Bricknell Primary School

Science Curriculum Overview

THE CONSTELLATION TRUST

Aspiration Knowledge Achievement

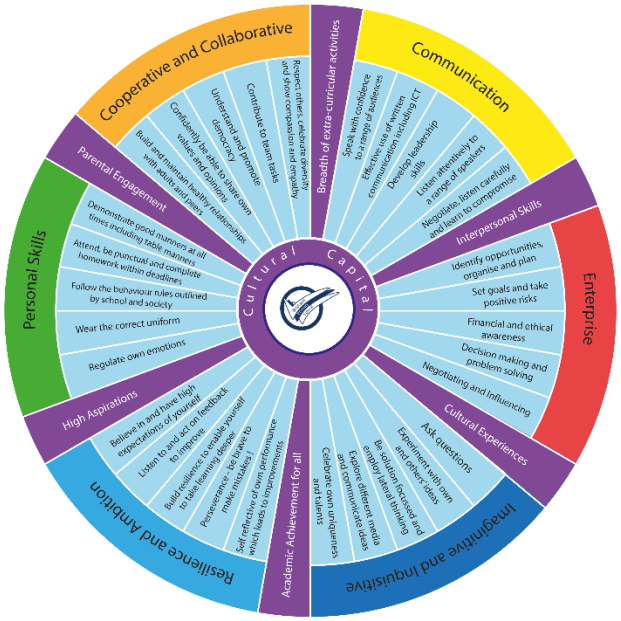
Contents

The Curriculum – our approach

Bricknell Primary School's curriculum has been developed over a period of 36 months. Much thought has gone into the research foundations for how children learn, the implication of subject specific best practice and the context of our school.

Through collaboration, rigours attention to detail and consultation with primary practitioners, trust leaders, secondary and Early Years teachers; the curriculum reflects a scheme of work that is intended to be sequenced form Early Years to Year 6 and enable pupils to be ready for the Key Stage 3 curriculum and world beyond education.

The curriculum design has a progressive approach at its core with a built in Aspiration Curriculum at the heart.



Intent:

The curriculum is built on the foundations of success. We believe all children should be aspirational, knowledgeable and should achieve their goals. This is the model our curriculum builds from

Aspiration

- An Aspiration Curriculum at the heart of every lesson.
- Building life skills to succeed outside the world of education.
- Real life examples and experiences in local contexts and in the wider world.
- Working with local colleges and building links.
- Community outreach opportunities.

Knowledge

- High quality teaching at the heart.
- Progressive curriculum mapping.
- Carefully timetabled broad and balanced curriculum.
- Carefully researched and implemented curriculum.
- Subject specific pedagogy.

Achievement

- Ambitious curriculum outcomes.
- Accessibility for all.
- Identification and facilitation of pupil's passions and love for a subject.
- Achievement beyond the classroom and into further education demonstrating a love for learning.
- Extensive extra-curricular offer.

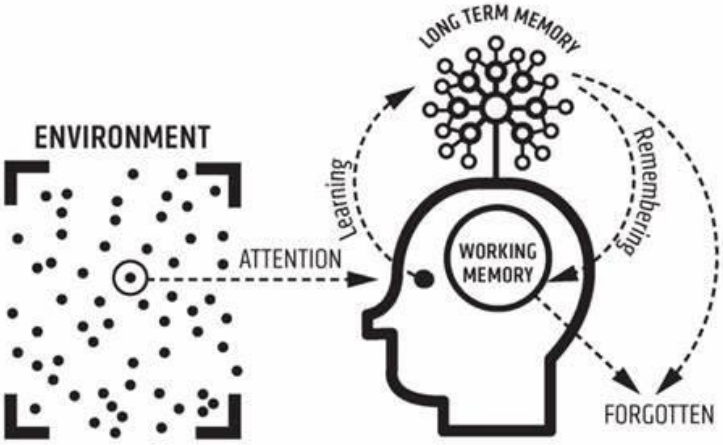
Subject Specific Sequencing:

Each subject discipline has been planned to ensure that knowledge and skills are sequenced form Early Years to Year 6. At Bricknell, we strive to go beyond the National Curriculum and as a result our highly skilled subject leaders have bridged the gap into Key Stage 3 within their curriculum planning. Knowledge is empowering and provides a foundation for success. We accept that the more children know, the more they can learn. The subject overviews provide specific, progressive objectives that allow teachers to be precise in planning. Specific elements of each curriculum area are repeated to ensure that knowledge becomes embedded. Retrieval practice forms part of regular teaching to allow pupils to secure long term knowledge.
This curriculum has been developed following extensive research. Some of the principles are outlined below.

Whilst researching the curriculum we have developed a shared understanding of how memory works. This article by posted by TOM SHERRINGTON · MARCH 10, 2020 · explains the model succinctly. We use his words below: https://teacherhead.com/2020/03/10/a-model-for-the-learning-process-and-why-it-helps-to-have-one/

One of the most powerful ideas I've engaged with recently is using a diagram to visualise a shared model of the learning process; using it to get a feel for how learning works in general but also to identify reasons for why it can sometimes not happen.

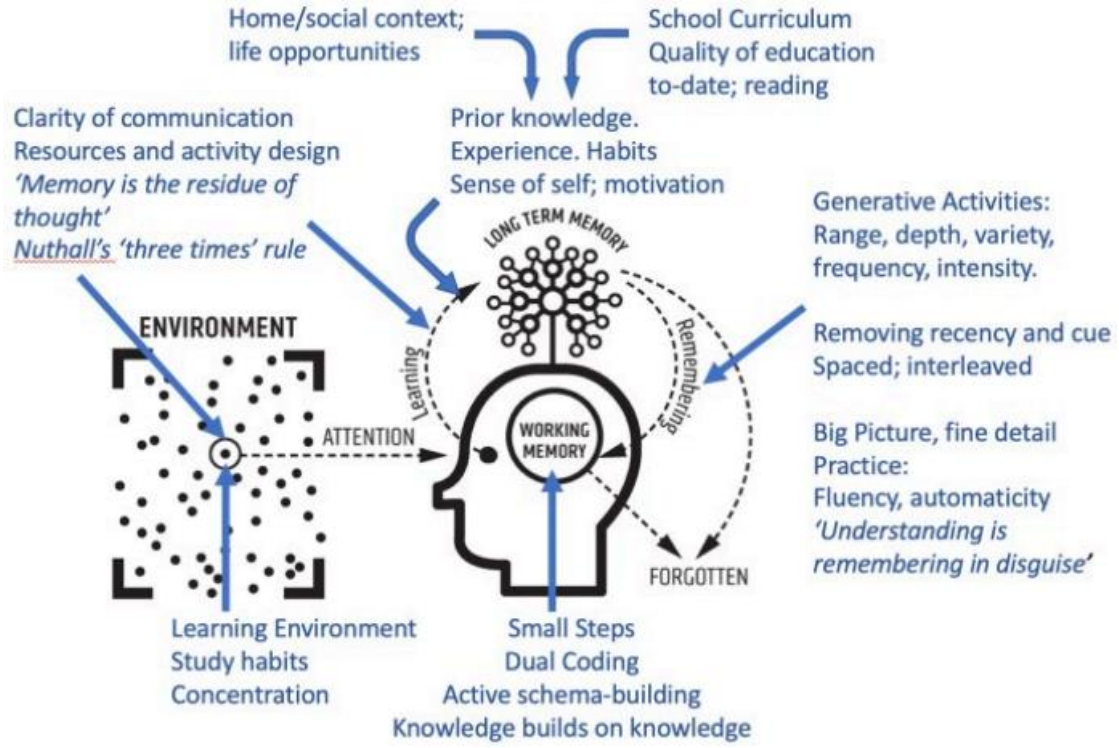
This model from the Rosenshine Principles book, courtesy of Oliver Caviglioli, demonstrates the learning process.



We found it massively helpful as a focus during CPD as we've explored a range of interlocking, overlapping ideas:

- Willingham's 'memory is the residue of thought' and various ideas in the classic 'Why do students forget everything I say?' chapter.
- Rosenshine's Principles: the value of practice, the use of daily review to activate prior learning; weekly and monthly review to enact retrieval practice; the need to break learning down into small steps.
- Nuthall's observations from Hidden Lives of Learners: the importance of prior knowledge; his 'three times rule'
- Shimamura's MARGE: A: Attend – the need to secure attention and the challenge of mind-wandering; R: teachers' opportunities to build relational models for areas of knowledge; G-E: the generate-evaluate cycle whereby learners bring ideas into working memory (learning is generative), evaluate for accuracy, add to or adjust their schema and then reconsolidate.

The near inevitability of forgetting, the role of retrieval, the need to connect new learning to prior knowledge and a whole host of other issues can be explored in some depth where we have a shared focus for framing the discussion:



(NB: The coloured labels here represent the discussion and thinking we might have around the diagram. They're not meant to complicate the simple diagram itself. I would hesitate to share the labels until I'd had the discussion first in any CPD scenario.)

When people see a simplified model it can allow them to jump to the assumption that the thinking is simplistic. It's not. As we have explored before – schema-building is a rich and complex business; 'remembering' and 'learning' as labels encompass nearly anything we can be said to have learned. They're broad terms, not reductive and confining. It is also not responsible, as educators, when people simply suggest that, 'it's a bit more complicated than that' – almost as a kind of free pass not to have to pose an alternative.

If someone suggests, rather pejoratively, that school has been reduced to 'memorising knowledge', I think there's a discussion to be had where, if we re-frame knowledge and memory as broad terms – actually, building schema (formed of knowledge, beliefs, memories, preferences.... of many kinds) in our memory is actually good enough as a concept to deal with quite a lot of the things we want to achieve in the field of education. If someone doesn't agree with that, then I'd want them to present a better model – not just tell me this one doesn't work. That way we have competing models to reference and debate, rather than the nebulousness of 'there's more to it than that'.

Schema

Below is a simple explanation of what a schema is, how it is formed and why this is worth knowing. This is taken from the work by David Didau. https://learningspy.co.uk/featured/how-to-explain-schema/

Because we have no capacity to introspect our long-term memories no one has any idea what actually happens in there. We know we must have a long-term memory because we can think about something, stop thinking about it and think about it again later. Where does it go in between? We have no idea but this is what we call memory.

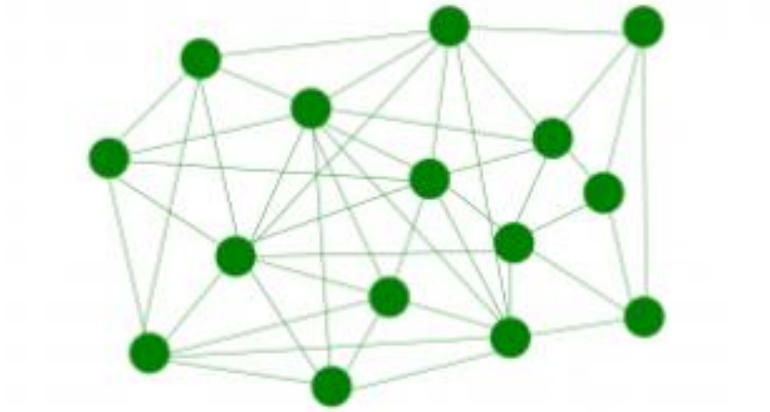
A schema is a theoretical construct that is no doubt wrong, but is, hopefully, useful. It can be thought of as an interconnected web of items of knowledge. The ability to retrieve items in memory is dependent on environmental cues and prompts. If I say bread, you say... *

The fact that a prompt cues us to retrieve some connected information provides with some logical evidence that schema exist and that we store items we know to be connected together. Let's imagine you know only one solitary thing about a subject. This single item is represented by the green dot below. Because it's not linked to anything else it will be very hard to retrieve. We would have to stumble upon precisely the correct prompt to be able to recall it.

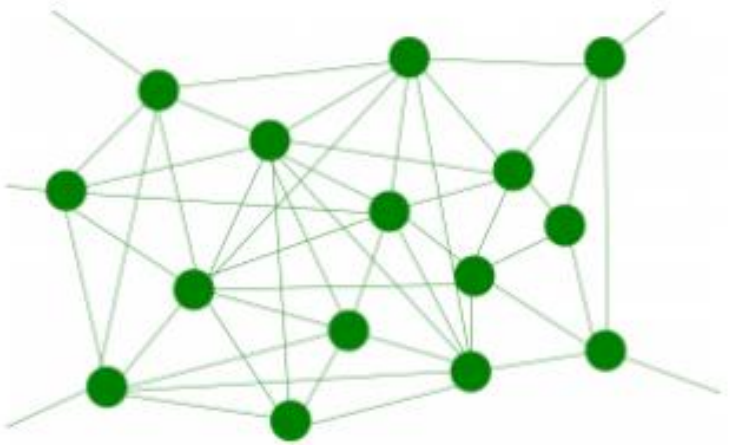
Let's now imagine that this solitary, unconnected fact is some vocabulary from a foreign language: the phrase ni hao. If this phrase is new to you, it will now be stored somewhere in your long-term memory but will, in all probability, be very hard to recall later. However, if you've encountered it before, maybe you remember what it means. Maybe you know it's Mandarin for 'hello'. If you do, then the Mandarin phase and its English meaning are stored as two, connected pieces of knowledge:

When I say ni hao, you say ‘hello’. This doubles your chances of retrieving either the Mandarin phrase or its English meaning. The more Mandarin vocabulary you learn, the easier it becomes to recall every other item within your Mandarin schema:

This is one of the counter-intuitive things about schema – the more items and the greater the number of connections between items, the easier it becomes to draw the entire schema into working memory.



Eventually, you arrive at a point where it becomes automatic and effortless to recall most of the items within a schema and the whole network is thoroughly embedded with other, connected schemas.



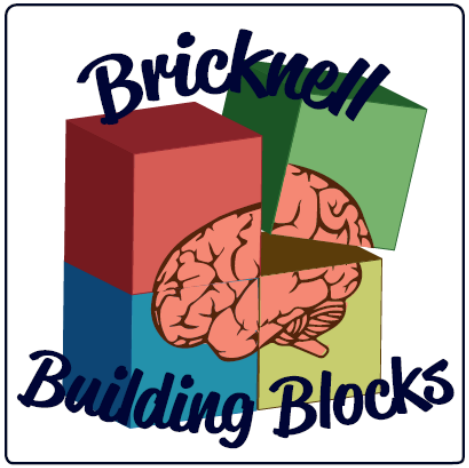
If all the dots with the schema represented Mandarin vocabulary, we could, at this stage, say a person was a fluent Mandarin speaker. It turns out that fluent Mandarin speakers never forget how to say ni hao. They don't bump into acquaintances, shrug sheepishly and say something along the lines of "I'm sorry, but there's this way of greeting people but I just can't for the life of me remember what it is." This is what it means to be fluent at anything: our ability to draw vast schemas into working memory effortless and automatically means we're unaware of just how much we know. This is the same for times table knowledge, number bonds, items of grammar, European capital cities, a basic chronology of British history, the ability to drive, or whatever else we might need to effortlessly recall.

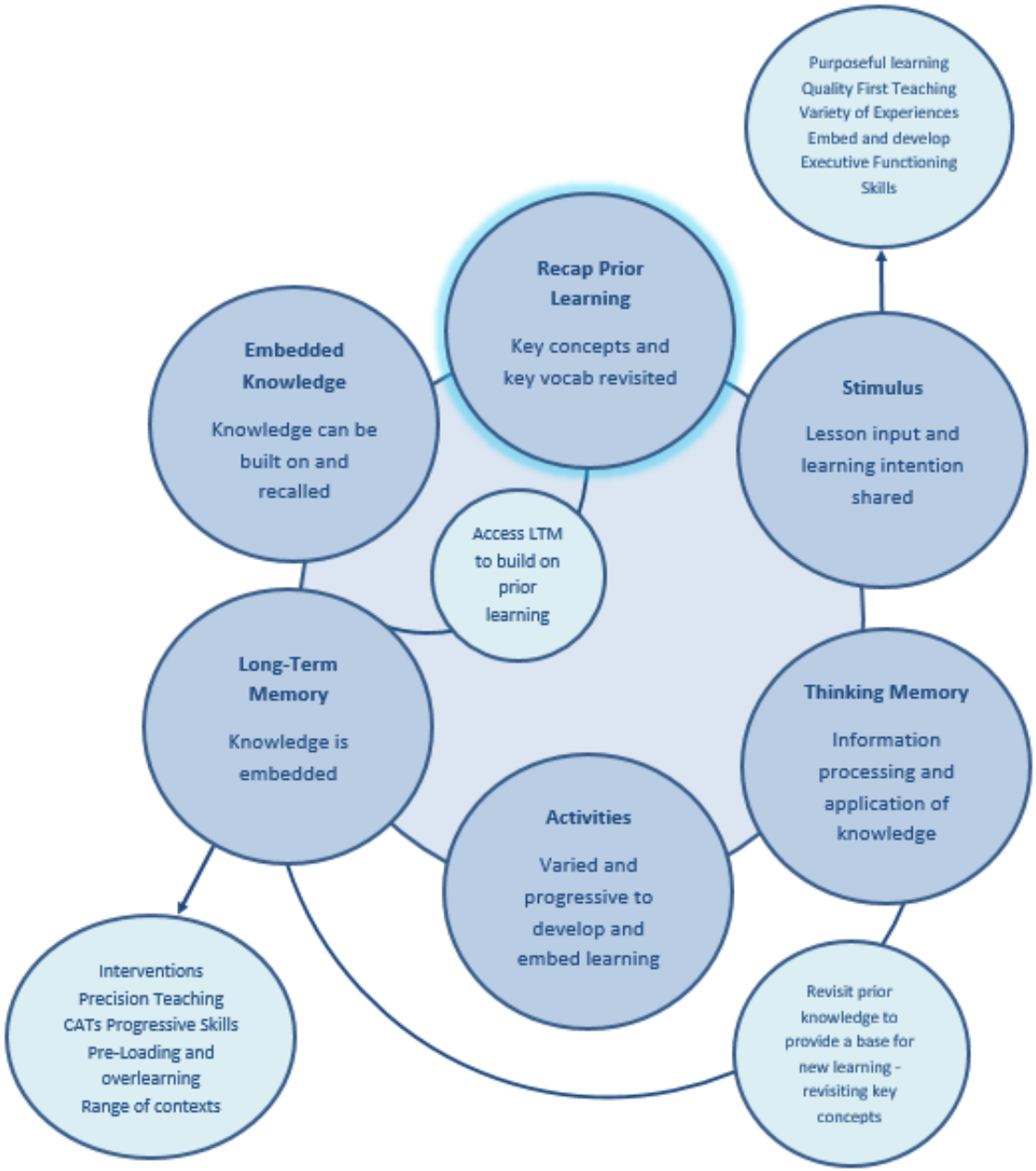
If we accept that learning (whatever else it is) is the acquisition of increasingly robust, interconnected schema, and that our role as teachers is to support children in being able to retrieve schemas effortlessly and automatically, it might make everyone's job a tiny bit easier.

Bricknell's Working Memory Model

With the collation of all this extensive research, we have generated a 'Working Memory Model' which enables teachers to ensure that learning is robust and that all pupils are using their interconnected schema to their full potential.

At the core of our model is the retrieval of prior knowledge. Therefore, all lessons at Bricknell Primary School start with Bricknell's Building Blocks; the foundations to learning.





A Broad and Balanced Curriculum

Hours per day	4.25
Hours per week	21.25
Hours per year	828.75

Curriculum area	Hours per year	Total hours
English		
Reading	**78**	195
Writing	**117**	
Maths		
Maths	**195**	195
Computer Science		
Science	**78**	117
Computing	39	
Humanities		
RE	**39**	75
History	18	
Geography	18	
Creative		
Art	18	54
Design Technology	18	
Music	18	
Additional		
Physical Education	**78**	156
PSHE	**39**	
MFL	**39**	

Additional timetabled hours		
Enterprise Week	10	20
Transition Week	10	

At Bricknell, we want to ensure that we celebrate the talents of all pupils and provide everyone with opportunities to shine. Therefore, we have calculated the number of teaching hours available and have ensured that all pupils receive a broad and balanced curriculum at Key Stage 2.

To prepare our pupils for the digital world beyond the classroom and to enable their communication skills, upskilling them across all areas of the curriculum, we have allocated 39 hours a year to the computing curriculum. This can be cross curricular across all subjects and does not need to be taught each week.

Reading, Writing and Maths are taught daily.

Science Physical Education, PSHE, RE and MFL are required to be taught weekly.

These are highlighted in blue

History, Geography, Art, Design Technology and Music all have equal weighting with 18 hours a year broken down to 3 half-termly blocks.

Year 4 offer a wider opportunities musical programme to the children therefore music has an increased weighting of 39 hours and to compensate, computing has a reduced weighting of 18 hours

- Art and Design Technology will each have 3 half term blocks. These will be taught alternatively to support staff workload.
- Music will have 3 half-termly blocks which will be taught at the same time across the whole school.
- Computing, History and Geography can remain blocked (in line with MTP)
- In addition to the teaching hours, pupils at Bricknell Primary School also receive a minimum of 400 minutes (6 hours, 40 minutes) of Opal Play a week.

Key Concepts

Through collaboration with subject leaders and subject specialists across our secondary schools, each subject has identified key concepts (big ideas) for their subject. These key concepts are the skills and knowledge essential to pupils achieving and exceeding expected standards in that specific subject. Key concepts are subject specific and build progressively as pupils move through the school. When pupils encounter a key concept, they will revisit other topics where they learnt about the same concept to enable them to make connections between different learning and build the schema they need.

Below is a summary of the key concepts in Science.

Science								
								
Working Scientifically	Animals including humans	Plants	Living things and their habitats	Materials	States of matter	Forces	Energy	Earth Science
	Biology			Chemistry		Physics		

Key concepts (Big Ideas) in **SCIENCE**

*Pupils build substantive knowledge of the main **concepts**, **models**, **laws** and **theories** across the three disciplines of science: biology, chemistry and physics. They will also learn about significant scientists and discoveries and the impact of these on our lives. Through each unit, pupils will develop their disciplinary knowledge as they learn how to work scientifically.*

Working scientifically* 

This is embedded through all units. Pupils will learn how scientific enquiry is used to grow and develop knowledge in science. They will learn how scientists use a variety of enquiry strategies to answer scientific questions. Different questions lead to different types of enquiry and are not limited to fair testing. Pupils will learn to use these enquiry strategies confidently and know that different strategies may be needed at different times. Through different units of science, pupils will learn the following:

- **Observing over time:** (observing or measuring how one variable changes over time)
- **Identifying and classifying:** (identifying and naming materials/living things and making observations or carrying out tests to organise them into groups.)
- **Looking for patterns:** (making observations or carrying out surveys of variables that cannot be easily controlled and looking for relationships between two sets of data)
- **Comparative and fair testing:** (observing or measuring the effect of changing one variable when controlling others)
- **Answering questions using secondary sources of evidence:** (answering questions using data or information that they have not collected first hand)
- **Using models:** (Developing or evaluating a model or analogy that represents a scientific idea, phenomenon or process)

Biology: **Animals including humans**  **Plants**  **Living things and their Habitats** 

Pupils will develop an understanding of **living things and their environments** through the study of animals, humans, plants and habitats. They will learn about reproductions, inheritance and evolution through the study of life processes and life cycles.

Chemistry: **Materials**  **States of matter** 

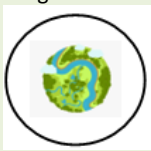
Pupils will learn about states of matter through the study of solids, liquids and gases. They will look at the properties of materials including rocks and fossils and will study reversible and irreversible changes in materials.

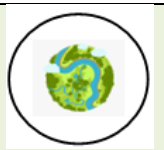
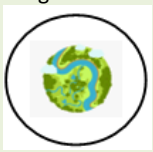
Physics: **Energy**  **Forces**  **Earth Science** 

Pupils will develop an understanding of the concepts and laws that apply to physics. They will study the concept of **energy** by learning about light, sound and electricity. They will develop an understanding of **forces** by studying and investigating friction, air resistance, gravity and magnets. They will learn about **Earth and space**, studying seasons, day and night, the solar system and beyond.

*These concepts are studied in all units of science

Science Key Concepts Year Group Mapping

	Autumn		Spring		Summer	
EYFS **Understanding the World**	In EYFS pupils are taught science through the strand **Understanding the World.** Throughout the year pupils will be taught:					
	Biology Animals Including Humans 	**Biology** Living Things in their Habitats 	**Biology** Plants 	**Chemistry** Materials 	**Physics** Forces 	**Physics** Earth Science 
Year 1	**Biology** Animals Including Humans  Amazing Animals	**Biology** Living Things in their Habitats  Outside Our Classroom	**Chemistry** Materials  Materials	**Biology** Living Things in their Habitats  Outside Our Classroom	**Biology** Plants  Plants	**Biology** Living Things in their Habitats  Outside Our Classroom	**Biology** Animals Including Humans  Senses
Year 2	**Biology** Living Things in their Habitats  Habitats	**Chemistry** Materials  Materials	**Chemistry** Materials  Changes	**Biology** Plants  Plants	**Biology** Animals Including Humans  Changing Me	**Biology** Animals Including Humans  Looking After Me	
Year 3	**Biology** Animals Including Humans  Our Brilliant Bodies	**Physics** Energy  Light	**Chemistry** Materials  Rocks	**Biology** Plants  Plants	**Biology** Plants  Plants	**Physics** Forces  Forces	
Year 4	**Biology** Animals Including Humans	**Physics** Energy 	**Chemistry** States of Matter	**Physics** Energy 	**Biology** Living Things in their Habitats	**Biology** Living Things in their Habitats	

	 Digestion	Electricity	 Staes of Matter	Sound	 Living Things	 Humans and Our Planet
Year 5	**Physics** Forces  Forces	**Chemistry** Materials  Mixtures, Materials and Changes	**Chemistry** States of Matter  Changing States	**Physics** Earth Science  Space	**Biology** Living Things in their Habitats  Reproduction in Plants and Animals	**Biology** Animals Including Humans  Life Cycles
Year 6	**Physics** Energy  Light	**Biology** Animals Including Humans  The Circulatory System	**Biology** Living Things in their Habitats  Evolution	**Biology** Living Things in their Habitats  The Natural World	**Biology** Animals Including Humans  Healthy Bodies	**Physics** Energy  Electricity

Knowledge and Skills Sequencing		Science					
		EYFS **Understanding the World**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Working Scientifically	Observation over time.	To be able to make observations and explain what To be able to see.	To be able to observe closely, using simple equipment. To be able to use their observations and ideas to suggest answers to questions.		To be able to make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. To able to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. To be able to use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. To be able to use straightforward scientific evidence to answer questions or to support their findings.		To be able to report and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	
	Identifying and Classifying.	To be able to sort objects into groups.	To be able to identify and classify.		To be able to gather, recording, classifying and presenting data in a variety of ways to help in answering questions.		To be able to record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	

	Looking for Patterns.		To be able to gather and record data to help in answering questions.	To be able to identify differences, similarities or changes related to simple scientific ideas and processes.	To be able to take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
	Comparative and Fair Testing.		To be able to perform simple tests.	To be able to record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. To be able to set up simple practical enquires, comparative and fair tests.	To be able to plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. To be able to use test results to make predictions to set up further comparative and fair tests.
	Using Secondary Sources of Evidence.		To be able to ask simple questions and recognise that they can be answered in different ways.	To be able to ask relevant questions and using different types of scientific enquiries to answer them.	To be able to identify scientific evidence that has been used to support or refute ideas or arguments.
	Using Models			To be able to understand how models can explain processes that can't be fully observed.	To be able to understand how models can explain processes that can't be fully observed.

Knowledge and Skills Sequencing		Science						
		EYFS **Understanding the World**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Biology	Living Things and their Habitats	To be able to understand the need to respect and care for the natural environment and all living things (responsibility).	To be able to observe changes across the four seasons. To be able to observe and describe weather associated with the seasons and how the day length varies.	To be able to explore and compare the differences between things that are living, dead, and things that have never been alive. To be able to 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. To be able to identify and name a variety of		To be able to recognise that living things can be grouped in a variety of ways. To be able to explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. To be able to recognise that environments can change and that this can sometimes pose dangers to living things.	To be able to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. To be able to describe the life process of reproduction in some plants and animals.	To be able to describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. To be able to give reasons for classifying plants and animals based on specific characteristics. To be able to recognise that living things have changed over time and that fossils provide

				plants and animals in their habitats, including micro habitats. To be able to 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.				information about living things that inhabited the Earth millions of years ago. To be able to recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. To be able to identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
	Animals Including Humans	To be able to understand the difference between plants and animals through observation	To be able to identify and name a variety of common animals including fish, amphibians,	To be able to notice that animals, including humans, have offspring which grow into adults.	To be able to identify that animals, including humans, need the right types and amount of nutrition, and	To be able to describe the simple functions of the basic parts of the digestive system in humans.	To be able to describe the changes as humans develop to old age.	To be able to identify and name the main parts of the human circulatory system, and

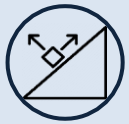
		(similarity and differences).	reptiles, birds and mammals. To be able to identify and name a variety of common animals that are carnivores, herbivores and omnivores. To be able to describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). To be able to identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	To be able to find out about and describe the basic needs of animals, including humans, for survival (water, food and air). To be able to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	that they cannot make their own food; they get nutrition from what they eat. To be able to identify that humans and some other animals have skeletons and muscles for support, protection and movement.	To be able to identify the different types of teeth in humans and their simple functions. To be able to construct and interpret a variety of food chains, identifying producers, predators and prey.		describe the functions of the heart, blood vessels and blood. To be able to recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. To be able to describe the ways in which nutrients and water are transported within animals, including humans.
	Plants	To be able to understand the difference between plants	To be able to identify and name a variety of common wild	To be able to observe and describe how seeds and bulbs	To be able to identify and describe the functions of			

		and animals through observation (similarity and differences).	and garden plants, including deciduous and evergreen trees. To be able to identify and describe the basic structure of a variety of common flowering plants, including trees.	grow into mature plants. To be able to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	different parts of flowering plants: roots, stem/trunk, leaves and flowers. To be able to explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. To be able to investigate the way in which water is transported within plants. To be able to explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.			

Knowledge and Skills Sequencing		Science						
		EYFS **Understanding the World**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Chemistry	Materials 	To be able to explore collections of materials and talk about similarities and differences. To be able to talk about the differences between materials and talk about the changes I see (cause and consequence).	To be able to distinguish between an object and the materials from which it is made. To be able to identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. To be able to describe the simple physical properties of a variety of everyday materials. To be able to compare and group together a variety of everyday	To be able 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. To be able to find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	To be able to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. To be able to describe in simple terms how fossils are formed when things that have lived are trapped within rock. To be able to recognise that soils are made from rocks and organic matter.		To be able to compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. To be able to give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.	

			materials on the basis of their simple physical properties.					
	States of Matter 					To be able to compare and group materials together, according to whether they are solids, liquids or gases. To be able to 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). To be able to identify the part played by evaporation and condensation in the water cycle and associate the rate of	To be able to know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. To be able to use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. To be able to demonstrate that dissolving, mixing and changes of state are reversible changes. To be able to explain that some	

						evaporation with temperature.	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.	

Knowledge and Skills Sequencing		Science						
		EYFS **Understanding the World**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Physics	Forces 	To be able to explain how things work, e.g. toys. To be able to explore pushes and pulls. To be able to talk about forces and concepts such as floating and sinking, magnetism and light.			To be able to compare how things move on different surfaces. To be able to notice that some forces need contact between two objects, but magnetic forces can act at a distance. To be able to observe how magnets attract or repel each other and attract some materials and not others. To be able to compare and group together a variety of everyday materials on the basis of whether		To be able to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. To be able to identify the effects of air resistance, water resistance and friction, that act between moving surfaces. To be able to recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	

					they are attracted to a magnet, and identify some magnetic materials. To be able to describe magnets as having two poles. To be able to predict whether two magnets will attract or repel each other, depending on which poles are facing.			
	Energy 				To be able to recognise that they need light in order to see things and that dark is the absence of light. To be able to notice that light is reflected from surfaces. To be able to recognise that light from the sun	To be able to identify how sounds are made, associating some of them with something vibrating. To be able to recognise that vibrations from sounds travel through a medium to the ear.		To be able to recognise that light appears to travel in straight lines. To be able to 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.

					can be dangerous and that there are ways to protect their eyes. To be able to recognise that shadows are formed when the light from a light source is blocked by an opaque object. To be able to find patterns in the way that the size of shadows change.	To be able to find patterns between the pitch of a sound and features of the object that produced it. To be able to find patterns between the volume of a sound and the strength of the vibrations that produced it. To be able to recognise that sounds get fainter as the distance from the sound source increases. To be able to identify common appliances that run on electricity. To be able to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires,		To be able to 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. To be able to use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. To be able to associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. To be able to compare and give reasons for variations in how components

						bulbs, switches and buzzers. To be able to 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. To be able to recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. To be able to recognise some common conductors and insulators, and associate metals with being good conductors.		function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. To be able to use recognised symbols when representing a simple circuit in a diagram.
	Earth Science	To be able to name and identify					To be able to describe the movement of the	

		some different types of weather.					Earth, and other planets, relative to the Sun in the solar system. To be able to describe the movement of the Moon relative to the Earth. To be able to describe the Sun, Earth and Moon as approximately spherical bodies. To be able to use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	

Second Order Concepts

Second order concepts are fundamental knowledge and skills which are transferable across a range of curriculum subjects. For example, we introduce pupils to the concept of 'similarity and difference' early in their education, developing the observational skills and language needed to make comparisons. This is developed and applied as pupils move through the school so they can confidently apply this in all areas of the curriculum by upper Key Stage Two.

A summary of the second order concepts and how they apply to science are provided in the table below.

Curriculum subject	Significance	Similarity and difference	Cause and consequence	Continuity and change	Responsibility	Communication (Oracy & Written)	Enquiry
Science	Significant scientists, discoveries, laws, models and theories	Making comparisons, finding patterns, noting differences, drawing conclusions	Models and laws, reactions between materials, observing processes	Observing what changes and what stays the same	Working safely, climate change and sustainability, how science solves problems	Using scientific terms, evaluating, drawing conclusions, explaining patterns and processes, presenting and interpreting data	Working scientifically, observing, classifying, patterns, fair testing, using evidence