


KNOWLEDGE OVERVIEW GRID

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

<p>Previous Knowledge -What have children learnt previously that will support this next step?</p>	<p>Year 1</p> <ul style="list-style-type: none"> •Distinguish between an object and the material from which it is made. •Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. •Describe the simple physical properties of a variety of everyday materials. •Compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>Year 2</p> <ul style="list-style-type: none"> •Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. •Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>Year 1</p> <ul style="list-style-type: none"> •Distinguish between an object and the material from which it is made. •Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. •Describe the simple physical properties of a variety of everyday materials. •Compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>Year 2</p> <ul style="list-style-type: none"> •Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. •Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>EYFS</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>Year 1</p> <ul style="list-style-type: none"> •Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. 	<p>Year 1</p> <ul style="list-style-type: none"> •Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. •Identify and describe the basic structure of a variety of common flowering plants, including trees. •Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. •Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). <p>Year 2</p> <ul style="list-style-type: none"> •Identify and name a variety of plants and animals in their habitats, including microhabitats. 	<p>Year 1</p> <ul style="list-style-type: none"> •Identify and name a variety of common animals that are carnivores, herbivores and omnivores. <p>Year 2</p> <ul style="list-style-type: none"> •Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). •Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. <p>Year 3</p> <ul style="list-style-type: none"> •Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.
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<p>Misconceptions -What are the common misconceptions in knowledge for this unit?</p>	<ul style="list-style-type: none"> • 'solid 'is another word for hard or opaque •solids are hard and cannot break or change shape easily and are often in one piece •substances made of very small particles like sugar or sand cannot be solids •particles in liquids are further apart than in solids and they take up more space •when air is pumped into balloons, they become lighter •water in different forms –steam, water, ice –are all different substances •all liquids boil at the same temperature as water (100 degrees) 	<ul style="list-style-type: none"> •melting, as a change of state, is the same as dissolving •steam is visible water vapour (only the condensing water droplets can be seen) •clouds are made of water vapour or steam •the substance on windows etc. is condensation rather than water •the changing states of water (illustrated by the water cycle) are irreversible •evaporating or boiling water makes it vanish •evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material. 	<ul style="list-style-type: none"> •electricity flows to bulbs, not through them •electricity flows out of both ends of a battery •electricity works by simply coming out of one end of a battery into the component. 	<ul style="list-style-type: none"> •sound is only heard by the listener •sound only travels in one direction from the source •sound can't travel through solids and liquids •high sounds are loud and low sounds are quiet. 	<ul style="list-style-type: none"> •the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain •there is always plenty of food for wild animals •animals are only land-living creatures •animals and plants can adapt to their habitats, however they change •all changes to habitats are negative. 	<ul style="list-style-type: none"> •arrows in a food chains mean 'eats' •the death of one of the parts of a food chain or web has no, or limited consequences on the rest of the chain •there is always plenty of food for wild animals •your stomach is where your belly button is •food is digested only in the stomach •when you have a meal, your food goes down one tube and your drink down another •the food you eat becomes "poo" and the drink becomes "wee".

<p>Learning Sequence -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"> 1. Can I explain the differences between solids, liquids and gases? 2. Can I make observations about solids, liquids and gases? 3. Can I understand the properties of solids? 4. Can I classify materials into solids, liquids and gases and explain their properties? 5. Can I investigate the different speeds at which solids change state? 6. Can I research the different states of water? 7. Can I explore how water changes state? 	<ol style="list-style-type: none"> 1. Can I make observations of liquids that are frozen and then change back to a liquid? 2. Can I investigate the rate of evaporation? 3. Can I make observations of condensation and discuss the change of state? 4. Can I make a model of the water cycle to understand its different stages? 5. Can I research and explain the water cycle? 6. Scientist 	<ol style="list-style-type: none"> 1. Can I identify and sort common appliances that run on electricity? 2. Can I create a simple circuit? 3. Can I make a switch for a simple circuit and explain the purpose of a switch? 4. Can I investigate which materials are conductors and insulators? 5. Can I investigate the brightness of bulbs in a circuit? 	<ol style="list-style-type: none"> 1. Can I explain how sounds are made? 2. Can I explain how sound travels through a medium to the ear? 3. Can I investigate and explain pitch? 4. Can I investigate volume and muffling a loud sound? 5. Can I use dataloggers to investigate sound at different distances? 6. LC: Can I create a musical instrument which changes pitch? 	<ol style="list-style-type: none"> 1. Can I identify different habitats and the living things they home? 2. Can I classify and sort living things? 3. Can I use a classification chart on a mini-beast hunt? 4. Can I create my own classification key? 5. Can I research human impact on different habitats and living things around the world? 6. Can I research and present a local environmental issue and its impact? 	<ol style="list-style-type: none"> 1. Can I identify the key parts of the digestive system? 2. Can I create a model to help me explain how the digestive system works? 3. Can I identify the functions of different teeth in humans? 4. Can I investigate the effect of different drinks on my teeth? 5. Can I construct food chains? 6. Can I classify animals based on their teeth?
<p>Curriculum End Points -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 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 in the local area.</p>	<p>Children will be able to share their understanding of the digestive system process when they demonstrate their models in action. Children to recall the functions of teeth when they revisit teeth in the animal classification activity e.g. function of molars, incisors and canines.</p>

<p>Knowledge Sentences -Using the end points, what are the key statements children need to remember by the end of the unit? (I know that...)</p> <p>(To share with children when it is taught during the unit)</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. 5/6. 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 the key parts of the digestive system are the mouth, teeth, oesophagus, stomach, small intestines, large intestines, rectum and anus. 2. I know that: a. food enters the body through the mouth. b. teeth start to break down the food together with saliva. c. food is swallowed and passes down the oesophagus to the stomach. d. food is broken down further in the stomach and chemicals are added. e. food passes into the small intestine and nutrients are removed from the food to be used around the body. f. the rest of the food then passes into the large intestine, water is removed and what is left is then stored in the rectum until it leaves the body through the anus. 3. I know that humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). 4. I know that different foods including sugar can cause tooth decay if we do not clean our teeth regularly. 5. I know that living things can be classified as producers, predators and prey according to their place in the food chain. 6. I know that animals have different teeth depending on whether they are a carnivore or herbivore.</p>	
<p>Key Vocabulary (To share with children and add to working walls/knowledge mats)</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>Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain</p>	
<p>What does this look like at Bramhope?</p>	<p>Enrichment Activities (trips, residentials, speakers, SMSC)</p>				<p><i>Science Media Museum – Sound Day</i></p>	<p><i>The Big Book of Bugs</i> <i>Bonkers about Beetles</i></p> <p><i>Wildlife garden visits/pond dipping</i></p> <p><i>Nature Reserve visit</i></p>	<p><i>STEM ambassadors/parent doctors to deliver talk about skeleton/nutrition/teeth or digestion.</i></p>
	<p>Physical Resources (artefacts)</p>	<p><i>Different materials</i> <i>Chocolate, butter</i> <i>Ice trays</i> <i>Thermometers</i></p>	<p><i>Different materials</i> <i>Chocolate, butter</i> <i>Ice trays</i> <i>Thermometers</i></p>	<p><i>Batteries</i> <i>Wires</i> <i>Bulbs</i> <i>Buzzers</i> <i>Switches</i> <i>Different materials (insulators and conductors)</i></p>	<p><i>Instruments</i> <i>Pitch forks</i> <i>iPad app – Arduino</i></p>		<p><i>Materials for creating own digestive system</i> <i>Human body model</i> <i>Teeth model</i></p>
	<p>Cross Curricular learning (Include opportunities)</p>	<p><i>Stick Dog Dreams of Ice Cream—Tom Watson</i> <i>George’s Marvellous Medicine —Roald Dahl</i></p>	<p><i>The Great Big Water Cycle Adventure</i> <i>The Rhythm of the Rain</i></p>	<p><i>DT – design a wire buzzer game.</i></p>	<p><i>Music – making/playing musical instruments to learn about pitch and volume.</i></p> <p><i>Computing – using iPads and Arduino app to measure volume.</i></p>	<p><i>What a waste</i> <i>Greta and the Giants</i></p> <p><i>Geography – human and physical geography looking at animals</i></p>	<p><i>Professor Astro Cat’s Human Body Odyssey by Dominic Walliman</i> <i>The Tooth Book by Dr Seuss</i> <i>The Story of the Little Mole Who Knew it Was None of His Business by Werner Holzwarth</i></p>

for writing and quality texts)	<i>DT – making rocky road cakes or ice cream.</i>			<i>Moses Goes to a Concert by Isaac Millman The Sound of Silence—Katrina Goldasito & Julia Kuo</i>	<i>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>Writing – explanation of digestive system.</i>
Local Learning including outdoor learning				<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>	
Opportunities for cultural Diversity				<i>Learning about diversity in science careers and scientists during science week.</i>		