Hopton Science Curriculum

Thematic 'big questions' of the Biology discipline:

What kinds of life are there? *Identifying and classifying organisms*

How do living things work? *Life processes*

***What* makes life go on?** *Habitats and food chains; life cycles and reproduction.*

Thematic 'big questions' of the Chemistry discipline:

What are things made from? *Materials and their properties; how they can be used and changed*

Is form fixed? *States of matter; reversible and irreversible changes*

What natural objects link science with history and geography? *Rocks, soils and fossils*

Thematic 'big questions' of the Physics discipline:

Can we see and hear energy? *Sound; light*

How do things move? *Gravity, friction and motion*

Can forces be useful? *Electricity and magnetism*

Key Whole-School Curriculum Threads:

Locality	Significant People	Human Influence	The Wider World	Comparison	Investigation	British Values

EYFS	Scientific Knowledge	Working Scientifically
What do plants need to live? **What is the life cycle of a seed/frog/butterfly?** **How do we know what season it is?** **How have I changed?** ***Children will be taught to:***	(F1) Understand the conditions and care required required for seeds to grow into plants. Understand the key features of the life cycle of a plant and an animal. Begin to understand the need to respect and care for the natural environment and all living things. (F2)	(F1) Show and explain the concepts of growth, change and decay with natural materials through the experiences of planting seeds and bulbs so children can observe growth and decay over time. Observe an apple core or banana skin going brown and mouldy over time. Help children to care for animals and take part in first-hand scientific explorations of animal life cycles, such as caterpillars or chick eggs. Plan and introduce new vocabulary related to the exploration. Encourage children to use it in their discussions, as they care for living things. Encourage children to refer to books, wall displays and online resources. This will support their investigations and extend their knowledge and ways of thinking.

	Understand the effect of changing seasons on the natural world around them.	(F2) Guide children's understanding by drawing children's attention to the weather and seasonal features. Provide opportunities for children to note and record the weather. Select texts to share with the children about the changing seasons. Throughout the year, take children outside to observe the natural world and encourage children to observe how animals behave differently as the seasons change. Look for children incorporating their understanding of the seasons and weather in their play.
What are natural materials? **Where do natural materials come from?** **How are materials different?** **How do materials change?** ***Children will be taught to:***	(F1) Group materials into those that are hard/soft, rough/smooth Know that some materials are strong. Soft materials can be shaped. Talk about the differences between materials and changes they notice using language such as rough, smooth, sharp, soft, hard.	(F1) Explore collections of materials with similar and/or different properties. Use all their senses in hands-on exploration of natural materials, including those found outside during seasonal change. Group objects into collections, including natural and man-made materials, investigate and discuss these. For example; • contrasting pieces of bark • different types of leaves and seeds. • different types of rocks • different shells and pebbles from the beach Talk about what they see, using a wide vocabulary that has been modelled; rough, smooth, soft, hard, sharp Provide equipment to support their curiosity and investigations such as; magnifying glasses/brushes and reference books. Encourage children to talk about what they see. Model observational and investigational skills. Ask out loud: "I wonder if...?" Explore how naturals materials such as clay/mud can be molded and change when dry/wet. Encourage children to make comparisons. Provide children with opportunities to change materials from one state to another. cooking – combining different ingredients, and then cooling or heating (cooking) them melting – leave ice cubes out in the sun, see what happens when you shake salt onto them (children should not touch to avoid danger of frostbite) Explore how different materials sink and float.

	(F2) Explore the natural world around them. Describe what they see, hear and feel whilst outside.	Explore how you can shine light through some materials, but not others. Investigate shadows. Plan and introduce new vocabulary related to the exploration and encourage children to use it. **(F2)** Provide children with have frequent opportunities for outdoor play and exploration. Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences. Create opportunities to discuss how we care for the natural world around us, discuss observations and information drawn from the senses to compare materials. Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water. Encourage focused observation of the natural world. Listen to children describing and commenting on things they have seen whilst outside, including plants and animals. Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in. Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.
How do toys move? **How does a boat float?** **What does magnetic mean?** **What happens when I shine a light on different materials?** ***Children will be taught to:***	(F1) Explore how things work. Explore and talk about different forces they can feel. (F2) Explore the natural world around them.	(F1) Provide mechanical equipment for children to play with and investigate. Suggestions: wind-up toys, pulleys, sets of cogs with pegs and boards, gears construction. Draw children's attention to forces when playing in water. Encourage the children to discuss and explore how the water pushes up when they try to push a plastic boat under it. Explore how they can stretch elastic, snap a twig, but cannot bend a metal rod. Explore magnetic attraction and repulsion using a range of materials both inside and outside. Plan and introduce new vocabulary related to the exploration and encourage children to use it. (F2)

		Provide frequent opportunities for outdoor play and exploration. Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences, for example mixing natural materials in the mud kitchen. Create opportunities to discuss how we care for the natural world around us, plant seeds, grow vegetables. Observe and interact with natural processes, such as ice melting, a sound causing a vibration (musical instruments and sound tubes), light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water.

Years 1 and 2 Cycle 1	Scientific Knowledge	Working Scientifically
What does it mean to be a living thing? ***Children will be taught to:***	*explore and compare the differences between things that are living, dead, and things that have never been alive *identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other *identify and name a variety of plants and animals in their habitats, including microhabitats *describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food **Study * Aristotle –Greek philosopher**	**(Year 1)** Perform simple tests and say whether the test has been successful and can say what has been learned. Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
What are animals like? ***Children will be taught to:***	*identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals *identify and name a variety of common animals that are carnivores, herbivores and omnivores *describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals	**(Year 1)** Perform simple tests and say whether the test has been successful and can say what has been learned. Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely

	including pets) *identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense **Study * Steve Backshall – wildlife presenter**	Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
How do we keep healthy? ***Children will be taught to:***	* describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene **Study *Joe Wicks**	**(Year 1)** Know whether the observations/tests have been successful and can say what has been learned Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely the weather closely e.g. thermometer, rain gauge Gather and record weather data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.

What are different lifecycles like? ***Children will be taught to:***	*notice that animals, including humans, have offspring which grow into adults *find out about and describe the basic needs of animals, including humans, for survival (water, food and air) **Study* Chris Packham**	**(Year 1)** Perform simple tests e.g. Which materials keep things warmest? Know whether the test has been successful and can say what has been learned Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
How can we change materials? ***Children will be taught to:***	*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 **Study* Johnny Ball**	**(Year 1)** Perform simple tests e.g. Which materials keep things warmest? Know whether the test has been successful and can say what has been learned Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
Years 1 and 2 **Cycle 2**	**Scientific Knowledge**	**Working Scientifically**

What are our bodies and what can they do?	***Children will be taught to:*** *understand that even though we are all different, humans are living things and share some characteristics with plants. *Animals (including humans) have some things in common. (grow/change/eat/drink, move. * know some of the things that make humans different from each other. *Be able to identify some external body parts and understand that humans have 5 senses.	**(Year 1)** Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found. **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment to observe properties Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
Where do animals and plants live?	***Children will be taught to:*** * compare the differences between things that are living, dead and have never been alive * map a local habitat and identify what is there * identify animals in their habitats * describe a habitat and identify animals that live in it * explain that most living things are suited to their habitat * describe how animals get their food	**(Year 1)** Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found. **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment to observe properties Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
How do the seasons change?	***Children will be taught to:*** *understand the big idea of seasonal change and cycles in the natural world. The children will be able to identify what the weather is like in winter and which months are usually winter months. The children will also be able to describe what happens to the plants in winter. They will also understand that water will freeze when it is cold and melt when the temperature increases. **Study *Sir Christopher Wren— Inventor of the rain gauge**	**(Year 1)** Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found. **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment to observe properties Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.

What is the life of a plant like?	***Children will be taught to:*** Year 1 * 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 some animals and plants explaining why they fall into either kingdom. Year 2 * observe and describe how seeds and bulbs grow into mature plants * find out and describe how plants need water, light and a suitable temperature to grow and stay healthy **Study* David Attenborough – How did his TV programmes affect people's views about nature?**	**(Year 1)** Perform simple tests and say whether the test has been successful and can say what has been learned. Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.
How do plants and animals need each other?	***Children will be taught to:*** Year 1 * identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals * identify and name a variety of common animals that are carnivores, herbivores and omnivores * describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) Year 2 * identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other * identify and name a variety of plants and animals in their habitats, including microhabitats * describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food	**(Year 1)** Know whether the observations/tests have been successful and can say what has been learned Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely the weather closely e.g. thermometer, rain gauge Gather and record weather data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment such as thermometers and rain gauges to observe closely changes over time Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.

What are things made from?	***Children will be taught to:*** *identify and name different materials such as wood, metal, plastic, glass, brick, rock, paper, fabric and cardboard. *explore different objects and identify the material * begin to understand why it is made out of a particular material. *use property words to compare and contract objects such as strong/weak, shiny/dull, soft/hard, water proof/not waterproof, transparent/not transparent, rough /smooth flexible/rigid. *sort materials and objects into tables. **(Year 2)** (Year 2 children to sort materials according to 2 properties on two criteria Carroll diagrams or diagrams. Do a fair test on which is most common material in classroom. Introduction to fair testing and gate in tallies. * explore different objects made out of a variety of materials. * explore which materials can be squashed, bent, twisted and stretched using the correct vocabulary * investigate different materials and find an answer to the questions e.g. which material stretches the most? * explore how materials can change through heat **Study* Zach Johnson—Clothes made from recycled plastic bottles found in the ocean**	**(Year 1)** Ask simple questions and recognise that they can be answered in different ways Use simple equipment to observe closely Gather and record data to help in answering questions Make a simple written explanation about what has been learned from an investigation or what conclusions have been found. **(Year 2)** Perform simple comparative and fair tests Ask simple questions and recognise that they can be answered in different ways including use of scientific language from the national curriculum Use simple equipment to observe properties Gather and record data to help in answering questions including from secondary sources of information using drawings, labelled diagrams, block graphs or tables. Communicate his/her Ideas, what he/she does and what he/she finds out In a variety of ways e.g. simple written reports or write ups.

Years 3 and 4 Cycle 1	Scientific Knowledge	Working Scientifically
How can environments change and what consequences can this have on creatures? ***Children will be taught to:***	*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 **Study *David Attenborough - biologist**	**(Year 3)** *with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves. *plan an enquiry, such as comparative or fair test, e.g. comparing how reflective different materials are. *set up a comparative test, e.g. finding patterns in the sounds made by elastic bands of different thicknesses. *use various equipment, as instructed, e.g. rulers * use standard measurements when taking measurements, e.g. measuring distances between a light source and an object. *with prompting, gather and display evidence in various ways, e.g. comparing the teeth of herbivores and carnivores. *with prompting, draw and label diagrams, e.g. to show how muscles work in pairs. *with prompting, use tables to record evidence, e.g. recording what happens to teeth when left in different liquids. *indicate findings from an enquiry that could be reported, e.g. answering questions about how humans digest food. *with prompting, write a conclusion based on evidence, e.g. the size of shadows through the day. *suggest how an investigation could be extended, e.g. making own instruments, using ideas about pitch and volume *recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs. **(Year 4)** *develop relevant, testable questions, e.g. based on observations of animals. *plan investigations using different types of scientific enquiry, e.g. exploring various rocks by observing change over time, running comparative tests and conducting surveys. *set up comparative and fair tests, e.g. how far things move on different surfaces. *use various equipment, as instructed, repeatedly and with care, e.g. rulers *recognise the importance of using standard units and measures accurately, e.g. measuring distance a car travels on different surfaces. *use various ways to record, group and display evidence, e.g. grouping and classifying various rocks. *use words and diagrams to record findings, e.g. how habitats change during the year. *use various ways to record evidence, e.g. about the ways that magnets behave in relation to each other. *present findings either in writing or orally, e.g. relating to investigating which materials are conductors. *write a conclusion based on evidence, e.g. materials electrical conductors are made of. *use evidence to suggest further relevant investigations, e.g. suggesting creative uses for different
How do we process food? ***Children will be able to:***	*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 **Study *William Beaumont—U.S. army surgeon, the first person to observe and study human digestion as it occurs in the stomach**	
What things are made up of? ***Children will be able to:***	*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 **Study *Einstein HT6 will look in detail at this and is part of the investigative topic covered**	

How do I hear sounds? ***Children will be taught to:***	*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 **Study *Italian physicist, Galileo,**	magnets. *recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets
How do I power my computer? ***Children will be taught to:***	*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 Study *Italian physicist, Galileo,	(Year 3) *with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves. *plan an enquiry, such as comparative or fair test, e.g. comparing how reflective different materials are. *set up a comparative test, e.g. finding patterns in the sounds made by elastic bands of different thicknesses. *use various equipment, as instructed, e.g. rulers * use standard measurements when taking measurements, e.g. measuring distances between a light source and an object. *with prompting, gather and display evidence in various ways, e.g. comparing the teeth of herbivores and carnivores. *with prompting, draw and label diagrams, e.g. to show how muscles work in pairs. *with prompting, use tables to record evidence, e.g. recording what happens to teeth when left in different liquids. *indicate findings from an enquiry that could be reported, e.g. answering questions about how humans digest food. *with prompting, write a conclusion based on evidence, e.g. the size of shadows through the day. *suggest how an investigation could be extended, e.g. making own instruments, using ideas about pitch and volume *recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs. (Year 4) *develop relevant, testable questions, e.g. based on observations of animals. *plan investigations using different types of scientific enquiry, e.g. exploring various rocks by observing change over time, running comparative tests and conducting surveys. *set up comparative and fair tests, e.g. how far things move on different surfaces. *use various equipment, as instructed, repeatedly and with care, e.g. rulers *recognise the importance of using standard units and measures accurately, e.g. measuring distance a car travels on different surfaces. *use various ways to record, group and display evidence, e.g. grouping and classifying various
Einstein's birthday ***Children will be taught to:***	*asking relevant questions and using different types of scientific enquiries to answer them *setting up simple practical enquiries, comparative and fair tests *making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers *gathering, recording, classifying and presenting data in a variety of ways to help in answering questions *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 using results to draw simple conclusions, make *predictions for new values, suggest improvements and raise further questions *identifying differences, similarities or changes related to simple scientific ideas and processes *using straightforward scientific evidence to answer questions or to support their findings.	rocks. *use words and diagrams to record findings, e.g. how habitats change during the year. *use various ways to record evidence, e.g. about the ways that magnets behave in relation to each other. *present findings either in writing or orally, e.g. relating to investigating which materials are conductors. *write a conclusion based on evidence, e.g. materials electrical conductors are made of. *use evidence to suggest further relevant investigations, e.g. suggesting creative uses for different magnets. *recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets

Years 3 and 4 Cycle 2	Scientific Knowledge	Working Scientifically
How do living things work? ***Children will be taught to:***	*Identify that humans and some other animals have skeletons for support, protection and movement. *Identify that humans and some other animals have muscles for movement. * identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. * investigate the way in which water is transported within plants. * explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Study *Anna Atkins - botanist and photographer of plants**	**(Year 3)** *with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves. *plan an enquiry, such as comparative or fair test, e.g. comparing how reflective different materials are. *set up a comparative test, e.g. finding patterns in the sounds made by elastic bands of different thicknesses. *use various equipment, as instructed, e.g. rulers * use standard measurements when taking measurements, e.g. measuring distances between a light source and an object. *with prompting, gather and display evidence in various ways, e.g. comparing the teeth of herbivores and carnivores. *with prompting, draw and label diagrams, e.g. to show how muscles work in pairs. *with prompting, use tables to record evidence, e.g. recording what happens to teeth when left in different liquids. *indicate findings from an enquiry that could be reported, e.g. answering questions about how humans digest food. *with prompting, write a conclusion based on evidence, e.g. the size of shadows through the day. *suggest how an investigation could be extended, e.g. making own instruments, using ideas about pitch and volume *recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs. **(Year 4)** *develop relevant, testable questions, e.g. based on observations of animals. *plan investigations using different types of scientific enquiry, e.g. exploring various rocks by observing change over time, running comparative tests and conducting surveys. *set up comparative and fair tests, e.g. how far things move on different surfaces. *use various equipment, as instructed, repeatedly and with care, e.g. rulers *recognise the importance of using standard units and measures accurately, e.g. measuring distance a car travels on different surfaces. *use various ways to record, group and display evidence, e.g. grouping and classifying various rocks. *use words and diagrams to record findings, e.g. how habitats change during the year. *use various ways to record evidence, e.g. about the ways that magnets behave in relation to each other. *present findings either in writing or orally, e.g. relating to investigating which materials are conductors. *write a conclusion based on evidence, e.g. materials electrical conductors are made of. *use evidence to suggest further relevant investigations, e.g. suggesting creative uses for different magnets. *recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets
Do living things need different things to survive? ***Children will be able to:***	*Identify that animals, including humans, need the right types of nutrition. *Identify that they cannot make their own food; they get nutrition from what they eat. * explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow). **Study *Dr Jane Goodall—International chimpanzee expert and zoologist**	
What can magnets do? ***Children will be able to:***	* notice that some forces need contact between two objects. * compare how things move on different surfaces. *notice that magnetic forces can act at a distance and attract some materials and not others. *compare and group materials according to whether they are magnetic. * observe how magnets attract or repel each other and attract some materials and not others. *describe magnets as having two poles and to predict whether two magnets will attract or repel each	

	other, depending on which poles are facing. *observe how magnets attract or repel each other and attract some materials and not others.	
Are all rocks the same? ***Children will be taught to:***	*name the three different types of rocks. * handle and examine rocks to identify their properties, with support. * be able to state the four different types of matter that soil is composed of. Children will learn to make careful observations. *They will be able to take part in and contribute towards an oral presentation of their observations **Study *James Hutton – father of geology**	
Why do we see colour? ***Children will be taught to:***	*learn why and how humans and other animals see colour and why they need to see it, and why animals are certain colours. *understand how colours are created and that light is made up of all colours. *conduct fair tests and make careful observations in relation to their results. * ask relevant questions in relation to their scientific enquiry.	**(Year 3)** *with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves. *plan an enquiry, such as comparative or fair test, e.g. comparing how reflective different materials are. *set up a comparative test, e.g. finding patterns in the sounds made by elastic bands of different thicknesses. *use various equipment, as instructed, e.g. rulers * use standard measurements when taking measurements, e.g. measuring distances between a light source and an object. *with prompting, gather and display evidence in various ways, e.g. comparing the teeth of herbivores and carnivores. *with prompting, draw and label diagrams, e.g. to show how muscles work in pairs. *with prompting, use tables to record evidence, e.g. recording what happens to teeth when left in different liquids. *indicate findings from an enquiry that could be reported, e.g. answering questions about how humans digest food. *with prompting, write a conclusion based on evidence, e.g. the size of shadows through the day. *suggest how an investigation could be extended, e.g. making own instruments, using ideas about pitch and volume *recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs. **(Year 4)** *develop relevant, testable questions, e.g. based on observations of animals.
What is the dark? ***Children will be taught to:***	* recognise that we need light in order to see things and that dark is the absence of light. * know that light is reflected from surfaces. * recognise that light from the sun can be dangerous and that there are ways to protect my eyes. * recognise that shadows are formed when the light from a light source is blocked by an opaque object. * find patterns in the way that the size of shadows change. **Study * Nicky Fox—Nasa scientist who studies the sun.**	

		*plan investigations using different types of scientific enquiry, e.g. exploring various rocks by observing change over time, running comparative tests and conducting surveys. *set up comparative and fair tests, e.g. how far things move on different surfaces. *use various equipment, as instructed, repeatedly and with care, e.g. rulers *recognise the importance of using standard units and measures accurately, e.g. measuring distance a car travels on different surfaces. *use various ways to record, group and display evidence, e.g. grouping and classifying various rocks. *use words and diagrams to record findings, e.g. how habitats change during the year. *use various ways to record evidence, e.g. about the ways that magnets behave in relation to each other. *present findings either in writing or orally, e.g. relating to investigating which materials are conductors. *write a conclusion based on evidence, e.g. materials electrical conductors are made of. *use evidence to suggest further relevant investigations, e.g. suggesting creative uses for different magnets. *recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets

Years 5 and 6 Cycle 1	Scientific Knowledge	Working Scientifically
Living things: what's the same and what's different? ***Children will be taught to:***	*describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals *give reasons for classifying plants and animals based on specific characteristics. *conduct a quadrant survey, use bush beating techniques and make pitfall traps to investigate organisms on the school field *(British Values – Respect for the Community)* *name the classes of vertebrates and invertebrates and justify why an animal belongs to one. *use branching diagrams to classify animals and plants. **Study * Carl Linnaeus' classification system to sort an animal** *investigate what happens to bread introduced to bacteria from our hands – mold spores. **Study *Eugenie Clark—Know as the shark lady for her study of shark behaviour.**	**(Year 5 and 6)** *answer questions using evidence gathered from different types of scientific enquiry, e.g. describing the effects of more voltage as a result of experiment, survey and secondary research. *identify and manage variables, e.g. the number of appliances in a circuit buzzer/bulb/motor. *use appropriate equipment to take measurements, e.g. measuring the number of volts using a voltmeter. *consider how, by modifying instrument or technique, measurements can be improved, e.g. quadrant survey *identify situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the effect of moving an object in relation to a light source. *use labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors. *use various ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid animal identification. *use line graphs to display complex data, e.g. heart rate in relation to exercise *display and present key findings from enquiries orally and in writing, e.g. deciding how well classifications fit unfamiliar animals and plants. *in conclusions, indicate how trustworthy they are, e.g. when timing falling objects. *write a conclusion using evidence and identifying causal links, e.g. investigating what makes a parachute fall quicker *use evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of paper aeroplanes. *identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics.
How do living things change over time and place? ***Children will be taught to:***	*understand that every living organism is made up of the DNA of its parents. In humans we all have a unique combination of DNA from both parents so siblings are similar but not the same. *identify the difference between inherited and acquired traits using animals including humans. * learn that species change and adapt due to genetic mutations that successfully allow organisms to thrive in their environments and that this survival of the fittest is the basis of the evolutionary process. *research different species of animals and consider how their inherited traits have allowed them to adapt successfully into their environments. *reflect on the importance and controversial theories **Study * Charles Darwin and Mary Anning as important scientists** Children are encouraged to bring in photographs of their parents and siblings to help them spot inherited traits in a meaningful way. They also look at how many different dog breeds have been developed due to selective breeding. ***(British Values – self-knowledge)***	

How do we see? ***Children will be taught to:***	*recognise that light appears to travel in straight lines * use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye *explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes *use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. *research how mirrors can reflect light in an application (periscope) to allow someone to see around a corner. *explain how periscopes work and build a working example. *use string to model how light travels from a light source to an object and then reflects into our eyes. * use filters over different coloured objects to see how we see different colours. **Study * Sir Isaac Newton and Dr Patricia Bath— Laser cataract surgery**	**(Years 5 and 6)** *answer questions using evidence gathered from different types of scientific enquiry, e.g. describing the effects of more voltage as a result of experiment, survey and secondary research. *identify and manage variables, e.g. the number of appliances in a circuit buzzer/bulb/motor. *use appropriate equipment to take measurements, e.g. measuring the number of volts using a voltmeter. *consider how, by modifying instrument or technique, measurements can be improved, e.g. quadrant survey *identify situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the effect of moving an object in relation to a light source. *use labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors. *use various ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid animal identification. *use line graphs to display complex data, e.g. heart rate in relation to exercise *display and present key findings from enquiries orally and in writing, e.g. deciding how well classifications fit unfamiliar animals and plants. *in conclusions, indicate how trustworthy they are, e.g. when timing falling objects. *write a conclusion using evidence and identifying causal links, e.g. investigating what makes a parachute fall quicker *use evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of paper aeroplanes. *identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics.
How do our choices affect how our bodies work? ***Children will be taught to:***	*identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood *describe the ways in which nutrients and water are transported within animals, including humans. *draw diagrams of the circulatory system and relate this to other body systems that they know. *recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function *conduct investigations, monitoring the changes in their heart rate from different types of exercise. *research the dangers of drugs from the perspective of impact on a healthy body.	
Can we vary the effects of electricity? ***Children will be taught to:***	*associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit *compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches *use recognised symbols when representing a simple circuit in a diagram. *build and break their own circuits to explore voltage, they will create burglar alarms as an investigation. **Study *research key scientists Edison and Tesla and compare and contrast their stories.**	

Year 5 and 6 Cycle 2	Scientific Knowledge	Working Scientifically
Do all life cycles look the same? ***Children will be taught to:***	*describe the life process of reproduction in some plants and animals. *describe the life cycle of a mammal. *describe the differences in the life cycles of an amphibian and an insect. * describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	**(Year 5)** *with support, answer questions with evidence from different types of scientific enquiry, e.g. comparing life cycles of plants using change over time, surveys and secondary sources. *with prompting, identify and manage variables, e.g. when exploring the brightness of bulbs. *following discussion of alternatives, select appropriate equipment, e.g. a thermometer. *take measurements that are precise as well as accurate, e.g. the amount of sugar which can be dissolved in different temperatures of water. *know how to process repeat readings, e.g. when investigating the behaviour of components in a circuit. *start to use labelled diagrams to show more complex outcomes, e.g. demonstrating how the circulatory system works. *with prompting, use various ways to record complex evidence, e.g. the behaviour of particles in different states of matter and when changing between states. *use a line graph to record basic data, e.g. length and mass of a baby as it grows. *with support, display and present key findings from enquiries orally and in writing, e.g. suggesting reasons for similarities and differences between various animals. *with support, indicate why some results may not be entirely trustworthy, e.g. in relating brightness of bulb to voltage supplied. *with prompting, write a conclusion using evidence and identifying causal links, e.g. what makes a bulb shine more brightly. * suggest further relevant comparative or fair tests, e.g. when testing materials for various properties to determine their suitability for an application. *show how evidence supports a conclusion, e.g. researching gestation periods of various mammals and relating them to adult mass. **(Year 6)** *answer questions using evidence gathered from different types of scientific enquiry, e.g. describing the effects of more voltage as a result of experiment, survey and secondary research. *identify and manage variables, e.g. the number of appliances in a circuit buzzer/bulb/motor. *use appropriate equipment to take measurements, e.g. measuring the number of volts using a voltmeter. *consider how, by modifying instrument or technique, measurements can be improved, e.g. quadrant survey *identify situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the effect of moving an object in relation to a light source. *use labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors. *use various ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid animal identification. *use line graphs to display complex data, e.g. heart rate in relation to exercise *display and present key findings from enquiries orally and in writing, e.g. deciding how well classifications fit unfamiliar animals and plants. *in conclusions, indicate how trustworthy they are, e.g. when timing falling objects. *write a conclusion using evidence and identifying causal links, e.g. investigating what makes a parachute fall quicker
What are things made from and why? **Can we change materials?** ***Children will be taught to:***	*compare and group together everyday materials on the basis of their properties, including their solubility, hardness, transparency, thermal conductivity, electrical conductivity and response to magnets. * give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. * know that some materials will dissolve in liquid to form a solution. * use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. * demonstrate that dissolving, mixing and changes of state are reversible changes. *describe how to recover a substance from a solution. *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. **Study * Walter Lincoln Hawkins— Engineering and uses of plastics**	

		*use evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of paper aeroplanes. *identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics.
How do things move? ***Children will be taught to:***	*explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. *identify the effects of air resistance, water resistance and friction. * identify the effects of air resistance. * identify the effects of water resistance. * identify the effects of friction. * recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Study *Galileo Galilei -Contribution to the science of motion**	
Sun, Earth and Moon: what is moving? ***Children will be taught to:***	*describe the movement of the Earth, and other planets, relative to the Sun in the solar system *describe the movement of the Moon relative to the Earth *describe the Sun, Earth and Moon as approximately spherical bodies *use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky **Study * Caroline Herschel— Astronomer** **Study * Prof Brian Cox - Physicist**	

How do our bodies change as we get older? The PHSE unit of puberty, including human reproduction, is taught as part of this topic. ***Children will be taught to:***	*describe the changes as humans develop to old age. **(See PHSE plan)** **Study *Lord Robert Winston professor of genetics**	