

Eastbrook Primary Science Curriculum



Intent: Character and Academics through Science

At Eastbrook Primary School we believe that our science curriculum provides our children with opportunities to learn about, ask questions and evaluate aspects of the world around them and to develop knowledge, curiosity and enquiry skills. In addition, we understand the importance of raising aspirations to promote a life-long love for science, to inspire a future generation of scientists (Wellcome Trust, 2017).

The science curriculum at Eastbrook Primary School has been developed so that as our children progress through the key stages, their knowledge, understanding and skill set is continually built upon and embedded. It offers a wide and rich variety of different experiences, including the use of the school grounds, practical and hands-on sessions and focused outreach visits. Our science teaching and learning is planned within the International Primary Curriculum, providing opportunities for cross curricular links.

Science is relevant to most everyday situations and to our children's character development and through our teaching of science we enable our children enjoy learning about different science concepts and using this to support their understanding of their world now and how they may mould the future.

Our curriculum ensures that all children:

- Have opportunities to develop their scientific knowledge and understanding within the key disciplines of biology, chemistry and physics
- Gain hands on, practical experiences and develop a respect for the equipment that they are using, enabling them to answer scientific questions about the world around them
- Develop a broad and rich scientific vocabulary which is built upon as they progress through the school
- Build a love for science which they share with their peers, supporting adults and family

End Point

Science education at Eastbrook School provides the foundation of understanding the world through biology, chemistry and physics which is a fundamental part of our everyday lives. It helps to explain so much of the world around us and enables advances in many areas including health, communication, the environment and leisure. All pupils should be taught essential aspects of the knowledge, methods, processes and uses of science entwined with their development of scientific knowledge and conceptual understanding. Scientific enquiries skills support their understanding and help them to answer every day scientific

questions about the world around them. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Our science curriculum spiral design clearly supports the building of knowledge, skills and virtue in increasing complexity. The teaching is well sequenced to remind and revisit main concepts through different topics in the spiral curriculum.

Way Points

As the future for our children change, the role of science and the demand for science-based careers in their future becomes ever more important (HM Government, 2017). It is necessary that we inspire and innovate the teaching of science to ensure that our children remain curious, interested and invested about science and their future.

By the end of Early Years Foundation Stage

Our EYFS science education is designed to introduce our young children to a range of ideas and practices related to the natural world around them. Inquiry based play is key to the science in our EYFS curriculum and through this, our children will leave early years as question askers, good thinkers and naturally curious.

By the end of Key Stage One

The main focus of science teaching in Key Stage One is to ensure that children have opportunities to be curious. Children will have hands on practical experiences, observing the phenomena and looking closely at the natural and human-constructed world around them. The children's questioning skills are developed to ensure they have the skills needed to ask questions and be able to answer them using their working scientifically skill set, including observing over time, pattern seeking, grouping and classifying, carrying out simple tests and finding out things using secondary sources of information. The main areas of science that children will be exposed to are plants, animals including humans, materials, living things and habitats, and seasons. Children use science specific vocabulary in line with their reading age at Key Stage One (National Curriculum, 2013).

By the end of Lower Key Stage Two

At the next stage of science teaching, children are encouraged to broaden their view of the world around them. Through discussion, testing and developing ideas, children are beginning to understand functions, link different concepts and build relationships between pieces of knowledge. Utilising their skill set developed in Key Stage One, children are now encouraged to ask their own questions and determine the best way of answering them. Children are supported in drawing conclusions from their results, both verbally and written, and are able to present their findings with using a wider science vocabulary with confidence. Children will be able to explore different concepts within animals including humans, rocks, electricity, light, sound, plants, living things and habitats and states of matter (National Curriculum, 2013).

By the end of Upper Key Stage Two

In the final stage of their primary science career, children now discover and ask questions about more abstract science concepts. They use their working scientifically skill set to answer their questions, allowing them to analyse functions, concepts and relationships more systematically. They use their knowledge to understand the world around them at a more complex level and are beginning to understand that this knowledge can be used to change and impact the future (National Curriculum, 2013).

Sequencing

Our science curriculum is a spiral based curriculum where knowledge is returned to at different stages of the child's primary science career. Each skill has been mapped out to make cohesive links between the key stages and to understand exactly how these skills are developed (Appendix A.) A key example of this is the study of plants. In year one, the children learn the names of different flowers and trees. These parts are then given a function in year two and are used to explain how plants grow from seeds and bulbs. To further understand the growth of plants, children in year three investigate the transport system of water and nutrients, recap and develop knowledge on the parts of the plants and begin to understand the life cycle of plants and seed dispersal. Finally, in year 5, children can describe the life cycle of different plants.

Adaptation

Eastbrook School has inherent significant factors that impacts on pupils' knowledge and skills:

- The number of mid-term intake students for every year group.
- The number of students with English as an Additional Language (EAL).
- The number of students with Social Emotional and Mental Health needs (SEMH).
- The number for students from economically deprived homes.
- The number of mid-term admissions without any previous or low English language.
- The variation in cultural experience amongst pupils.
- The number of students without any formal science education prior to admission.

The science curriculum sequencing and planning ensures coverage of gaps in knowledge and skills for every cohort of students.

Pedagogic adaptation

Teaching science using different strategies:

- modelling
- practical experiments
- using visual diagram/pictures
- using video clips
- use of spiral curriculum to address gaps and develop sticky knowledge

Cultural Capital

To address this disparity in science experiences and ensure our children have a science rich experience, to build their science capital and develop a love of learning, in line with our character values, we:

- Link our science units through the teaching of IPC where practically possible, making science relevant and current
- Use practical and engaging methods of teaching including Now Press Play, educational visits, guest speakers and fieldwork.
- Opportunities to interact and discover more about science-based careers, inspiring future scientists
- Hold a yearly science week based on a current trend or theme
- Host the 'Great Science Share'

Transferable Skills

Within our science curriculum we aim to inspire in pupils the character virtues of perspective, social intelligence, appreciation, curiosity and fascination about the world and its people that will remain with them for the rest of their lives.

Examples of decussating skills and knowledge are listed below.

Knowledge/Skill	Curricular Link
Taking accurate measurements	Maths- capacity, length, time
Recording key findings using keys, bar charts and tables	Maths- data handling
Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	Writing- sentence structure, genre specific vocabulary and style Speaking and Listening- presentation skills, listening to others, responding to others
Research	Reading Skills Computing- using search engines effectively, word processing skills to present findings

References

Department for Education. (2014). *The national curriculum in England: complete framework for key stages 1 to 4*. Available at: <https://www.gov.uk/government/publications/national-curriculum-in-england-framework-for-key-stages-1-to-4> (Accessed: 17 December 2019).

HM Government. (2017). Industrial Strategy: White Paper. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf (Accessed: 17 December 2019).

Wellcome Trust. (2017). *State of the nation report of UK primary science education*. Wellcome Trust. London. Available at: <https://wellcome.ac.uk/what-we-do/our-work/transforming-primary-science> (Accessed: 17 December 2019).

Appendix A- Science Progression Map

Biology

Year One	Year Two	Year Three	Year Four	Year Five	Year Six
<ul style="list-style-type: none"> identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. <p>Superhumans</p>	<ul style="list-style-type: none"> describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. <p>Live and Let Live</p>	<ul style="list-style-type: none"> identify that humans and some other animals have skeletons and muscles for support, protection and movement. * <p>How Humans Work</p> <ul style="list-style-type: none"> describe the simple functions of the basic parts of the digestive system in humans <p>How Humans Work</p> <p>identify the different types of teeth in humans and their simple functions</p> <p>How Humans Work</p>			<ul style="list-style-type: none"> identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood <p>Being Human</p> <ul style="list-style-type: none"> describe the ways in which nutrients and water are transported within animals, including humans <p>Being Human</p> <ul style="list-style-type: none"> recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function <p>Being Human</p>
<ul style="list-style-type: none"> identify and name a variety of common animals that are carnivores, herbivores and omnivores <p>The Earth Our Home</p>	<ul style="list-style-type: none"> find out about and describe the basic needs of animals, including humans, for survival (water, food and air) <p>Live and Let Live</p>	<ul style="list-style-type: none"> identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat * <p>How Humans Work</p> <p>Shake It!</p> <ul style="list-style-type: none"> construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Land, Sea and Sky</p>			
	<ul style="list-style-type: none"> notice that animals, including humans, have offspring which grow into adults 			<ul style="list-style-type: none"> describe the changes as humans develop into old age <p>Jigsaw PSHE Lesson</p>	<ul style="list-style-type: none"> recognise that living things produce offspring of the same kind, but normally

	Live and Let Live			<ul style="list-style-type: none"> describe the life process of reproduction in some plants [and animals] * Existing, endangered, extinct 	<ul style="list-style-type: none"> offspring vary and are not identical to their parents <p>Being Human</p> <ul style="list-style-type: none"> identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. <p>Being Human Out of Africa</p>
	<ul style="list-style-type: none"> explore and compare the differences between things that are living, dead, and things that have never been alive <p>Flowers and Insects Live and Let Live</p>				<ul style="list-style-type: none"> recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago <p>Out of Africa</p>
<ul style="list-style-type: none"> describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) <p>The Earth Our Home</p> <ul style="list-style-type: none"> identify and name a variety of common animals that are carnivores, herbivores and omnivores <p>The Earth Our Home</p>	<ul style="list-style-type: none"> 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 <p>Flowers and Insects</p>	<ul style="list-style-type: none"> identify that humans and some other animals have skeletons and muscles for support, protection and movement * <p>How Humans Work</p> <ul style="list-style-type: none"> recognise that living things can be grouped in a variety of ways <p>Land, Sea and Sky</p> <ul style="list-style-type: none"> explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment <p>Land, Sea and Sky</p>		<ul style="list-style-type: none"> describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird <p>Existing, endangered, extinct</p>	<ul style="list-style-type: none"> 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 <p>Existing, endangered, extinct</p> <ul style="list-style-type: none"> give reasons for classifying plants and animals based on specific characteristics <p>Existing, endangered, extinct</p>
<ul style="list-style-type: none"> identify and describe the basic structure of a variety of common flowering plants, including trees * <p>Green Fingers</p>	<ul style="list-style-type: none"> identify and name a variety of plants and animals in their habitats, including micro-habitats <p>Live and Let Live</p>	<ul style="list-style-type: none"> recognise that environments can change and that this can sometimes pose dangers to living things <p>Land, Sea and Sky</p>	<ul style="list-style-type: none"> 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 		

<ul style="list-style-type: none"> identify and name a variety of common wild and garden plants including deciduous and evergreen trees <p>The Earth Our Home</p> <ul style="list-style-type: none"> identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals <p>The Earth Our Home</p>	<p>Flowers and Insects</p> <ul style="list-style-type: none"> 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 <p>Live and Let Live</p> <p>Flowers and Insects</p>		<p>Let's Plant It!</p>		
		<ul style="list-style-type: none"> describe in simple terms how fossils are formed when things that have lived are trapped within rock <p>Land, Sea and Sky</p> <p>Footprints from the Past</p>			<ul style="list-style-type: none"> recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago <p>Out of Africa</p> <ul style="list-style-type: none"> recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents <p>Being Human</p> <ul style="list-style-type: none"> identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. <p>Out of Africa</p>
<ul style="list-style-type: none"> identify and describe the basic structure of a variety of common flowering plants, including trees * <p>The Earth Our Home</p> <p>Green Fingers</p>	<ul style="list-style-type: none"> find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <p>Flowers and Insects</p>		<ul style="list-style-type: none"> identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers <p>Let's Plant It!</p>	<ul style="list-style-type: none"> describe the life process of reproduction in some plants [and animals] * <p>Existing, endangered, extinct</p>	

	<ul style="list-style-type: none">• observe and describe how seeds and bulbs grow into mature plants <p>Flowers and Insects</p>		<ul style="list-style-type: none">• investigate the way in which water is transported within plants <p>Let's Plant It!</p> <ul style="list-style-type: none">• explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <p>Let's Plant It!</p>		
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Physics

Year One	Year Two	Year Three	Year Four	Year Five	Year Six
			<ul style="list-style-type: none"> • identify how sounds are made, associating some of them with something vibrating Turn it Up! • recognise that vibrations from sounds travel through a medium to the ear Turn it Up! • find patterns between the pitch of a sound and features of the object that produced it Turn it Up! • find patterns between the volume of a sound and the strength of the vibrations that produced it Turn it Up! • recognise that sounds get fainter as the distance from the sound source increases Turn it Up! 		
			<ul style="list-style-type: none"> • recognise that they need light in order to see things and that dark is the absence of light Turn it Up! • notice that light is reflected from surfaces Turn it Up! • recognise that light from the sun can be dangerous and that there are ways to protect their eyes * Turn it Up! • recognise that shadows are formed when the light from a 		<ul style="list-style-type: none"> • recognise that light appears to travel in straight lines Look Hear! • 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 Look Hear! • 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 Look Hear!

			<p>light source is blocked by an opaque object</p> <p>Turn it Up!</p> <ul style="list-style-type: none"> find patterns in the way that the size of shadows changes. <p>Turn it Up!</p>		<ul style="list-style-type: none"> use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them <p>Space Scientists</p>
			<ul style="list-style-type: none"> compare how things move on different surfaces <p>Feel the Force</p> <ul style="list-style-type: none"> notice that some forces need contact between two objects, but magnetic forces can act at a distance <p>Feel the Force</p> <ul style="list-style-type: none"> observe how magnets attract or repel each other and attract some materials and not others <p>Feel the Force</p> <ul style="list-style-type: none"> describe magnets as having two poles <p>Feel the Force</p> <ul style="list-style-type: none"> predict whether two magnets will attract or repel each other, depending on which poles are facing <p>Feel the Force</p>		<ul style="list-style-type: none"> explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object <p>Space Explorers</p> <ul style="list-style-type: none"> identify the effects of air resistance, water resistance and friction, that act between moving surfaces <p>Fascinating Forces-Summer Project</p>
					<ul style="list-style-type: none"> recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect <p>Fascinating Forces-Summer Project</p>
			<ul style="list-style-type: none"> identify common appliances that run on electricity <p>Bright Sparks</p> <ul style="list-style-type: none"> construct a simple series electrical circuit, identifying 		<ul style="list-style-type: none"> associate the brightness of a lamp or the volume of a buzzer with the number and

			<p>and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>Bright Sparks</p> <ul style="list-style-type: none"> • 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 <p>Bright Sparks</p> <ul style="list-style-type: none"> • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit <p>Bright Sparks</p>		<p>voltage of cells used in the circuit</p> <p>Full Power</p> <ul style="list-style-type: none"> • 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 <p>Full Power</p> <ul style="list-style-type: none"> • use recognised symbols when representing a simple circuit in a diagram <p>Full Power</p>
<ul style="list-style-type: none"> • observe changes across the four seasons <p>Discrete Teaching (Autumn and Summer)</p> <ul style="list-style-type: none"> • observe and describe weather associated with the seasons and how day length varies. <p>Discrete Teaching (Autumn and Summer)</p>		<ul style="list-style-type: none"> • recognise that light from the sun can be dangerous and that there are ways to protect their eyes * <p>Bright Sparks</p>			<ul style="list-style-type: none"> • describe the Sun, Earth and Moon as approximately spherical bodies <p>Space Explorers</p> <ul style="list-style-type: none"> • describe the movement of the Earth, and other planets, relative to the Sun in the solar system <p>Space Explorers</p> <ul style="list-style-type: none"> • describe the movement of the Moon relative to the Earth <p>Space Explorers</p> <ul style="list-style-type: none"> • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky <p>Space Explorers</p>

Chemistry

Year One	Year Two	Year Three	Year Four	Year Five	Year Six
<ul style="list-style-type: none"> distinguish between an object and the material from which it is made What's it made of? identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock What's it made of? describe the simple physical properties of a variety of everyday materials What's it made of? compare and group together a variety of everyday materials on the basis of their simple physical properties What's it made of? 	<ul style="list-style-type: none"> identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses The Magic Toy Maker find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching The Magic Toymaker 		<ul style="list-style-type: none"> compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Footprints from the Past recognise that soils are made from rocks and organic matter Footprints from the Past Let's Plant It! compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Feel the Force recognise some common conductors and insulators, and associate metals with being good conductors Bright Sparks 	<ul style="list-style-type: none"> 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 Bake It!-Summer Project give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic Bake It!-Summer Project 	
		<ul style="list-style-type: none"> compare and group materials together, according to whether they are solids, liquids or gases Shake It! 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) Shake It! identify the part played by evaporation and 		<ul style="list-style-type: none"> know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution Bake It!-Summer Project use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating Bake It!-Summer Project 	

		<p>condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Shake It!</p>		<ul style="list-style-type: none"> • demonstrate that dissolving, mixing and changes of state are reversible changes <p>Bake It!-Summer Project</p> <ul style="list-style-type: none"> • 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. <p>Bake It!-Summer Project</p>	
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