

# Bricknell Primary School

## Science Curriculum Overview



THE  
CONSTELLATION  
TRUST



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*Knowledge*

*Achievement*

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# 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.



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## 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.
- Assessability 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.



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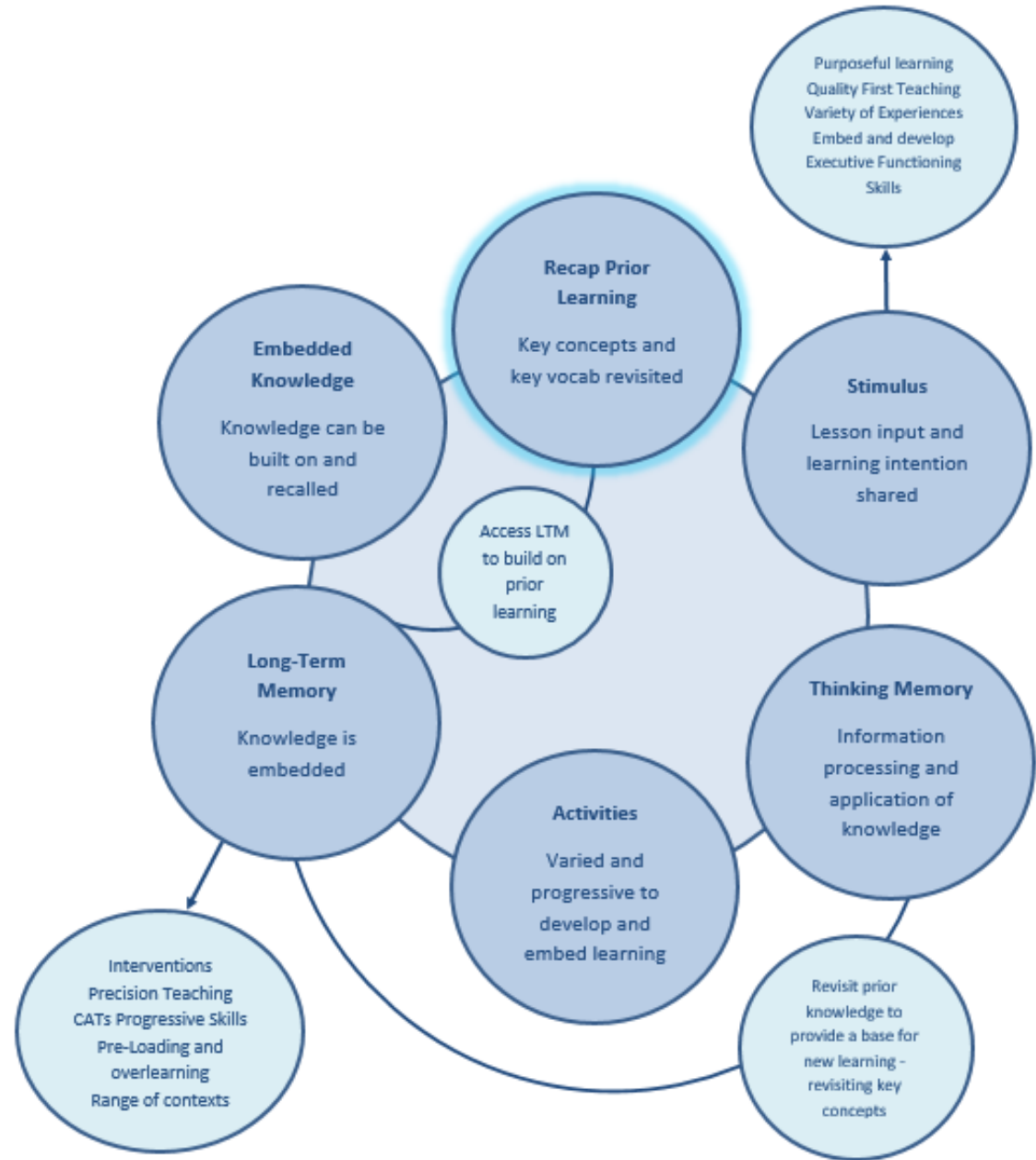
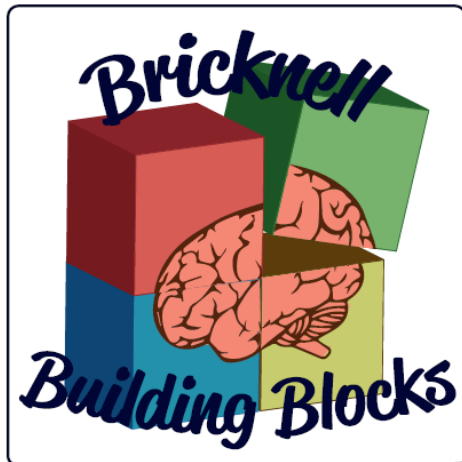
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## Bricknell's Working Memory Model

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.



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## 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
<b>English</b>		
<b>Reading</b>	<b>78</b>	195
<b>Writing</b>	<b>117</b>	
<b>Maths</b>		
<b>Maths</b>	<b>195</b>	195
<b>Computer Science</b>		
<b>Science</b>	<b>78</b>	117
Computing	39	
<b>Humanities</b>		
<b>RE</b>	<b>39</b>	75
History	18	
Geography	18	
<b>Creative</b>		
Art	18	54
Design Technology	18	
Music	18	
<b>Additional</b>		
<b>Physical Education</b>	<b>78</b>	156
<b>PSHE</b>	<b>39</b>	
<b>MFL</b>	<b>39</b>	

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.



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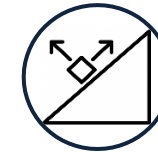


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## Key Concepts

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		



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## 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

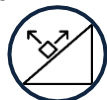


Pupils will learn about states of matter through the study of solids, liquids and gases. They will look at the properties of materials including rocks and fossils and will study reversible and irreversible changes in materials.

### Physics: Energy



### Forces



### Earth Sciences



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



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## Science Key Concepts Year Group Mapping

	Autumn	Spring	Summer
EYFS Understanding the World	In EYFS pupils are taught science through the strand <b>Understanding the World</b> . Throughout the year pupils will be taught: <b>Animals including humans, Living things and their habitats, Plants, Materials, Forces and Earth science.</b>		
Year 1	<b>Animals including humans</b> - Amazing animals  <b>Living things and their habitats</b> - Outside our classroom	<b>Materials</b> - Materials  <b>Living things and their habitats</b> - Outside our classroom	<b>Plants</b> - Plants  <b>Animals including humans</b> - Senses  <b>Living things and their habitats</b> - Outside our classroom
Year 2	<b>Living things and their habitats</b> - Habitats / Outside our classroom  <b>Materials</b> - Materials	<b>Materials</b> - Materials  <b>Plants</b> - Plants	<b>Animals including humans</b> - Changing me  <b>Animals including humans</b> - Looking after me
Year 3	<b>Living things and their habitats</b> – Outside our classroom  <b>Animals including humans</b> - Our brilliant bodies  <b>Energy</b> - Light	<b>Living things and their habitats</b> - Outside our classroom  <b>Materials</b> - Rocks  <b>Plants</b> - Plants	<b>Plants</b> - Plants  <b>Forces</b> - Forces
Year 4	<b>Animals including humans</b> - Digestion  <b>Energy</b> - Electricity	<b>States of matter</b> - States of matter  <b>Energy</b> - Sound	<b>Living things and their habitats</b> – Living things  <b>Living things and their habitats</b> - Humans and the planet
Year 5	<b>Forces</b> - Forces  <b>States of matter</b> - Changing states  <b>Materials</b> - Materials	<b>Materials</b> - Mixtures  <b>Materials</b> - Materials and changes  <b>Earth Science</b> - Space	<b>Living things and their habitats</b> - Reproduction in plants and animals  <b>Animals including humans</b> - Life cycles
Year 6	<b>Energy</b> - Light  <b>Animals including humans</b> - Circulatory system	<b>Animals including humans</b> - Evolution	<b>Living things and their habitats</b> - The natural world  <b>Animals including humans</b> - Healthy bodies  <b>Energy</b> - Electricity



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Knowledge and skills sequencing		SCIENCE						
		EYFS Understanding the world	Y1	Y2	Y3	Y4	Y5	Y6
WORKING SCIENTIFICALLY	Observing over time  Using observations and data to draw conclusions	I can make observations and explain what I can see	I can use observations and ideas to suggest answers to questions	I can observe changes over time  I can ask questions about what I notice	I make careful and systematic observations and take accurate measurements using standard units  I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions  I can record findings using bar charts keys, tables and labelled diagrams		I can take measurements, using a wider range of scientific equipment, with increasing accuracy and precision and taking repeat reading when appropriate  I can report and present findings from enquiries including conclusions, explanations, data and diagrams including scatter graphs and line graphs.	I use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate  I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including observing changes over different periods of time  I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways  I am evaluate the degree of trust in results
	Identifying /classifying	I can sort objects into groups	I can identify and classify according to simple criteria	I can group and classify things	I can gather, record, classify and present information in a variety of different ways to help me answer questions		I can classify materials and identify why they are / are not fit for purpose	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and grouping and classifying things
	Looking for patterns		I can perform simple tests, involving observations and the	I can use different types of Scientific enquiry to gather and record data,	I can identify differences, similarities or changes related to simple scientific ideas and processes			I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and noticing patterns



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			gathering and recording of data	using simple equipment  I notice patterns in my observations or data		
Comparative and fair testing			I can carry out simple comparative tests	I can ask relevant questions and use different types of scientific enquiry to answer them, including comparative and fair tests  I can record findings and present data using simple scientific language, explanations, diagrams, pictures, keys, bar charts and tables.	I can plan and carry out scientific enquiry using a range of scientific equipment and variables in order to answer questions  I can use test results to make predictions to set up further comparative and fair tests	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary and carrying out comparative and fair tests  I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways
Using secondary sources of evidence			I can find things out using secondary sources of information	I can identify scientific evidence that has been used to support or refute ideas or arguments	I describe and evaluate my own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources  I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including finding things out using a wide range of secondary sources	
Using models				Understand how models can explain progresses that can't be fully observed eg: how light/sound travel, magnetism, the water cycle  Understand how models explain how molecules behave when substances change shape.	Understand how models about space and the solar system explain processes that can't be observed.	



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		EYFS Understanding the world	Y1	Y2	Y3	Y4	Y5	Y6
BIOLOGY	Living things and their environments 	To understand the difference between plants and animals through observation (similarity and difference)  To understand the need to respect and care for the natural environment and all living things (responsibility)		To identify whether things are alive, dead or have never lived  To name different plants and animals and describe how they are suited to different habitats  To describe how animals get their food from plants and other animals, using the idea of a simple food chain to describe this relationship	To describe in simple terms how fossils are formed when things that have lived are trapped within rock.	To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.  To recognise that living things can be grouped in a variety of ways  To recognise that environments can change and that this can sometimes pose dangers to living things.	To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.  To describe the life process of reproduction in some plants and animals.	To group, classify and identify plants, animals and micro-organisms using keys or other methods based on their observable features  To describe how living things have changed over time and evolved using the basic ideas of inheritance, variation and adaptation  To give evidence for evolution I can recognise that living things produce offspring of the same kind but that offspring normally vary and are not identical to their parents.
	Animals including humans 	To talk about lifecycles (continuity and change) To use my senses in hands on explanations	To describe and compare the features of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).	To describe the basic needs of animals for survival and the main changes as young animals (including humans) grow into adults	To identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food;	To describe the simple functions of the basic parts of the digestive system in humans.  To identify the different types of	To describe the changes as humans develop to old age.	To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.



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		<p>(similarity and difference) To name my 5 senses (similarity and difference) To explain what my 5 senses are (similarity and difference)</p>	<p>To identify, name, draw and label the basic parts of the human body. To say which part of the body is associated with each sense.</p> <p>To group animals according to what they eat</p>	<p>To notice that animals, including humans, have offspring that grow into adults.</p> <p>To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>they get nutrition from what they eat.</p> <p>To identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	<p>teeth in humans and their simple functions.</p> <p>To construct and interpret a variety of food chains, identifying producers, predators and prey.</p>		<p>To describe the effects of diet, exercise, drugs and lifestyle on how the body functions</p>
Plants		<p>To plant seeds and care for growing plant with support (responsibility)</p> <p>To say what a plant needs to survive (cause and consequence)</p> <p>To talk about lifecycles (continuity and change)</p>	<p>To name, identify and describe the basic structure of a variety of common flowering plants including trees.</p>	<p>To describe the basic needs of plants for survival and the impact of changing these</p> <p>To observe and describe the main changes as seeds and bulbs grow into mature plants.</p>	<p>To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>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</p> <p>To understand the way in which water is transported within plants. To explore the part that flowers play in the life cycle of</p>		<p>To name, locate and describe the functions of the main parts of plants, including those involved in reproduction</p>	



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					flowering plants, including pollination, seed formation and seed dispersal.			
		<b>EYFS Understanding the world</b>	Y1	Y2	Y3	Y4	Y5	Y6
<b>CHEMISTRY</b>	Materials 	<p>To explore collections of materials and talk about similarities and differences</p> <p>To talk about the differences between materials and talk about the changes I see (cause and consequence)</p>	<p>To name, compare and group a variety of everyday materials and describe their simple, physical properties.</p> <p>To distinguish between an object and the materials from which it is made</p>	<p>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.</p>	<p>To compare and group together different kinds of rocks and soil on the basis of their appearance and simple physical properties.</p>		<p>To compare and group together everyday materials on the basis of their properties</p> <p>To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p>	
	States of matter 					<p>To describe the characteristics of different states of matter and group materials on this basis</p> <p>To describe how materials change state at different temperatures</p> <p>To observe that some materials change state when</p>	<p>To describe the characteristics of different states of matter and group materials on this basis</p> <p>To describe how materials change state at different temperatures</p> <p>To observe that some materials change state when</p>	<p>To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through</p>



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						<p>they are heated or cooled and measure or research the temperature at which this happens in degrees Celsius.</p> <p>To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p>	<p>filtering, sieving and evaporating.</p> <p>To identify, with reasons, whether changes in materials are reversible or not</p> <p>To explain that some changes of state result in the formation of new material and that this kind of change is not usually reversible.</p>	
PHYSICS	<p>Forces</p> 	<p>To explore how things work e.g. toys</p> <p>To explore pushes and pulls</p> <p>To talk about forces and concepts such as floating and sinking, magnetism and light.</p>			<p>To notice contact and non-contact forces and observe similarities and differences.</p> <p>To describe how magnetic forces act at a distance</p> <p>To describe magnets as having two poles.</p> <p>To compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet</p>		<p>To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>To identify the effects of air resistance, water resistance and friction that act between moving surfaces.</p> <p>To recognise that some mechanisms, including levers, pulleys and gears,</p>	



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					To predict and explain whether two magnets will attract or repel each other, depending on which poles are facing.		allow a smaller force to have a greater effect.	
Energy					<p><b>Light</b> To recognise and understand the properties of light.</p> <p>To recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>To find patterns in the way that the size of shadows changes.</p>	<p><b>Sound</b> To identify how sounds are made, associating some of them with something vibrating.</p> <p>To recognise that vibrations from sounds travel through a medium to the ear.</p> <p>To recognise that sounds get fainter as the distance from the sound source increases</p> <p>To describe the relationship between the pitch of a sound and the features of its source</p>		<p><b>Light</b> To use the idea that light travels in straight lines and enters our eyes to explain how we see things</p> <p>To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p> <p>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</p>



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						<p>To describe the relationship between the volume of a sound, the strength of the vibrations and the distance from its source</p> <p><b>Electricity</b> To construct and name the basic parts of a simple series circuit, including cells, wires, bulbs, switches and buzzers.</p> <p>To identify whether or not a lamp will light in a simple series circuit</p> <p>To recognise that a switch opens and closes a circuit</p> <p>To recognise and explain why materials are good conductors and insulators.</p>		<p><b>Electricity</b> To use simple apparatus to construct &amp; control a series circuit, and describe how the circuit may be affected when changes are made to it</p> <p>To use recognised symbols when representing a simple circuit in a diagram.</p>
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	<p>Earth science</p> 	<p>To name and identify some different types of weather</p>	<p>To explain how the weather changes throughout the year and name the seasons (link to geography)</p> <p>To use a globe to identify the equator and north and south poles (Link to geography)</p>				<p>To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>To describe the movement of the Moon relative to the Earth.</p> <p>To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>To describe and explain the key physical features of different climate zones and biomes (link to geography)</p>
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## 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



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