CUSP SCIENCE Handbook

|

MIXED AGE SEQUENCE
CURRICULUM ARCHITECTURE

September 2023

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AN EXAMPLE OF THE LONG-TERM SEQUENCE FOR SCIENCE – EYFS to KS1

<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>

CUSP Early Foundations – Structured Story Time, Foundational Knowledge, and Opportunities and Experiences

What do we mean by Opportunities and Experiences?

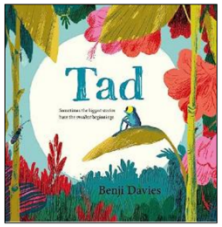
The **Foundational Knowledge** and **Progression** documents outline the key concepts that we want pupils to learn and how their application of knowledge will become more advanced throughout the EYFS.

The **Opportunities and Experiences** document acts as a menu for practitioners to select ideas for how core aspects of learning can be built into provision so that pupils can develop their understanding of the key concepts that they have learned. This is not exhaustive and practitioners will need to be responsive to the young people in their care.

We have deliberately built this around **learning**, not activity, so that we keep the focus on how pupils **interact** with the knowledge and skills acquired through the curriculum.

Foundational Knowledge

Name some common plants / vegetation, e.g. grass, tree, bush, daisy, dandelion (and other plants and tree names local to their environment, e.g. reeds / lily pads in a school pond). Examine change over time, for example, the life cycle of different plants / fruit / vegetables, growing plants from seeds and plants which go to seed (collect seeds). Talk about simple plant parts and what happens to them. Use language such as leaves, roots, stem and petal. Talk about simple similarities and differences in plants.



Structured Story Time

EYFS

rich mathematics

+

exemplary phonics

Opportunities and Experiences

What will I explicitly teach?

Where will pupils meet this in continuous provision?

How will it progress throughout the year?

How will I enhance this provision?

What does effective interaction look like?

When will pupils meet this learning and vocabulary again?

What will it look like if pupils have secured their understanding?

Understanding the World: Science focus

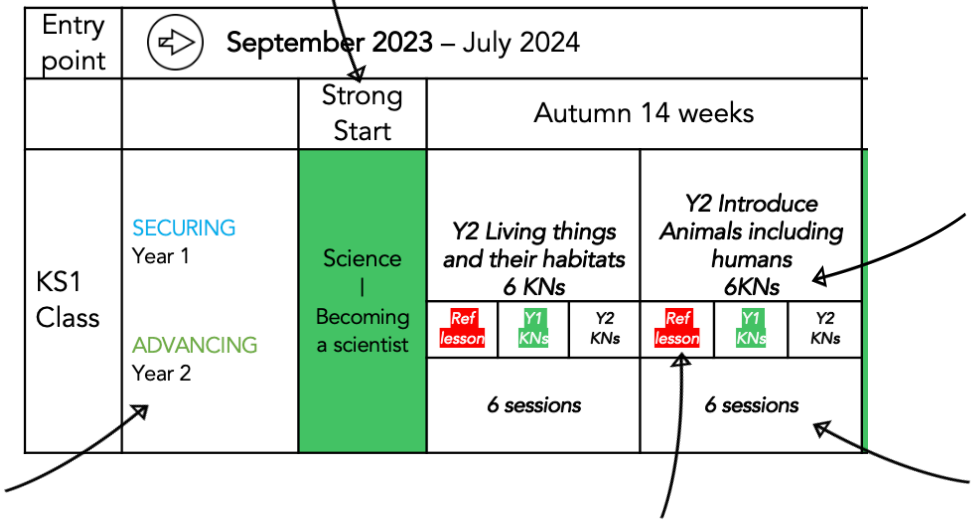
What will pupils know and be able to do?	2 – 3 years	3 – 4 years	4 – 5 years
Plants	▪ Talk about some of the things they have observed such as plants / trees. ▪ Notice features of plants. ▪ Know that plants grow. ▪ Know that plants often grow in the ground or in pots.	▪ Know that fruit and vegetables are plants. ▪ Know that some vegetables grow underground and they look different above and below the ground. ▪ Understand the key features of the life cycle of a plant. ▪ Develop an understanding of growth, decay and changes over time, e.g. observing an apple / banana rotting / school compost heap, wet pile of leaves. ▪ Show care and concern for living things and the environment, e.g. keep plants alive by watering them.	▪ Name some common plants / vegetation, e.g. grass, tree, bush, daisy, dandelion (and other plants and tree names local to their environment, e.g. reeds / lily pads in a school pond). ▪ Examine change over time, for example, life cycle of different plants / fruit / vegetables, growing plants from seeds, plants which go to seed (collect seeds). ▪ Talk about simple plant parts and what happens to them. Use language, e.g. leaves, roots, stem, petal. ▪ Talk about simple similarities and differences in plants.
Essential vocabulary	plant, tree, grass, leaves, twig / stick, ground, grow	seeds, rot, change, fruit, vegetable, die underground	leaves, roots, stem, petal, familiar plant names, life cycle

What will I explicitly teach?	Where could pupils meet this in provision (this is not exhaustive)?			
	Specific provision			**Wider provision**
▪ how to observe plants carefully, modelling the correct vocabulary ▪ noticing plants and trees in the environment through observation and dialogue, e.g. *look – a tree with xxx shaped leaves, look at its branches* ▪ where plants usually grow ▪ the life cycle of plants ▪ how to care for plants ▪ the names of plants and trees in the local environment ▪ similarities and differences in plants	**Gardening and Growing Area** ▪ wheelbarrow ▪ brushes, rakes, spades, ▪ watering cans, buckets, hose ▪ gardening gloves ▪ plant pots / reclaimed bottles / fruit juice cartons ▪ raised bed (if room) ▪ soil, compost ▪ seasonal seeds, bulbs, plants ▪ mark-making equipment ▪ gardeners' calendar	**Mud Kitchen** ▪ pots of herbs ▪ growing flowers / plants in pots ▪ leaves ▪ scissors, blunt safety knives, whisks, spoons, stirrers ▪ fruit and vegetables (whole and chopped) ▪ cauldrons ▪ water / different coloured water	**Themed Role Play** ▪ till ▪ seed packets ▪ real and fake plants and flowers ▪ gardening gloves ▪ wellies ▪ pots, compost, seeds, ▪ buckets ▪ gardening books ▪ flower presses ▪ mark-making materials ▪ magnifying glasses	Pupils will also meet this in other aspects of the provision, for example: when taking part in forest school activities; when on sounds walks in the environment and when out visiting local parks and garden centres. It is useful to make links in the community, e.g. with local garden centres (for cast off plants) or with parents / grandparents who are expert gardeners.

Understanding the World: Science focus

	2 – 3 years	3 – 4 years	4 – 5 years
Stories that could unlock this learning include:	  	   	   
Five ideas for enhancements	1. Put their eye colour and hair colour on a photo of themselves – looking in mirrors to help them. 2. Taste the different fruit and vegetables from Oliver's Garden. Grow and harvest one of them. 3. Explore all the different sources of water in the Nursery setting. Over time: stamp in puddles, look for dew drops on grass, observe and play in the rain. Play with ice. 4. Collect different natural materials in the environment. Organise in different ways. 5. Explore different materials, e.g. dough, shaving foam, sand.	1. Clean, peel and chop different vegetables, e.g. carrots that Erroll grew. 2. Make a boat for Pete the badger to avoid the flood. What materials will you use? 3. Draw around themselves and draw on body parts / facial features. 4. Hunt for beetles and worms for Pete to eat. Observe other creatures that live in the Nursery environment. 5. Mix soil and water – what happens the more water you add?	1. Sort out the acorns /conkers / seeds / buds / bulbs / mushrooms / pinecones (take care with allergies) for the squirrels. Share them equally between Cyril and Bruce. 2. Order the life cycle of a frog / observe tadpole change. 3. Plant seeds in shallow drills like Mrs Noah. Observe growth. 4. Sort animals / creatures into their habitats, e.g. farm, forest, pond, home or into family groups – old and young. 5. Collect the litter and sort into recycling boxes, e.g. plastic, cardboard, paper.

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



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

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

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

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

CUSP Science Mixed Age Sequence Content Progression

KS1	Autumn	Spring	Summer
Cycle 1 2023 – 2024 (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 2 2024 – 2025 (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
LKS2			
Cycle 1 2023 – 2024 (Year 4)	Living things and their habitats States of matter	Animals, including humans	Electricity Sound
Cycle 2 2024 – 2025 (Year 3)	Rocks Animals, including humans Revisit Rocks	Forces and magnets Plants	Plants continued Light
UKS2			
Cycle 1 2023 – 2024 (Year 6)	Electricity Animals including humans (circulatory system)	Animals including humans (water transport) Light	Living things and their habitats Evolution and inheritance
Cycle 2 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

AN EXAMPLE OF THE MIXED AGE UNSEQUENCED LONG-TERM SEQUENCE FOR SCIENCE Year 1 – Year 6

(This model shows conceptual sequence and references where the content may be taught:

	EYFS Understanding the world	Cycle 1 (Year 2 Content)	Cycle 2 (Year 1 Content)	Cycle 1 (Year 4 Content)	Cycle 2 (Year 3Content)	Cycle 1 (Year 6 Content)	Cycle 2 (Year 5 Content)
Biology (53% of Science content)	The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	Living things and their habitats *(+ revisit modules)*		Living things and their habitats		Living things and their habitats	Living things and their habitats
		Plants	Plants		Plants		
		Animals, including humans *(+ revisit modules)*	Animals, including humans *(+ revisit modules)*	Animals, including humans	Animals, including humans	Animals, including humans	Animals, including humans
						Evolution and inheritance	
Physics (29% of Science content)			Seasonal changes *(+ revisit module)*		Light	Light	
					Forces and magnets		Forces
				Electricity		Electricity	
				Sound			
							Earth and space
Chemistry (18% of Science content)		Use of everyday materials	Everyday materials				Properties and change of materials
					Rocks *(+ revisit module)*		
				States of matter			

Sequence overview for Mixed Age Sequence including Strong Start and Reference Lessons

KS1 CYCLE 1 – Science 2023 – 2024
Year 2

Entry point	**September 2023** – July 2024					Key Stage 1 Science								Cycle 1
		Strong Start	Autumn 14 weeks			Strong Start	Spring 12 weeks					Strong Start	Summer 12 weeks		
KS1 Class	SECURING Year 1 ADVANCING Year 2	Science | Becoming a scientist	*Y2 Living things and their habitats 6 KNs*			Science | Becoming a scientist	*Y2 Uses of Everyday materials 6 KNs*			*Y2 Revisit Living things and their habitats / materials 3KNs*			Science | Becoming a scientist	*Y2 Plants 6Kns*		*Y2 Revisit 2 living things and their habitats 3 KNs*	
			Ref lesson	Y1 KNs	Y2 KNs		Ref lesson	Y1 KNs	Y2 KNs	Ref lesson	Y1 KNs	Y2 KNs			Y1 KNs	Y2 KNs	Y1 KNs	Y2 KNs
			6 sessions				*6 sessions*			*5 sessions (+2)*				*6 sessions*		*5 sessions (+2)*	

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

KS1 CYCLE 1 – Science 2024 – 2025
Year 1

Entry point	**September 2024** – July 2025					Key Stage 1 Science								Cycle 2
		Strong Start	Autumn			Strong Start	Spring					Strong Start	Summer		
KS1 Class	SECURING Year 1 ADVANCING Year 2	Science | Becoming a scientist	*Y1 Seasonal changes and weather3 KNs*		*Y1 Introduce plants (trees) 3KN*		*Y1 Introduce Animals including humans 5 KNs*		Science | Becoming a scientist	*Y1 Everyday materials 6 KNs*		*Y1 Revisit 1 Animals including humans 3 KNs*		Science | Becoming a scientist	*Y1 Plants 3 KNs*		*Y1 Second revisit Animals and Plants 3 KNs*	
			Y1 KNs	Y2 KNs	Y1 KNs	Y2 KNs	Y1 KNs	Y2 KNs		Y1 KNs	Y2 KNs	Y1 KNs	Y2 KNs		Y1 KNs	Y2 KNs	Y1 KNs	Y2 KNs
			3 sessions		*3 sessions (+1 enrichment opportunity)*		*5 sessions (+1 enrichment opportunity)*			*6 sessions*		*5 sessions (+2)*			*5 sessions (+2)*		*6 sessions (+3)*	

LKS2 CYCLE 1 – Science 2023 – 2024
Year 4

Starting point	September 2023 – July 2024												Lower Key Stage 2 Science												Cycle 1
		Strong Start	Autumn						Strong Start	Spring			Strong Start	Summer											
LKS2 Class	SECURING Year 3 ADVANCING Year 4	Science I Becoming a scientist	*Y4 Living thing and their habitats 6 KNs*			*Y4 States of matter 6 KNs*			Science I Becoming a scientist	*Y4 Animals including humans 9 KNs*			Science I Becoming a scientist	*Y4 Electricity 3 KNs*			*Y4 Sound 3 KNs*								
			Ref lesson	Y3 KNs	Y4 KNs	Ref lesson	Y3 KNs	Y4 KNs		Ref lesson	Y3 KNs	Y4 KNs		Ref lesson	Y3 KNs	Y4 KNs	Y3 KNs	Y4 KNs							
			6 sessions			*7 sessions (+1 enrichment opportunity =+2)*				*11 sessions (+2)*				*5 sessions (+2)*			*6 sessions (+3)*								

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

LKS2 CYCLE 2 – Science 2024 – 2025
Year 3

Starting point	September 2024 – July 2025																								Cycle 2
		Strong Start	Autumn 14 weeks						Strong Start	Spring 12 weeks					Strong Start	Summer 12 weeks									
LKS2 Class	SECURING Year 3 ADVANCING Year 4	Science I Becoming a scientist	*Y3 Rocks 6 KNs*		*Y3 Animals including humans 3 KNs*		*Y3 Revisit Rocks 3 KNs*		Science I Becoming a scientist	*Y3 Forces and magnets 6 KNs*		*Y3 Plants 3 KNs 6 KNs in total*			Science I Becoming a scientist	*Y3 Plants 3 KNs*		*Y3 Light 3 KNs*								
			Y3 KNs	Y4 KNs	Y3 KNs	Y4 KNs	Y3 KNs	Y4 KNs		Y3 KNs	Y4 KNs	Ref lesson	Y3 KNs	Y4 KNs		Y3 KNs	Y4 KNs	Y3 KNs	Y4 KNs							
			6 sessions		*4 sessions (+1)*		*3 sessions + 1 enrichment opportunity*			*6 sessions*		*5 sessions (+2)*				*5 sessions (+2)*		*6 sessions (+3)*							

LKS2 CYCLE 1 – Science 2023 – 2024
Year 6

Starting point	September 2023 – July 2024					Upper Key Stage 2 Science								Cycle 1		
		Strong start	Autumn 14 weeks			Strong start	Spring 12 weeks				Strong start	Summer 12 weeks				
UKS2 Class	SECURING Year 5 ADVANCING Year 6	Science | Becoming a scientist	Y6 Electricity 3 KNs			Science | Becoming a scientist	Y6 Animals including humans (+ water transport) 3 KNs		Y6 Light 6 KNs			Science | Becoming a scientist , …	Y6 Living things and their habitats 6 KNs			Y6 Evolution and inheritance 6 KNs		
			Ref lesson	Y5 KNs	Y6 KNs		Y5 KNs	Y6 KNs	Ref lesson	Y5 KNs	Y6 KNs		Ref lesson	Y5 KNs	Y6 KNs	Ref lesson	Y5 KNs	Y6 KNs
			5 sessions (+2)				4 sessions (+1)		7 sessions (+1)				6 sessions			6 sessions		

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

LKS2 CYCLE 1 – Science 2024 – 2025
Year 5

Starting point	September 2024 – July 2025					Upper Key Stage 2 Science								Cycle 2		
		Strong start	Autumn			Strong start	Spring				Strong start	Summer				
UKS2 Class	SECURING Year 5 ADVANCING Year 6	Science | Becoming a scientist	*Y5 Properties and changes of materials 6 KNs*			Science | Becoming a scientist	Y5 Forces 4 KNs		Y5 Earth in Space 5 KNs			Science | Becoming a scientist	*Y5 Living things and their habitats 6 KNs*			*Y5 Forces continued 2 KNs*		
			Ref lesson	Y5 KNs	Y6 KNs		Ref lesson	Y5 KNs	Y6 KNs	Ref lesson	Y5 KNs	Y6 KNs	Ref lesson	Y5 KNs	Y6 KNs	Y5 KNs	Y6 KNs	
			8 sessions (+2)				5 sessions (+1)		5 sessions (+1)				6 sessions			5 sessions (+2)		

Examples of Cumulative End Goals – By the end KS1 Cycle 1 (Year 2 content)

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

Examples of Cumulative End Goals – By the end KS1 Cycle 2 (Year 1 content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Seasonal changes and daily weather *Physics* Animals, including humans *Biology* Everyday materials *Chemistry* Plants *Biology*	• knowing and explaining what an animal is and what a plant is • knowing and explaining how seasons influence plants and animals • knowing and identifying the common features of fish, amphibians, reptiles, birds and mammals • knowing, explaining and grouping animals by the types of food they eat • knowing and explaining the places (habitats) that fish, amphibians, reptiles, birds and mammals live • knowing and locating the main body parts of a human • knowing the five senses and explaining how they help compare different textures, sounds and smells • knowing and identifying the basic structure of plants and trees, such as roots, bulbs, stem, leaf, flower, fruits, trunk, branch and crown • knowing and identifying the common names of wild and garden plants • knowing and identifying explaining different trees in the locality, such as oak or Scots Pine… • knowing and explaining the difference between evergreen and deciduous trees, including the influence of seasons	• 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

Examples of Cumulative End Goals – By the end LKS2 Cycle 1 (Year 4 content)

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

Examples of Cumulative End Goals – By the end LKS2 Cycle 2 (Year 3 content)

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

Examples of Cumulative End Goals – By the end UKS2 Cycle 1 (Year 6 content)

	BIOLOGY	PHYSICS	CHEMISTRY
	Pupils develop an understanding of the concept of BIOLOGY through:	**Pupils develop an understanding of the concept of PHYSICS through:**	**Pupils develop an understanding of the concept of CHEMISTRY through:**
Electricity *Physics*	• knowing, 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 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*	• knowing and explaining reasons for classifying plants and animals based on specific characteristics, such as vertebrates or invertebrates • knowing and using classification systems and keys to identify some animals and plants in the immediate environment • knowing how to classify animals and plants they are unfamiliar with using a classification system		
Evolution and inheritance *Biology*	• knowing and explaining that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago, such as body fossils, mould fossils, cast fossils and trace fossils • knowing and explaining that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • knowing, identifying and explaining how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • knowing and explaining about significant scientists who have helped us understand the theory of evolution, such as Alfred Wallace and Charles Darwin		

Examples of Cumulative End Goals – By the end UKS2 Cycle 2 (Year 5 content)

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