


# Knowledge Overview: Science

## Year 5 (Working Document to be completed over this year)

	Autumn 1	Autumn 2 & Spring 1	Spring 2 & Summer 1	Summer 2	
	Earth and Space	Properties of Materials	Forces	Living Things and habitats	Animals
<p><b>NC Objectives Covered</b> (Taken directly from the National Curriculum)</p> <p>Red= substantive knowledge</p> <p>Blue= disciplinary knowledge</p>	<ul style="list-style-type: none"> <li>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</li> <li>Describe the movement of the Moon relative to the Earth.</li> <li>Describe the Sun, Earth and Moon as approximately spherical bodies.</li> <li>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.</li> </ul>	<ul style="list-style-type: none"> <li>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</li> <li>Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.</li> <li>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> <li>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</li> <li>Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</li> </ul>	<ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</li> <li>Identify the effects of air resistance, water resistance and friction that act between moving surfaces.</li> <li>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</li> <li>Make predictions using knowledge of forces when carrying out an investigation.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>Describe the life process of reproduction in some plants and animals.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age</li> </ul>
<p><b>Working Scientifically-disciplinary</b> (Taken from the PLAN materials/NC)</p>	<p>Identifying scientific evidence that has been used to support or refute ideas or arguments Making observations and taking measurements.</p>	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Making observations and taking measurements. Select from a range of practical resources to gather evidence to answer their questions.</p>	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Making observations and taking measurements.</p> <p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	<p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p> <p>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</p>	
<p><b>Previous Knowledge</b> -What have children learnt previously that will support this next step?</p>	<ul style="list-style-type: none"> <li>Explore the natural world around them. (Reception – Earth and space)</li> <li>Describe what they see, hear and feel whilst outside. (Reception – Earth and space)</li> <li>Observe changes across the four seasons. (Y1 - Seasonal changes) Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)</li> </ul>	<ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</li> <li>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)</li> <li>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. (Y3 - Forces and magnets)</li> <li>Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)</li> <li>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter)</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)</li> </ul>	<ul style="list-style-type: none"> <li>Compare how things move on different surfaces. (Y3 - Forces and magnets)</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</li> <li>Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)</li> <li>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)</li> <li>Describe magnets as having two poles. (Y3 - Forces and magnets)</li> <li>Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)</li> </ul>	<ul style="list-style-type: none"> <li>Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)</li> <li>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)</li> </ul>	

<p><b>Misconceptions</b> -What are the common misconceptions in knowledge for this unit?</p>	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>the Earth is flat</li> <li>the Sun is a planet</li> <li>the Sun rotates around the Earth</li> <li>the Sun moves across the sky during the day</li> <li>the Sun rises in the morning and sets in the evening</li> <li>the Moon appears only at night</li> <li>night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.</li> </ul>	<p>Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. Some children may think:</p> <ul style="list-style-type: none"> <li>thermal insulators keep cold in or out</li> <li>thermal insulators warm things up</li> <li>solids dissolved in liquids have vanished and so you cannot get them back</li> <li>lit candles only melt, which is a reversible change.</li> </ul>	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>the heavier the object the faster it falls, because it has more gravity acting on it</li> <li>forces always act in pairs which are equal and opposite</li> <li>smooth surfaces have no friction</li> <li>objects always travel better on smooth surfaces</li> <li>a moving object has a force which is pushing it forwards and it stops when the pushing force wears out a non-moving object has no forces acting on it.</li> </ul>	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>all plants start out as seeds</li> <li>all plants have flowers</li> <li>plants that grow from bulbs do not have seeds</li> <li>only birds lay eggs a baby grows in a mother's tummy a baby is "made".</li> </ul>	
<p><b>Learning Sequence</b> -Detail the learning sequence using key questions in an ordered sequence. -The questions should have a sequential build up to answer the overall learning challenge.</p>	<ol style="list-style-type: none"> <li>What do I know about the Solar System?</li> <li>Can I describe the movement of the Earth, moon and other planets relative to the sun in the solar system?</li> <li>Can I explain day and night?</li> <li>Can I investigate how shadows change during the day?</li> <li>Can I compare the planets in our solar system?</li> <li>LC: Can I find out about what people thought about the Solar System in the past?</li> <li>Can I research a scientist?</li> </ol>	<ol style="list-style-type: none"> <li>LC: Can I explain the difference between a solid, a liquid and a gas? (Checking Year 4 knowledge is secure)</li> <li>Can I compare and group materials based on their everyday properties</li> <li>Can I form a solution and describe how to recover a substance from it?</li> <li>Can I carry out a fair test linked to solutions?</li> <li>Can I separate mixtures using filtering, sieving or evaporation? <i>Problem solving lesson.</i></li> <li>Can I explain the difference between a reversible and irreversible change?</li> <li>Can I set up an investigation to explore how well different materials can keep something warm? (Thermal insulators) <i>Planning</i></li> <li>Can I set up an investigation to explore how well different materials can keep something warm? (Thermal insulators) <i>Investigation</i></li> <li>Can I research a scientist? Meet a scientist online.</li> </ol>			
<p><b>Curriculum End Points</b> -What will children know and be able to do by the end of the unit? -What will the children produce to demonstrate this knowledge?</p>	<p>Children will use diagrams and explanations to explain their understanding of the movement of the planets, Earth, sun and moon. They will produce a written piece of work about scientists.</p>	<p>Children will:</p> <ul style="list-style-type: none"> <li>be able to group and compare materials and explain their choices.</li> <li>demonstrate how a solution can be made and then separated.</li> <li>will conduct a comparative test to decide the best material for a specific job.</li> <li>will separate mixtures and choose the most appropriate way.</li> <li>will be able to explain the difference between reversible and irreversible changes and give examples.</li> </ul>	<p>Children can:</p> <ul style="list-style-type: none"> <li>demonstrate the effect of gravity acting on an unsupported object.</li> <li>give examples of friction, water resistance and air resistance</li> <li>give examples of when it is beneficial to have high or low friction, water resistance and air resistance demonstrate how pulleys, levers and gears work</li> </ul>		

<p><b>Knowledge Sentences</b> -Using the end points, what are the key statements children need to remember by the end of the unit? (I know that...)  (To share with children when it is taught during the unit)</p>		<ol style="list-style-type: none"> <li>I know that the Sun is a star. It is at the centre of our solar system.</li> <li>I know that the 8 planets travel around the Sun in fixed orbits. I know that the Sun, Earth and Moon are spherical bodies.</li> <li>I know that the Earth takes 365 ¼ days to complete its orbit around the sun. The Earth rotates (spins) on its axis. As the Earth rotates, half faces the Sun (here it is day) and half is facing away from the Sun (night). I know that the Moon orbits the Earth. I know that it takes about 28 days to complete its orbit.</li> <li>I know that shadows change during the day because of the position of the Sun in the sky which is caused because the Earth is spinning on it's axis.</li> <li>I know that there are 8 planets and can name them in order. (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)</li> <li>I can explain how our understanding of the Solar System has changed over time.</li> <li>I can name and tell you about 1 or more scientists involved in space exploration and discovery.</li> </ol>	<ol style="list-style-type: none"> <li> <p>A) I know that in a solid the molecules are close together, in a liquid they are more spaced apart and can move around and in a gas they are very spaced apart.</p> <p>B) I can give an example of each.</p> <p>C) I know that a solid becomes a liquid through melting; a liquid becomes a gas through evaporation when heated; a gas becomes a liquid when it cools and this is condensation; a liquid becomes a solid when it cools (freezes) and solidifies.</p> </li> <li>I know that there is a range of ways to group and compare materials including hardness, transparency, electrical and thermal conductivity and attraction to magnets.</li> <li>I know that some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. I can explain that evaporation will recover a solute from a solution</li> <li>I know how to carry out a fair test, choosing my own variables and using my knowledge about solutions.</li> <li>I know that materials/mixtures can be separated by using filtering/sieving and evaporation.</li> <li>I know that some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials, and these are not reversible.</li> <li>I know that materials have different uses based on their properties and can set up a comparative test to decide which is the best for a particular job.</li> <li>I know that materials have different uses based on their properties and can conduct a comparative test to decide which is the best for a particular job.</li> <li>I can name and give information about a scientist.</li> </ol>			
<p><b>Key Vocabulary</b> (To share with children and add to working walls/knowledge mats)</p>		<p>Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets</p>	<p>Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material</p>	<p>Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears</p>	<p>Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings, Puberty – the vocabulary to describe sexual characteristics</p>	
<p><b>What</b></p>	<p><b>Enrichment Activities</b></p>	<p>wonderdome</p>				

	<b>(trips, residentials, speakers, SMSC)</b>					
	<b>Physical Resources (artefacts)</b>		Sieves Materials to separate, dissolve etc Filter paper Containers/measuring jugs/cylinders PSTT – A scientist like me Standing on the shoulders of giants	Equipment for making parachutes gears, levers and pulleys		
	<b>Cross Curricular learning (Include opportunities for writing and quality texts)</b>	Art – sketches – Linked to Hiroyuki Doi		DT - Design, build and test model cars, rockets or bridges, and investigate the forces acting on them.  PE – investigating forces/air resistance through throwing rugby balls, javelins. See outdoor ideas.		
	<b>Local Learning including outdoor learning (These need editing)</b>	The playground provides a larger space to create models showing the movement of the Sun, Earth and Moon and the impact of this on day and night and the apparent movement of the Sun. Role play the movement of the planets around the sun.  Observe movement of shadows across the playground throughout the day to discuss the movement of the sun across the sky.		Make parachutes and drop from greater height in school e.g. Y5/6 classrooms to investigate air resistance.  It may be more convenient to explore water resistance in the playground to avoid water on the floor in the classroom.  Running across the playground, then running across with an open umbrella to introduce the concept of air resistance.  Throwing different equipment like rugby balls and javelins across the playground to investigate air resistance.  Hitting a tennis ball into the air in the playground to understand gravity. What other forces are influencing the ball? What happens when you hit it with a harder force?		
	<b>Opportunities for cultural Diversity</b>	Scientist – Science capital	Scientist – Science capital	Scientist – Science capital		