry out own research.</li> <li>-Set up some simple, practical enquiries, comparative and fair tests.</li> <li>-Begin to recognise when a fair test is necessary and help decide how to set it up.</li> <li>-Make predictions with reasons.</li> <li>-Gather, record and begin to classify data in a variety of ways.</li> <li>-Begin to record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.</li> <li>-Begin to use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</li> <li>-With help, I can look for changes, patterns, similarities and differences in data.</li> <li>-Begin to make systematic and careful observations.</li> </ul>	

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	<b>Learning Journey Question for Assessment</b>	Test the roles of a plant by removing them and observing the effect on the health of the plant.



Year	Unit 1	
Year 4	<b>Digestion</b>	
	Children keep a food diary for a day and then check tally up how much of each food group was in their diet. How does this compare with a healthy diet?	
	<b>Why this?</b>	
	Children will build on their understanding of the human body by looking at vital organs for the first time.	
	<b>Why now?</b>	
Following on from skeletons in Year 3, children will look at the function of organs in the digestive system in basic terms.		
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
	<p>-Animals need a variety of foods to help them grow and survive. The main food groups are:</p> <ul style="list-style-type: none"> <li>-Meat, dairy and pulses to provide protein for muscles.</li> <li>-Grains and root vegetables to provide carbohydrates for energy.</li> <li>-Fat for insulation and energy.</li> <li>-Fruit and vegetables for minerals, vitamins and fibre. These are essential to keep our bodies working well and protect us from illnesses.</li> <li>-Different animals require different foods to survive. Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do.</li> <li>-The nutrients in food have to get to every part of the body. The blood transports them. The role of digestion is to get the nutrients in food to dissolve in the blood, if it doesn't dissolve it can't enter the blood and be transported.</li> </ul> <p>PSHE link: About dental health and the benefits of good oral hygiene, including visits to the dentist.</p>	<ul style="list-style-type: none"> <li>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</li> <li>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</li> <li>-I can decide when and how research will help and carry out research on my own.</li> <li>-Set up practical enquiries, comparative and fair tests.</li> <li>-Recognise when a fair test is necessary and decide how to set it up.</li> <li>-Make predictions drawing on previous experience and knowledge.</li> <li>-Gather, record and classify data in a variety of ways.</li> <li>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</li> <li>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</li> <li>-Identify similarities, differences or changes related to simple scientific ideas or processes.</li> </ul>
<b>Learning Journey Question for Assessment</b>	Children keep a food diary for a day and then check tally up how much of each food group was in their diet. How does this compare with a healthy diet?	
	<b>Unit 2</b>	



<b>Longitudinal Study</b>	
Judge the longitudinal study as a whole. Correct conclusions and accurate recording of results. Accurate graphs draw/ constructed.	
<p><b>Why this?</b></p> <p>Each year group should experience collecting their own data using the school grounds as their base. This allows the children to conduct field work and apply their 'Working Scientifically' skills in a meaningful way. In Year 4, children will investigate how the weather changes across the year. They will look at wind speed, temperature and rainfall in particular.</p> <p><b>Why now?</b></p> <p>Starting longitudinal studies earlier in the year allows children to collect data across a longer period. Links can be to computing here by using the data collected to become a weather reporter in front of a green screen.</p>	
<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
<ol style="list-style-type: none"> <li>1. Using a thermometer correctly by waiting for the mercury to stabilise before taking a measurement.</li> <li>2. Using an anemometer correctly by counting the number of spins accurately. Using a homemade anemometer every 10 spins = 1 mph wind speed.</li> <li>3. Carefully reading the scale off the rain meters.</li> <li>4. Collecting the results for each measurement at the same time each day/week/month.</li> <li>5. Constructing graphs and generating graphs from the results.</li> </ol>	<ul style="list-style-type: none"> <li>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</li> <li>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</li> <li>-I can decide when and how research will help and carry out research on my own.</li> <li>-Set up practical enquiries, comparative and fair tests.</li> <li>-Recognise when a fair test is necessary and decide how to set it up.</li> <li>-Make predictions drawing on previous experience and knowledge.</li> <li>-Gather, record and classify data in a variety of ways.</li> <li>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</li> <li>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</li> <li>-Identify similarities, differences or changes related to simple scientific ideas or processes.</li> </ul>
<b>Learning Journey Question for Assessment</b>	Judge the longitudinal study as a whole. Correct conclusions and accurate recording of results. Accurate graphs draw/ constructed.



Unit 3	
<b>Classification in own environment</b>	
Can you explain about food webs in the local environment?	
<p><b>Why this?</b> Classifying organisms around the school environment is very beneficial to the children’s ‘Working Scientifically’ skills. They can identify organisms using dichotomous and classification keys, construct predicted food chains and then research the organisms to find out if they were correct.</p> <p><b>Why now?</b></p> <p>Like the longitudinal studies, the classification topic promotes children to take ownership of where their topic goes. They will raise questions and their fieldwork will lead to answers with research from the internet.</p>	
Substantive Knowledge	Scientific Skills
<p>1) Living things must MRS GREN. Move Reproduce Sense (Sensitivity) Grow Respire Excrete Nutrition.</p> <p>2) Know the differences between vertebrates.</p> <p>3) Birds have feathers, lay eggs and warm-blooded.</p> <p>4) Mammals have fur, feed young milk and warm-blooded.</p> <p>5) Fish have scales, gills, lay eggs and are cold-blooded animals.</p> <p>6) Reptiles are cold-blooded creatures with scales and lay eggs.</p> <p>7) Amphibians lay eggs in water, have smooth skin and are cold-blooded.</p> <p>8) Using dichotomous keys and classification keys to identify invertebrates.</p> <p>9) Construct food webs/chains from ‘found’ invertebrates.</p> <p>10) Human impact on the environment:</p> <ul style="list-style-type: none"> <li>• Positive: nature reserves / ecological parks</li> <li>• Negative: Litter / urban development.</li> </ul>	<p>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</p> <p>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</p> <p>-I can decide when and how research will help and carry out research on my own.</p> <p>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</p> <p>-Record on findings using oral and written explanations, displays or presentations.</p> <p>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Help make decisions about what observations to make, how long to make them for and the type of equipment that might be used.</p> <p>-Can choose from a selection of equipment.</p> <p>-Identify similarities, differences or changes related to simple scientific ideas or processes.</p> <p>-Talk about criteria for grouping, sorting and classifying and use simple keys.</p>
Learning Journey Question for Assessment	Can you explain about food webs in the local environment?
Unit 4	



<p><b>Plants</b> How do plants reproduce?</p>	
<p><b>Why this?</b> Children will already know what conditions are needed to promote plant growth and survival from KS1 and Year 3. In this topic, children will investigate the plants reproductive parts and how seeds are dispersed.</p> <p><b>Why now?</b> This topic builds on Year 3 knowledge. The children will now learn how a plant reproduces using the knowledge of how a plant grows.</p>	
<p><b>Substantive Knowledge</b></p>	<p><b>Substantive Knowledge</b></p>
<ol style="list-style-type: none"> <li>1) Flowering plants have evolved specific parts to carry out pollination, fertilisation and seed growth.</li> <li>2) Coloured and scented petals and attract insects</li> <li>3) Stamen hold pollen. Stigma collect pollen. Ovaries contain eggs that grow into seeds when pollen from the male moves down the stigma.</li> <li>4) All flowering plants reproduce by pollen from the male reaching the stigma of the female. However all plants look slightly different because they pollinate in different ways.</li> <li>5) Most plants use insects to pollinate and so have colourful petals and strong scents, a few plants use the wind, these often have less colourful petals and little scent.</li> <li>6) Plants have evolved many different ways to disperse their seeds. Seed dispersal increase the chances of the seeds germinating and growing into mature plants</li> <li>7) Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth (i.e. until the plant is able to produce its own food through its leaves).</li> </ol>	<ul style="list-style-type: none"> <li>-Raise different kinds of questions about scientific phenomena.</li> <li>-Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Begin to recognise which secondary sources will be the most useful to research their ideas.</li> <li>-Set up comparative and fair tests and begin to decide which variables to control.</li> <li>-Make and explain predictions.</li> <li>-Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</li> <li>-Begin to report and present findings from enquiries using scientific language.</li> <li>-Begin to decide how to record data from a choice of familiar approaches.</li> <li>-Begin to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Begin to make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose the most appropriate equipment and use it correctly.</li> <li>-Begin to take accurate and precise measurements.</li> </ul>
<p><b>Learning Journey Question for Assessment</b></p>	<p>How do plants reproduce?</p>



Unit 5									
<b><u>Mixtures</u></b>									
Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax? Get pure salt <b>and</b> sand from a salty sandy mixture.									
<b>Why this?</b> This topic looks at dissolving solids in liquids, such as water, and different filtration techniques. They will need some understanding of what a solid, liquid and a gas is in order to access evaporation for example.									
<b>Why now?</b> Building upon the knowledge children gaining in Year 3 (States of Matter), children will look at mixtures and how they are separated.									
Substantive Knowledge	Scientific Skills								
<p>1) When more than one substance are present in the same container it is called a mixture</p> <p>2) When a substance is added to a liquid it has dissolved if no bits of the substance can be seen and the liquid is transparent. This mixture is called a solution. Not all substances dissolve in water. <i>(Always be aware that if too much substance is added it may appear as if it hasn't dissolved but some may have, so add small quantities).</i></p> <p>3) All mixtures can be separated if they have a difference in property. This is because both (or all) of the materials are still present.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Separating technique</th> <th style="width: 75%;">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> </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	<ul style="list-style-type: none"> <li>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</li> <li>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</li> <li>-I can decide when and how research will help and carry out research on my own.</li> <li>-Set up practical enquiries, comparative and fair tests.</li> <li>-Recognise when a fair test is necessary and decide how to set it up.</li> <li>-Make predictions drawing on previous experience and knowledge.</li> <li>-Gather, record and classify data in a variety of ways.</li> <li>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</li> <li>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</li> <li>-Identify similarities, differences or changes related to simple scientific ideas or processes.</li> </ul>
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	
<b>Learning Journey Question for Assessment</b>	Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax? Get pure salt <b>and</b> sand from a salty sandy mixture.	
<b>Unit 6</b>		
<b><u>Electricity</u></b>		
Can you make the map light up?		
<p><b>Why this?</b> Every child will have first-hand experience of electrical appliances at home and school. In year 4, children will construct circuits and be introduced to electrical conductors and insulators for the first <b>time</b>.</p> <p><b>Why now?</b> This topic paves the way for a Year 6 topic for electricity. This topic also links to our DT topic of building a lighthouse.</p>		
<b>Substantive Knowledge</b>	<b>Scientific Skills</b>	
<p>1.Many devices are powered by electricity; these need a source of electricity, which could be mains or battery.</p> <p>2.The battery’s job is to push electricity to the device, but it needs something to carry the electricity all the way from the supply to the device, this is what we call a circuit.</p> <p>3. If there are more batteries they push harder and so the device will work harder e.g. brighter or faster.</p> <p>4.However not everything can carry the electricity from the source to the device, some materials allow the electricity through (conductors) and others don’t (insulators)</p>	<p>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</p> <p>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</p> <p>-I can decide when and how research will help and carry out research on my own.</p> <p>-Set up practical enquiries, comparative and fair tests.</p> <p>-Recognise when a fair test is necessary and decide how to set it up.</p> <p>-Make predictions drawing on previous experience and knowledge.</p> <p>-Gather, record and classify data in a variety of ways.</p> <p>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</p> <p>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Identify similarities, differences or changes related to simple scientific ideas or processes.-Begin to talk about criteria for grouping, sorting and classifying.</p>	



		-Begin to compare and group according to behaviour or properties.
<b>Learning Journey Question for Assessment</b>	Can you make the a circuit light up?	

Year	Unit 1	
Year 5	<u>Space</u>	
	Can you predict the temperature and light levels on different planets and suggest which planets might be possible to support life in the future?	
	<b>Why this?</b> In this topic, children will learn the location of Earth in the solar system, its relationship relative to the sun and the moon.	
	<b>Why now?</b> This is the first (and only) time Space appears on the KS2 curriculum. It uses some of the concepts from LKS2, such as boiling and melting points.	
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
1)The universe is vast and contains billions of stars. 2)The solar system is a collection of planets and moons orbiting our nearest star, the sun. It can be represented using a model. 3)All objects in the solar system are spinning as well as orbiting. 4)The time it takes for an object to spin once is called a day 5)The time it takes a planet to orbit the un is called a year. 6)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 7)Gravity is a force of attraction between any two things that have mass and bigger masses exert bigger forces. 8)Gravity works over a distance but gets weaker as the distance increases. Stars, planets and moons have so much mass they exert a large gravitational attraction on other things, including each other. 9)Differences in gravity result in smaller mass objects like planets (or moons) orbiting larger mass objects like stars (or planets)	-Raise different kinds of questions about scientific phenomena. -Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.) -Begin to recognise which secondary sources will be the most useful to research their ideas. -Set up comparative and fair tests and begin to decide which variables to control. -Make and explain predictions. -Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs. -Begin to report and present findings from enquiries using scientific language. -Begin to decide how to record data from a choice of familiar approaches. -Begin to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate. -Begin to make their own decisions about what observations to make, how long to make them for and whether to repeat them.	



		<ul style="list-style-type: none"> <li>-Choose the most appropriate equipment and use it correctly.</li> <li>-Begin to take accurate and precise measurements- N g kg mm cm mins secs.</li> <li>-Begin to use and develop keys and other information records to</li> <li>-Identify, classify and describe living things and materials.</li> </ul>
	<p><b>Learning Journey Question for Assessment</b></p>	<p>Can you predict the temperature and light levels on different planets and suggest which planets might be possible to support life in the future?</p>
<b>Unit 2</b>		
<b>Longitudinal Study</b>		
Do shadows appear the same length all year round?		
<p><b>Why this?</b></p>		
<p>Each year group should experience collecting their own data using the school grounds as their base. This allows the children to conduct field work and apply their 'Working Scientifically' skills in a meaningful way.</p>		
<p><b>Why now?</b></p>		
<p>Starting longitudinal studies earlier in the year allows children to collect data across a longer period. Children use their knowledge of light from Year 3 and their Space knowledge in Year 5.</p>		
<p><b>Substantive Knowledge</b></p>		<p><b>Scientific Skills</b></p>
<ul style="list-style-type: none"> <li>- Earth orbits around the Sun once every 365.25 days.</li> <li>- As the seasons change, due to the Earth's tilt, the Sun appears higher in the sky (Summer and Spring) and lower in the sky (Autumn and Winter).</li> <li>- The Earth rotates once every 24 hours. This is how we have day and night.</li> <li>- The Sun appears to move across the sky due to Earth's rotation.</li> <li>- Shadows are formed when an opaque object blocks light.</li> <li>- The length and direction of a shadow depend on the Sun's apparent position.</li> <li>- Shadows are longest when the Sun is lowest in the sky (morning/evening, winter) and shortest when the Sun is highest (midday, summer).</li> <li>- Weather and cloud cover can impact the visibility of shadows.</li> </ul>		<ul style="list-style-type: none"> <li>-Use their scientific experiences to explore ideas and raise questions.</li> <li>-Select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Recognise which secondary sources will be the most useful</li> <li>-Decide which variables to control and why.</li> <li>-Make and explain predictions using scientific language and begin to support with scientific evidence.</li> <li>-Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar, line or scatter graphs.</li> </ul>



		<ul style="list-style-type: none"> <li>-Report and present findings from enquiries using detailed scientific language.</li> <li>-Decide how to record data from a choice of familiar approaches.</li> <li>-Choose the best way to present data.</li> <li>-Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Use evidence to justify ideas and conclusions.</li> <li>-Identify scientific evidence that has been used to support and refute ideas.</li> <li>-Use test results to make predictions and set up further tests.</li> <li>-Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose equipment and explain how to use it accurately.</li> <li>-Take accurate and precise measurements.</li> </ul>
	<b>Learning Journey Question for Assessment</b>	Do shadows appear the same length all year round?
<b>Unit 3</b>		
<b><u>Materials</u></b>		
Has a new substance been made?		
<p><b>Why this?</b> Children in year 5 will now begin to investigate different properties of materials. The children will look at changing materials into new substances by changing their property.</p> <p><b>Why now?</b> This knowledge builds upon mixtures and changing state topics from LKS2. The children will utilise key concepts from those topics to help their working scientifically skills here. Links to other areas of the curriculum can be made (Art / DT).</p>		
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
	1.It is possible to change materials into completely different ones. This is very important because new substances might have different properties to materials we currently have. For example plastics can be moulded into intricate shapes, are waterproof, strong and electrical insulators.	<ul style="list-style-type: none"> <li>-Raise different kinds of questions about scientific phenomena.</li> <li>-Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and</li> </ul>



	<p>2. 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> <p>3. Indicators that something new has been made are:</p> <p>The properties of the material are different (colour, state, texture, hardness, smell, temperature)</p> <p>If it is not possible to get the material back easily it is likely that it is not there any more and something new has been made (irreversible change).</p>	<p>classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</p> <ul style="list-style-type: none"> <li>-Begin to recognise which secondary sources will be the most useful to research their ideas.</li> <li>-Make and explain predictions.</li> <li>-Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</li> <li>-Begin to report and present findings from enquiries using scientific language.</li> <li>-Begin to decide how to record data from a choice of familiar approaches.</li> <li>-Begin to report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Begin to use evidence to justify ideas and conclusions.</li> </ul>
	<p><b>Learning Journey Question for Assessment</b></p>	<p>Has a new substance been made?</p>
	<p><b>Unit 4</b></p>	
	<p><b>Sound</b></p> <p>Which materials make the best string telephone components?</p>	
<p><b>Why this?</b></p> <p>Sound is a concept that everyone recognises innately. Children will learn how sounds are made and how they behave over distances. They will also investigate volume and pitch using different amounts of water in glasses.</p>		
<p><b>Why now?</b></p> <p>Sound has been moved from LKS2 to UKS2 at SFJS because sound is a difficult topic in a content rich phase. Children need to learn that when objects vibrate, they produce sounds and sounds move through materials by making that material vibrate in turn. None of these vibrations can be seen by the naked eye and so they are abstract concepts.</p>		
<p><b>Substantive Knowledge</b></p> <p>1) Sounds can be made in many different ways and individual sounds have the properties of pitch and volume.</p> <p>2) When a sound is made it immediately spreads out in all directions. As it travels its volume decreases but its pitch remains the same.</p>		<p><b>Scientific Skills</b></p> <ul style="list-style-type: none"> <li>-Raise different kinds of questions about scientific phenomena.</li> <li>-Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and</li> </ul>



	<p>3) Sound is made when an object is made to vibrate (move backwards and forwards or up and down).</p> <p>4) As the material vibrates it makes whatever it is in contact with vibrate, including air. As the air vibrates it makes whatever it is in contact with vibrate also, which might be a wall or even your eardrum. Sound moves through materials vibrating making other materials they are in contact with vibrate.</p> <p>5) Pitch and volume are determined by how the material vibrates:                  ☑ Pitch is determined by how fast an object vibrates, i.e. the frequency of vibration. The higher the frequency the higher the pitch.                  ☑ Volume is determined by how big the movement of each vibration is (the amplitude of vibration). The bigger the amplitude the higher the volume.</p> <p>6) Smaller objects and tighter strings and surfaces tend to vibrate with a higher frequency.</p> <p>7) The ear is the body that receives soundwaves and converts it using structures within the middle and inner ear to meaningful sounds we can listen to. The parts of the ear are: pinna, ear canal, ear drum, ossicles (hammer, anvil and stirrup), cochlea and auditory nerve.</p>	<p>classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</p> <ul style="list-style-type: none"> <li>-Begin to recognise which secondary sources will be the most useful to research their ideas.</li> <li>-Set up comparative and fair tests and begin to decide which variables to control.</li> <li>-Make and explain predictions.</li> <li>-Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</li> <li>-Begin to report and present findings from enquiries using scientific language.</li> <li>-Begin to decide how to record data from a choice of familiar approaches.</li> <li>-Begin to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Begin to make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose the most appropriate equipment and use it correctly.</li> <li>-Begin to take accurate and precise measurements.</li> </ul>
	<p><b>Learning Journey Question for Assessment</b></p>	<p>Which materials make the best string telephone components?</p>

<b>Unit 5</b>	
<b><u>Forces</u></b>	
<p>How does adding holes to a parachute affect the time it takes to fall?</p> <p>How does the type of liquid put between two surfaces affect the friction between them?</p>	
<p><b>Why this?</b> In Year 3, children learnt about a non-contact force (Magnetism). In Year 5, children move onto looking at contact forces such as friction, air and water resistance alongside another non-contact force, gravity.</p> <p><b>Why now?</b> This topic builds on the knowledge gained from the Magnetism topic in Year 3.</p>	



Substantive Knowledge		Scientific Skills
<p>1)When objects move through air and water they have to push it out of the way. The water and air push back with forces called water resistance and air resistance. The harder it is to push the material out of the way the greater the resistance.</p> <p>2)Gases weigh less than liquids and so water resistance is greater than air resistance.</p> <p>3)Friction is a force against motion caused by two surfaces rubbing against each other. It occurs because no surfaces are perfectly smooth; they have bumps and undulations that can interlock when placed on top of each other.</p> <p>4)To move one interlocking surface over another one of three things must happen:</p> <p>5)The surfaces must rise slightly</p> <p>6)The bumps on the surface must bend</p> <p>7)The bumps on the surface must break</p> <p>8)All of these actions requires a force, this is what causes friction.</p> <p>9)Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.</p>		<p>-Ask increasingly relevant scientific questions and use different types of scientific enquiries to answer them.</p> <p>-Make some decisions about which types of enquiry will be the best way of answering questions including observing changes over time, noticing patterns, grouping and classifying, carrying out simple comparative and fair tests, finding things out.</p> <p>-I can decide when and how research will help and carry out research on my own.</p> <p>-Set up practical enquiries, comparative and fair tests.</p> <p>-Recognise when a fair test is necessary and decide how to set it up.</p> <p>-Make predictions drawing on previous experience and knowledge.</p> <p>-Gather, record and classify data in a variety of ways.</p> <p>-Record findings using simple scientific language, drawings, labelled diagrams, bar charts, keys and tables.</p> <p>-Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions.</p> <p>-Identify similarities, differences or changes related to simple scientific ideas or processes.</p>
<b>Learning Journey Question for Assessment</b>	<p>How does adding holes to a parachute affect the time it takes to fall?</p> <p>How does the type of liquid put between two surfaces affect the friction between them?</p>	
<b>Unit 6</b>		
<b><u>Life Cycles- Changes in old age</u></b>		
Construct time lines for different organisms and consider why there are such variations in the relative times for each of these stages?		
<b>Why this?</b>		
<p>Children will investigate the life cycles of different living things (bird, insect and amphibian). They will also use school grounds to find living things to document.</p> <p>Also, they will identify the life cycle of human and gain an understanding of what each stage of development is.</p>		
<b>Why now?</b> The local environment will be teeming with life to investigate so identifying the life cycles of mini beasts will be more successful.		
Substantive Knowledge		Scientific Skills



	<p>1) For human development see the document 'Human Life Cycle Explanation in Science folder.</p> <p>2) A bird life begins within an egg. A special hard structure called the egg tooth forms on the baby bird's beak to help it break the egg shell. This special tooth drops off a few days later.</p> <p>3) A baby bird that has just hatched is called a hatchling.</p> <p>4) While the hatchling is growing in the nest and being fed by its parents we call it a nestling.</p> <p>5) When a nestling grows its flight feathers and is ready to leave the nest it takes its first flight or fledges. We call a bird that has just fledged a fledgling.</p> <p>6) A fledgling has fluffy down feathers and is often fed by its parents for several weeks more. Its flight feathers continue to grow and its wing muscles get stronger.</p> <p>7) When a fledgling or juvenile has finished growing it becomes a mature or adult bird.</p> <p>8) An adult bird attracts a mate, builds a nest and raises young to start the cycle all over again.</p> <p>9) Amphibians begin life as eggs in water. They hatch into larvae, like tadpoles, which breathe through gills. Over time, they grow legs, develop lungs, and lose their tails. As adults, they live on land but often return to water to reproduce.</p> <p>10) Insects with complete metamorphosis go through four stages: egg, larva, pupa, and adult. Larvae hatch from eggs and grow before transforming inside a pupa. They emerge as adults, often with wings, ready to reproduce and continue the cycle.</p> <p>11) Insects with incomplete metamorphosis develop in three stages: egg, nymph, and adult. Nymphs hatch from eggs and resemble smaller adults. They shed their exoskeleton multiple times as they grow, gradually developing wings and reproductive abilities before reaching adulthood.</p>	<ul style="list-style-type: none"> <li>-Raise different kinds of questions about scientific phenomena.</li> <li>-Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Begin to recognise which secondary sources will be the most useful to research their ideas.</li> <li>-Set up comparative and fair tests and begin to decide which variables to control.</li> <li>-Make and explain predictions.</li> <li>-Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</li> <li>-Begin to report and present findings from enquiries using scientific language.</li> <li>-Begin to decide how to record data from a choice of familiar approaches.</li> <li>-Begin to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Begin to make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose the most appropriate equipment and use it correctly.</li> <li>-Begin to take accurate and precise measurements.</li> </ul>
	<p><b>Learning Journey Question for Assessment</b></p>	<p>Construct time lines for different organisms and consider why there are such variations in the relative times for each of these stages?</p>



Year	Unit 1	
Year 6	<b><u>Longitudinal Study</u></b> Do all body parts grow at the same rate?	
	<b>Why this?</b> Each year group should experience collecting their own data using the school grounds as their base. This allows the children to conduct field work and apply their 'Working Scientifically' skills in a meaningful way  <b>Why now?</b> Starting longitudinal studies earlier in the year allows children to collect data across a longer period.	
	<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
	1. Da Vinci's Vitruvian Man is a sketched drawing of a man showing body parts in proportion with one another. Can we investigate this in school? 2. Take a sample of children from each year group and measure their height, weight, arm, leg and foot length and compare it to their height. 3. Repeat this across the year to see if there is a change in growth rates of body parts compared to the height. 4. Create a height chart and see how the height changes across the year.	-Use their scientific experiences to explore ideas and raise questions. -Select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.) -Recognise which secondary sources will be the most useful



		<ul style="list-style-type: none"> <li>-Decide which variables to control and why.</li> <li>-Make and explain predictions using scientific language and begin to support with scientific evidence.</li> <li>-Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar, line or scatter graphs.</li> <li>-Report and present findings from enquiries using detailed scientific language.</li> <li>-Decide how to record data from a choice of familiar approaches.</li> <li>-Choose the best way to present data.</li> <li>-Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Use evidence to justify ideas and conclusions.</li> <li>-Identify scientific evidence that has been used to support and refute ideas.</li> <li>-Use test results to make predictions and set up further tests.</li> <li>-Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose equipment and explain how to use it accurately.</li> <li>-Take accurate and precise measurements.</li> </ul>
<p><b>Learning Journey Question for Assessment</b></p>	<p>Do all body parts grow at the same rate?</p>	
<p><b>Unit 2</b></p>		
<p><b><u>Circulation</u></b></p> <p>How do the hearts of different animals differ and what would that mean for their circulation?</p>		
<p><b>Why this?</b></p> <p>Children will learn about the human heart's function and anatomy. They will also learn about lung capacity and its relationship with the heart and muscles.</p> <p><b>Why now?</b></p> <p>Children will follow up their understanding of the human digestive and musculoskeletal system. By this point the children will have a basic understanding of major systems in the body.</p>		



Substantive Knowledge		Scientific Skills
<p>1.All animals need oxygen to survive. Air is breathed into the lungs (however lungs are not part of the circulatory system) where the oxygen in the air is passed into the blood. Every part of animals’ bodies need oxygen, especially muscles</p> <p>2.Muscles need a supply of oxygen and sugar to make them work, they are supplied this by the blood.</p> <p>3.The blood circulates around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar</p> <p>4.The heart pumps blood to every muscle in the body. The circulatory route must allow the blood to collect oxygen from the lungs, sugar from the intestines and visit muscles.</p> <p>5.The blood then returns to the heart where it is pumped again.</p>	<p>-Raise different kinds of questions about scientific phenomena.</p> <p>-Begin to select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</p> <p>-Begin to recognise which secondary sources will be the most useful to research their ideas.</p> <p>-Set up comparative and fair tests and begin to decide which variables to control.</p> <p>-Make and explain predictions.</p> <p>-Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.</p> <p>-Begin to report and present findings from enquiries using scientific language.</p> <p>-Begin to decide how to record data from a choice of familiar approaches.</p> <p>-Begin to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</p> <p>-Begin to make their own decisions about what observations to make, how long to make them for and whether to repeat them.</p> <p>-Choose the most appropriate equipment and use it correctly.</p> <p>-Begin to take accurate and precise measurements- N g kg mm cm mins secs.</p> <p>-Begin to use and develop keys and other information records to</p> <p>-Identify, classify and describe living things and materials.</p>	
<b>Learning Journey Question for Assessment</b>	How can we recover quicker?	
<b>Unit 3</b>		
<b><u>Light</u></b>		
What happens to light when it is shone through water? How is the affected by putting glitter in the water, or salt in the water, or talc in the water?		
<b>Why this?</b>		
Children will learn about how light travels and what happens when light hits an object.		



<b>Why now?</b>	
Children have been introduced to light in Year 3. This topic builds on that knowledge.	
<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
<ol style="list-style-type: none"> <li>1. When light is emitted from a light source it travels in straight lines until it hits an object. This can be represented by an arrow.</li> <li>2. Shadows form when light hits an opaque object, the area behind is in darkness because light can only travel in straight lines.</li> <li>3. When light hits a transparent object it goes through it in a straight line so we can see a clear image through it.</li> <li>4. When light hits a translucent material it goes through it but is scattered, this means light can pass through but we can't see an image through it.</li> <li>5. When light hits a mirrored surface it reflects off it in straight lines, so we can see an image in the reflective material</li> <li>6. Some times when light hits a material it reflects off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material</li> <li>7. Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them.</li> <li>8. Animals see objects when light is reflected off the object and enters the eye through the pupil. The pupil changes its size to allow enough, but not too much light into the eye. Too much light damages the eye and too little results in poor quality images.</li> </ol>	<ul style="list-style-type: none"> <li>-Use their scientific experiences to explore ideas and raise questions.</li> <li>-Select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Recognise which secondary sources will be the most useful</li> <li>-Decide which variables to control and why.</li> <li>-Make and explain predictions using scientific language and begin to support with scientific evidence.</li> <li>-Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar, line or scatter graphs.</li> <li>-Report and present findings from enquiries using detailed scientific language.</li> <li>-Decide how to record data from a choice of familiar approaches.</li> <li>-Choose the best way to present data.</li> <li>-Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Use evidence to justify ideas and conclusions.</li> <li>-Identify scientific evidence that has been used to support and refute ideas.</li> <li>-Use test results to make predictions and set up further tests.</li> <li>-Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose equipment and explain how to use it accurately.</li> <li>-Take accurate and precise measurements.</li> </ul>
<b>Learning Journey Question for Assessment</b>	What happens to light when it is shone through water? How is the affected by putting glitter in the water, or salt in the water, or talc in the water?
<b>Unit 4</b>	



<b>Electricity</b>	
How does the number of lamps in a circuit affect how long a battery lasts?	
<b>Why this?</b>	
Children will look at how to make different types of circuits (series and parallel) as well being introduced to electrical resistance and heat being released from electrical appliances.	
<b>Why now?</b>	
The children will build on their basic understanding of components of a circuit from Year 4.	
<b>Substantive Knowledge</b>	<b>Scientific Skills</b>
<p>1.The power supply pushes the current round the circuit. The voltage of the power supply is a measure of this push. Batteries have a limited store of energy, when it is gone they no longer push the current.</p> <p>2.When current goes through a device it makes it work, the greater the current the harder the device works</p> <p>3.When any device is placed in the circuit it makes it harder for current to flow (resistance). The more devices the greater the resistance and the lower the current.</p> <p>4.As current goes through a conductor it heats it up. The greater the current flowing the greater the heating effect. This can be useful in electrical heaters but can be hazardous and cause fires.</p>	<ul style="list-style-type: none"> <li>-Use their scientific experiences to explore ideas and raise questions.</li> <li>-Select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Recognise which secondary sources will be the most useful</li> <li>-Decide which variables to control and why.</li> <li>-Make and explain predictions using scientific language and begin to support with scientific evidence.</li> <li>-Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar, line or scatter graphs.</li> <li>-Report and present findings from enquiries using detailed scientific language.</li> <li>-Decide how to record data from a choice of familiar approaches.</li> <li>-Choose the best way to present data.</li> <li>-Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Use evidence to justify ideas and conclusions.</li> <li>-Identify scientific evidence that has been used to support and refute ideas.</li> <li>-Use test results to make predictions and set up further tests.</li> </ul>



		<ul style="list-style-type: none"> <li>-Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose equipment and explain how to use it accurately.</li> <li>-Take accurate and precise measurements.</li> </ul>
	<b>Learning Journey Question for Assessment</b>	How does the number of lamps in a circuit affect how long a battery lasts?

<b>Unit 5</b>	
<b><u>Evolution and Inheritance</u></b>	
Fossil evidence suggests mammoths lived from 400,000 to 10,000 years ago. What happened to them? Did they become extinct? Did they evolve into modern elephants? Are they still here?	
<b>Why this?</b>	
Children will learn about Darwin's Theory of Evolution and compare sizes of bird beaks. They will also investigate how an animal is adapted to its environment.	
<b>Why now?</b>	
Children need to understand how looking at fossils can help scientists form theories about the world around them.	
<b><u>Substantive Knowledge</u></b>	<b><u>Scientific Skills</u></b>
<ol style="list-style-type: none"> <li>1. Over the last many millions of years there are many examples of organisms becoming extinct and others evolving into new organisms over many generations.</li> <li>2. The fossil record provides evidence for this.</li> <li>3. The fossilisation process begins when a plant or animal dies and is buried by sediment. Over time, minerals replace bones or hard parts, turning them into rock. Layers of sediment build up, and millions of years later, fossils may be uncovered.</li> </ol>	<ul style="list-style-type: none"> <li>-Use their scientific experiences to explore ideas and raise questions.</li> <li>-Select and plan the most appropriate ways to answer science questions using different types of scientific enquiry (including observing changes over different periods of time, noticing patterns, grouping and classifying, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.)</li> <li>-Recognise which secondary sources will be the most useful</li> <li>-Decide which variables to control and why.</li> <li>-Make and explain predictions using scientific language and begin to support with scientific evidence.</li> </ul>



	<p>4. The way fossils form and are found mean the fossil record is an incomplete record of all evolution. Scientists have had to piece together evidence to work out how organisms evolve.</p> <p>5. Darwin's theory of Natural Selection explains how evolution occurs. It can be simplified in the flow chart.</p> <p>6. Some organisms reproduce sexually where offspring inherit information from both parents, others reproduce asexually by making a copy of a single parent. A sexual reproduction results in little variation in a population that makes evolution less likely.</p> <div data-bbox="884 295 1176 550" style="text-align: center;"> <pre> graph TD     A[Organisms reproduce and offspring have similar characteristics to parents] --&gt; B[Variation exists within a population (and between offspring of same parents)]     B --&gt; C[Competition exists for resources and mates]     C --&gt; D[Organisms best suited to their environment are more likely to survive long enough to reproduce]             </pre> </div>	<ul style="list-style-type: none"> <li>-Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar, line or scatter graphs.</li> <li>-Report and present findings from enquiries using detailed scientific language.</li> <li>-Decide how to record data from a choice of familiar approaches.</li> <li>-Choose the best way to present data.</li> <li>-Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms.</li> <li>-Use evidence to justify ideas and conclusions.</li> <li>-Identify scientific evidence that has been used to support and refute ideas.</li> <li>-Use test results to make predictions and set up further tests.</li> <li>-Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.</li> <li>-Make their own decisions about what observations to make, how long to make them for and whether to repeat them.</li> <li>-Choose equipment and explain how to use it accurately.</li> <li>-Take accurate and precise measurements.</li> </ul>
<p><b>Learning Journey Question for Assessment</b></p>	<p>Fossil evidence suggests mammoths lived from 400,000 to 10,000 years ago. What happened to them? Did they become extinct? Did they evolve into modern elephants? Are they still here?</p>	