

Our Overriding Vision for Science at Keir Hardie:

We teach Science because we recognise that it is more than a body of knowledge. It is a way of thinking - an ability to be sceptical, to demand verifiable evidence for assertions presented as true. This ability is a vital skill for an adult to be an independent, informed and involved citizen. That makes Science a vitally important subject to learn.

Subject: SCIENCE

Curriculum Provision Statement

Inspiring Excellence Our days are always filled with MAGIC

Context

We are proud of the provision we have for science at Keir Hardie. We passionately believe that children need to be equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future, and our provision is designed to maximise retention, cross-curricular links and respect for the natural world. Recognising that the children who come to us have greatly differing levels of *Science Capital* (exposure to science in their day to day lives), we take every opportunity to make links to children's own experiences and heritage in science, encouraging children to see science as an integral part of their lives, rather than an abstract subject. From the beginning of children's learning in EYFS, we put emphasis on hands-on learning and the development of vocabulary, empowering children to explore things around them, and ask questions about what they find. We particularly make use of our extensive rooftop garden and other natural areas, encouraging children to participate in growing, cultivating and harvesting plants and crops. The results of our approach are evident in our pupil voice surveys, in which boys and girls of all ages and backgrounds speak of science as enjoyable and interesting, and as a possible future career.

Our science curriculum sets out what it means 'to get better' at science. Expertise in science requires pupils to build at least 2 forms, or categories, of knowledge. The first is 'substantive' knowledge, which is knowledge of the products of science, such as models, laws and theories. The second category is 'disciplinary knowledge', which is knowledge of the practices of science. We ensure that children are taught both, interconnectedly, as well as having ample opportunities to formulate their own questions and answer them using all six forms of scientific enquiry.

Our recent attainment of the prestigious Primary Science Quality Mark (Gilt Level) reflects our high expectations and continued emphasis on the importance of science as a core subject, and our school plays an active role in local outreach to other schools, developing and sharing best practice and approaches in science education.

Intent	Implementation	Impact
Our curriculum is designed to be spiral: revisiting certain topics periodically and progressively, and building upon what children have already understood in previous years. Throughout the curriculum, children's learning is supported by links to other subjects and plentiful opportunities for reading related to each topic.	Our Science Curriculum is based on the National Curriculum and has been designed by a Science Leader of ten years experience, with the support of established experts in science education such as the Association for Science Education, the Primary Science Teaching Trust, The National STEM Centre, Institute of Education and the Primary Science Education Consultancy.	Pupils enjoy and value their science lessons. A significant majority of our pupils achieve the national standard in all substantive and disciplinary areas of the National Curriculum for Science at Primary Level. Children in EYFS transition to Year 1 with a wide range of vocabulary to describe natural and man-made phenomena around them. They
Above all else, we aim to promote curiosity in children, ensuring that all children, including those who come from disadvantaged backgrounds or who have SEND, are able to access our curriculum and achieve.	It is taught regularly throughout the year, in a sequenced and progressive curriculum, and in line with recommendations is given a minimum of two hours of lesson time each week, reflecting its status as a core subject.	arrive in Key Stage 1 having had extensive opportunities to play with and explore a range of different materials, plants, animals and seasonal conditions, and have developed a sense of curiosity, respect and affection for the natural world. Pupils leaving the school at the end of
Science lessons are carefully sequenced to reveal the interplay between substantive and disciplinary knowledge. Our science curriculum is organised to ensure all pupils learn extensive and connected knowledge of substantive concepts.	Children identified as struggling to meet the standards explicit in our <i>Progression of Skills</i> <i>and Knowledge</i> document are given targeted support to achieve those standards, whereas children who achieve the standards are guided to deepen their understanding via supportive questioning, extension activities or enrichment opportunities such as our STEM clubs and further research.	Year 6 are ready for Key Stage 3, and have linked science to other areas of the curriculum such as maths, English, PSHE and History. Through this, children are prepared for life as independent, confident and thoughtful members of society, able to look after their own wellbeing and that of others.

Subject Coverage

	Autumn	Spring	Summer
EYFS - Nursery	Ourselves Exploring our bodies and our senses 	 Animals Looking at similarities and differences learning about animals and their habitats 	 Growth and Change Planting seeds and looking after them as they grow Looking at life cycles - caterpillars, chicks
EYFS - Reception	 Celebrations Looking at light and dark Learning about nocturnal animals 	 Hot and Cold Climates around the world, animals and their habitats. New life Life cycles, metamorphosis, planting, plant growth and change. 	 Little Explorers Exploring melting and freezing Exploring Metamorphosis - caterpillar experience and eggs. Exploring animals and their habitats through learning about continents.
EYFS - Working Scientifically	 show curiosity and ask questions make observations using their senses and simple equipment make direct comparisons use equipment to measure record their observations by drawing, taking photographs, using sorting rings or boxes and, in Reception, on simple tick sheets use their observations to help them to answer their questions talk about what they are doing and have found out identify, sort and group. 		
Year 1	 Seasonal Changes (throughout the year) Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Everyday Materials Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. 	 Seasonal Changes (throughout the year) Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Animals Including Humans Senses Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Identify and name 	 Seasonal Changes (throughout the year) Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies. Plants Identify and name basic structure Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.

	 Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties. 	 Basic structure Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores. Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). 	 Identify and describe the basic structure of a variety of common flowering plants, including trees. Consolidation & review of this year's topics
Year 2	 Living Things and their Habitats Life processes Interdependence Explore and compare the differences between things that are living, dead, and things that have never been alive. Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Identify and name a variety of plants and animals in their habitats, including microhabitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Animals Including Humans Life cycle and basic needs Notice that animals, including humans, have offspring which grow into adults. 	Uses of Everyday Materials Materials and their uses • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	 Plants and growing Conditions for growth Sequence of growth Observe and describe how seeds and bulbs grow into mature plants. Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Consolidation & review of this year's topics

	 Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 		
KS1 - Working Scientifically	 Ask simple questions and recognise language from the national curricule Use simple equipment to observe of Perform simple comparative tests Identify, group and classify Use observations and ideas to sug Gather and record data to help in a 	se that they can be answered in different lum closely including changes over time gest answers to questions noticing sim answering questions including from sec	nt ways including use of scientific nilarities, differences and patterns condary sources of information
Year 3	Animals Including Humans Nutrition Movement • 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. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Rocks Properties Fossils • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.	Light Light sources Shadows Reflection • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change. Forces and Magnets Friction • Compare how things move on different surfaces.	 Plants Conditions for growth Functions of parts Life cycle Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. 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. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

		 Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. 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. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing. 	
Year 4	 Living Things and their Habitats Digestion Food chains Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things. Animals Including humans Human influence Classification Describe the simple functions of the basic parts of the digestive system in humans. 	 States of Matter States of matter Changes of state Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Electricity Simple circuits 	 Sound Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases. Consolidation & review of this year's topics

	 Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey. 	 Conductors & insulators Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. 	
LKS2 - Working Scientifically	 Ask relevant questions and use an Set up simple practical enquiries, of Make systematic and careful observations and units, using a range of experimental data units, using	understanding of different types of sci comparative and fair tests rvations and where appropriate, take a quipment including thermometers and on the data in a variety of ways to help in an atific language, drawings, labelled diago including oral and written explanations sions, make predictions for new values changes related to simple scientific ide ence to answer questions or to support	entific enquiries to best answer them ccurate measurements using data loggers nswering questions rams, keys, bar charts, and tables displays or presentations of results , suggest improvements and raise as and processes his/her findings
Year 5	 Properties and Changes of Materials Properties separation Chemical Changes Solubility Compare and group together everyday materials on the basis of their 	Forces Air+Water Resistance Gravity, Friction, Mechanisms • Explain that unsupported objects fall towards the Earth because of	Life Cycles (Living Things and their Habitats + Animals Including Humans) Life cycles Reproduction Human life cycle

	 properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. 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. 	 the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. Earth and Space Earth, Sun and Moon Day, night and year Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of the Moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. 	 Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals. Describe the changes as humans develop to old age. Consolidation & review of this year's topics
Year 6	 Electricity Component symbols Changing circuits Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram. 	 Living Things and their Habitats Classification Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics. 	 Evolution and Inheritance Variation Adaptation Evolution Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

 WKS2 - Working Scientifically Plan different types of scientific enquiries to answer their own or others' questions, including recognising and controlling variables where necessary Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs Use test results to make predictions to set up further comparative and fair tests Report and present findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations Identify scientific evidence that has been used to support or refute ideas or arguments 		Animals Including Humans Circulation Health • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans	Light Shadows Reflection & how we see How light travels • Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	 Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution Consolidation & review of this year's topics
Enrichment/Cultural Capital	UKS2 - Working Scientifically	 Plan different types of scientific en controlling variables where necess Take measurements, using a range repeat readings when appropriate Record data and results of increas tables, scatter graphs, bar and line Use test results to make prediction Report and present findings from e and degree of trust in results, in or Identify scientific evidence that has 	quiries to answer their own or others' o ary e of scientific equipment, with increasir ing complexity using scientific diagram e graphs is to set up further comparative and fai enquiries, including conclusions, casua al and written forms such as displays a s been used to support or refute ideas	questions, including recognising and ng accuracy and precision, taking as and labels, classification keys, r tests I relationships and explanations of and other presentations or arguments
		Enrichment/C	ultural Capital	

Visits to the Science Museum and the Natural History Museum, Visits to Greenwich and the Royal Observatory, Local visits to Cody Docks, STEM Ambassadors linked in curriculum, World scientists throughout history linked and celebrated in curriculum, Science Capital promoted throughout the school, A wide range of science literacy is available and promoted to children, including fiction which makes specific links, Explorify, Concept Cartoons, Science-themed school visits, STEM Ambassador Visitors.

Year 1 children benefit from nature walks in the local area to find living things and compare habitats.

Year 2 children are able to observe and care for a living thing in class (stick insects) and again go on extended nature rambles. They also explore the life and work of Edwin Binney, and the challenges he faced and overcame in designing the crayola crayon.

Year 3 children support their growing understanding of the process of pollination by observing bees and butterflies in our rooftop garden.

Year 4 children benefit from STEM ambassadors who work in industries that use electricity and sound coming into school and speaking to them, encouraging them to consider STEM industries as a potential career path.

Year 5 have their learning on Forces and Space supported with educational visits to the Science Museum as well as the Greenwich Observatory and Planetarium.

Year 6 go far afield and visit Down House, where Charles Darwin wrote his Origin of Species, or the Natural History Museum and take part in workshops which strengthen their understanding both of evolutionary theory and the development of scientific understanding throughout the ages.

In addition to this, all children benefit from high-dialogic approaches to each lesson, where Explorify activities or concept cartoons promote discussion and debate. Our excellent Rooftop Garden resource, as well as our dedicated and passionate gardener and teaching assistant Ms Gilani, enables us to provide the children with exceptionally high-quality resources for their learning about plants and living things and their habitats. Finally, with reading being a whole-school priority, each and every science topic for each year group throughout the school has a dedicated set of books (fiction and nonfiction) specially selected to develop curiosity and strengthen understanding and wonder of those scientific topics.

EYFS Essential Knowledge

 Understanding the World: Recognise some environments that are different to the one in which they live. Talk about members of their immediate family and community. Name and describe people who are familiar to them. Draw information from a simple map. Explore the natural world around them. Describe what they see, hear and feel whilst outside. Recognise some environments that are different to the one in which they live. Explore the natural world around them. Describe what they see, hear and feel whilst outside. Mathematical world around them. Describe what they see, hear and feel whilst outside. Understand the effect of changing seasons on the natural world around them. 	 Characteristics of Effective Learning: Playing and exploring – children investigate and experience things, and 'have a go' Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things Playing and exploring – children investigate and experience things, and 'have a go' Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements Creating and thinking critically – children investigate and experience things, and 'have a go' Active learning – children concentrate and keep on trying if they encounter difficulties, and enjoy achievements Creating and thinking critically – children have and develop their own ideas, make links between ideas, and develop strategies for doing things
Year 1 Essential Knowledge	Year 2 Essential Knowledge
 Describe the differences they can expect to see between spring, summer autumn and winter 	 Identify and distinguish between living things, dead things and things which have never been alive

 Identify, group, compare and describe different materials, and distinguish an object from the material from which it is made. Know the five different senses and which parts of the body sense them Know and describe a variety of different common animals Know that different animals are omnivores, herbivores or carnivores Identify, name and describe plants, including deciduous and evergreen plants 	 Understand what a habitat is and that living things are adapted to their habitats Understand and describe a simple food chain Describe why the properties of a particular material make it suitable for a particular object Describe how the shape of an object can be changed by squashing, bending, twisting and stretching Explain that plants needs light, water and a suitable temperature to grow, and describe in basic terms how germination occurs
 Ask simple questions Use simple equipment Perform Notice similarities, differences and 	n simple comparative tests ♦ Identify, group and classify ♦ patterns ♦ Gather and record data ♦
Year 3 Essential Knowledge	Year 4 Essential Knowledge
 Understand what nutrition is, and that animals need food to live Understand the function and purpose of skeletons and muscles Describe rocks, soils and fossils, and the process by which fossils are formed Understand light is necessary to see things, that darkness is the absence of light, and that shadows are caused by opaque objects blocking a light source Compare how things move on different surfaces Describe the properties of magnets Identify and describe the functions of roots, stems/trunks, leaves and flowers Develop understanding of what plants need for healthy growth Understand and describe how flowers help plants reproduce (including the processes of pollination and seed dispersal) 	 Group and classify different living things Understand that changing environments pose dangers to living things Describe the digestive system and the function of teeth in humans Create simple food chains that include producers, predators and prey Understand and describe the primary 3 different states of matter, including that they know that changes of state occur primarily because of temperature change. Have experience measuring the temperature of things in °C. Apply this understanding to the context of the Water Cycle Understand that sound is a vibration which travels through a medium to the ear, and that pitch and volume are related to the speed and strength of these vibrations respectively.

 Ask relevant questions and answer them Ask relevant questions and answer them Set up practical enquiries and tests Make o Gather, record, classify and present data Record findings Uraw conclusions, make predictions, suggest improvements, raise further questions Use evidence to answer questions Use evidence to answer questions Year 6 Essential K Compare, contrast and group materials on the basis of a wide range of properties. Understand solubility and sieving, and show using these methods how one material might be separated from another. Understand and give examples of reversible and irreversible changes result in the formation of new materials (chemical change). Understand gravity is a force which pulls things towards the centre of the Earth Understand friction, air resistance and water resistance Show how simple mechanisms (like lever, pulleys slopes etc) 	servations and take accurate measurements ♦ Report on findings ♦ dentify differences, similarities or changes ♦ owledge mbols for circuits
 Year 5 Essential Knowledge Compare, contrast and group materials on the basis of a wide range of properties. Understand solubility and sieving, and show using these methods how one material might be separated from another. Understand and give examples of reversible and irreversible changes, and understand that many irreversible changes result in the formation of new materials (chemical change). Understand gravity is a force which pulls things towards the centre of the Earth Understand friction, air resistance and water resistance Show how simple mechanisms (like levers, pulleys, slopes etc) 	owledge mbols for circuits
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 Show how simple mechanisms like levels, policys, slopes etc) can make completing a task easier by change the force needed. Accurately describe the Earth, Moon, Sun and Solar System and how their movements result in the phenomenon of night and day. Describe lifecycles of mammals, amphibians, insects and birds Describe reproduction in plants and animals Describe how human beings get older 	re batteries = brighter bulb/louder buzzer nutrients, food and blood are transported ody ects of drugs, exercise, diet and lifestyle on the at light travels in straight lines, and using this kplain how light reflecting off of surfaces and allows us to see, and how the blocking of the esults in shadows, and therefore why the he same shape as the objects. Docess of evolution in basic terms, and give luding how fossils provide evidence of change

◆ Report and present findings from enquiries, including degree of trust in results ◆ Identify scientific evidence for or against ideas ◆