

Science at Bomere Heath

We are keen that children should develop enquiring minds and a scientific approach to problems and investigations, so that they can further explore and understand the world around them. We believe that this journey begins their formal science education in the early years foundation stage (EYFS). This involves learning foundational knowledge primarily through the 'understanding the world: the natural world' area of learning. This provides a number of rich contexts for pupils to learn a wide range of vocabulary. These words form the beginnings of scientific concepts that will be built on in Year 1 and beyond.

At the core of scientific expertise lies extensive, connected knowledge. This means that as pupils travel through the school curriculum, they need to build their knowledge of scientific concepts and procedures. By doing so, pupils can reason scientifically about phenomena with increasing sophistication and can use their knowledge to work scientifically with increasing expertise.

Substantive knowledge (knowledge of the products of science, such as concepts, laws, theories and models) this is referred to as scientific knowledge and conceptual understanding in the national curriculum.

Disciplinary knowledge (knowledge of how scientific knowledge is generated and grows) this is specified in the 'working scientifically' sections of the national curriculum and it includes knowing how to carry out practical procedures.

We believe that this type of distinction is useful for curriculum design because it reflects how knowledge is arranged and used in the sciences. By learning substantive and disciplinary knowledge, pupils not only know 'the science' they also know the evidence for it.

At Bomere Heath CE Primary School, we have developed our curriculum alongside Mary Le Breuilly and the 'Engaging Science' scheme.

Our science scheme of work is based on the principles that:

- Science is best taught through practical sessions and investigation
- Pupils should be encouraged to think both scientifically and creatively
- Curiosity, wonder, humour and even disgust are emotions that build engagement in science
- Science should take advantage of the many opportunities the outdoor environment offers to learn science in context
- The teaching of science should be rigorous and ensure that pupils of all abilities make progress
- Assessment in science should be based on what pupils demonstrate they can do in lessons rather than on tests.

The Engaging Science scheme meets the needs of the 2014 National Curriculum

We have detailed below the units of work children will learn during their science lesson at Bomere Heath CE Primary School. Due to our mixed age classes, we have some flexibility around which units are taught in which 'Cycle', and we also believe we should teach about famous and inspiring scientists, as well as local man Charles Darwin.

Forces and Magnets by engaging science



Pupils explore magnetism and non-contact forces, suspending magnetic items in mid-air under the influence of magnetic forces. They test materials for magnetic properties and think about what materials are magnetic. They describe the properties of a magnet in simple terms and learn about the uses of magnets.



Rocks

Pupils explore the characteristics of rocks and learn their names. They carry out simple tests on different rocks and use chocolate to model how rocks are formed. They explore the composition of soil and think about how soil is made. They learn about the formation of fossils and make their own model fossils. They look at pictures of dinosaur fossils and try to come to some conclusions about the living dinosaurs the fossils came from.



Science in EYFS

Development matters Reception

Explore the natural world around them. (UTW)

Describe what they see, hear and feel whilst outside. (UTW)

Recognise some environments that are different to the one in which they live. (UTW)

Understand the effect of changing seasons on the natural world around them. (UTW)

ELG Understanding: the natural world

Explore the natural world around them, making observations and drawing pictures of animals and plants.

Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.

Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

STEM

STEM stands for Science, Technology, Engineering, and Mathematics in an educational context. STEM-related learning is important in schools and at home, as it provides an opportunity for children to learn about topics and disciplines that will serve them well in later life, particularly for in-demand new job roles.

The children have been able to work alongside STEM ambassadors in all of these areas. They have benefitted from TEAMS talks, face – to - face workshops and full days of STEM activities.

Esme – year 4 - I loved Mars day, it was interesting finding out information about Mars and how we may get to go there in the future.

Indreya – year 4 - I found the talk from the gentleman who had complex learning needs inspirational, because he is now working in Engineering, but it took him many, many years to get there. I was amazed by his perseverance.

Matthew – Year 4 - I really enjoyed designing a robot that could help out at home and making gliders.

Noah – Year 1 – I loved Mars Day! I went home and made my own Solar System and space cakes.

Millie – Year 5 (St John the Baptist) I am really passionate about science so I have really enjoyed the STEM days. Especially the ones that have focussed on women working within the STEM industries.

		Year 1/2	Year 3/4	Year 5/6
Working Scientifically	Asking Questions	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> ask simple questions and recognise that they can be answered in different ways 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> ask relevant questions and use different types of scientific enquiries to answer them <ul style="list-style-type: none"> <input type="checkbox"/> set up simple practical enquiries, comparative and fair tests 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
	Measuring and Recording	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> observe closely, using simple equipment <input type="checkbox"/> perform simple tests <input type="checkbox"/> gather and record data to help in answering questions 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers <input type="checkbox"/> record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables <input type="checkbox"/> gather, record, classify and present data in a variety of ways to help in answering questions 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate <input type="checkbox"/> record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
	Concluding	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and classify <input type="checkbox"/> use their observations and ideas to suggest answers to questions 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify differences, similarities or changes related to simple scientific ideas and processes <input type="checkbox"/> report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions <input type="checkbox"/> use straightforward scientific evidence to answer questions or to support their findings 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify scientific evidence that has been used to support or refute ideas or arguments <input type="checkbox"/> report and present 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
	Evaluation		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> use test results to make predictions to set up further comparative and fair tests

	Year 1	Year 2	Year 3
Plants	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and name a variety of common wild and garden plants, including deciduous and evergreen trees <input type="checkbox"/> identify and describe the basic structure of a variety of common flowering plants, including trees <p>Vocabulary: Common – wild plants, garden plants, deciduous, evergreen. Plant – leaf, root, leaves, bud, flowers, blossom, petals, root, stem. Tree – deciduous, evergreen, trunk, branches, leaf, root, fruit, vegetables, bulb, seed.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> observe and describe how seeds and bulbs grow into mature plants <input type="checkbox"/> find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <p>Vocabulary (Same as year 1 plus) Water, light, suitable, temperature, germination, reproduction.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers <input type="checkbox"/> 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 <input type="checkbox"/> investigate the way in which water is transported within plants <input type="checkbox"/> explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal <p>Vocabulary As year 1 and year 2</p>
Animals including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals <input type="checkbox"/> identify and name a variety of common animals that are carnivores, herbivores and omnivores <input type="checkbox"/> describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) <input type="checkbox"/> 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>Vocabulary: Common Animals – fish, amphibians, reptiles, birds, mammals, pets. Senses – Tongue/ taste, nose/ smell, eyes/ vision/ skin/touch, ears/ hearing, head, leg, eyes, neck, knees, hair, arms, face, mouth, elbows, ears, teeth. Omnivores – meat and plants, badger, human, bear, chickens.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> notice that animals, including humans, have offspring which grow into adults <input type="checkbox"/> find out about and describe the basic needs of animals, including humans, for survival (water, food and air) <input type="checkbox"/> describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene <p>Vocabulary Offspring, grow, adults, nutrition, reproduce, egg, chicken, chick, caterpillar, pupa, butterfly, spaw, tadpole, frog, lamb, sheep, baby, toddler, child, teenager. Survival – water, food, air, exercise, hygiene.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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 <input type="checkbox"/> identify that humans and some other animals have skeletons and muscles for support, protection and movement <p>Vocabulary Nutrition, nutrients, carbohydrates, protein, fats, fibre, water, vitamins, minerals, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic, skeleton, vertebrate, invertebrate, contact, relax, muscles,</p>

	<p>Carnivores – Meat, cat, dog, lion, tiger, fox, shark, killer, whale, eagle, hawk, snake, tyrannosaurus rex.</p> <p>Herbivore – plants, cows, horses, mice, elephants, deer.</p>		<p>ball joint, socket joint, hinge joint, gliding joint.</p>
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	Year 1	Year 2	Year 3
Living things and their Habitats		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> explore and compare the difference between things that are living, dead, and things that have never been alive <input type="checkbox"/> identify that most living things live in habitats to which they are suited and describe how different habitats provide the basic needs of different kinds of animals and plants, and how they depend on each other <input type="checkbox"/> identify and name a variety of plants and animals in their habitats, including micro-habitats <input type="checkbox"/> 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>Vocabulary Living, dead, never alive, habitats, micro-habitats, food chain, food, sun, grass, cow, human, alive, healthy, logs, leaf litter, stony path, under bushes, shelter, seashore, woodland, ocean, rainforest, conditions, hot/ warm/ wet, bright/ shade/ dark.</p>	

	Year 1	Year 2	Year 3
Light			<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> recognise that they need light in order to see things and that the dark is the absence of light <input type="checkbox"/> notice that light is reflected from surfaces <input type="checkbox"/> recognise that light from the sun can be dangerous and that there are ways to protect their eyes <input type="checkbox"/> recognise that shadows are formed when the light from a light source is blocked by a solid object <input type="checkbox"/> find patterns in the way that the size of shadows changes <p>Vocabulary Light – see, dark, reflect, surface, natural, star, sun, moon, shadow, blocked, solid, artificial, torch, candle, lamp, sunlight, dangerous, protect eyes.</p>
Forces and Magnets			<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> compare how things move on different surfaces <input type="checkbox"/> notice that some forces need contact between two objects, but magnetic forces can act at a distance <input type="checkbox"/> observe how magnets attract or repel each other and attract some materials and not others <input type="checkbox"/> compare and group together a variety of everyday materials on the basis on whether they are attracted to a magnet, and identify some magnetic materials <input type="checkbox"/> describe magnets as having two poles <input type="checkbox"/> predict whether two magnets will attract or repel each other, depending on which poles are facing. <p>Vocabulary Force, push, pull, open, surface, magnet, magnetic, attract, repel, magnetic poles, North, South.</p>

	Year 1	Year 2	Year 3
Seasonal Change	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> observe changes across the four seasons <input type="checkbox"/> observe and describe weather associated with the seasons and how day length varies <p>Vocabulary: Season – summer, winter, autumn, spring, day, daytime. Weather – wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold.</p>		
Material	<p>Everyday Materials</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> distinguish between an object and the material from which it is made <input type="checkbox"/> identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock <input type="checkbox"/> describe the simple physical properties of a variety of everyday materials <input type="checkbox"/> compare and group together a variety of everyday materials on the basis of their simple physical properties <p>Vocabulary: Material – wood, plastic, glass, metal, water, rock, brick, paper, fabrics, elastic, foil. Properties – hard/soft, stretchy/ stiff, shiny/ dull, rough/ smooth, bendy/ not bendy, waterproof/ not waterproof, absorbent/ not absorbent.</p>	<p>Uses of Everyday Materials</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses <input type="checkbox"/> find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching <p>Vocabulary Material – wood, metal, plastic, glass, brick, rock, paper, cardboard, squashing, bending, twisting, stretching. Wood – matches, floors, telegraph poles. John Dunlop – Rubber Charles Macintosh – Waterproof Fabric John McAdam – macadamisation Metal – coins, cans, cars, table legs. Spoons - plastic</p>	<p>Rocks</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> compare and group together different kinds of rocks on the basis of their appearance and simple physical properties <input type="checkbox"/> describe in simple terms how fossils are formed when things that have lived are trapped within rock <input type="checkbox"/> recognise that soils are made from rocks and organic matter <p>Vocabulary Appearance, physical, properties, hard/ soft, shiny/ dull, rough/ smooth, absorbent/ not absorbent, fossils, sedimentary, metamorphic, igneous, rock, soils, organic matter, buildings, gravestones, grains, crystals,</p>

	Year 4	Year 5	Year 6
Living Things and their Habitats	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> recognise that living things can be grouped in a variety of ways <input type="checkbox"/> explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment <input type="checkbox"/> recognise that environments can change and that this can sometimes pose dangers to living things <p>Vocabulary Environment, flowering, non-flowering, plants, animals, vertebrate, dangers. Vertebrate – fish, amphibians, reptiles, birds, mammals. Invertebrate – snails, slugs, worms, spiders, insects. Plants – flowering plants (including grasses), non-flowering (including mosses and ferns) Human impact – positive – nature reserves, ecologically planned parks, garden ponds. Negative – population, development, litter, deforestation.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird <input type="checkbox"/> describe the life process of reproduction in some plants and animals <p>Vocabulary Life cycles – mammal, amphibian, insect, bird. Life process of reproduction – plants, animals, vegetable garden, flower boarder. Animal naturalists – David Attenborough Animal behaviourist – Jane Goodall Reproduction – plants, sexual, asexual, animals, sexual. Lifecycles around the world – rainforest, oceans, desert, prehistoric, similarities, differences.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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 <input type="checkbox"/> give reasons for classifying plants and animals based on specific characteristics <p>Vocabulary Classify, compare, Linnaeus, Carl Linnaeus, classification, domain, kingdom, phylum, class, order, family, genus, species, characteristics, vertebrates, invertebrates, microorganisms, organism, flowering, non-flowering.</p>
Animals, including Humans	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> describe the simple functions of the basic parts of the digestive system in humans <input type="checkbox"/> identify the different types of teeth in humans and their simple functions <input type="checkbox"/> construct and interpret a variety of food chains, identifying producers, predators and prey <p>Vocabulary Human digestive system – digestion, mouth, tongue – mixes, moistens, saliva, oesophagus, transports, stomach, acid, enzymes, small intestine – absorbs water, vitamins, large intestine – compacts colon. Teeth – incisors - cutting, slicing, canines – ripping, tearing, molars – chewing, grinding, floss, brush.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> describe the changes as humans develop to old age <p>Vocabulary Puberty, life cycle, gestation, growth, reproduce, foetus, baby, fertilisation, toddler, child, teenager, adult, old age, life expectancy, adolescence, adulthood, early adulthood, middle adulthood, late adulthood, childhood.</p>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood <input type="checkbox"/> recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function <input type="checkbox"/> describe the ways in which nutrients and water are transported within animals, including humans <p>Vocabulary Internal organs, heart, lungs, liver, kidney, brain, skeletal, skeleton, muscle, muscular, digest, digestion, digestive, circulatory system, blood</p>

	Food Chain – sun, producers, prey, predators, carnivore, herbivore, omnivore.		vessels, blood, impact, diet, exercise, drugs, lifestyle, nutrients, water, damage, drugs, alcohol, substances.
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	Year 4	Year 5	Year 6
Evolution and Inheritance			<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago <input type="checkbox"/> recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents <input type="checkbox"/> identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution <p>Vocabulary Evolution, adaption, inherited traits, adaptive traits, natural selection, inheritance, Charles Darwin, Alfred Wallace, DNA, genes, variation, parent, parent, offspring, fossil, environment, habitat, fossilisation, plants, animals, living things.</p>
States of Matter	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> compare and group materials together, according to whether they are solids, liquids or gases <input type="checkbox"/> 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) <input type="checkbox"/> identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature <p>Vocabulary Solid, solidify, iron, ice, melt, freeze, liquid, evaporate, condense, gas, container, changing state, heated, heat, cooled, cool, degrees Celsius °C, thermometer, water cycle, evaporation, condensation, temperature, melting, warm/ cool, water, water vapour.</p>		


	Year 4	Year 5	Year 6
Earth and Space		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> describe the movement of the Earth, and other planets, relative to the Sun <input type="checkbox"/> describe the movement of the Moon relative to the Earth <input type="checkbox"/> describe the Sun, Earth and Moon as approximately spherical bodies <input type="checkbox"/> use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky <p>Vocabulary Earth, Sun, Moon, moons, planets, stars, solar system, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, rotate, day, night, Aristotle, Ptolemy, Galileo, Copernicus, Brahe, Alhazen, orbit, axis, spherical, heliocentric, geocentric, hemisphere, season, tilt.</p>	
Forces		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object <input type="checkbox"/> identify the effects of air resistance, water resistance and friction, that act between moving surfaces <input type="checkbox"/> recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect <p>Vocabulary Gravity, air resistance, water resistance, friction, surface, force, effect, move, accelerate, decelerate, stop, change direction, brake, mechanism, pulley, gear, spring, theory of gravitation, Galileo Galilei, Isaac Newton.</p>	

	Year 4	Year 5	Year 6
Light			<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> recognise that light appears to travel in straight lines <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them <p>Vocabulary Light, travels, straight, reflect, reflection, light source, object, shadows, mirrors, periscope, rainbow, filters.</p>
Sound	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify how sounds are made, associating some of them with something vibrating <input type="checkbox"/> recognise that vibrations from sounds travel through a medium to the ear <input type="checkbox"/> find patterns between the pitch of a sound and features of the object that produced it <input type="checkbox"/> find patterns between the volume of a sound and the strength of the vibrations that produced it <input type="checkbox"/> recognise that sounds get fainter as the distance from the sound source increases <p>Vocabulary Vibrate, vibration, vibrating, air, medium, ear, hear, sound, volume, pitch, faint, fainter, loud, louder, string, percussion, woodwind, brass, insulate.</p>		

	Year 4	Year 5	Year 6
Electricity	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> identify common appliances that run on electricity <input type="checkbox"/> construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers <input type="checkbox"/> 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 <input type="checkbox"/> recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit <input type="checkbox"/> recognise some common conductors and insulators, and associate metals with being good conductors <p>Vocabulary Appliances, electricity, electrical circuit, cell, wire, bulb, buzzer, danger, electrical safety, sign Insulators – wood, rubber, plastic, glass. Conductors – metal, water. Switch – open, closed</p>		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit <input type="checkbox"/> 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 <input type="checkbox"/> use recognised symbols when representing a simple circuit in a diagram <p>Vocabulary Voltage, brightness, volume, switches, danger, series circuit, working safely with electricity, electrical safety sign, circuit diagram, switch, bulb, buzzer, motor, recognised, symbols.</p>

	Year 4	Year 5	Year 6
Properties and Changes of Materials		<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 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 <input type="checkbox"/> know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution <input type="checkbox"/> use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating <input type="checkbox"/> give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic <input type="checkbox"/> demonstrate that dissolving, mixing and changes of state are reversible changes <input type="checkbox"/> 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>Vocabulary Properties, hardness, solubility, transparency, electrical conductor, thermal conductor, response to magnets, dissolve, solution, separate, separating, solids, liquids, gases, evaporating, reversible changes, dissolving, mixing, evaporation, filtering, sieving, melting, irreversible, new material, burning, rusting, magnetism, electricity, chemists, Spencer Silver, Ruth Bererito, quantitative, measurements, conductivity, insulation, chemical,</p>	

	Year A 2020/ 2021						Year B 2021/2022					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
P	The Weather Including seasonal changes in our environment (1.5)	Materials (1.3)	Plants (2.4)	Seasonal changes Our environment Inventors	Living Things and Habitats	Seasonal Changes Our Environment	Seasonal Changes Our Environment	Humans Body and Senses	Inventors and Scientists Charles Darwin	Seasonal Changes Our Environment	Living Things and Habitats	Plants (1.4)
H	The Weather (1.5)	Using Materials (2.5)	Plants (2.4)	Inventors <i>Dunlop, MacIntosh, McAdam</i>	Living Things (1.2) Habitats (2.6)	Seasonal Changes Our Environment	Our Environment (1.1) Local Habitats (2.1)	Humans Body and Senses (2.3)	Inventors & Scientists <i>Charles Darwin</i> Local Habitats (2.1)	Seasonal Changes Our Environment (1.1)	Living Things (2.2) Local Habitats (2.1)	Plants (1.4)
	Seasonal changes in our environment. Include weather focus.						Seasonal Changes					
G	Environmental changes – Animal Homes 3.1 Animals and Skeletons 3.2	Rocks and Fossils 3.6	Magnets and Forces 3.3	Scientist and Inventors	Plants 3.4	Light 3.5	Environmental changes – Animal Homes 3.1 Animals and Skeletons 3.2	Rocks and Fossils 3.6	Magnets and Forces 3.3	Scientist and Inventors	Plants 3.4	Light 3.5
S	Digestion 4.3	Decay and Recycling 5.1	Electricity 4.4	Classification 4.2	Life Cycles 5.2	Inventors and Scientists	Mixtures and Reactions	States of Matter 4.6	Respecting our Environment	Inventors and Scientists	Light	Sound
W	Earth and Space	Inventors and Scientists	Heart and Lungs	Human Development	Electricity	Field Studies	Evolution and Inheritance	Scientists and Inventors	Classification	Human Development	Light	Field Studies

 Based on a single year 3 entry (May be subject to change if a mixed 2/3 or 3/4 cohort)

	Year B 2022/ 2023						Year A 2023/2024					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
P	The Weather (1.5)	Materials (2.5)	The Animal Kingdom (1.2)		Plants (2.4)	Habitats Around the World (2.6)	Everyday Materials (1.3)	Animals and their Needs <i>Human focus</i> (2.3)	Habitats in the UK (2.6)	Living Things (2.2)	Animals and their Needs <i>Animal focus</i> (2.3)	Plants (1.4)
H	Our Environment. Include weather focus. (1.1)						Local Habitats (2.1)					
G	Rocks and Fossils 3.6 Mary Anning	Magnets and Forces 3.3 Sir Isaac Newton	Animals and Skeletons including humans 3.2	Animal Homes 3.0	Light 3.5	Plants 3.6	Rocks and Fossils 3.6 Mary Anning	Magnets and Forces 3.3 Sir Isaac Newton	Animals and Skeletons 3.2	Animal Homes 3.0	Light 3.5	Plants 3.6
	Stiperstones and Wrekin ONLY 2022/ 2023						Year A 2023/2024					
S	Digestion – Animals including humans 4.3 Respecting Our Environment 4.1	Electricity 4.4 And Sound 4.5	Mixtures and Reactions – States of matter 5.4 States of Matter 4.6	Earth and Space 5.3 and Forces 5.6	Decay and Recycling 5.1 including classification 4.2	Human Development 5.5 and Life cycles 5.2	Decay and Recycling 5.1	Life Cycle 5.2	Earth and Space 5.3	Mixtures and Reactions- States of Matter 5.4	Human Development 5.5	Forces 5.6
W	Human Development – Animals including humans 5.5 Digestion 4.3 Hearts and Lungs – Animals including humans 6.2	Earth/ Space 5.3 And Sound 4.5 Including classification – Living things and their habitats 6.3	Life cycle 5.2 And Evolution and inheritance 6.6	Mixtures Reactions – Properties of changes of materials 5.4 And States of matter 4.6	Decay/ recycling 5.1 and	Forces 5.6 And Electricity 6.4	Decay and Recycling 5.1	Life Cycle 5.2	Earth and Space 5.3	Mixtures Reactions – Properties of changes of materials 5.4	Human Development – Animals including humans 5.5	Forces 5.6

	Year B 2024/2025						Year A 2025/2026					
P	The Weather (1.5)	Materials (2.5)	The Animal Kingdom (1.2)	Plants (2.4)	Habitats Around the World (2.6)	Everyday Materials (1.3)	Animals and their Needs <i>Human focus</i> (2.3)	Habitats in the UK (2.6)	Living Things (2.2)	Animals and their Needs <i>Animal focus</i> (2.3)	Plants (1.4)	The Weather (1.5)
H	Our Environment. Include weather focus. (1.1)						Local Habitats (2.1)					
G	Rocks and Fossils Mary Anning	Magnets and Forces Sir Isaac Newton	Animals and Skeletons	Animal Homes	Light	Plants	Rocks and Fossils Mary Anning	Magnets and Forces Sir Isaac Newton	Animals and Skeletons	Animal Homes	Light	Plants
S	Respecting Our Environment 4.1	Classification 4.2	Digestion 4.3	Electricity 4.4	Sound 4.5	States of Matter 4.6	Decay and Recycling 5.1	Life Cycle 5.2	Earth and Space 5.3	Mixtures Reactions – Properties of changes of materials 5.4	Human Development – Animals including humans 5.5	Forces 5.6
W	Field Studies 6.1	Hearts and Lungs – Animals including humans 6.2	Classification 6.3	Electricity 6.4	Light 6.5	Evolution and Inheritance 6.6	Decay and Recycling 5.1	Life Cycle 5.2	Earth and Space 5.3	Mixtures Reactions – Properties of changes of materials 5.4	Human Development – Animals including humans 5.5	Forces 5.6

Here is an overview of teaching and learning in science:

Year 1 and 2

Unit 1.1 Our Environment

Pupils study the same natural area during the course of the year, looking at how the area as a whole changes and also at how individual aspects such as a single tree change during the different seasons. They use their senses to observe the area and find and identify common animals and plants within the area. They learn how to show respect for the area and for the living things in it.

Unit 1.2 The Animal Kingdom

In this unit pupils describe the external parts of the human body and learn the basic needs of human beings. They look at a range of familiar and unfamiliar British animals and establish some basic ideas about what constitutes an animal. They learn that animals belong to one of six main classes: birds, fish, amphibians, reptiles, mammals and invertebrates and that each class has different characteristics and sometimes different body parts. They learn the names of some common British animals and research one animal in more detail.

Unit 1.3 Materials

Pupils develop vocabulary to describe material properties. They carry out a range of simple tests on materials and investigate the best material to make a particular object.

Unit 1.4 Plants

Pupils learn the names of some common native flowering plants and trees. They plant bulbs and/or seeds and observe their growth over a period of weeks. They go outside to study flowers and trees in wild and cultivated areas, making sketches and notes.

Unit 1.5 Weather

Pupils study different types of weather through making and using a weather station and looking at the weather around the World. They study different aspects of the weather and learn how different weather is associated with different seasons. They give different weather forecasts for different times of the year.

2.1 Local Habitats

Pupils visit the same habitats and microhabitats at different times of year and explore the seasonal changes in a habitat and a micro-habitat. They continue to develop their observation and questioning skills.

2.2. Living Things

Pupils classify things as living, once alive and never alive. They learn about the characteristics of living things, building and observing a wormery and going outside to hunt for examples of living and non-living things. They look for characteristics of life in plants and establish that plants are living things.

2.3 Animals and their needs

In this unit pupils begin by learning about the stages of human growth. They learn that animals grow until they are adult and that that different animals start life in different forms, some as eggs and some as live births and they look at the needs of the young of different species. Throughout the unit they observe some animals as they grow, both in the classroom, and through webcams on the Internet. This unit should be taught in late spring when it is possible to observe young birds and animals growing through webcams on the Internet.

2.4 Plants

Pupils think about the difference between seeds and other objects and work out what a seed is. They plant beans and monitor them weekly, observing, measuring, sketching and photographing them to provide a record of growth. They investigate the basic needs of plants for healthy growth and explore the way that plants change through the seasons.

2.5 Materials

Pupils explore different materials and begin to link properties with the use of the material, carrying out an investigation to decide on the best material for a particular use and imagining what objects would be like if they were made from “silly” materials. They learn about the life of John Boyd Dunlop who invented the pneumatic tyre.

2.6 Habitats

Pupils spend time learning about familiar and unfamiliar habitats such as woodland and the seashore. They work in the classroom and outdoors to look at animals and plants and further their knowledge of the variety of life in different places and they go pond dipping. They extend their knowledge of the diets of different animals to understand about food chains

Unit 3.1 Animal Homes

Pupils look at the “homes” that insects and birds need and make the school friendlier towards these creatures. They evaluate the success of the measures they have taken. Pupils also observe plants over time to explore the development of seeds and the life cycle of plants.

Unit 3.2 Animals and Skeletons

Pupils revisit the classification of animals according to diet as carnivores, herbivores or omnivores, researching the diets of animals in more detail. They look at human dietary requirements and begin to identify different food types and their different uses in the body. Dissecting an owl pellet provides a link between learning about diets and the study of skeletons. They then learn about external and internal skeletons, making a life size skeleton cut-out and studying the names and functions of the major bones in the human skeleton.

Unit 3.3 Forces and Magnets

Pupils explore magnetism and non-contact forces, suspending magnetic items in mid-air under the influence of magnetic forces. They test materials for magnetic properties and think about what materials are magnetic. They describe the properties of a magnet in simple terms and learn about the uses of magnets.

Unit 3.4 Plants

Pupils carry out a long-term investigation of the factors that affect the growth of plants, observing and measuring their plants for the course of the unit. They learn about the main functions of the different parts of a plant and study the life cycle of a flowering plant and the different methods of seed dispersal.

Unit 3.5 Light

Pupils learn to distinguish a light source from reflected light. They learn that light travels in straight lines, study how we see and are taught how to protect their eyes. They investigate the transparency of fabrics using data loggers and carry out some experiments to find out about shadow formation.

Unit 3.6 Rocks

Pupils explore the characteristics of rocks and learn their names. They carry out simple tests on different rocks and use chocolate to model how rocks are formed. They explore the composition of soil and think about how soil is made. They learn about the formation of fossils and

make their own model fossils. They look at pictures of dinosaur fossils and try to come to some conclusions about the living dinosaurs the fossils came from.

Unit 4.1 Respecting our Environment

Pupils look at the area within and near the school grounds and at the impact of humans on the environment. They discuss the need to balance human requirements against those of the environment.

Unit 4.2 Classification

Pupils learn about the variety of living things and how they can be grouped according to shared characteristics. They use and construct keys to identify unfamiliar animals and plants. They study the life of Carl Linnaeus who developed the system of classification used today.

Unit 4.3 Digestion

In this unit pupils learn about the structure of the mouth and about how to care for their teeth, investigating which drink stains teeth the most. They learn about the structure of the digestive system and building a model of the digestive process and making “poo” then using their knowledge to produce a piece of creative writing. They explore interrelationships in food, constructing food chains and food webs.

Unit 4.4 Electricity

Pupils learn that some materials allow electricity through them and others do not. They learn about the history of electricity and they make and test electrical circuits with a variety of components. They use their knowledge of electricity to design and build a model of a burglar alarm for a house.

Unit 4.5 Sound

Pupils listen to and identify sounds and learn how our ears work to detect sounds. They carry out experiments to help them learn about loudness and pitch and use data loggers to investigate the best material for muffling sound. They make and play musical instruments.

Unit 4.6 States of Matter

Pupils learn that materials come in three states of matter: solid, liquid or gas. They identify materials as solids, liquids or gases, including some that are harder to classify such as sand or sponge. They learn how to use a thermometer and investigate changes of state. They learn about the water cycle.

Unit 5.1 Decay and recycling

Pupils will carry out a number of visits in and around the school to look for evidence of decay. They will create a compost heap and observe it over time. Natural and man-made materials will be left in different places to see how well they break down. Pupils will also carry out a litter survey in the local area and report back through a school assembly. This unit is intended to be taught across the whole year. [

Unit 5.2 Life Cycles

Pupils revisit the life cycle of plants, and learn about pollination. They compare the life cycles of birds, mammals, insects and amphibians and learn that insects and amphibians undergo metamorphosis.

Unit 5.3 Earth and Space

Pupils study our solar system, learning about the relative movements of the planets and the Moon and relating these to the way we experience the Sun and the Moon on Earth. They carry out some research into planets and investigate the way meteorites have shaped the surface of the Moon.

Unit 5.4 Mixtures and Reactions

After reviewing and extending their knowledge of materials from previous years, pupils study dissolving and learn how to recover materials from a solution. They look at other methods of separating mixtures and carry out an investigation on “sewage” to clean it up before discharge into a river. They investigate chemical reactions including burning and use a key and a series of simple tests to identify some mystery powders. They learn about reversible and irreversible changes and they create a drama about the life of a famous materials scientist.

Unit 5.5 Human Development

Pupils learn about the human life cycle and about the changes of the body during puberty. They learn about the development of a baby during pregnancy and about the birth of a baby. This unit has been written to match lessons in Personal, Social and Health Education on puberty and the feelings associated with growing up.

Unit 5.6 Forces

Pupils learn more about the forces of gravity and friction and investigate the friction of different surfaces. They study air resistance, investigate paper spinners falling, look at floating and sinking and build a self-righting boat. Learning about simple forces includes activities to study pulleys, gears and other simple machines and gives pupils the chance to use their knowledge of machines to build a catapult.

Unit 6.1 Field Studies

Pupils use different field studies sampling methods to study the local environment across the year and to establish how the population of different species varies with the seasons. They bring earthworms to the surface with diluted mustard so that they can count them and test the conditions that encourage algae to grow.

Unit 6.2 Heart and Lungs

Drawing a giant circulatory system in the playground helps pupils learn about the circulatory system, and squeezing water out of an old, split tennis ball gives them an idea of how the heart pumps blood. They make model lungs to explore breathing and find out about the way that exercise affects heart and breathing rates.

Unit 6.3 Classification

Building on their work from Year 4, pupils learn about the classification of invertebrates, playing specially devised card games to help them learn names and examples of the different classes. They make a key to identify types of microbes and put the common microorganism, yeast, to work as they bake bread.

Unit 6.4 Electricity

Pupils investigate how the flow of electricity is changes by using different components and different wires in a circuit. They draw and interpret circuit diagrams and begin to study circuits that make more than one loop. They build games such as a steady hand game, an electric quiz or an operation-style game.

Unit 6.5 Light

Pupils extend their understanding of how light behaves, investigating shadows and reflectivity. They build a shadow puppet theatre, using their knowledge of shadows to create special effects and add drama to their performances. They learn about the eye and how we see and make a pinhole camera to explore how the light focuses on the retina.

Unit 6.6 Evolution

Starting with the story of the life and works of Charles Darwin, pupils learn about evolution, the survival of the fittest and adaptation. They search for “caterpillars” made of wool to understand more about camouflage and they create an evolutionary timeline that is so long it has to be set out using toilet roll. They investigate the differences between selective breeding and evolution, looking at successive generations of an imaginary animal.