"It seems to me that the natural world is the greatest source of excitement; the greatest source of visual beauty; the greatest source of intellectual interest. It is the greatest source of so much in life that makes life worth living."

Sir David Attenborough

At Crowton, we will ensure our children become scientists by making sure they meet the National Curriculum expectations to:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

We recognise the importance of Science in assisting children with their understanding of the world around them. Our vision is to give children a curriculum which enables them to explore and discover, so that they have a deeper understanding of the world in which we live. To achieve this, it involves exciting lessons and learning that encourages curiosity and questioning.

Our carefully planned and progressive science curriculum is designed with the target of all children becoming scientists. In most lessons, there will be a balance of knowledge (sticky knowledge), vocabulary and scientific skills such as identifying and classifying. Mixed-age classes allow for a more personalised approach to learning and teaching, meeting the needs of all the children more effectively, supporting the less able and stretching the more able appropriately.

Science at Crowton links with our Christian ethos and focuses on the importance of stewardship and building knowledge of human impact and responsibility of our environment and world.

Intent

Our intent is to give every child a broad and balanced Science curriculum which enables them to confidently explore and discover what is around them, so that they have a deeper understanding of the world we live in. We want our children to love science. We want them to have no limits to what their ambitions are and grow up wanting to be astronauts, forensic scientists, toxicologists or microbiologists.

To achieve this, it involves exciting, practical hands-on experiences that encourage curiosity and questioning. Our aim is that these stimulating and challenging experiences help every child secure and extend their scientific knowledge and vocabulary, as well as promoting a love and thirst for learning

We want our children to remember their science lessons in our school, to cherish these memories and embrace the scientific opportunities they are presented with!

At Crowton, we are studying CUSP science. Through this, pupils become more expert as they progress through the curriculum, accumulating, connecting and making sense of the rich substantive and disciplinary knowledge.

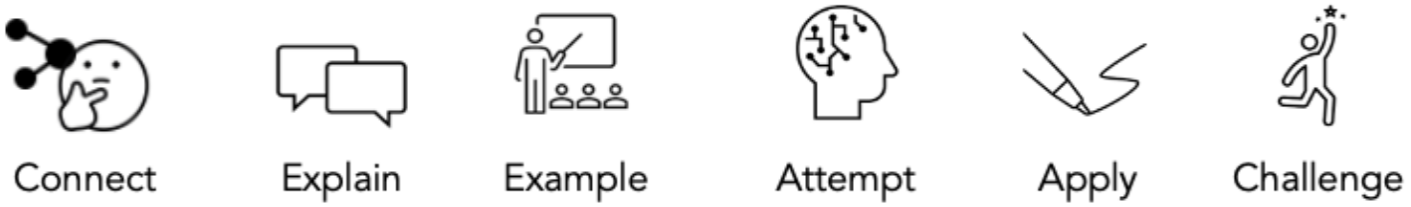
1. Substantive knowledge - this is the subject knowledge and explicit vocabulary used to learn about the content. Common misconceptions are explicitly revealed as non-examples and positioned against known and accurate content. In CUSP science, an extensive and connected knowledge base is constructed so that pupils can use these foundations and integrate it with what they already know. Misconceptions are challenged carefully and in the context of the substantive and disciplinary knowledge. In CUSP Science, it is recommended that misconceptions are not introduced too early, as pupils need to construct a mental model in which to position that new knowledge.

2. Disciplinary knowledge – this is knowing how to collect, use, interpret, understand and evaluate the evidence from scientific processes. This is taught.

Scientific analysis is developed through **IPROF** criteria. We call it '**Thinking Scientifically**.'
- **i**dentifying and classifying
- **p**attern seeking
- **r**esearch
- **o**bserving over time
- **f**air and comparative testing

Implementation

Our science curriculum is built around the principles of cumulative knowledge. The effect of this cumulative model supports opportunities for children to associate and connect with significant periods of time, people, places and events. They connect where new learning fits in with prior learning. New vocabulary and knowledge are explained. Staff share example, classes attempt work together before children apply independently. Then new learning is challenged further.



CUSP Science has sequenced the national curriculum into **meaningful and connected 'chunks'** of content to reduce the load on the working memory, **addressing common misconceptions** and placing importance on subject content as well as the **context** it is taught in. We also value the study of scientists from the past as well as promoting **diverse** present-day role models in the field.

Key Stage One (Y1/Y2)

Pupils study the **Seasons** and develop an early conceptual understanding of how day becomes night. An understanding of change over time connects to the study of **Plants**, including trees. This focus enables children to associate trees as belonging to the plant kingdom and notice the changes deciduous trees go through connected to the seasons.

Contrasting that study, pupils learn about **Animals, including human**s. Non-examples of plants are used to contrast the features of an animal.

Pupils are introduced to i**dentifying and classifying materials**. Scientific terms, such as transparent, translucent and opaque are taught explicitly through vocabulary instruction and pupils make further sense by applying it to what they know and then to working and thinking scientifically tasks. This substantive knowledge is enriched by pupils' use of disciplinary knowledge through scientific enquiry.

Within the **study of Living things and their habitats** and **Uses of everyday materials** new substantive knowledge is constructed and made sense of through Working and Thinking scientifically tasks.

Lower Key Stage Two (Y3/4)

The unit on **Rocks** is studied and connected with prior knowledge from 'Everyday materials' in KS1. A study of **Animals, including humans** is built upon from KS1 and contrasts the physical features with the functions they perform, including the skeleton and muscles. **Rocks** is revisited again to sophisticate and deepen pupils' knowledge, advancing their understanding.

Forces and magnets are introduced and connect with KS1 materials, including twisting, bending and squashing. Contact and non-contact forces are taught and understanding applied through Working and Thinking Scientifically.

The abstract concept of **Light** is made concrete through knowing about light sources and shadows.

Plants are studied to develop a more sophisticated understanding of their parts and functions, including pollination.

A study of **Living things and their habitats** pays close attention to classification and is directly taught using prior knowledge to ensure conceptual frameworks are secure. Animals, plants and environments are connected in this study with a summary focusing on positive and negative change.

Electricity is introduced and pupils acquire understanding about electrical sources, safety and components of a single loop circuit.

Animals, including humans focuses on the sequence of digestion, from the mouth to excretion.

States of matter and Sound are taught using knowledge of the particle theory. Practical scientific tasks and tests help pupils build a coherent understanding of the particle theory by applying what they know through structured scientific enquiry.

Upper Key Stage Two (Y5/Y6)

Pupils reuse and draw upon their understanding of states of matter in the study of **Properties and changes of materials.** Change is also studied within **Animals**, including humans, focusing on growth and development of humans and animals.

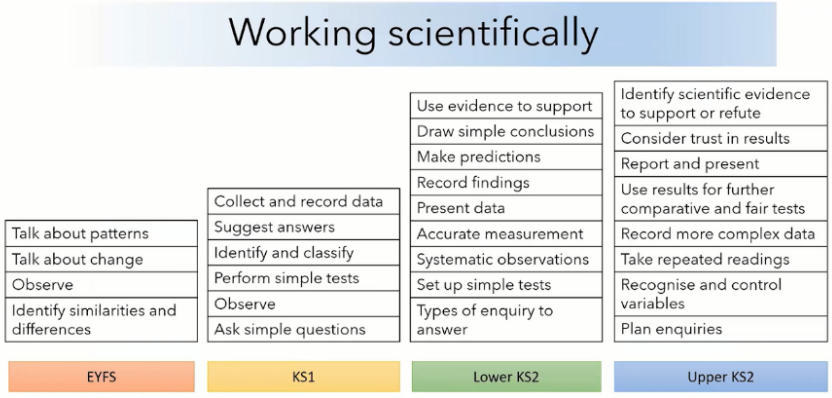
Earth in Space develops the conceptual understanding of our place in the universe.

A study of Forces sophisticates the substantive knowledge acquired in KS1 and LKS2. Enhancing this study of Forces, pupils learn about Galileo Galilei 1564 - 1642 (considered the father of modern science).

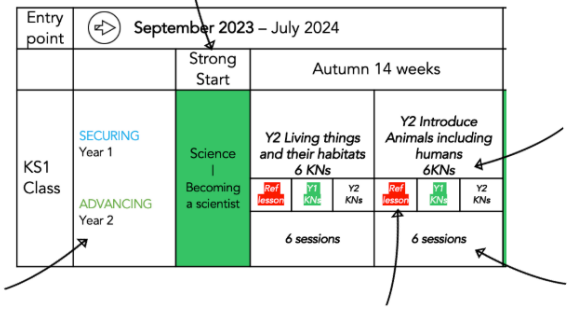
Living things and their habitats focuses on differences in life cycles of living things and how they reproduce. This study also contrasts previous scientific thinking. A further study of **Living things and their habitats** enables pupils in UKS2 to revisit and add to their understanding of classification through the taxonomy created by Carl Linnaeus. More complex animals are studied.

Light is revisited and taught with advanced substantive knowledge. This is physics study with a focus on the properties of light, not the biology of the eye.

Dual coded knowledge organisers contain core information for children to easily access and use as a point of reference and as a means of retrieval practise. Events such as Science Week or project days, STEM sessions or science blocked learning allow all pupils to come off-timetable, to provide broader provision and the acquisition and application of knowledge/skills.



Strong Starts are planned into the CUSP Science sequence. They are single lessons, with context, at the beginning of every term that help pupils to think and become more like a scientist through practising working scientifically before they engage fully with the content. This helps with their procedural knowledge. These are optional.



Name of the CUSP Learning Module and number of Knowledge Notes in total. Some will be ESSENTIAL and some will be ENRICHMENT. Knowing your class, you decide which ones will be best and how many to use in the sequence you have time for.

In the Learning Module, you will find two Knowledge Notes (KN).
They will both cover the same Learning Question, but one will secure knowledge and one will advance it. You decide who needs which one.

A Reference Lesson is a CUSP resource for you for one lesson to secure foundational knowledge and start everyone off from a shared point. Essential in Mixed Age teaching, but are optional.

This shows the total number of allocated sessions based on CUSP timetabling. For some Learning Modules, there will be more sessions than lessons. This allows for consolidation of misconceptions or elaboration.

Science: Curriculum Overview – Year A

This means there are 2 spare sessions beyond the allocated science lessons to enrich, elaborate or consolidate learning.

Key Stage 1 Science – Year A

Entry point		Strong Start	Autumn			Strong Start	Spring		Strong Start	Summer	
KS1 Class	SECURING Year 1 ADVANCING Year 2	Science | Becoming a scientist	*Y1 Seasonal changes and weather3 KNs* Y1 KNs / Y2 KNs *3 sessions*	*Y1 Introduce plants (trees) 3KN* Y1 KNs / Y2 KNs *3 sessions (+1 enrichment opportunity)*	*Y1 Introduce Animals including humans 5 KNs* Y1 KNs / Y2 KNs *5 sessions (+1 enrichment opportunity)*	Science | Becoming a scientist	*Y1 Everyday materials 6 KNs* Y1 KNs / Y2 KNs *6 sessions*	*Y1 Revisit 1 Animals including humans 3 KNs* Y1 KNs / Y2 KNs *5 sessions (+2)*	Science | Becoming a scientist	*Y1 Plants 3 KNs* Y1 KNs / Y2 KNs *5 sessions (+2)*	*Y1 Second revisit Animals and Plants 3 KNs* Y1 KNs / Y2 KNs *6 sessions (+3)*

Lower Key Stage 2 Science – Year A

Starting point		Strong Start	Autumn 14 weeks			Strong Start	Spring 12 weeks		Strong Start	Summer 12 weeks	
LKS2 Class	SECURING Year 3 ADVANCING Year 4	Science | Becoming a scientist	*Y3 Rocks 6 KNs* Y3 KNs / Y4 KNs *6 sessions*	*Y3 Animals including humans 3 KNs* Y3 KNs / Y4 KNs *4 sessions (+1)*	*Y3 Revisit Rocks 3 KNs* Y3 KNs / Y4 KNs *3 sessions + 1 enrichment opportunity*	Science | Becoming a scientist	*Y3 Forces and magnets 6 KNs* Y3 KNs / Y4 KNs *6 sessions*	*Y3 Plants 3 KNs 6 KNs in total* Ref lesson / Y3 KNs / Y4 KNs *5 sessions (+2)*	Science | Becoming a scientist	*Y3 Plants 3 KNs* Y3 KNs / Y4 KNs *5 sessions (+2)*	*Y3 Light 3 KNs* Y3 KNs / Y4 KNs *6 sessions (+3)*

Upper Key Stage 2 Science – Year A

Starting point		Strong start	Autumn		Strong start	Spring		Strong start	Summer	
UKS2 Class	SECURING Year 5 ADVANCING Year 6	Science | Becoming a scientist	*Y5 Properties and changes of materials 6 KNs* Ref lesson / Y5 KNs / Y6 KNs *8 sessions (+2)*	*Y5 Animals including humans 3 KNs* Y5 KNs / Y6 KNs *5 sessions (+2)*	Science | Becoming a scientist	Y5 Forces 4 KNs Ref lesson / Y5 KNs / Y6 KNs *5 sessions (+1)*	Y5 Earth in Space 5 KNs Ref lesson / Y5 KNs / Y6 KNs *5 sessions (+1)*	Science | Becoming a scientist	*Y5 Living things and their habitats 6 KNs* Ref lesson / Y5 KNs / Y6 KNs *6 sessions*	*Y5 Forces continued 2 KNs* Y5 KNs / Y6 KNs *5 sessions (+2)*

Science: Curriculum Overview – Year B

Entry point		Key Stage 1 Science								Year B
		Strong Start	Autumn 14 weeks		Strong Start	Spring 12 weeks		Strong Start	Summer 12 weeks	
KS1 Class	SECURING Year 1 ADVANCING Year 2	Science | Becoming a scientist	*Y2 Living things and their habitats 6 KNs* Ref lesson | Y1 KNs | Y2 KNs *6 sessions*	*Y2 Introduce Animals including humans 6KNs* Ref lesson | Y1 KNs | Y2 KNs *6 sessions*	Science | Becoming a scientist	*Y2 Uses of Everyday materials 6 KNs* Ref lesson | Y1 KNs | Y2 KNs *6 sessions*	*Y2 Revisit Living things and their habitats / materials 3KNs* Ref lesson | Y1 KNs | Y2 KNs *5 sessions (+2)*	Science | Becoming a scientist	*Y2 Plants 6Kns* Y1 KNs | Y2 KNs *6 sessions*	*Y2 Revisit 2 living things and their habitats 3 KNs* Y1 KNs | Y2 KNs *5 sessions (+2)*

Starting point		Lower Key Stage 2 Science								Year B
		Strong Start	Autumn		Strong Start	Spring		Strong Start	Summer	
LKS2 Class	SECURING Year 3 ADVANCING Year 4	Science | Becoming a scientist	*Y4 Living thing and their habitats 6 KNs* Ref lesson | Y3 KNs | Y4 KNs *6 sessions*	*Y4 States of matter 6 KNs* Ref lesson | Y3 KNs | Y4 KNs *7 sessions (+1 enrichment opportunity =+2)*	Science | Becoming a scientist	*Y4 Animals including humans 9 KNs* Ref lesson | Y3 KNs | Y4 KNs *11 sessions (+2)*		Science | Becoming a scientist	*Y4 Electricity 3 KNs* Ref lesson | Y3 KNs | Y4 KNs *5 sessions (+2)*	*Y4 Sound 3 KNs* Y3 KNs | Y4 KNs *6 sessions (+3)*

Starting point		Upper Key Stage 2 Science								Year B
		Strong start	Autumn 14 weeks		Strong start	Spring 12 weeks		Strong start	Summer 12 weeks	
UKS2 Class	SECURING Year 5 ADVANCING Year 6	Science | Becoming a scientist	Y6 Electricity 3 KNs Ref lesson | Y5 KNs | Y6 KNs *5 sessions (+2)*	Y6 Animals including humans (+ water transport) 7 KNs Ref lesson | Y5 KNs | Y6 KNs *8 sessions (+1)*	Science | Becoming a scientist	Y6 Animals including humans (+ water transport) 3 KNs Y5 KNs | Y6 KNs *4 sessions (+1)*	Y6 Light 6 KNs Ref lesson | Y5 KNs | Y6 KNs *7 sessions (+1)*	Science | Becoming a scientist , …	Y6 Living things and their habitats 6 KNs Ref lesson | Y5 KNs | Y6 KNs *6 sessions*	Y6 Evolution and inheritance 6 KNs Ref lesson | Y5 KNs | Y6 KNs *6 sessions*

Impact

We want all of our pupils to develop a love of learning and enquiry; to plan, to question, to think critically and to evaluate and reflect. We want them to appreciate that learning and understanding comes when we demonstrate critical thinking, resilience, endeavour and perseverance. We want children to understand the impact their actions have on the natural world and how working scientifically can solve the climate crisis.

The impact of this curriculum design will lead to outstanding progress over time across key stages relative to a child's individual starting point and their progression of skills. Children will therefore be expected to leave Crowton reaching at least age-related expectations for Science. Our Science curriculum will also lead pupils to be enthusiastic learners, evidenced in a range of ways, including pupil voice and their work.

How do we know what the children have learned?

- Questioning
- Pupil Book Study talking about learning with the children
- Talking to teachers
- Quizzing and retrieval practise
- Feedback and marking
- Progress in book matches the curriculum intent

After each science unit, teachers will assess the children's retention of the knowledge they have gained and how their working scientifically skills have developed. By comparing pre and post learning questions and using open ended questions that require children to connect and explain their learning, through the disciplinary and substantive concepts, which are the focus of that particular science study.

The science leader will continually monitor the impact of science throughout the school in order to ensure progress of knowledge and skills is being taught. In addition, the science leader will continue to access CPD in order to identify new activities and learning opportunities that will keep the subject fresh, exciting and relevant for an ever-changing world.

Science: EYFS

The Early Years Foundation Stage Curriculum supports children's understanding of Science through the planning and teaching of '**Understanding the World**.' Children find out about objects, materials and living things using all of their senses looking at similarities, differences, patterns and change.

Both the environment and skilled practitioners foster curiosity and encourage explorative play, children are motivated to ask questions about why things happen and how things work. Our children are encouraged to use their natural environment around them to explore. Children enjoy spending time outdoors exploring mini-beasts and their habitats, observing the changing seasons, plants and animals.

Specific Area of Learning **Understanding the World**	ELG's	How this is achieved in EYFS	Key Vocabulary to be developed in EYFS		Science KS1	
					Year 1	Year 2
	Managing Self • Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. ELG 14 The Natural World • Explore the natural world around them, making observations and drawing pictures of animals and plants.	• Discussions at snack time of the importance of healthy food choices. • During lunch time discussions. • Through stories and circle time discussions, e.g. the story – Now wash your hands and Funny bones. • P.E lessons that encourage getting dressed and undressed independently. • Naming body parts through songs – Heads, shoulders, knees and toes. • RSE link – Correct naming of body parts. • Talking about pets at home. • Exploring minibeasts and recording our observations.	• Exercise • Healthy • Wash • Toothbrush • Tooth / Teeth • Body • Head • Bones • Skeleton • Family	• Animal • Human • Mammal • Bird • Fish • Amphibian • Insect • Lifecycle • Nocturnal	Animals, including humans	
	ELG 14 The Natural World • Explore the natural world around them, making observations and drawing pictures of animals and plants.	• Going on walks to observe the local environment and to compare and learn about the seasons. • Taking photos to compare seasons and discuss. • Planting seeds and plants. • Looking after the EYFS garden. • Creating bug hotels.	• Lifecycle • Plant • seed • grow • roots • Flower	• Seasons • Autumn • Winter • Spring • Summer • Change • Weather	Plants Seasonal changes	Living things and their habitats
	ELG 14 The Natural World • Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	• Growing plants from bulbs and seeds. • Making boats to explore best materials. • Water tray activities to explore water, ice, and materials that float and sink. • Testing the best material for a raincoat for Paddington bear.	• Material • Wood • Plastic • Glass • Float	• Sink • Liquid • Solid	Everyday materials	Uses of everyday materials
Scientific Vocabulary – scientist, sort, observation, identify, compare, group, investigate, test, evaluate						

Long Term Sequence for Science (2 Year Cycle)

	EYFS Understanding the World	Year A (Y1 Content)	Year B (Y2 Content)	Year A (Y3 Content)	Year B (Y4 Content)	Year A (Y5 Content)	Year B (Y6 Content)
Biology (53% of Science content)	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.		Living Things and Their Habitats **(+revisit modules)**		Living Things and Their Habitats	Living Things and Their Habitats	Living Things and Their Habitats
		Plants	Plants	Plants			
		Animals including Humans **(+revisit modules)**	Animals including Humans **(+revisit modules)**	Animals including Humans	Animals including Humans	Animals including Humans	Animals including Humans
							Evolution and Inheritance
Physics (29% of Science content)		Seasonal Changes **(+revisit modules)**		Light			Light
				Forces and Magnets		Forces	
					Electricity		Electricity
					Sound		
						Earth and Space	
Chemistry (18% of Science content)		Everyday Materials	Use of Everyday Materials			Properties and Changes of Materials	
				Rocks **(+revisit module)**			
					States of Matter		

Cumulative End Goals – By the end KS1 Cycle A (Y1 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Seasonal changes and daily weather *Physics*	• knowing and explaining what an animal is and what a plant is • knowing and explaining how seasons influence plants and animals • knowing and identifying the common features of fish, amphibians, reptiles, birds and mammals • knowing, explaining and grouping animals by the types of food they eat • knowing and explaining the places (habitats) that fish, amphibians, reptiles, birds and mammals live • knowing and locating the main body parts of a human • knowing the five senses and explaining how they help compare different textures, sounds and smells	• knowing and explaining the order of seasons • knowing and explaining the changes within each season including months of the year • knowing different patterns of weather and explaining, for example, how rain can occur in all seasons • knowing that the earth rotates and explaining how day and night occurs	• knowing the properties of everyday materials, such as wood, plastic, glass, metal, water and rock • knowing and explaining the difference between an object and the material from which it is made, such as metal and a spoon • knowing and explaining the properties of materials, such as hard / soft, stretchy, / stiff, rough / smooth, bendy / rigid, waterproof /not waterproof, absorbent / not absorbent, opaque / translucent / transparent • knowing, explaining and grouping a range of everyday materials depending on their properties
Animals, including humans *Biology*			
Everyday materials *Chemistry*			
Plants *Biology*	• knowing and identifying the basic structure of plants and trees, such as roots, bulbs, stem, leaf, flower, fruits, trunk, branch and crown • knowing and identifying the common names of wild and garden plants • knowing and identifying explaining different trees in the locality, such as oak or Scots Pine… • knowing and explaining the difference between evergreen and deciduous trees, including the influence of seasons		

Cumulative End Goals – By the end KS1 Cycle B (Y2 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Living things and their habitats *Biology*	• knowing and explaining the common characteristic of living things, such as MRS GREN • knowing and explaining the difference between things that are living, dead and things that have never been alive • knowing and explaining what a habitat is and why plants and animals that live there are best suited to it		• knowing and explaining what properties everyday materials have • knowing, comparing and explaining the properties and suitability of everyday materials for particular uses, such as glass in windows or bricks for building – identifying what is suitable or unsuitable • knowing and explaining how the shape of everyday materials can be changed, for example by squashing, bending, twisting and stretching • explaining how significant scientists have made useful things from knowing about the properties of materials, such as Charles Macintosh
Animals, including humans *Biology*	• knowing and identifying a variety of plants and animals in micro-habitats and habitats • knowing and explaining what an animal is and how they get their food from other plants and animals • knowing and explaining what a simple food chain is, including the direction of energy		
Uses of everyday materials *Chemistry*	• knowing and explaining that animals, including humans, have offspring which grow into adults • knowing and explaining simple life cycles of animals, including humans • knowing and explaining that animals need water, food and air to survive • knowing and explaining that to be healthy, humans need to exercise, eat the right amounts of different types of food and keep clean		
Plants *Biology*	• knowing and explaining what conditions are needed for seeds to germinate and mature into plants • knowing and explaining how bulbs grow • knowing and explaining the conditions that plants need to thrive, grow, mature, and reproduce		

Cumulative End Goals – By the end LKS2 Cycle A (Y3 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Rocks *Chemistry*	• knowing and explaining that animals, including humans, need the right types and amounts of nutrition • knowing and explaining that animals only get nutrition from the food they eat – they cannot make their own food like plants • knowing, identifying and explaining the purpose and function of the human skeleton, such as supporting the body, protecting the lungs and helping joints move • knowing, identifying and explaining the purpose and function of the muscles, such as skeletal, cardiac or smooth muscles • knowing and explaining the difference between vertebrates and invertebrates	• knowing how objects move on different surfaces using friction and resistance to explain why • knowing and explaining the difference between contact and non-contact forces • knowing and explaining how magnets attract and repel each other • knowing and explaining how magnets attract some materials and not others • using what they know about the properties of materials from KS1 to group everyday materials that are attracted to a magnet • knowing and identifying magnetic materials • knowing and explaining that a magnet has two poles, and predicting whether they will attract or repel each other	• knowing and explaining that rocks can be grouped together on the basis of their appearance and properties • knowing and explaining how rocks are formed • knowing and explaining what a rock is and what is not a rock • knowing and explaining different types of rock, such as igneous, sedimentary and metamorphic rock • knowing and explaining how fossils of animals and plants are formed • knowing and explaining the different types of fossils, including body and trace fossil • knowing and explaining what soil is made from • knowing and explaining the different types of material that make up soil, including rocks and organic matter
Animals, including humans *Biology*			
Forces and magnets *Physics*			
Plants *Biology*	• knowing and identifying the structure of the different parts of flowering plants • knowing and explaining the function of the parts of flowering plants • knowing and explaining what plants need to live and grow, such as air, light, water, nutrients from soil and space to grow • knowing how water is transported within plants and explaining the process of transpiration • knowing and explaining the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	• knowing and explaining that light is needed to see things • knowing and explaining that dark is the absence of light • knowing and explaining that light is reflected from surfaces and enters our eyes • knowing that the light of the sun can be dangerous and how to protect their eyes • knowing and explaining that shadows are formed when light from a source is blocked by an opaque object • knowing and explaining how shadows change size	
Light *Physics*			

Cumulative End Goals – By the end LKS2 Cycle B (Y4 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Living things and their habitats *Biology*	• knowing and explaining that living things can be grouped in a variety of ways, such as vertebrate or invertebrate and flowering and non-flowering plants • knowing, using and explaining the classification of vertebrates, such as fish, amphibians, reptiles, birds and mammals • knowing, using and explaining the classification of invertebrates, such as snails and slugs, worms, spiders and insects • knowing and use classification keys to group, identify and name a variety of living things in their local environment • knowing and explaining the impact on living things if their habitat changes	• knowing and explaining that household appliances run on electricity from mains or batteries • knowing, identifying and explaining what a simple single loop circuit is (also known as a simple series electrical circuit) • knowing, identifying and explaining the component of a single loop circuit, such as cells, wires, bulbs, switches and buzzers • knowing and explaining 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 • knowing and explaining that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a single loop circuit • knowing and identifying that some common conductors and insulators as well as associating metals with being good conductors. • knowing and explaining that current is the flow of electricity through a circuit	• knowing and explaining what matter and state means • being introduced to simple models that explain what particles are • knowing and explaining the difference between solids, liquids and gases, such as solids hold their shape, liquids form a pool not a pile and gases escape from an unsealed container • observing and knowing that some materials change state when they are heated or cooled, such as water evaporating or butter melting • knowing and using Celsius as a measure of temperature • knowing and explaining the part played by evaporation and condensation in the water cycle • observing, knowing and explaining how the rate of evaporation is associated with temperature
States of matter *Chemistry*			
Animals, including humans *Biology*	• knowing and identifying the parts of the human digestive system, such as the mouth, tongue, teeth, oesophagus, stomach, small and large intestine • knowing and explaining the functions of the parts of the human digestive system, such as the mouth, tongue, teeth, oesophagus, stomach, small and large intestine • knowing and explaining the different teeth that carnivores and herbivores have and why this is important for their diet • knowing, constructing and explaining food chains • knowing and identifying producers, predators and prey in a food chain		
Electricity *Physics*			
Sound *Physics*			

Cumulative End Goals – By the end UKS2 Cycle A (Y5 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Properties and changes of materials *Chemistry*	• knowing, describing and explaining the changes humans go through to old age • knowing and using a timeline to show stages of growth and development of humans, including puberty • knowing, comparing and explaining the difference in gestation periods of humans to other animals, such as an elephant or butterfly	• knowing and explaining that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • knowing, identifying and explaining the effects of air resistance, water resistance and friction, that act between moving surfaces, such as a parachute or a brake on a bike • knowing and explaining how significant scientists, such as Isaac Newton or Galileo Galilei helped develop the theory of gravitation • knowing, experiencing and explaining how the effect of friction on movement slows or stops moving objects	• knowing, identifying and grouping the properties of everyday materials, such as hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets • knowing and explaining how some materials dissolve in liquid to form a solution • knowing and describing how to recover a substance from a solution • knowing and using their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • knowing and explaining, by giving reasons based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • knowing and explaining how dissolving, mixing and changes of state are reversible changes • knowing and explaining that some changes result in the formation of new materials that are not usually reversible, such as burning
Animals, including humans *Biology*	• knowing, identifying and explaining the differences in the life cycles of a mammal (dog), an amphibian (frog), an insect (ladybird) and a bird (chicken) • knowing and explaining the life process of reproduction in some plants and animals • knowing and explaining about a significant scientist, such as Maria Merion who David Attenborough described as one of the most important contributors to entomology	• knowing and explaining that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect known as a force multiplier • knowing and experiencing how levers, pulleys and gears multiply a smaller force to achieve a greater effect, such as removing a nail using a claw hammer, making simple pulleys and gears on a bike	
Forces *Physics*			
Earth in Space *Physics*		• knowing and identifying the eight planets in our solar system - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune • knowing and identifying Pluto as a dwarf planet • knowing, identifying and explaining the movement of the Earth and other planets, relative to the Sun in the solar system • knowing and explaining the movement of the Moon relative to the Earth • knowing and explaining that a moon is a celestial body that orbits a planet, such as the Moon around Earth or the four large moons of Jupiter - Io, Europa, Ganymede and Callisto first seen by Galileo Galilei • knowing and explaining that the Sun, Earth and Moon are approximately spherical bodies • knowing about Earth's rotation to explain day and night and the apparent movement of the sun across the sky	
Living things and their habitats *Biology*			

Cumulative End Goals – By the end UKS2 Cycle A (Y6 Content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Electricity *Physics*		• knowing and explaining how a single loop circuit (series circuit) works • knowing and explaining how the brightness of a lamp or the volume of a buzzer is affected by the number and voltage of cells used in a circuit • knowing, using and explaining the reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • knowing and using recognised symbols when representing a simple circuit in a diagram • knowing and explaining how to be safe when working with electricity	
Animals including humans *Biology*	• knowing, identifying and explaining the main parts of the human circulatory system and describe the functions of the heart, such as lungs, heart, aorta, pulmonary vein, left atrium, right atrium, left ventricle, right ventricle, arteries, veins and capillaries, oxygenated and deoxygenated • knowing, identifying and explaining the components and function of blood, such as plasma, red blood cells, white blood cells, platelets, nutrients and oxygen • knowing and explaining the impact of diet, exercise, drugs and lifestyle on the way their bodies function • knowing, describing and explaining the ways in which nutrients and water are transported within animals, including humans • knowing and explaining how significant scientists helped us understand more about the circulatory system, such as Galen or William Harvey		
Animals including humans (water transport) *Biology*	• knowing and explaining 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 • knowing and identifying the five major kingdoms of living things, including plant, animal, fungi, algae, slime and mould, and bacteria • knowing and explaining how significant scientists, such as Aristotle or Carl Linnaeus, helped us understand more about classification		
Light *Physics*		• knowing and explaining that light appears to travel in straight lines • knowing that light travels in straight lines to explain how objects are seen because they give out or reflect light into the eye • knowing and explaining that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • knowing that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	
Living things and their habitats *Biology*	• knowing, using and explaining taxonomy • knowing and explaining reasons for classifying plants and animals based on specific characteristics, such as vertebrates or invertebrates • knowing and using classification systems and keys to identify some animals and plants in the immediate environment • knowing how to classify animals and plants they are unfamiliar with using a classification system		
Evolution and inheritance *Biology*	• knowing and explaining that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago, such as body fossils, mould fossils, cast fossils and trace fossils • knowing and explaining that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • knowing, identifying and explaining how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • knowing and explaining about significant scientists who have helped us understand the theory of evolution, such as Alfred Wallace and Charles Darwin		