


## KNOWLEDGE OVERVIEW GRID

		Subject: Science			Year Group: 3/4 Year B		
		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		States of Matter	States of Matter	Electricity	Sound (Summer 1)	Living things and their Habitats (Summer 2)	Rocks and Soils
<p><b>NC Objectives Covered</b> (Taken directly from the National Curriculum)</p> <p><b>Red= substantive knowledge</b></p> <p><b>Blue= disciplinary knowledge</b></p>	<ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</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).</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</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).</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify common appliances that run on electricity.</li> <li>• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</li> <li>• Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</li> <li>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</li> <li>• Recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify how sounds are made, associating some of them with something vibrating.</li> <li>• Recognise that vibrations from sounds travel through a medium to the ear.</li> <li>• Find patterns between the pitch of a sound and features of the object that produced it.</li> <li>• Find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>• Recognise that sounds get fainter as the distance from the sound source increases.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways.</li> <li>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</li> <li>• Recognise that soils are made from rocks and organic matter.</li> </ul>	
<p><b>Working Scientifically-disciplinary</b> (Taken from the PLAN materials/NC)</p>	<ul style="list-style-type: none"> <li>• Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>• Setting up simple practical enquiries, comparative and fair tests</li> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>• Asking relevant questions and using different types of scientific enquiries to answer them</li> <li>• Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>• Setting up simple practical enquiries, comparative and fair tests</li> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• Using straightforward scientific evidence to answer questions or to support their findings</li> <li>• Identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>• Setting up simple practical enquiries, comparative and fair tests.</li> <li>• Asking relevant questions and using different types of scientific enquiries to answer them.</li> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying differences, similarities or changes related to simple scientific ideas and processes.</li> <li>• Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</li> <li>• Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</li> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> </ul>	<ul style="list-style-type: none"> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.</li> <li>• Asking relevant questions and using different types of scientific enquiries to answer them</li> <li>• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>• Setting up simple practical enquiries, comparative and fair tests.</li> <li>• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.</li> <li>• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> <li>• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> </ul>	

<p><b>Previous Knowledge</b> -What have children learnt previously that will support this next step?</p>	<p><b>Year 1</b></p> <ul style="list-style-type: none"> <li>•Distinguish between an object and the material from which it is made.</li> <li>•Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>•Describe the simple physical properties of a variety of everyday materials.</li> <li>•Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul> <p><b>Year 2</b></p> <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.</li> <li>•Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	<p><b>Year 1</b></p> <ul style="list-style-type: none"> <li>•Distinguish between an object and the material from which it is made.</li> <li>•Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>•Describe the simple physical properties of a variety of everyday materials.</li> <li>•Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul> <p><b>Year 2</b></p> <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.</li> <li>•Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	<p><b>EYFS</b></p> <p>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.</p>	<p><b>Year 1</b></p> <ul style="list-style-type: none"> <li>•Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</li> </ul>	<p><b>Year 1</b></p> <ul style="list-style-type: none"> <li>•Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>•Identify and describe the basic structure of a variety of common flowering plants, including trees.</li> <li>•Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</li> <li>•Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</li> </ul> <p><b>Year 2</b></p> <ul style="list-style-type: none"> <li>•Identify and name a variety of plants and animals in their habitats, including microhabitats.</li> </ul>	<p><b>Year 1</b></p> <ul style="list-style-type: none"> <li>•Distinguish between an object and the material from which it is made.</li> <li>•Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>•Describe the simple physical properties of a variety of everyday materials.</li> <li>•Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul> <p><b>Year 2</b></p> <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.</li> </ul>
<p><b>Misconceptions</b> -What are the common misconceptions in knowledge for this unit?</p>	<ul style="list-style-type: none"> <li>• ‘solid ’is another word for hard or opaque</li> <li>•solids are hard and cannot break or change shape easily and are often in one piece</li> <li>•substances made of very small particles like sugar or sand cannot be solids</li> <li>•particles in liquids are further apart than in solids and they take up more space</li> <li>•when air is pumped into balloons, they become lighter</li> <li>•water in different forms –steam, water, ice –are all different substances</li> <li>•all liquids boil at the same temperature as water (100 degrees)</li> </ul>	<ul style="list-style-type: none"> <li>•melting, as a change of state, is the same as dissolving</li> <li>•steam is visible water vapour (only the condensing water droplets can be seen)</li> <li>•clouds are made of water vapour or steam</li> <li>•the substance on windows etc. is condensation rather than water</li> <li>•the changing states of water (illustrated by the water cycle) are irreversible</li> <li>•evaporating or boiling water makes it vanish</li> <li>•evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.</li> </ul>	<ul style="list-style-type: none"> <li>•electricity flows to bulbs, not through them</li> <li>•electricity flows out of both ends of a battery</li> <li>•electricity works by simply coming out of one end of a battery into the component.</li> </ul>	<ul style="list-style-type: none"> <li>•sound is only heard by the listener</li> <li>•sound only travels in one direction from the source</li> <li>•sound can’t travel through solids and liquids</li> <li>•high sounds are loud and low sounds are quiet.</li> </ul>	<ul style="list-style-type: none"> <li>•the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain</li> <li>•there is always plenty of food for wild animals</li> <li>•animals are only land-living creatures</li> <li>•animals and plants can adapt to their habitats, however they change</li> <li>•all changes to habitats are negative.</li> </ul>	<ul style="list-style-type: none"> <li>•melting, as a change of state, is the same as dissolving</li> <li>•steam is visible water vapour (only the condensing water droplets can be seen)</li> <li>•clouds are made of water vapour or steam</li> <li>•the substance on windows etc. is condensation rather than water</li> <li>•the changing states of water (illustrated by the water cycle) are irreversible</li> <li>•evaporating or boiling water makes it vanish</li> <li>•evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.</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>1. Can I explain the differences between solids, liquids and gases?</li> <li>2. Can I make observations about solids, liquids and gases?</li> <li>3. Can I understand the properties of solids?</li> <li>4. Can I classify materials into solids, liquids and gases and explain their properties?</li> <li>5. Can I investigate the different speeds at which solids change state?</li> <li>6. Can I explain the different states of water?</li> <li>7. Can I explore how water changes state?</li> </ol>	<ol style="list-style-type: none"> <li>1. Can I make observations of liquids that are frozen and then change back to a liquid?</li> <li>2. Can I investigate the rate of evaporation?</li> <li>3. Can I make observations of condensation and discuss the change of state?</li> <li>4. Can I make a model to help me understand the water cycle?</li> <li>5. Can I research and explain the water cycle?</li> <li>6. Scientists</li> </ol>	<ol style="list-style-type: none"> <li>1. Can I identify and sort common appliances that run on electricity?</li> <li>2. Can I create a simple circuit?</li> <li>3. Can I make a switch for a simple circuit and explain the purpose of a switch?</li> <li>4. Can I investigate which materials are conductors and insulators?</li> <li>5. Can I investigate the brightness of bulbs in a circuit?</li> </ol>	<ol style="list-style-type: none"> <li>1. Can I explain how sounds are made?</li> <li>2. Can I explain how sound travels through a medium to the ear?</li> <li>3. Can I investigate and explain pitch?</li> <li>4. Can I investigate volume and muffling a loud sound?</li> <li>5. Can I use dataloggers to investigate sound at different distances?</li> <li>6. Can I create a musical instrument which changes pitch?</li> </ol>	<ol style="list-style-type: none"> <li>1. Can I identify different habitats and the living things they home?</li> <li>2. Can I classify and sort living things?</li> <li>3. Can I use a classification chart on a mini-beast hunt?</li> <li>4. Can I create my own classification key?</li> <li>5. Can I research human impact on different habitats and living things?</li> </ol>	<ol style="list-style-type: none"> <li>1. Can I sort and group different rocks based on their appearance?</li> <li>2. Can I make careful observations about the simple properties of rocks?</li> <li>3. Can I understand how rocks are formed?</li> <li>4. Can I explore the properties of rocks and explain these?</li> <li>5. Can I explain how fossils are formed?</li> <li>6. Can I explain what soil is made of and compare different soils?</li> <li>7. Can I investigate the water retention of different types of soil?</li> </ol>

<p><b>Curriculum End Points</b></p> <p><b>-What will children know and be able to do by the end of the unit?</b></p> <p><b>-What will the children produce to demonstrate this knowledge?</b></p>	<p>Children will understand the differences between solids, liquids and gases and will have observed a range of these. They will be able to explain how each state of matter is able to change state.</p>	<p>Children will be able to explain their understanding of how water changes state through their explanations and diagrams of the water cycle.</p>	<p>Children can make a circuit which includes a bulb, a switch and a buzzer. They can explain which materials they would use to conduct electricity and which would be good to use in a buzzer game.</p>	<p>Children can make a musical instrument which allows them to change the pitch of the sound and they can explain how they would change the volume of a sound and how sound is made.</p>	<p>Children create a classification key based on minibeasts found within our wildlife garden. Children present a piece of work linked to the environmental issue they have researched.</p>	<p>Children are able to identify and name some different types of rock. They are able to explain the properties of these rocks as a result of their investigations.</p>	
<p><b>Knowledge Sentences</b></p> <p><b>-Using the end points, what are the key statements children need to remember by the end of the unit? (I know that...)</b></p> <p><b>(To share with children when it is taught during the unit)</b></p>	<p>1/2/4. I know that:  a. a solid keeps its shape and has a fixed volume.  b. a liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface.  c. a gas fills all available space; it has no fixed shape or volume.  3. I know that granular and powdery solids like sand can be poured but that each individual grain demonstrates the properties of a solid.  5. I know that melting is a state change from solid to liquid.  6. I know that the freezing point of water is 0oC. I know that water boils when it is heated to 100oC.  7. I know that freezing is a state change from liquid to solid. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid.</p>	<p>1. I know that melting is a state change from solid to liquid. Freezing is a state change from liquid to solid.  2. I know that evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy.  3. I know that condensation is the change back from a gas to a liquid caused by cooling.  4/5 - I know that:  a. water at the surface of seas, rivers etc. evaporates into water vapour (a gas).  b. This rises, cools and condenses back into a liquid forming clouds.  c. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation.</p>	<p>1. I know that many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries.  2. I know that an electrical circuit consists of a cell or battery connected to a component using wires.  3. I know that if there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.  4. I know that metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water also conducts electricity.  5. I know that if I add more bulbs to a circuit the brightness of the bulb will dim and that if I add more batteries then the bulb will be brighter.</p>	<p>1. I know a sound produces vibrations which travel through a medium from the source to our ears.  2. I know different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter).  3. I know that pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.  4. I know that the loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. A sound insulator is a material which blocks sound effectively.  5. I know that sounds decrease in volume as you move away from the source.   6. I know that sound is made by vibrations, that pitch is the highness or lowness of a sound and that volume is the loudness of sound.</p>	<p>1. I know the names of common minibeasts and local habitats (incl. ponds, under rocks/logs, hedgerows, fields). I know that a habitat is the natural home or environment of an animal, plant, or other organism.  2. I know that living things can be grouped (classified) in different ways according to their features and their habitats  3/4. I know that classification keys can be used to identify and name living things.  5. I know that different environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering).</p>	<p>1. I know that rock is a naturally occurring material. I know there are different types of rock e.g. sandstone, limestone, slate etc. which have different properties.  2. I know that rocks can be hard or soft and that they have different sizes of grain or crystal. Rocks can be different shapes and sizes (stones, pebbles, boulders).  3. I know there are three different types of rock: igneous, metamorphic and sedimentary.  4. I know that rocks have different durability and that some absorb water and some don't.  5. I know that some rocks contain fossils. Fossils were formed millions of years ago:  - When plants and animals died, they fell to the seabed.  - They became covered and squashed by other material.  - Over time the dissolving animal and plant matter is replaced by minerals from the water.  6. I know that Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter).  7. I know that the type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.</p>	
<p><b>Key Vocabulary (To share with children and add to working walls/knowledge mats)</b></p>	<p>Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation/evaporate, temperature, degrees Celsius, condense/condensation, air, oxygen, ice/water/steam, heated/heating, cool/cooling, melt, freeze, solidify, boil, water cycle, precipitation, transpiration</p>	<p>Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation/evaporate, temperature, degrees Celsius, condense/condensation, air, oxygen, ice/water/steam, heated/heating, cool/cooling, melt, freeze, solidify, boil, water cycle, precipitation, transpiration</p>	<p>Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol</p>	<p>Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation, solid, liquid, gas, muffle,</p>	<p>Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate, amphibians, reptiles, birds, mammals, vertebrates, invertebrates</p>	<p>Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil, permeable/impermeable, durable, hardwearing</p>	
<p><b>What does this look like at Bramhope?</b></p>	<p><b>Enrichment Activities (trips, residentials, speakers, SMSC)</b></p>				<p><i>Science Media Museum – Sound Day</i></p>	<p><i>The Big Book of Bugs Bonkers about Beetles</i></p> <p><i>Wildlife garden visits</i></p> <p><i>Nell Bank (Pond dipping/classification activities)</i></p>	<p><i>Local walk – observe rocks used for different purposes including visit to churchyard to look at gravestones and changes in rock over time.</i></p>

<b>Physical Resources (artefacts)</b>	<i>Different materials Chocolate, butter Ice trays Thermometers</i>	<i>Different materials Chocolate, butter Ice trays Thermometers</i>	<i>Batteries Wires Bulbs Buzzers Switches Different materials (insulators and conductors)</i>	<i>Instruments Pitch forks iPad app – Arduino</i>		<i>Different rock samples Magnifying glasses Pipettes Soil samples</i>
<b>Cross Curricular learning (Include opportunities for writing and quality texts)</b>	<i>Stick Dog Dreams of Ice Cream—Tom Watson George’s Marvellous Medicine —Roald Dahl The Great Big Water Cycle Adventure The Rhythm of the Rain  DT – making rocky road cakes or ice cream.</i>	<i>The Great Big Water Cycle Adventure  The Rhythm of the Rain</i>		<i>Music – making/playing musical instruments to learn about pitch and volume.  Computing – using iPads and Arduino app to measure volume.  Moses Goes to a Concert by Isaac Millman  The Sound of Silence—Katrina Goldasito &amp; Julia Kuo</i>	<i>What a waste Greta and the Giants  Geography – human and physical geography looking at animals in different habitats across the world and threats faced.  Explore local area – look at new building development and its impact. Litter pick in local area.  Art – observational drawings – Darwins.</i>	<i>A Pebble in My Pocket—Meredith Hooper Stone Girl, Bone Girl—Laurence Anholt  Geography – natural resources Art – making clay ‘mold and cast’ fossils, sketching fossils</i>
<b>Local Learning including outdoor learning</b>				<i>Pupils measure how the volume of a sound changes as they move away from the sound source. Pupils can use Arduino app on iPad as a data logger.  Pupils to tap different wooden and metal objects outside to see if they can hear if they put their ears to the other end.  Pupils to make and use string telephones outdoors to see if sound travels through a medium. Does it still work if the phones are around a corner? Do different lengths of string make a difference?</i>	<i>Pupils use classification keys to name living things seen in the playground or local environment. Pupils collect minibeasts using pooters and use classification keys to identify.  Pupils carry out litter surveys in the playground or local area/local park and consider the impact of this on the living things.</i>	<i>Pupils talk about the properties of rocks in the playground or wildlife garden.  Pupils could go on a local walk around Bramhope to observe different rock types (stone houses, gravestones in church yards). Pupils could visit local church yard to look at effects of weathering on stone over time.  Pupils dig in the soil in the wildlife garden to look for rocks and organic matter. Check CLEAPSS for health and safety guidance.</i>
<b>Opportunities for cultural Diversity</b>				<i>Learning about diversity in science careers and scientists during science week.</i>		