St. Joseph's Catholic Primary School
Science Planning and Progression Document Rec- Y6

CUSP Science pays close attention to guidance provided by the National Curriculum sequence and content. It is infused with evidence-led practice and enriched with retrieval studies to ensure long-term retention of foundational knowledge. The foundations of CUSP science are cemented in the EYFS through learning within the Natural World, and People, Culture and Communities.

Our ambitious interpretation of the National Curriculum places knowledge, vocabulary, working and thinking scientifically at the heart of our principles, structure and practice. CUSP Science precisely follows the units outlined in the National Curriculum.

Through studying CUSP science, pupils become 'a little more expert' as they progress through the curriculum, accumulating, connecting and making sense of the rich substantive and disciplinary knowledge. This guidance is supported by Ofsted documents and research papers, including:
https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science

Biology	Physics	Chemistry
is the study of living things (organisms), their structure and environments.	is the study of matter, forces and motion, sound, light and waves, electricity and magnetism and Earth in Space.	is the study of the composition, behaviour and properties of matter, and of the elements of the Earth and its atmosphere. (BBC Bitesize)
In the Primary Curriculum it is the study of | Animals, including humans Plants Living things and their habitats Evolution and inheritance	In the Primary Curriculum it is the study of | Seasonal changes Light Forces and magnets Electricity Sound Forces Earth in Space Light	In the Primary Curriculum it is the study of | Everyday materials Uses of everyday materials Rocks States of matter Properties and changes of materials

SCIENCE CUSP PRIMARY CURRICULUM WITH UNITY SCHOOLS PARTNERSHIP

WHAT PUPILS WILL KNOW

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.

WHAT PUPILS WILL DO

Disciplinary knowledge – this is knowing how to collect, use, interpret, understand and evaluate the evidence from scientific processes. This is taught. It is not assumed that pupils will acquire these skills by luck or hope. Pupils construct understanding by applying substantive knowledge to questioning and planning, observing, performing a range of tests, accurately measuring, comparing through identifying and classifying, using observations and gathering data to help answer questions, explaining and reporting, predicting, concluding, improving, and seeking patterns. We call it 'Working Scientifically.

Scientific analysis is developed through IPROF criteria. We call it 'Thinking Scientifically.'

- identifying and classifying
- pattern seeking
- research
- observing over time
- fair and comparative testing

These will be mapped throughout CUSP Science against each knowledge note. 3. Substantive concepts include concrete examples, such as 'plant' or more abstract ideas, such as 'biodiversity'. Concepts are taught through explicit vocabulary instruction as well as through the direct content and context of the study.

PRINCIPLES A guiding principle of CUSP Science is that each study draws upon prior learning. For example, in the EYFS, pupils may learn about The Natural World through daily activities and exploring their locality and immediate environment. This is revisited and positioned so that new and potentially abstract content in Year 1, such as Animals, including humans, is related to what children already know. This makes it easier to cognitively process. This helps to accelerate new learning as children integrate prior understanding.

CUSP Science is organised into three distinct subject domains: biology, physics and chemistry. Where inter-disciplinary concepts are encountered, such as the particle model, these are taught explicitly and connected across science domains.

CUSP Science has sequenced the national curriculum into meaningful and connected 'chunks' of content to reduce the load on the working memory as well as creating coherent and strong long-term memories. The sequence of substantive and disciplinary knowledge enables pupils to become 'more expert' with each study and grow an ever broadening and coherent mental model of the subject. This guards against superficial, disconnected and fragmented scientific knowledge and weak disciplinary knowledge. High frequency, multiple meaning words (Tier 2) are taught explicitly and help make sense of subject specific words (Tier 3). Each learning module in CUSP Science has a vocabulary module with teacher guidance, tasks and resources to enhance and deepen understanding.

CUSP Science is planned so that the retention of knowledge is much more than just 'in the moment knowledge'. The cumulative nature of the curriculum is made memorable by the implementation of Bjork's desirable difficulties, including retrieval and spaced retrieval practice, word building and deliberate practice tasks. This powerful interrelationship between

structure and research-led practice is designed to increase substantive knowledge and accelerate learning within and between study modules. That means the foundational knowledge of the curriculum is positioned to ease the load on the working memory: new content is connected to prior learning. The effect of this cumulative model supports opportunities for children to associate and connect significant scientific concepts, over time, and with increasing expertise and knowledge.

CUSP Science deliberately pays attention and values the importance of subject content as well as the context it is taught in. Common scientific misconceptions are identified in all CUSP Science learning modules. These misconceptions are made explicit to pupils. Children draw upon substantive and disciplinary knowledge to reason and practise acquiring the conception, whilst repelling the misconceptions. Examples and non-examples are powerful ways of saying what something is and what something isn't.

CUSP Science values the study of scientists from the past as well as promoting diverse present-day role models in the field. These studies help us to learn how they used, at that time, their substantive and disciplinary knowledge to develop a conception. This illuminates how misconceptions can permeate substantive knowledge and appear to be a known truth. An example of this is the study of Maria Merion in Year 5, who was born in Germany in 1667. She observed and drew insects going through biochemical metamorphosis. She challenged the misconception that all insects were evil, born from mud and were the work of the devil. Further examples of contextual misconceptions and refinement of conceptions can be seen in the study of Galen's views about blood circulation in AD 157 and William Harvey's findings in 1602.

CUSP fulfils and goes well beyond the expectations of the National Curriculum as we believe there is no ceiling to what pupils can learn if the architecture and practice is founded in evidence-led principles.

Science Long Term Plan

<table>
<tr><td rowspan="5">Specific Area of Learning
Understanding the World</td><td>ELG's</td><td>How this is achieved in EYFS</td><td colspan="2">Key Vocabulary to be developed in EYFS</td><td colspan="2">Science KS1</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td>Year 1</td><td>Year 2</td></tr>
<tr><td>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.</td><td>• 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.</td><td>• Exercise
• Healthy
• Wash
• Toothbrush
• Tooth / Teeth
• Body
• Head
• Bones
• Skeleton
• Family</td><td>• Animal
• Human
• Mammal
• Bird
• Fish
• Amphibian
• Insect
• Lifecycle
• Nocturnal</td><td colspan="2">Animals, including humans</td></tr>
<tr><td>ELG 14
The Natural World

• Explore the natural world around them, making observations and drawing pictures of animals and plants.</td><td>• 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.</td><td>• Lifecycle
• Plant
• seed
• grow
• roots
• Flower</td><td>• Seasons
• Autumn
• Winter
• Spring
• Summer
• Change
• Weather</td><td colspan="2">Plants</td></tr>
<tr><td>ELG 14
The Natural World

• Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.</td><td>• 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.</td><td>• Material
• Wood
• Plastic
• Glass
• Float</td><td>• Sink
• Liquid
• Solid</td><td>Seasonal changes

Everyday materials</td><td>Living things and their habitats

Uses of everyday materials</td></tr>
<tr><td colspan="7">Scientific Vocabulary – scientist, sort, observation, identify, compare, group, investigate, test, evaluate</td></tr>
</table>

Science Long Term Plan

	Autumn	Spring	Summer
Class 1 (EYFS)	**The Natural World** • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter		
Class 1 (Year 1)	Seasonal changes and daily weather Introduce Plants – (trees) Animals, including humans	Everyday materials Revisit 1: Animals, including humans	Plants Revisit 2: Plants, Animals including humans
Cycle 1 (B) 2024 – 2025 (Year 3)	Rocks Animals, including humans Revisit Rocks	Forces and magnets Plants	Plants continued Light
Cycle 2 (A) 2025 – 2026 (Year 2)	Living things and their habitats Animals, including humans	Uses of everyday materials Revisit Living things and their habitats / materials	Plants Revisit Living things and their habitats / Animals, including humans
Cycle 1 (B) 2024 – 2025 (Year 5)	Properties and changes of materials Animals, including humans	Forces (Gravity and Galileo) Earth in space	Living things and their habitats Forces continued
Cycle 1 (A) 2025 – 2026 (Year 4)	Living things and their habitats States of matter	Animals, including humans	Electricity Sound
CLASS 4	Evolution and inheritance Animals including humans (circulatory system)	Animals including humans (water transport) Light	Living things and their habitats Electricity

Vertical Links	EYFS Understanding the world	Class 1 (Year 1 Content)	Cycle A (Year 3 Content)	Cycle B (Year 2 Content)	Cycle A (Year 5 Content)	Cycle B (Year 4 Content)	Cycle 1 (Year 6 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	Animals, including humans *(+ revisit modules)*	Animals, including humans	Animals, including humans	Animals, including humans
							Evolution and inheritance
Physics (29% of Science content)		Seasonal changes *(+ revisit module)*	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 change of materials		
			Rocks *(+ revisit module)*				
						States of matter	

Substantive Knowledge Progression – Cumulative End Goals (LANDING POINTS)

	VERTICAL LINKS		
	BIOLOGY	PHYSICS	CHEMISTRY
Year 1	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 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*	• 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		
Everyday materials *Chemistry*	• knowing and identifying the basic structure of plants and trees, such as roots, bulbs, stem, leaf, flower, fruits, trunk, branch and crown		
Plants *Biology*	• 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		

	VERTICAL LINKS		
	BIOLOGY	PHYSICS	CHEMISTRY
Year 2	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 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		• 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
Animals, including humans *Biology*	• 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		• explaining how significant scientists have made useful things from knowing about the properties of materials, such as Charles Macintosh
Uses of everyday materials *Chemistry*	• 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		
Plants Biology			

Year 3	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 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 that rocks can be grouped together on the basis of their appearance and properties • knowing and explaining how rocks are formed
Animals, including humans *Biology*	• 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 how magnets attract and repel each other • knowing and explaining how magnets attract some materials and not others	• 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
Forces and magnets *Physics*	• knowing and explaining the difference between vertebrates and invertebrates	• 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 how fossils of animals and plants are formed • knowing and explaining the different types of fossils, including body and trace fossil
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 and explaining what soil is made from • knowing and explaining the different types of material that make up soil, including rocks and organic matter
Light *Physics*	• 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	

Year 4	BIOLOGY	PHYSICS	CHEMISTRY
Living things and their habitats *Biology* States of matter *Chemistry* Animals, including humans *Biology* Electricity *Physics* Sound *Physics*	Pupils develop an understanding of the concept of BIOLOGY through: | • 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 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	Pupils develop an understanding of the concept of PHYSICS through: | • 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 how sounds are made through vibrations and travel as waves • knowing and explaining how sounds travel through a medium, such as a solid (wood), a liquid (water) or gas (air) • knowing and explaining how sounds travel through a medium to the ear as vibrations • knowing and explaining that sound is the transfer of energy • knowing and explaining what pitch means – frequency of the sound wave • knowing and explaining what loudness means – the size of the sound wave • knowing, identifying and explaining patterns between the pitch of a sound and the features of the object that produced it, such as the length of an elastic band • knowing, identifying and explaining patterns between the volume of a sound and the strength of the vibrations that produced it, such as the bang of a drum • knowing and explaining that sounds get fainter as the distance from the sound source increases	Pupils develop an understanding of the concept of CHEMISTRY through: | • 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

Year 5	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 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	• 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		
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*			

Year 6	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, 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	• 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 (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 • 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	• 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	
Light *Physics*			
Living things and their habitats *Biology*			
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		

Disciplinary Knowledge

Skill domains: VERTICAL LINKS	Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Exploring and observing *UKS2 - Developing a deeper understanding of a wide range of scientific ideas and encountering more abstract ideas.* *LKS2 - Developing their own ideas and their understanding of the world around them.* *KS1 - Observing closely Using their observations and ideas to suggest answers to questions. EYFS – Comments and questions the world around them through encounters during provision.*	• Comments and asks questions about the natural worlds and items around them through making observations and drawing pictures	• Begin to use simple scientific language to talk about or record what they have noticed. (Link to Y1 LTP) • Use observations to make suggestions and/or ask questions. • Look/observe closely and communicate changes over time. • Look / observe closely and communicate the features or properties of things in the real world. • Observe closely using their senses.	• Use simple scientific language to talk about /record what they have noticed (linked to Y2 LTP) • Use observations to make suggestions and/or ask questions. • Observe and describe simple processes /cycles /changes with several steps *(e.g., growth cycle, simple food chain, saying how living things depend on one another).* • Observe closely and communicate with increasing accuracy the features or properties of things in the real world.	• Observe and record relationships between structure and function (linked to Y3 LTP). • Observe and record changes /stages over time • Explore / observe things in the local environment / real contexts and record observations.	• Suggest their own ideas on a concept and compare these with what they observe / find out. • Use observations to suggest what to do next. • Discuss ideas and develop descriptions from their observations using relevant scientific language and vocabulary (from Y4 LTP) • Observe and record relationships between structure and function or between different parts of a processes • Observe and record changes /stages over time	• Use their developing scientific knowledge and understanding and relevant scientific language and terminology to discuss, communicate and explain their observations (incl. more abstract ideas from Y5 LTP (e.g., friction, air resistance, forces, Earth and space, reversible and irreversible changes). • Evaluate their observations and suggest a further test, offer another question, or make a prediction. • Observe (including changes over time) and suggest a reason for what they notice.	• Use correct scientific knowledge and understanding and relevant scientific language to discuss their observations and explorations (linked to Y6 LTP). • Identify changes that have occurred over a very long period (evolution) and discuss how changes have impacted the world. • Explore more abstract systems / functions /changes / behaviours and record their understanding of these *(e.g., the relationship between diet, exercise, drugs, lifestyle and health; evolutionary changes; how light travels).*
Grouping and classifying *UKS2 - Compare and contrast a variety of examples linked to UKS2 LTP.* *LKS2 - Compare and contrast a variety of examples linked to LKS2 LTP.* *KS1 - Compare and contrast a variety of examples linked to KS1 LTP.*	• 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	• Name/identify common examples and some common features. • With help, decide how to sort and group objects, materials or living things. • Name basic features of objects, materials and living things. • Say how things are similar or different. • Compare and contrast simple observable	• Name / identify common examples, some common features or different uses. • Sort and group objects, materials or living things by observable and/or behavioural features. • Compare and contrast… a variety of things [objects, materials or living things] - focusing on	• Decide ways and give reasons for sorting, grouping, classifying, identifying things/objects, living things, processes or events based on specific characteristics. • Compare and contrast and begin to consider the relationships between different things	• Make a simple guide to local living things. • Use guides or simple keys to classify / identify [animals, flowering plants and non-flowering plants]. • Use their observations to identify and classify. • Begin to give reasons for these similarities and differences. Record similarities as well as differences and/or	• Suggest reasons for similarities and differences. • Compare and contrast things beyond their locality and use these similarities and differences to help to classify • *(e.g., features of animals, life cycles of different living things, melting compared with dissolving, etc).*	• Recognise the importance of classification to the scientific world and form a conclusion from their sorting and classifying. • Compare and contrast more complex processes, systems, functions (e.g., sexual and asexual reproduction). • Construct a classification key /

EYFS – Notices similarities and differences across the understanding the world strand		features / characteristics of objects, materials and living things.	the similarities as well as the differences.	• *(e.g., structures of plants, functions of plant parts, diets, skeletons of humans and other animals, changes over time, etc.).* • Record similarities as well as differences *(e.g., what do all skeletons have? as well as the differences between skeletons.*	changes related to simple scientific ideas or processes or more complex groups of objects/living things/events *(e.g., evaporation and condensation, different food chains, different electrical circuits).*	• Use secondary sources of information to identify and classify. • Decide which sources of information (and/or equipment and/or test) to help identify and classify.	branching database using more than two items. • Compare and contrast things beyond their locality and discuss advantages/disadvantages, pros/cons of the similarities and differences. • Use research to identify and classify things. • Use classification systems, keys and other information records [databases] to help classify or identify things.
Research *UKS2 – Summarise research from a wide variety of sources and recognising that scientific ideas change and develop over time. LKS2 - Finding things out using a wide range of secondary sources of information. KS1 - Finding things out using secondary sources of information. EYFS – Finding things our about their immediate environment and those studied through continuous provision.*	• Comments and asks questions about the natural worlds and their environment experienced through continuous provision	• Ask people questions (e.g., an expert or hot seating). • Use simple primary and secondary sources (such as objects, books and photographs) to find things out.	• Talk about how useful the information source was and express opinion about findings. • Make suggestions about who to ask or where to look for information. • Ask people questions to help them answer their questions. • Use simple and appropriate secondary sources (such as books, photographs, videos and other technology) to find things out / find answers.	Find things out using range of secondary sources of information *(e.g., books photographs, videos and* • *other technology).*	• Make decisions about which information to use from a wide range of sources and make decisions about how to present their research. • Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.	• Find out how scientific ideas have changed/developed over time (linked to Y5 LTP). • Articulate and explain findings from their research using scientific knowledge and understanding. • Make decisions about which information to use from a wide range of sources.	• Research how scientific ideas have developed over time and had an impact on our lives. • Use evidence from a variety of sources to justify their ideas • Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. • Interview people to find out information
Planning and testing *UKS2 - Using different types of scientific enquiry making decisions*	• Observes simple tests and discuss and question what they have seen and experienced.	• With help, carry out a simple test/comparative test.	• Carry out simple comparative tests as part of a group, following a method	• Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair.	• Carry out simple fair tests with increasing confidence investigating the effect of something	• Carry our fair tests and other investigations with increasing independence.	• Predict what a graph might look like before collecting results.

		• With help, make a simple prediction or					• Make a hypothesis where they say how

about and explaining choices for testing. LKS2 - Making decisions about and setting up simple practical enquiries, comparative tests and fair tests. *KS1 - Performing simple tests.* *EYFS – Observe simple test*		suggestion about what might happen. • Begin to suggest some ideas e.g., choose which equipment to use, choose which materials to test from a selection. • Talk about ways of setting up a test.	with some independence. • Make a simple prediction about what might happen and try to give a vague reason (even though it might not be correct). • With support, make suggestions on a method for setting up a simple comparative test. • Talk about a practical way to find answers to their questions.	• Make a prediction based on everyday experience. • With support/as a group, set up simple practical enquiries including comparative and fair tests e.g., make a choice from a list of a things (variables) to change when conducting a fair test. *(e.g., choose which magnets to compare and which method to use to test their strength).* • As a group, begin to make some decisions about the best way of answering their questionsFind/suggest a. • practical way to compare things *e.g., rocks, magnets.*	on something else (linked to Y4 LTP). • Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific questions *(is a fair test the best way to investigate their question?)* • Make a prediction based on the knowledge acquired from previous explorations /observations and apply it to a new situation. • Explain their planning decisions and choices. • Make some of the planning decisions about what to change and measure/observe. • Begin to recognise when a fair test is necessary.	• Suggest more than one plausible prediction and begin to suggest which is the most likely. Justify their reason with some knowledge and understanding of the scientific concept. • Make decisions about which variables to change, measure and keep the same (linked to the appropriate units in the Y5 LTP). • Make most of the planning decisions for an investigation. • Recognise when it is appropriate to carry out a fair test.	one thing will affect another and give a reason for their suggestion with a developing understanding of the scientific concept. • Identify variables to change, measure and keep the same for a test to be fair. • Independently plan investigations and explain planning decisions. • Decide when it is appropriate to carry out a fair test investigation, comparative test or alternative.
Describing result / Pattern seeking *UKS2 - Looking for patterns analysing functions, relationships and interactions more systematically.* *LKS2 - Describing their findings/ results.* *KS1 - Talk about what happened / what they noticed.* *EYFS – Orally describe what happened/what they notice*	• Orally describe what they notice through pictures or in real time.	• Use recordings to talk about and describe what happened. • Sequence photographs of an event/observation.	• With guidance, begin to notice patterns in their data *e.g., order their findings, sequence best to worst, say what happened over time, etc.* • Recognise if results matched predictions (say if results were what they expected). • Use their recordings to talk about and describe what has happened.	• With scaffold/support, describe and compare the effect of different factors on something • *(e.g., we noticed that larger magnets are not always stronger).* • With help, look for changes and simple patterns in their observations, data, chart or graph. • Use their results to consider whether they met their predictions.	• Notice / find patterns in their observations and data. (Describe the effect of something on something else). • *(e.g., as I lengthen the ruler, I notice that the pitch gets lower).* • With some independence, analyse results / observations by writing a sentence that matches the evidence i.e., deciding the important aspect	• Describe straightforward patterns in results linking cause and effect e.g., using er or the word 'more' • *(e.g., the longer, thinner shapes move through the water more quickly OR the larger the wings, the longer it takes the spinner to fall).* • Look for / notice relationships between things and begin to describe these.	• Spot unexpected results that do not fit the pattern (anomalies). • Identify patterns in results collected and describe them using the change and measure variables (causal relationships) *(e.g., as we increased the number of batteries the brightness the bulb increased.*

					of the result and summarising in a conclusion *(e.g., metals tend to be good conductors of electricity).*	• Comment on the results and whether they support the initial prediction.	
Questioning *UKS2 - Asking their own questions about scientific phenomena. LKS2 - Asking relevant questions. KS1 - Asking simple questions. EYFS – Comments and asks questions*	• Comments and asks questions about the natural worlds and items around them through making observations and drawing pictures	• Ask simple questions about what they notice about the world around them. • Demonstrate curiosity by the questions they ask.	• Raise their own logical questions based on or linked to things they have observed. • With help / scaffolds, begin to ask questions such as 'What will happen if…?"	• Explore their own ideas about 'what if….?' scenarios e.g., humans did not have skeletons. • Ask questions such as 'What if we tried….? or 'What if we changed…?' • Begin to understand that some questions can be tested in the classroom, and some cannot. • Within a group suggest questions that can be explored, observed, tested or investigated further. • Within a group suggest relevant questions about what they observe and about the world around them.	• Ask/raise their own relevant questions with increasing confidence and independence that can be explored, observed, tested or investigated further. • Ask questions such as 'What will happen if…?" or 'What if we changed…? (Linked with Y4 LTP). • Choose/select a relevant question that can be answered [by research or experiment / test].	• Recognise scientific questions that do not yet have definitive answers (linked to Y5 LTP). • Refine a scientific question so that it can be tested e.g. 'What would happen to… if we changed…?' • Decide whether their questions can be answered by researching or by testing. • Independently ask their own scientific questions taking some ownership for finding out the answers.	• Recognise scientific questions that do not yet have definitive answers (linked to Y6 LTP). • Refine a scientific question to make it testable • i.e., ask a testable question which includes the change and measure variables, *e.g., what would happen to…if we changed…?* • *e.g., What effect would we have on … if we…?* • *e.g., How would exercise affect the pulse rate?* • Use observations to suggest a further (testable or research) question. • Independently ask a variety of scientific questions and decide the type of enquiry needed to answer them.
Modelling *Non-Statutory Using dance, drama or a visual aid to represent science in the real world.*	• With help, follow movements (dance / drama) to act out their science.	• With help, follow movements (dance / drama) to act out their science.	• Act out something to represent something else about the world around us *(e.g., a life cycle).*	• Act out or make a model of something to represent something in the real world using appropriate scientific vocabulary verbally.	• Make a visual representation or a model of something to represent something they have seen or a process that is difficult to see.	• Perform / create simple models to exemplify scientific ideas using scientific terminology where appropriate *(e.g., spheres to represent movements of the Sun and*	• Make / perform and use their own versions of simple models to describe and explain scientific ideas *(e.g., circulatory system drama, periscopes to explain how light travels,*

					• Suggest their own ideas on a concept	*Earth, solar*	*burglar alarm*

					and compare these with models or images.	*system models, shadow clocks, a simple lever or mechanism).*	*to explain components in a circuit).*
Collaborating *Non-Statutory Interacting effectively as part of a group.*	• Share ideas in a group and listen to the ideas of others.	• Share ideas in a group and listen to the ideas of others. • Work with others on a science task.	• Share ideas in a group and listen to the ideas of others. • Work cooperatively with others on a science task making some choices.	• Begin to make some decisions about an idea within a group from a list of choices • *(e.g., let's put them all in a pile first OR I think we should try…).* • With help, support, listen to and acknowledge others in the group • (*e.g., Yes. I prefer that one too).* • Build on / add to someone else's idea. *(e.g., we could use x as well as y).* • Begin to understand that it is okay to disagree with their peers and offer a reason for their opinion.	• Make some decisions about an idea within a group *(e.g., I think we should find out by testing…)* • Increasingly support, listen to and acknowledge others in the group. • Build on / add to someone else's idea to improve a plan. • Understand that it is okay to disagree with their peers and offer reasons for their opinion.	• Present their own ideas and make decisions with agreement in a group. • Support, listen to and acknowledge others in the group *e.g. Yes. I prefer that one too.* • Check the clarity of each other's suggestions *e.g., are you saying you think this one is an herbivore?* • Build on / add to someone else's idea to improve a plan or suggestion. • Understand that it is okay to disagree with their peers and offer a reason for their opinion.	• Present their own ideas and make decisions with agreement in a group. • Support, listen to and acknowledge others in the group. • Check the clarity of each other's suggestions. • Build on / add to someone else's idea to improve a plan or suggestion. • Understand that it is okay to disagree with their peers and offer reasons for their opinion.

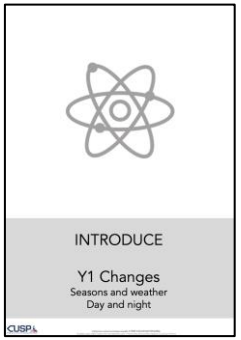
Using equipment and measures *UKS2 - Increasing complexity and increasing accuracy and precision* *Make their own decisions about the data to collect.* *LKS2 - Making accurate measurements and gathering data.* *KS1 - Using simple equipment and gathering data to help in answering their questions.* *EYFS – Exploring different equipment and relate to measuring*	• Experience different forms of equipment – formal and informal – in context to understand what measuring is.	• Measure using non-standard units e.g., how many lolly sticks/cubes/handfuls, etc. • Observe closely, using simple equipment (e.g., hand lenses, egg timers). • Use senses to compare different textures, sounds and smells.	• Measure using non-standard and simple standard measures (e.g., cm, time) with increasing accuracy. • Begin to make decisions about which equipment to use. • Correctly and safely use equipment provided to make observations and/or take simple measurements.	• Collect data from their own observations and measurements using notes/ simple tables/standard units. • Help to make some decisions about what observations to make, how long to make them for, the type of simple equipment that might be used and how to work safely. • Make simple accurate measurements using whole number standard units, using a range of equipment.	• Begin to identify where patterns might be found and use this to begin to identify what data to collect. • Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used. • Recognise obvious risks and how to keep themselves and others safe. • Learn how to use new equipment, such as data loggers and	• Make their own decisions about what observations to make or measurements to use and how long to take them for (recognising the need for repeat readings on some occasions). • Take measurements using a range of scientific equipment with increasing accuracy and using more complex scales / units. • Identify plausible risks to themselves and others and suggest	• Decide whether to repeat any readings and justify the reason for doing so. • Make their own decisions about what measurements to take (and begin to identify the ranges used). • Make, and act on, suggestions to control/ reduce risks to themselves and others. • Use equipment fit for purpose to take measurements which are increasingly accurate and precise.
				• Gather data in a variety of ways to help in answering questions. • Use equipment accurately to improve the detail of their measurements/observations *(e.g., microscopes, measuring syringes, measuring cylinders, hand lenses).*	measure temperature in degrees Celsius (°C) using a thermometer. • Collect data from their own observations and measurements, using notes / simple tables / standard units. • Make accurate measurements using standard units [and more complex units and parts of units] using a range of equipment and scales.	ways of reducing these. • Choose the most appropriate equipment and make accurate measurements.	• Decide the most appropriate equipment to use to collect data.

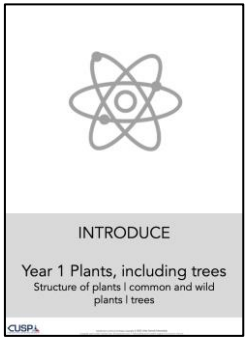
Communicating and Presenting data *UKS2 / LKS2 / KS1 Reporting findings, recording data, presenting findings. Read, spell and pronounce scientific vocabulary correctly linked to the relevant year group.*	• Contribute to a class data and displays • Draw pictures and add simple labels from observations • Orally discuss during lessons with adults and partners.	• Communicate their ideas to a range of audiences in a variety of ways. • Complete a pre-constructed table/ chart using picture records or simple words. • Contribute to a class data and displays • Add annotations to drawings or photographs. • Begin to use some simple scientific language from Y1 LTP. • Record simple visual representations of observations made.	• Record and communicate their findings in a range of ways to a variety of audiences. • Use simple scientific language with increasing accuracy (from Y2 LTP). • Record simple data with some accuracy to help in answering questions • With support or using frameworks, make decisions about how to complete a variety of tables/charts (e.g., *Present findings in a class displays, Sequence / annotate photographs of change over time, produced increasingly detailed drawings which are labelled/annotated.* • Interpret and construct simple pictograms, tally	• Record and present findings using simple scientific language and vocabulary from the Y3 LTP *including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using scales chosen for them), displays or presentations.* • With scaffold / support record, and present data in a variety of ways to help in answering questions. • Communicate their findings in ways that are appropriate for different audiences. • Interpret and present data using scaled bar charts, pictograms and tables.	• Record findings using relevant scientific language and vocabulary (from Y4 LTP), including discussions, oral and written explanations, notes, drawings (annotated), pictorial representations, labelled diagrams, tables and bar charts [where intervals and ranges agreed through discussion], displays or presentations. • Begin to select the most useful ways to collect, record, classify and present data from a range of choices. • Make decisions on how best to communicate their findings in ways that are appropriate for different audiences.	• Use their developing scientific knowledge and understanding and relevant scientific language and terminology to communicate more abstract concepts (linked to Y5 LTP). • Present and explain their findings through talk, in written forms or in other ways (e.g., using technology) for a range of audiences / purposes. • Record data and results of increasing complexity using different formats e.g., tables, annotated scientific diagrams, classification keys, graphs and models. • Make decisions about the most appropriate way of recording data. • Interpret and present data discrete and continuous data using	• Articulate understanding of the concept using scientific language and terminology when describing abstract ideas, observations and findings (linked to the Y6 LTP). • Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs, and models. • Make decisions about how to present and explain their findings through talk, in written forms or in other ways (e.g., using technology). • Interpret and construct pie charts and line graphs and use these to solve problems.

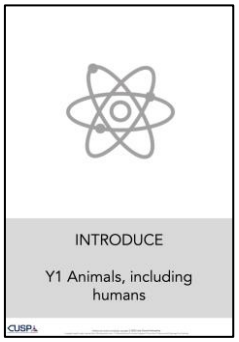
			charts, block diagrams and tables. • Ask and answer simple questions by counting the number of objects in each category and sort categories by quantity.	• Use information presented in scaled bar charts, pictograms and tables to answer question e.g., *how many more? How many fewer?*	• Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. • Use the information to make comparisons, sum and difference problems, presented in bar charts, pictograms, tables and other graphs.	appropriate graphical methods including bar charts, line graphs and time graphs.	• Calculate and interpret the mean as an average.

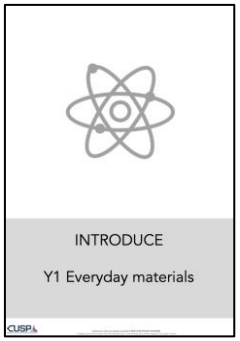
Explaining results *UKS2 - Draw conclusions based on / supported by evidence and comment on how reliable they are.* *LKS2 - Reporting on findings saying why something happened and suggest what could be improved.* *KS1 - Talk about what they found out and beginning to explain if the result is fair or not.* *EYFS – Talk about what they observed through experiences and provision.*	• Orally discuss observation from experiences	• Begin to use simple scientific language (from Y1 LTP) to talk about what they have found out or why something happened.	• Begin to use simple scientific language (from Y2 LTP) to explain what they have found out. • Give a simple, logical reason why something happened *(e.g., I think … because…).* • Begin to discuss if the test was unfair.	• Use their experience and some evidence or results to draw a simple conclusion to answer their original question. • Write a simple explanation of why things happened (using the word 'because') and using simple scientific language and vocabulary from the Y3 LTP. • Say whether what happened was what they expected and notice any results that seem odd. • Begin to recognise when a test is not fair and suggest improvements	• Begin to develop their ideas about relationships and interactions between things and explain them. • Use relevant scientific language and vocabulary (from Y4 LTP) to begin to say / explain why something happened. • Use results to suggest improvements, new questions and/or predictions for setting up further tests. • Compare their results with others and give reasons why results might be different.	• Use their scientific knowledge and understanding and appropriate scientific language and terminology (linked to Y5 LTP) to explain their findings and data and answer their initial question. • Draw a valid conclusion (explain *why* it happened) based on their data and observations (from Y5 LTP). • Begin to recognise how repeated readings improve the reliability of results. • Compare results with others and comment on how reliable they are.	• Identify evidence that refutes or supports their ideas. • Independently form a conclusion which draws on the evidence from the test (linked to Y6 LTP). • Use scientific language and terminology (linked to Y6 LTP) to explain why something happened. • Be able to suggest reasons for unexpected results (anomalies). • Describe how to improve planning to produce more reliable results. • Say how confident they are that their results are reliable and give a reason.

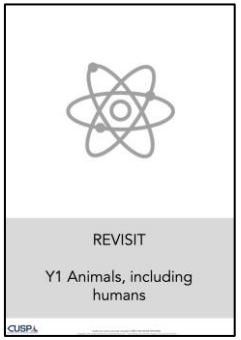
Study Modules Year 1-6

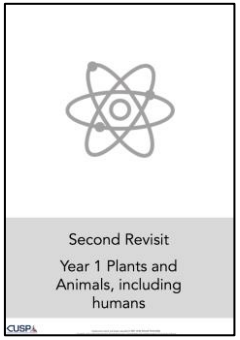
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 Seasons and weather Day and night |  	Physics* | The study of energy forces mechanics waves structure of atoms physical universe | Earth in Space *Adapted from BBC Bitesize	Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	Seasons and weather What are the four seasons? What's the weather like in Autumn, Winter, Spring and Summer? Day to night Why does day become night?	dawn dusk mild rotate soaked weather	month season spring summer autumn winter

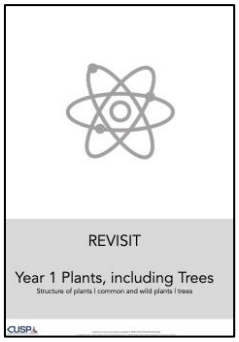
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 Plants, including trees |  	Biology | The study of living things, including **Common plants and trees in a local environment**	Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	Structure of plants What are the parts of a plant? Wild and common plants What are wild plants and where do you find them? What are garden plants and where do you find them? Trees What makes a tree? What types of tree are there? (Trees that live around my school) What's the difference between trees?	bud trunk branch bark seed wild	nutrients stem deciduous evergreen

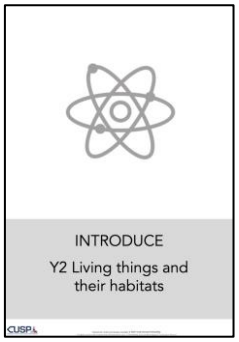
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 Animals, including humans |  	Biology | The study of living things, including **Types of animals** **Food animals eat** **Senses**	Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	**Animals** What is an animal? What types of animals are there? What is similar and what is different? **Eating** What does food tell us about an animal? **Senses** What makes me an animal? What senses do I have?	blood senses young feather s fur scales	mammal amphibian reptile herbivore carnivore omnivore

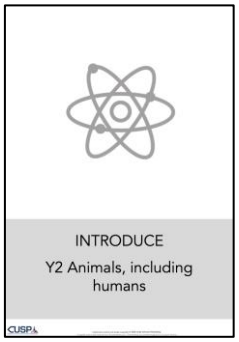
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 Everyday materials |  	Chemistry* | the study of the **composition, behaviour and properties of matter** *Adapted from BBC Bitesize	Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	**Materials** What are materials? What are things made of in school? **Properties** How can I describe materials? Which materials are waterproof and which are not? Which materials are transparent and which are opaque? **Use what you know** What's the best material for the job? Why?	absorb rough smooth waterproof metal plastic	materials properties flexible transparent opaque physical

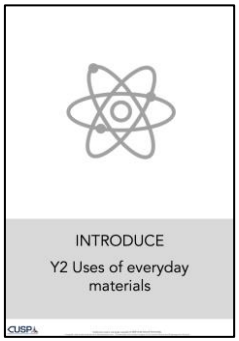
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 REVISIT Animals, including humans |  	Biology | The study of living things, including **Types of animals** **Food animals eat** **Senses we have**	Y1 Animals including humans	**Revisit and name it** What features do animals have? Use the cues and single words in knowledge note to focus on vocabulary. Consolidate by talking and writing sentences on the page next to the knowledge note. **Describe it** Retrieve and complete labels on the knowledge organiser. What are the features of the animal group? Go further by writing sentences or drawing diagrams on the page next to it. **Describe it** Continue to describe the features of each animal group. Go further by writing sentences / draw diagrams on the page next to it. **Sort it** Compare animal groups – what do you notice is similar and what is different? Go further by writing sentences / draw diagrams on the page next to it.	blood senses young feather s fur scales	mammal amphibian reptile herbivore carnivore omnivore

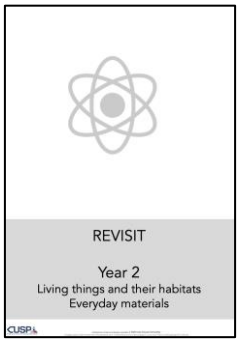
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 SECOND REVISIT | Plants and Animals, including humans |  	Biology | The study of living things, including **Types of animals** **Food animals eat** **Senses we have** **Common plants and trees in a local environment**	Y1 Animals including humans	**Remember it** Animals, including humans **Elaborate it** Animals, including humans	blood senses young feather s fur scales	mammal amphibian reptile herbivore carnivore omnivore
		Y1 Plants	**Remember it** Plants	bud trunk branch bark seed wild	nutrients stem deciduous evergreen

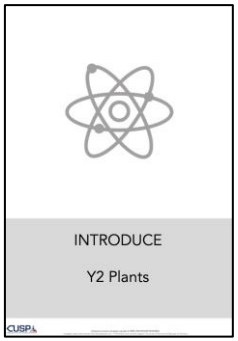
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y1 REVISIT Plants, including trees | MODULAR SEQUENCE  	Biology | The study of living things, including **Common plants and trees in a local environment**	Managing Self Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices. The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Explore the natural world around them, making observations and drawing pictures of animals and plants. Understanding some important processes and changes in the natural world around them, including seasons and changing states of matter.	Structure of plants What are the parts of a plant? Wild and common plants What are wild plants and where do you find them? What are garden plants and where do you find them? Trees What makes a tree? What types of tree are there? (Trees that live around my school). What's the difference between trees?	bud trunk branch bark seed wild	nutrients stem deciduous evergreen

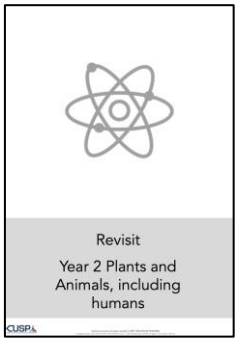
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 Living things and their habitats |  	Biology | The study of living things, including Characteristics of living things Relationship of living things and their environment.	EYFS – Natural Word Y1 Plants Y1 Animals including humans Y1 Revisit Animals, including humans Y1 Second revisit of Animals, including human and plants	**Characteristics of living things** What is alive and what is not? What do all living things have in common? **Location of living things** Where do plants and animals live? What plants and animals live in our local environment? How living things are connected What are food chains? How are they connected? Why do plants and animals need each other?	thrive depend producer consume prey predator	oxygen nutrition respiration sensitivity reproductio n excretion

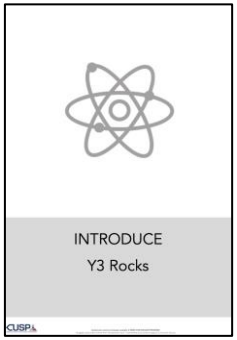
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 Animals, including humans |  	Biology | The study of living things, including Reproduction Basic needs Diet and exercise for humans .	EYFS – Natural Word Y1 Plants Y1 Animals including humans Y1 Revisit Animals, including humans Y1 Second revisit of Animals, including human and plants	**Animals and change** REMEMBER: what is an animal? How do animals change as they mature? **Air, water and food** How do we change as we mature? What do all animals need to stay alive? **Health and food** Keeping healthy: why do we exercise? Keeping healthy: why do we eat different types of food?	healthy survive exercise heart lungs muscles	hygiene larva pupa vertebrates invertebrates metamorphosis

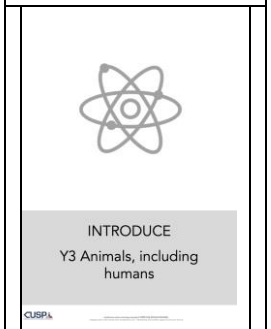
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 Use of everyday materials |  	Chemistry* | the study of the **composition, behaviour and properties of matter** *Adapted from BBC Bitesize	EYFS Natural world Y1 Everyday materials	**Materials** What are materials used for? Categorise and compare wood, metal, plastic and glass. What are materials used for? Categorise and compare ceramics, rock, paper and card, and fabric. **Changes** What happens when we squash, bend, twist or stretch a material? Purpose What's the right material for the job? What's the most absorbent material? Who invented waterproofing?	artificial brittle extracted fabric manufactured natural	ceramic durable inflexible reflective rigid translucent

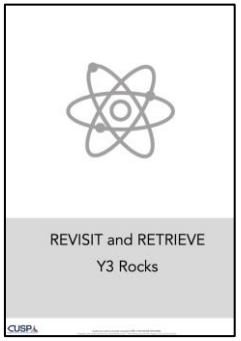
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 Revisit Living things and their habitats | Use of everyday materials |  	Biology | The study of living things, including Characteristics of living things Relationship of living things and their environment Chemistry* | the study of the **composition, behaviour properties of matter**	Y1 Animals, including humans Y1 Plants Y2 Living things and their habitats Y2 Uses of everyday materials	**Materials** What is it made from? **Characteristics of living things** Compare: what is alive, what is not alive and what has never been alive? Apply it What materials do our pets have or need? Why is that?	artificial brittle extracted fabric manufactured natural	ceramic durable inflexible reflective rigid translucent
				thrive depend producer consume prey predator	oxygen nutrition respiration sensitivity reproductio n excretion

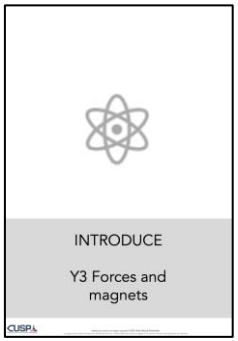
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 Plants |  	Biology | The study of living things, including Growth Health Relationship of living things and their environment	EYFS – Natural Word Y1 Plants Y1 Animals, including humans Y2 Living things and their habitats	**Growing from a seed** How do seeds germinate and what happens? **Growing from a bulb** What happens when bulbs sprout? Healthy plants What do plants need to thrive and be healthy? What can happen if plants don't get the things they need? What do I notice about plants around the school? How are they healthy? How are they unhealthy? **Show what you know** How do seeds and bulbs grow? What do plants need to be healthy?	wither dormant mature bulb anchor sustain	germination perennial carbon dioxide glucose clone

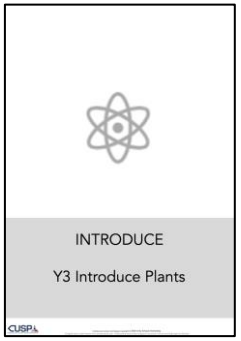
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y2 REVISIT Plants, and Animals, including humans |  	Biology | The study of living things, including Growth Health Relationship of living things and their environment Reproduction Basic needs Diet and exercise for humans	EYFS – Natural Word Y1 Plants Y1 Animals, including humans Y2 Animals, including humans Y2 Living things and their habitats Y2 Revisit Living things and their habitats	**EXPLAIN-IT** How do seeds and bulbs grow? **SUMMARISE-IT** What do I know about animals, including humans? **INTERLEAVING and EXPLAIN-IT** What do plants need to thrive and be healthy?	wither dormant mature bulb anchor sustain healthy survive exercise heart lungs muscles	germination perennial carbon dioxide glucose clone hygiene larva pupa vertebrates invertebrates metamorphosis

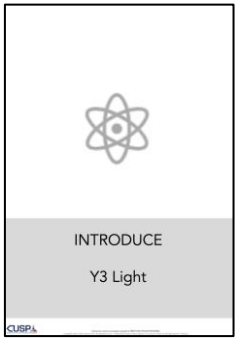
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Rocks |  	Chemistry* | the study of the **composition, behaviour and properties of matter** *Adapted from BBC Bitesize	Y1 Everyday materials Y2 Use of everyday materials	**Types** How are rocks formed? What types of rocks are there? **Change** Can rocks change? How can we test a rock to see if it is limestone or chalk? **Soil** Is soil just dirt? What makes soil? **Fossils** How are fossils formed? Elaborate and remember rocks, soils and fossils.	cemented compacted decay prehistoric soil transform	fossil igneous magma metamorphic minerals sedimentary

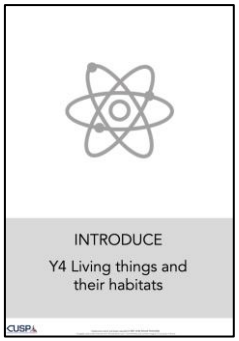
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Animals, including humans |  	Biology | The study of living things, including Amount and type of nutrition Structure of humans and animals	EYFS Natural world Y1 Animals, including humans Y2 Animals, including humans Y2 Living things and their habitats	**Food** What effect does the food we eat have? **Skeleton** Where is my skeleton and what does it do? **Muscle** Where are my muscles and what do they do?	minerals skeleton skull voluntary involuntary nerves	biceps triceps vertebrae vitamins proteins carbohydrates

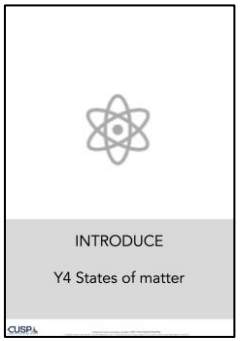
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Revisit rocks |  	Chemistry* | the study of the **composition, behaviour and properties of matter** *Adapted from BBC Bitesize	Y1 Everyday materials Y2 Use of everyday materials	**Types** How are rocks formed and what types are there? **Change** Remember: how can rocks change? **Fossils** Remember: how are fossils formed and how do we know?	cemented compacted decay prehistoric soil transform	fossil igneous magma metamorphic minerals sedimentary

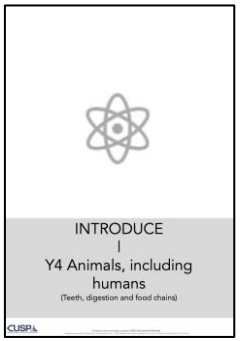
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Forces and Magnets |  	Physics* | The study of energy forces mechanics waves structure of atoms physical universe | Earth in Space	Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials	**Contact force and friction** What are contact forces? How do surfaces affect the motion of an object? How does friction affect moving objects? **Non-contact force** What is a non-contact force? How is this different to a contact force? **Magnetic force** How do magnets attract and repel? Which materials are magnetic? Forces and magnetism summary.	consequence contact force attract north south	magnet resistance friction repel pole magnetic field

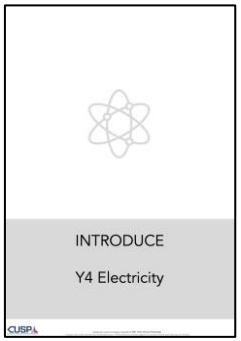
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Plants |  	Biology | The study of living things, including Structure and function Food and survival Life systems Reproduction	Y1 Plants Y1 Animals, including humans Y2 Living things and their habitats Y2 Plants	**Flowering plants** What are the parts of a flowering plant? What do they do? **Food and survival** Do all plants need the same things to thrive and grow? How do leaves make food for the plant? How does water move through a plant? **Flower function** What do flowers do? What is pollination?	adapt essential glucose transport variety vital	transpiratio n stoma pollination stamen pistil photosynthesis

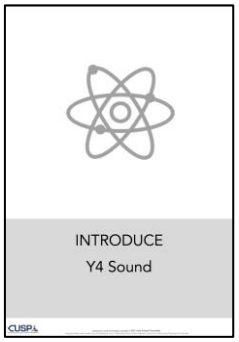
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y3 Light |  	Physics* | The study of energy forces mechanics waves structure of atoms physical universe | Earth in Space	Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials Y3 Forces and magnets	**Seeing** Do we need light to see things? **Shadows** How are shadows formed? Changing variables What happens to the size of a shadow when the object moves closer to, or away from, the light source?	absence cast (shadow) impenetrable reflect shadow source (light)	constant dependent independent illuminate translucent variable

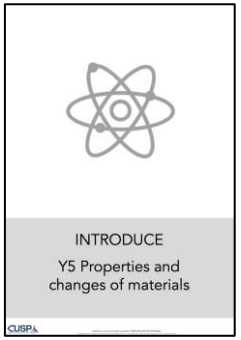
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y4 Living things and their habitats |  	Biology | The study of living things, including Grouping Classification Environmental change and impact	Y1 Plants Y1 Animals, including humans Y2 Living things and their habitats Y2 Plants Y3 Plants	**Living things** What are the characteristics of living things? **Vertebrates and invertebrates** What animals are vertebrates? What animals are invertebrates? **Plants** What groups are plants classified in? **Classification keys** What is classification? How do I use a key? **Environmental changes** What happens if the environment in a habitat changes?	classification environment interdependence interact beneficial hierarchy	vertebrate invertebrate biotic ecosystem species niche

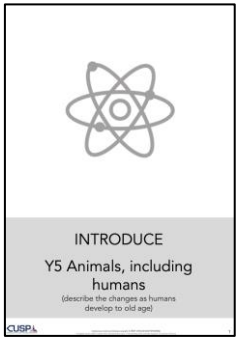
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y4 States of matter |  	Chemistry* | the study of the **composition, behaviour and properties of matter**	Y1 Everyday materials Y2 Use of everyday materials Y3 Forces and magnets	What is matter? What does 'state' mean? What are solids, liquids and gases? Melting: how do materials change state? Evaporating: how do materials change state? Condensing: how do materials change state? Summary: how do materials change their state of matter?	permanen t particle solid liquid gas vapour	evaporate condense melt matter state volume

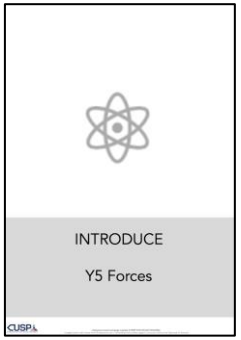
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y4 Animals, including humans |  	Biology | The study of living things, including Structure of digestive system Function of digestive system Relationship food chains	Y1 Plants Y1 Animals, including humans Y2 Living things and their habitats Y2 Plants Y3 Plants Y4 Living things and their habitats	Teeth and eating What teeth do humans have? What do they do? How does our mouth and teeth help digestion? What's the process? Can teeth tell us what animals eat? The digestive system What are the parts of the digestive system? What do they do? How does digestion work? What's the process? Food chains What are food chains How do they work? How do I construct and interpret a food chain? SUMMARY How are teeth, digestion and food chains connected?	expel compact digestion acid stomach intestines	incisor canine molar enzyme saliva peristalsis

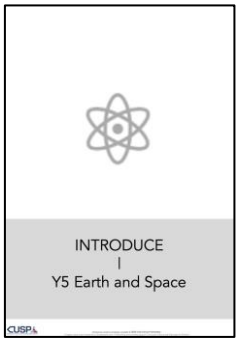
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y4 Electricity |  	Physics* | The study of energy forces mechanics waves structure of atoms physical universe | Earth in Space	Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials Y3 Forces and magnets	**Sources of electricity** What appliances use electricity? What sort of power makes them work? **Components** Name it - what are the components in a simple series circuit? **Apply what you know** Diagnose it – what are the effects of changing circuit components and batteries?	associate identify portable effect appliance series	component electrical insulator electrical conductor circuit hypothesis variable

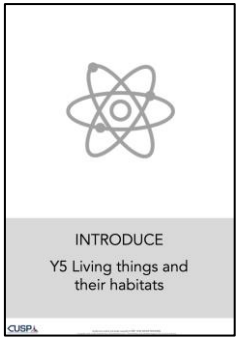
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y4 Sound |  	Physics* | The study of energy forces mechanics waves structure of atoms physical universe | Earth in Space	Y1 Seasonal changes Y1 Everyday materials Y2 Uses of everyday materials Y3 Forces and magnets Y4 Electricity	**Properties** What is sound? Movement How does sound travel? **Pitch and loudness** What is the pitch and loudness of sound?	produce propert y source frequen t regular affect	vibrate pitch volume medium vacuum sound wave

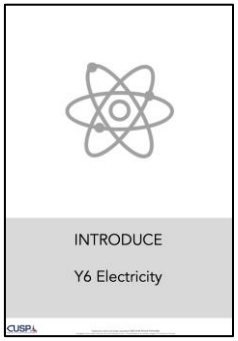
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y5 Properties and changes of materials |  	Chemistry* | the study of the **composition, behaviour properties of matter**	Y1 Everyday materials Y2 Uses of everyday materials Y3 Rocks Y3 Light Y4 States of matter	Properties, mixtures and solutions What properties do materials have? How do we use them? What is a mixture? What is a solution? (Solubility) Separation of materials How can we separate materials from a mixture? (Sieving and filtration) How can we separate materials from a solution? (Evaporation) Reversible and irreversible change What changes are reversible? What changes are irreversible?	property particle separate combine recover comparative	atom molecule chemical (changes) physical (changes) reversible reaction

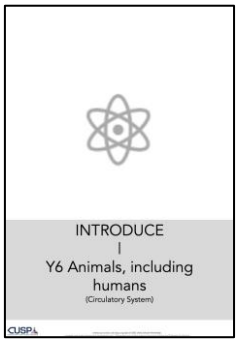
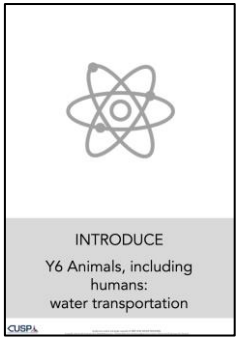
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y5 Animals, including humans |  	Biology | The study of living things Lifespan and life cycle Change and growth	Y1 Animals, including humans Y2 Animals, including humans Y3 Animals, including humans Y4 Animals, including humans	Life What is the human timeline? Growth How do we change into adults? Compare How do human and animal lifespans compare?	development diverse unique generation mature equipped	adolescence puberty gestation embryo foetus womb

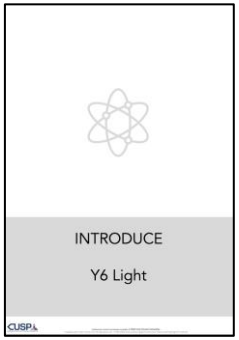
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y5 Forces |  	Physics | Matter **Forces and motion** Sound, light and waves Electricity and **magnetism** Earth in Space	Y3 Forces and magnetism Y3 Light Y4 States of matter Y4 Electricity Y4 Sound	Non-contact and contact forces Remember gravity. When is friction helpful and when is it not? Resistance What is the effect of air resistance? Air resistance investigation Inspirational scientist Who was Galileo Galilei? Resistance What's the effect of water resistance? Levers, pulleys and gears How do levers help us? How do pulleys and gears help us?	opposite reaction advantage displace weight mass	pulley gear pivot fulcrum lever upthrust

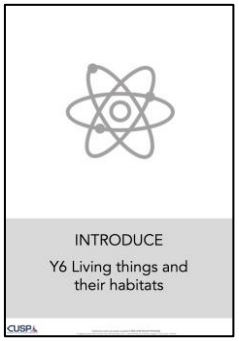
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y5 Earth and Space |  	Physics | Matter **Forces and motion** **Sound, light and waves** Electricity and **magnetism** | **Earth in Space**	Y3 Forces and magnetism Y3 Light Y4 States of matter Y4 Electricity Y4 Sound Y5 Forces	Position, relationship / movement of planets / spherical bodies. What are the planets in our solar system? (Planet comparison) How does the view of the Moon change in a solar month? (Moon phases, moon diaries) The effect of the Earth's rotation, tilt and orbit has on day, night and seasons. Why does the rotation of the Earth result in day and night? Why is the Earth's tilt (axis) responsible for the seasons?	luminous phenomenon attraction approximately relative apparent	orbit axis crescent gravitational waxing waning

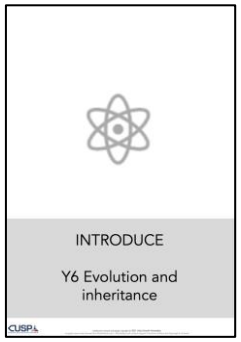
Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y5 Living things and their habitats |  	Biology | The study of living things, including Structure Order Life cycles Reproduction	Y1 Plants Y2 Plants Y3 Plants Y3 Living things and their habitats Year 4 Living things and their habitats	Mrs GREN – Recap of life processes <u>Life Cycles</u> What's the difference between a mammal and amphibian? What's the difference between an insect and a bird? What is similar and what is different between the life cycle of a mammal, amphibian, insect and bird? <u>Inspirational scientists</u> Who was Maria Merion and what did she do? <u>Reproduction</u> How do living things reproduce? Plants and animals – what's the life process of reproduction.	deduce process re-form transfor m adolescence contrast	embryo sexual metamorphosis incubate biochemical fertilisation

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y6 Electricity |  	Physics | Matter Forces and motion Sound, light and waves **Electricity** and magnetism	Y1 Everyday materials (chem) Y2 Uses of everyday materials (chem) Y3 Light Y4 States of matter Y4 Sound Y4 Electricity Y5 Forces Y5 Earth in Space	<u>Do-it</u> What is electricity? How does it work? How do we build and represent a series circuit? What are the components in a series circuit? <u>Test-it</u> How does the number of cells and voltage affect components in a circuit? <u>Diagnose-it</u> What are the effects and consequences of changing circuit components and batteries?	Component Consequence Systematic Represent Source Generate	Proton Neutron Electron Terminal Series Voltage

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y6 Introduce animals, including humans |   	Biology | The study of living things Structure and function of the circulatory system Health and exercise	Y1 Animals, including humans identify animals – mammal, reptile, bird, amphibian, fish Y2 Animals, including humans Reproduction and basic needs Y3 Animals, including humans Nutrition Structure of humans and animals Y4 Animals, including humans Human digestion Y5 Animals, including humans Lifespans and life cycles, growth and change	Blood and blood vessels What is blood made of and why do we need it? Why do our bodies need nutrients and how are they transported? What is our circulatory system? The functions of the heart What is our heart like inside? How does it work? Who influenced what we know about our circulatory system? The effect of exercise, drugs and lifestyle What can we do to keep healthy? Present and explain what we know about the circulatory system, nutrients and keeping healthy. Digestion and circulation Remember circulation and digestion: how are these two systems connected? Removal of waste Where are the kidneys and what do they do? Keeping healthy How do kidneys keep us healthy?	Cell Chamber System Circulation Vessel Clot Filter Expel Substance Function Regulate Transform	Plasma Platelet Artery Capillary Vein Ventricle Kidney Bladder Urine Excretion Toxin Nutrient

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y6 Light |  	Physics | Matter Forces and motion **Sound, light and waves** **Electricity** and magnetism | **Earth in Space**	Y1 Everyday materials Y2 Uses of everyday materials Y3 Light Y4 States of matter Y4 Sound Y4 Electricity Y5 Forces Y5 Earth in Space	<u>Properties of light</u> How does light travel? What colour is light made of? <u>Reflection</u> Reflection - how does light help us to see objects? Which surfaces make the best reflectors? <u>Colour</u> Why do we see objects as a particular colour? <u>Refraction</u> What happens to the appearance of objects when placed in water?	Impurity Emit Absorb Constituent Filter Artificial	Refraction Incidence Spectrum Prism Lux Piment

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y6 Living things and their habitats |  	Biology | The study of living things, including Pioneering scientists Classification	Y1 Plants Y2 Plants Y3 Plants Y3 Living things and their habitats Year 4 Living things and their habitats Y5 Living thing and their habitats	<u>Pioneering scientists</u> Who was the scientist Carl Linnaeus and what did he do? <u>Classification</u> How do we classify vertebrates? How do we classify invertebrates we know? How do we classify invertebrates we don't know? How do we classify invertebrates we don't know? <u>Apply</u> What animals can I classify? What animals and plants exist in my local environment?	Characteristic Interdependence Specific Categorise Primitive Hierarchy	Fungus Arthropod Taxonomy Kingdom Phylum Genus

Year group, Unit Title and Name	Substantive concept	Previous Learning	Big Ideas/Key Questions/Learning Foci	Tier 2 Vocabulary	Tier 3 Vocabulary
Y6 Evolution and Inheritance |  	Biology | The study of living things Change Evolution Adaption Environment	Y3 Plants Y4 Living things and their habitats Y5 Living things and their habitats Y6 Living things and their habitats	<u>Change over time</u> How have living things changed over time? How do we know? How has life evolved over time? <u>Biological change</u> What is DNA and what does it do? Are all offspring identical to their parents? <u>Theories of evolution</u> Darwin and Wallace – what evidence did they share to argue the case for evolution? Survival of the fittest - how have animals adapted and evolved to suit their environment?	Characteristic Adaptation Acquire Theory Modify Generation	Evolve Survival Species Clone Inherit Fossil